

INTRODUCTION

Among the many novelties in the history of ideas that emerged in the seventeenth century, a widespread concern with language planning belongs to the most conspicuous ones. The history of linguistic ideas had known extended episodes of intensive language study before that period, but it had never been usual for scholars to be engaged in the construction of artificial writing systems or the invention of fully-fledged universal and philosophical languages. In the seventeenth century, a large number of proposals and schemes appeared, which were all meant to provide a universal means of communication, and most of which were supposed to be suited to the tasks normally performed by means of natural languages. Indeed, it was often claimed that the artificial systems greatly improved on existing languages, not only for the purpose of communication, but also for accurate representation of knowledge. In rare cases, it was even believed that an artificial language could be a miraculous instrument for thinking, which would advance scientific knowledge with otherwise impossible and incredible speed.

The proposed schemes were diverse in several respects. Firstly, they ranged from tentative proposals and rudimentary sketches to completely developed artificial language schemes comprising a dictionary and a grammar. Secondly, the aims of the various projects differed in that some were merely intended to overcome language barriers, while others were directed towards more ambitious scientific and philosophical goals. Thirdly, the methods used varied from numbering words in a dictionary to the construction of artificial words on the basis of sophisticated phonetic principles. A similar diversity characterized the social and scholarly status of the language planners. Some of them were unconnected with influential political or scientific circles, and sometimes the inventors hoped to make their fortune out of their schemes. Others belonged to leading groups of scholars, and several of the men who are still famous for their contributions to science and philosophy, such as Newton and Leibniz, occupied themselves with artificial language projects. Further, such activities were not confined to a particular country, as projects of this kind were pursued in France, Italy and Germany as well as in England. Neither were specific religious beliefs or clerical affiliations typical for the

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proponents of these schemes, as there were Catholic priests, Protestant reformers, as well as members of the Anglican clergy among them.

In the twentieth century, historians have studied these seventeenth-century linguistic projects from various perspectives. When Couturat & Leau investigated the history of universal language schemes in 1903, this was done within the context of a heated debate on the choice between diverse universal languages, each of which had been proposed to overcome the drawbacks of language diversity. The seventeenth-century schemes thus came to be viewed as the first in a long list of fruitless attempts to create, or to restore, linguistic unity among the nations of the world. Couturat was also the historian who influentially drew attention to Leibniz's writings on the construction of a philosophical language, meant to be a logical and scientific tool.

Subsequent scholarship has rarely combined these two lines of investigation. Most of the literature either focused on Leibniz, treating other plans, if at all, as a footnote to what he had to say on the subject, or concentrated on one or other aspect of the schemes made by others, while disregarding Leibniz. Thus a number of logicians writing in the first half of the twentieth century tended to portray Leibniz's linguistic scheme as a unique achievement in the context of his time, while historians of science and linguistics occasionally published studies which were exclusively concerned with projects carried out in England. In a classic article, Cohen (1954) pointed out that the project of a 'universal character' was by no means unique for Leibniz, and that in fact it was an intellectual commonplace in seventeenth-century Western Europe. Although this fact is now generally acknowledged, the more recent literature on the subject is still largely divided into Leibniz-oriented studies on the one hand, and treatments of what is often called the universal language movement on the other hand.

In the latter type of literature, it has long been acknowledged that the construction of a universal means of communication was just one of many goals pursued by proponents of universal language schemes. A concomitant aim was precisely what made these schemes much more interesting than mere early versions of Esperanto-like projects. This was the endeavour to create a language which is not only more regular and easier to learn than existing ones, but also better suited to the unambiguous expression of thought and the accurate description of things. This latter aspect is clearest in two works that appeared in the 1660s in England, and it is on these projects, and the context in which they appeared, that most of the relevant literature is focused. These works are Dalgarno's *Ars Signorum* (1661), and Wilkins's *Essay concerning a Real Character, and a Philosophical Language* (1668). In the last decades a large number of studies have been devoted to the contents as well as the historical context of these works, among which are several book-length treatments (e.g. Salmon 1972, Knowlson 1975, Slaughter 1982, Strasser 1988, Hüllen 1989, Stillman 1995). Many, though not all, of these studies have assumed, or argued, that Wilkins's work constitutes the summit of the seventeenth-century universal language movement, while evaluating Dalgarno's work as a minor contribution towards essentially the same goal.

In dealing with the work of Dalgarno, Wilkins, and Leibniz respectively, this study differs from most of the existing literature with respect to the following points.

Firstly, it attempts to bring together the relevant material enabling a just estimation of the similarities and the differences between the projects carried out in England on the one hand, and Leibniz's grand but uncompleted scheme on the other hand. In discussing Leibniz, more than usual attention is paid to his acquaintance with the English schemes, and to the use he made of the work of both Dalgarno and Wilkins in working on the execution of his own plan. Though this account relies on published sources for the most part, some minor details are illustrated by material preserved in the Leibniz Archiv in Hanover. The specific focus on connections with Wilkins and Dalgarno has led to the discovery that a few recently published Leibnizian manuscripts should be interpreted in the light of such connections. This discovery bears on wider methodological issues concerning research on Leibniz.

Secondly, this study treats Dalgarno's and Wilkins's artificial languages as the result of two quite distinct, and indeed in some respects antagonistic, approaches. Although a comparison of their works is a quite sufficient basis to establish this too often neglected point, the argument profits greatly from a hitherto unpublished autobiographical manuscript by Dalgarno, which contains many illuminating details concerning his debate with Wilkins on the proper foundation of a philosophical language (cf. 3.1 below).

The discussion in the following pages is primarily based upon close reading of the relevant works, and only secondarily on external sources which relate to them. In other words, rather than examining the works under discussion from the perspective of the context from which they are supposed to have originated, the context is explored from the perspective of what these works appear to reveal about it. This method has resulted in an emphasis on two further points which have been treated less extensively in most of the literature. Firstly, the relationship between spoken and written language proved to be a far more significant issue for the construction of artificial languages than is often assumed. Secondly, the logical tradition, especially the theory of categories, emerges as a very central element in each of the schemes discussed.

At the same time, the method followed has caused some obvious limitations. A great number of sources, influences, motives and historical connections known to be relevant for the subject treated in this study have been largely or completely disregarded. Further, the treatment of many of Leibniz's ideas had to be cursory, and most of the vast secondary literature on Leibniz could not be taken into account. These limitations are perhaps clearest in chapter 2, which provides little more than a brief summary of some of the essential elements of the intellectual background. A much better treatment is to be found in most of the works mentioned (especially Salmon 1972). Chapters 3, 4, and 5 deal with Dalgarno, Wilkins, and Leibniz respectively. Chapter 6 presents a few concluding remarks.

CHAPTER 2

THE BACKGROUND

2.1 A NEW ERA

Writing in 1901, Couturat believed that the source of the wide-spread seventeenth-century attempts to create a universal language could be easily identified. As he explains, this design “obviously proceeds from the intellectual movement of the Renaissance, which, renewing all sciences and philosophy, had revealed the fundamental unity of the human spirit”. New types of scientific research were undertaken, which led to the desire for a more modern logic, better suited to the needs of the new sciences. “Reason became aware of its power and its independence, and tended to free itself from all the impediments of tradition and routine; one began to realize that one could surpass antiquity in knowledge of the universe, and to envisage the possibility of unlimited progress”. All this, Couturat claims, “naturally had to suggest the creation of a philosophical and scientific language, more logical than the vulgar languages, that would be common to all scholars, and, as a consequence, international” (1901:55-56).

This account has some obvious shortcomings in that it confuses quite distinct developments. The Renaissance’s ‘Republic of Letters’ secured its unity by the use of Latin, revering the usage of classical authors as the ideal model rather than challenging their authority. Schemes for an artificial universal language emerged precisely when this unity began to fall apart. Furthermore, rather than stimulating the development of new types of logic, both the Humanist ideal of classical scholarship and the rise of the new science led to a general downgrading of logic as a subject. Nevertheless, the link between the new science and the emergence of universal language schemes has been emphasized by other historians as well.

Thus Jones, although evaluating these schemes quite differently, likewise ascribed their origin to the rise of science. According to Jones, the ideal underlying schemes for an artificial language “reduced language to its simplest terms, a single word being exactly equivalent to a single thing, and (...) sought to degrade words to symbols of the same colorless nature as characterized those of mathematics”. This ideal resulted from the views of seventeenth-century scientists, “characterized by a suspicion of language arising out of its association with the old science, which seemed to depend more upon

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words than upon nature, and out of a feeling that all instituted languages tended to obscure rather than to describe realities” (Jones 1951 [1932]:156-157).

Both Couturat and Jones assume a sharp break between the old world view of the Middle Ages and that of the modern scientists. Subsequent writers have challenged this assumption, pointing at the continuities between medieval learning and seventeenth-century thought. For example, the very characteristic Jones considered typical for the advocates of the new science, ‘a suspicion of language’, is interpreted by Padley as a sign of the continued influence of Scholasticism: “Despite the self-conscious anti-medievalism of seventeenth-century thought, many of its roots go back to Nominalism, which paved the way for the century’s distrust of words and its fascination with nomenclature” (1985:325). Padley further argues that it is in the method used for achieving an unambiguous system of communication “that the continuing Scholastic influence becomes paramount. The new scientists look for, and of course find, a classification of the universe that corresponds to the categories already established by Aristotle” (1985:326).

With a similar emphasis on continuity, Slaughter has described the seventeenth-century artificial languages as the result of an attempt to bring order into the revolutionary multiplicity of information men were confronted with. To this end, taxonomies were established which “rested on a philosophy of Aristotelian essentialism”. Thus the early days of science were characterized by a ‘taxonomic episteme’, which was not abandoned until ‘mechanistic philosophy and its mathematical method’ finally gained the upper hand by the end, not at the beginning of the seventeenth century (1982:217-219). Although Slaughter’s claims are open to various objections which will be discussed below (cf. 4.6), they have the merit of showing that the connection between seventeenth-century artificial languages and the ‘new science’ is not as close and direct as had previously been supposed by Jones and others.

The connection between artificial language construction and the rise of the new science has also been questioned from quite a different angle. The issue here is not whether old or new science played the most important part, but the significance of science in general. Thus DeMott has argued that the creation of new languages was religiously rather than scientifically motivated. According to DeMott, the English language planners were directly influenced by the religious beliefs of Comenius, who was as much inspired by ‘continental mysticism’ as he was a follower of Bacon (1992[1955]:158). The major goal pursued in creating a new language both for Comenius and his purported English followers was the ‘promotion of religious harmony’ (1992[1955]:159). DeMott’s specific claims concerning Comenian influence have been disputed by Funke (1959) and conclusively refuted by Salmon (1966b) and Cram (1989), but his more general assertion that an exclusive focus on scientific aspects is likely to impede a proper understanding of the artificial language movement has been accepted by several commentators.

Thus Rossi lists ‘the works, the teaching, the utopies and the hopes’ of Comenius as one of the three main phenomena characterizing intellectual life in England in the first half of the seventeenth century, besides the two items traditionally recognized as important: first, the works of Bacon and the Baconians of the Royal Society and second, the great scientific revolution (1960:203). In a similar vein, Knowlson has criticized the work of Jones for being ‘much too easy’, ignoring as it does ‘different tendencies that also played a significant part in the movement to discover a real character’. Following Rossi, Knowlson emphasizes that especially for Comenius and Kircher “the universal character was ... both an attempt to renew contact with divine harmony in the universe and a crucial effort to bring about a reconciliation between men, that would lay the foundations for an enduring, religious peace” (1975:14-15). Likewise, Clauss asserts that “the idea of forming a new universal language to replace Latin grew in part out of nostalgia for international Christendom” (1992[1982]:47).

As the seventeenth century was ridden with religious conflict, and religion permeated all aspects of life, religious motives certainly cannot be ignored in any account of the intellectual atmosphere. However, the importance of such motives for the construction of artificial languages should not be exaggerated. Although the inventors of these languages habitually cited the promotion of Christian faith and the ending of religious disputes among the advantages to be expected from their schemes, this does not warrant the conclusion that these aims were their primary concern. It would be equally unconvincing to claim that business objectives were foremost on the basis of the fact that one of the other advantages often mentioned was the facilitation of international commerce. In fact, scholarly occupations could be and often were pursued quite independently of religious considerations. Wilkins, who was both the author of a philosophical language and a member of the clergy, argued for the grounding of philosophy on mere principles of reason, as distinct from revelation (Aarsleff 1976:361). Although Comenius’s schemes were embedded in a programme imbued by religious beliefs and hopes, then, this was not a characteristic shared by all schemes of a similar type. However, the religious background was undoubtedly of primary importance in another respect, that is, in that the biblical account both of language origin and of language diversity provided an unquestionable framework for any linguistic theory (cf. 2.2.2).

A number of scholars have argued for the existence of close connections between universal language schemes on the one hand and yet another paradigm of thought, markedly different from the scientific one, on the other hand. According to these scholars, the universal language schemes were influenced by the same sort of ideal as that which inspired mystical writers such as John Dee and Jacob Boehme, who were dreaming of restoring the knowledge of the ‘language of nature’, whereby the names bear the ‘signatures’ of the things they represent. For example, Rossi claims that the languages of Dalgarno and Wilkins were intended to be a means ‘for decyphering the divine alphabet’

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(1960:215). As will be argued below (4.6), this view is largely unfounded, and based upon a misunderstanding of some central issues.

The very diversity of explanations that have been put forward by historians for the emergence of artificial languages in the seventeenth century testifies to the complexity of the intellectual climate in the period. Nevertheless, for all the complications related to the interplay between continuity and change in any historical period, there is a general trait which clearly distinguishes the seventeenth century from previous periods. This is what Couturat rightly draws attention to: there was a general reversal in outlook away from the past towards the future, and a feeling that great progress in science was lying ahead. Whereas both Antiquity and the Middle Ages were inclined to place the ideal world as well as the ideal language in the past, the seventeenth century was characterized by a sense of beginning, and by a strong belief in the power of human art to change and improve the world.

2.2 SOME ASPECTS OF THE INTELLECTUAL CONTEXT

2.2.1 Attitudes towards language

The linguistic situation in the seventeenth century was characterized by profound changes. Whereas during the Middle Ages and the Renaissance the linguistic unity of the learned of Europe and the Middle East was secured by the use of Latin, increasing contacts with Asia and the Americas caused a dramatic widening of the intellectual horizon. The work of missionaries stimulated an awareness of the multitude and diversity of the languages spoken in the world. At the same time, problems of communication were more strongly felt than before¹.

Further, the use of Latin as the language of the international scientific community declined. Although Latin continued functioning as such for centuries afterwards, scholars in the seventeenth century increasingly used the vernaculars for communication, in private letters as well as in printed works. The inconvenience of the ensuing fragmentation was apparent, and it was 'both novel and disconcerting'². It is telling as well as ironic that Wilkins's Essay, which was meant to overcome language barriers by the construction of an artificial language, but which used English for its exposition, was translated into Latin on the request of various scholars on the continent (among whom was Leibniz) so as to make the work more generally accessible.

Several reasons why Latin started losing its dominant position have been mentioned in the literature. Thus it has been pointed out that the rise of Protestantism did much to promote the use of the vernacular languages,

¹ Cohen 1954:51; Salmon 1972:5; Knowlson 1975:8; Asbach-Schnitker 1984:x.

² Knowlson 1975:28.

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because Latin was often associated with the Catholic church¹. Further, economical and social pressures towards publishing in the vernacular have been held to be important, as the market for printed books was expanded by selling them to readers who were insufficiently familiar with Latin². Finally, the use of the vernacular was sometimes motivated by the educational purpose of familiarizing a wider audience with scientific results. Thus Wilkins wrote his works in English “for the capacity of every unlettered ingenious artificer”³. In short, the once proud ‘Republic of Letters’ was in the process of sinking to the status of an insignificant province, both geographically and socially.

The changing linguistic situation caused a great interest in language learning and teaching. At the same time, a depreciative attitude towards language and linguistic knowledge in general developed in reaction to the ideal of literary education cherished by the Humanists. As Bacon pointed out, one of the ‘discredits to learning’ originated from an excessive concern for eloquence, caused by the fact that “men began to hunt more after words than matter”⁴. The opposition between words and things became a commonplace used by many writers emphasizing the value of real knowledge as opposed to merely linguistic knowledge. This opposition was central to the educational reform promoted by Comenius, whose new method of teaching Latin was based on the idea that “things are essential, words only accidental; things the body, words but the garment; things are the kernel, words the shell and the husk”⁵. Discussing the possibility of constructing a universal writing system, Wilkins, in the *Mercury* (1641), points out that one of its advantages will be the facilitation of “the spreading and promoting of all Arts and Sciences: Because that great part of our Time which is now required to the Learning of Words, might then be employed in the Study of Things”⁶.

In addition, a related view, also influentially articulated by Bacon, gained prominence with many scholars. This is the idea that language may have a pernicious influence on sound judgement. Since language has incorporated all kinds of prejudices, its use may easily lead to serious misconceptions. The so-called ‘idols of the market-place’ “have crept into the understanding through the tacit agreement of men concerning the imposition of words and names”. As a consequence, “the juggleries and charms of words will in many ways seduce and forcibly disturb the judgement”⁷. Furthermore, words “lead men away into numberless empty controversies and idle fancies”⁸. Accordingly, one of the advantages Wilkins claimed for his philosophical language was the possibility of “unmasking many wild errors,

¹ Salmon 1972:46-47.

² Large 1985:9.

³ Cited from Wilkins’s *Mathematical Magick* in Aarsleff 1992[1976]:7.

⁴ *The Advancement of Learning*, First Book, IV, 2, p. 26.

⁵ Slaughter 1982:99.

⁶ Wilkins 1641:56.

⁷ *De Augmentis Scientiarum*, I, p. 645-646, IV, p. 433-434.

⁸ *Novum Organum* IV, p. 55.

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that shelter themselves under the disguise of affected phrases” (Essay, the Epistle Dedicatory).

In spite of this critical attitude, many seventeenth-century scholars were fascinated by semiotics. The discovery of hieroglyphics and the acquaintance with Chinese script stimulated the study of symbol systems for their own sake. The development of shorthand systems, the study of cryptography, the construction of methods for communicating with the deaf and dumb were widely pursued. In mathematics, a revolutionary development such as the emergence of algebra was recognised to be intimately connected with the use of a new method of notation. One of the first scholars in England to introduce this new branch of mathematics was Seth Ward, who was also a central figure in the development of universal language schemes. In a treatise written in 1654, he explicitly connected the ‘Symbolicall way’ used in mathematics with the construction of a universal character¹. Leibniz’s plans for a philosophical language were similarly motivated.

2.2.2 The biblical tradition

The great changes in the linguistic situation notwithstanding, seventeenth-century theorizing about language was largely determined by a biblical framework, of which the two following elements are especially important.

Firstly, the question of language origin was treated in the context of the Genesis story about Adam giving names to all creatures: “So the Lord God formed of the earth every beast of the field, and every foule of the heaven, and brought *them* unto the man to see how he would call *them*: for howsoever the man named the living creature, so was the name thereof” (Genesis II 19). On the basis of this story, it was beyond doubt that all mankind originally spoke one and the same language, which was created by Adam. However, the nature of this language was controversial. Some believed that it was irrecoverably lost, others assumed that one of the languages currently in existence could be identified with, or at least be considered as the most direct descendant of the Adamic language, most scholars opting for Hebrew. Further, many believed that the names given by Adam were not arbitrarily chosen, but somehow expressed the essence of the things named. Although it was a matter of speculation and debate how this could have been done, the Adamic language was thus viewed not only as the first and universal, but also as the best possible language.

Secondly, the diversity of languages was accounted for by the confusion of tongues at Babel. Accordingly, the existence of language barriers was seen as a curse inflicted on human kind. Although this curse was a punishment for human pride, it is characteristic of seventeenth-century secularisation and optimism that it was generally believed to be both legitimate and feasible to remedy the curse of Babel by inventing a new universal language.

¹ Ward 1654:20-21.

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The biblical background, then, caused a general familiarity with the idea of a universal, ideal language and enhanced the attractiveness of the programme to restore the unity of language.

2.2.3 Philosophical grammar

Although many scholars in the seventeenth century felt the need for renewal in all departments of learning, linguists drew heavily on the achievements of the past. The Middle Ages inherited grammatical theory from the classical period mainly through the works of Priscian and Donatus. This theory acquired a new branch of investigation during the later Middle Ages. In the twelfth century, Peter Helias tried to provide philosophical explanations for the rules of grammar laid down by Priscian. Thereafter the field of grammar became divided into a descriptive part, primarily concerned with the exposition of grammatical rules to schoolboys on the one hand (*grammatica positiva*), and a theoretical part on the other hand, which aimed at supplying a philosophical basis for grammar in general (*grammatica speculativa*). The latter type of grammar culminated in the work of the Modistae, who sought to establish a correspondence between the structure of reality, the workings of the human mind and the basic concepts of grammar. Declined by the humanists in the post-medieval period, philosophical grammar was revived in the sixteenth century by the works of Scaliger and Sanctius, the latter of whom was a major source for the famous seventeenth century rationalist grammarians of Port Royal. Though differing in orientation, the Modistae and their post-medieval successors shared the supposition that linguistic expressions should be considered as specific realizations of underlying universal principles of grammar, which are intimately connected with the principles of human thought. The seventeenth-century language planners worked within this atmosphere, postulating a universal logical form underlying all languages, and using this form as a standard determining the characteristics a language ought to have.

2.2.4 The logical tradition

The study of language had been intimately connected with logic for many centuries. However, both the Humanist ideal of classical scholarship and the rise of the new science led to a general downgrading of logic as a subject. Aristotelian logic as practised by the Scholastics was the only type of logic known to the Western world. This logic suffered vigorous attacks, from the humanists for being both morally vacuous and stylistically disastrous and from proponents of the new science for being useless as an instrument for acquiring knowledge of nature. Nevertheless, much of seventeenth-century thinking about language, especially as far as semantics is concerned, moved within a framework determined by the logical tradition. One of the elements

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of this tradition, the theory of categories, played a particularly important part in shaping the structure of the philosophical languages that were envisaged and created.

Aristotle's short treatise on categories, together with his *De Interpretatione* and some commentaries from late antiquity formed the core of the so-called 'old logic'. It was not until the twelfth century that Aristotle's other logical writings were rediscovered by the Western world. In the scholastic period, the categories, or as they were commonly called, the 'predicaments', formed the standard paradigm of knowledge representation, functioning as the most general heads of an all-embracing classification of reality, and serving as an inventory of the basic concepts and major subjects of the various special sciences. Although the value of the theory of predicaments was seriously challenged during the seventeenth century, it was this theory which both Dalgarno and Wilkins turned to when looking for a general and systematical catalogue of 'things and notions' (cf. 3.3.2; 4.3.1). Leibniz's plans were also inspired by this theory, although he aimed at a thorough revision of its principles (cf. 5.2.7). His efforts to devise a new type of logic were unique in the period.

Another component of the logical tradition is perhaps less known since it was never explicitly described in any of Aristotle's works. It was rather connected with an arrangement of his works which reflected a specific view of the structure of language. This view was so generally taken for granted that it was beyond dispute and hence seldom an explicitly stated tenet. Aristotle's logical works were arranged according to increasing degrees of complexity as regards their subject matter, that is, terms (the *Categories*), propositions (*De Interpretatione*), and syllogisms (the *Analytics*). The structure of both linguistic meaning and thought in general were regarded as consisting of the same levels of complexity. The basic level is that of terms or words, which correspond to concepts. Terms are combined into propositions, which correspond to sentences expressing judgements. Propositions in their turn are combined to form syllogisms, i.e. a series of sentences constituting an argument. Since logic books were typically organized according to these levels and logic was still a standard part of seventeenth-century education, the compositionality of meaning and of knowledge was one of those general assumptions that were more often presupposed than articulated. This view on the structure of knowledge and of language gave rise to the notion that ideally the primitive symbols of a language ought to correspond to the primitive elements of knowledge, and that complex expressions ought to mirror the composition of their referents. As Ward expressed it:

it did p[r]esently occurre to me, that by the helpe of Logick and Mathematicks [sic] this [i.e. a universal character] might soone receive a mighty advantage, for all Discourses being resolved in sentences, those into words, words signifying either simple notions or being resolvable into simple notions, it is manifest, that if all the sorts of simple notions be found out, and have Symboles assigned to them, those will be extreemly few in respect of the other [namely a real character assigning a symbol to every 'thing and notion'; cf. 2.3.1 below] ... the reason of their

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composition easily known, and the most compounded ones at once will be comprehended (Ward 1654:21)

As it happened, this method was seriously considered but only half-heartedly applied by Dalgarno for practical reasons (cf. 3.4.3), rejected by Wilkins for being impracticable (cf. 3.3.3), and taken as a basis for the philosophical language by Leibniz (cf. 5.2.7).

2.3 PLANS AND PROJECTS: UNIVERSAL WRITING

2.3.1 A real character and the myth of a universal writing

The first proposals for a universal means of communication made in the seventeenth century were conceived as universal writing systems rather than complete languages. Although these schemes differ in many respects from the philosophical languages to be discussed in the following chapters, they formed the initial stage in a development of which these languages were the outcome. As will be seen, Wilkins in particular viewed his own project as a direct continuation of an early proposal for a universal writing (cf. 4.2.1). In order to understand why the first proposals were of this form, it will be helpful to consider some common views concerning the relation between written and spoken language.

The opening section of Aristotle's *On Interpretation* contains a few succinct statements on the relations between language, thought and reality which have determined the framework for much of linguistic theorizing in subsequent ages¹, including the seventeenth century. The passage reads as follows:

Now spoken sounds are symbols of affections in the soul, and written marks symbols of spoken sounds. And just as written marks are not the same for all men, neither are spoken sounds. But what these are in the first place signs of - affections of the soul - are the same for all; and what these affections are likenesses of - actual things - are also the same (*Peri Hermeneias* 1, 16a 4-7; transl. Ackrill 1963:43)

This framework distinguishes four elements: things in the real world, mental representations of these things, spoken words, and written words. Things are related to their mental representations by a natural connection, and both are universal. Spoken words, by contrast, vary from people to people, and are related to these mental representations by a more accidental, conventional connection. The same kind of variable relationship holds between spoken words and written words. Further, spoken words are related to things only through mental representations, and written words are related to both mental representations and things only through spoken words. Two features of this framework are particularly important for present purposes. First, the

¹ Cf. Nuchelmans 1976.

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relationship between written and spoken language is an integral part of a view on how language relates to thought and to the world. Secondly, a different status is assigned to spoken and written language respectively: spoken words are primary signs, symbolizing concepts; written words are secondary signs, being signs of signs.

Francis Bacon, in his discussion of ‘the art of transmission’, explicitly took this framework as a starting point, stating that “Aristotle says rightly that ‘words are the images of thoughts and letters are the images of words’”¹. However, Bacon added an amendment which was to be extremely influential in the following period:

The art of transmission has some other children besides Words and Letters. This then may be laid down as a rule; that whatever can be divided into differences sufficiently numerous to explain the variety of notions (provided those differences be perceptible to the sense) may be made a vehicle to convey the thoughts of one man to another (De Augmentis Scientiarum VI, ch. 1)

Bacon thus generalizes the framework, pointing out that the third place in the sequence ‘things - notions - words - letters’ may also be occupied by other types of symbols than words. In this context, Bacon treats the first two elements of this sequence as an unanalyzed whole, using the phrase ‘things and notions’ to refer indiscriminately to both of them. Many seventeenth-century scholars were to follow him in this. A type of symbol other than words which are equally capable of representing ‘things and notions’, then, is formed by gestures. As Bacon observes, gestures are effectively used by people who do not understand each other’s language and by deaf-mutes. Another example is the following:

in China and the provinces of the furthest East there are in use at this day certain real characters, not nominal; characters, I mean, which represent neither letters nor words, but things and notions (De Augmentis Scientiarum VI, ch. 1)

This observation does not just supplement the original framework, but reveals that it is not always accurate. For the existence of real characters shows that written language does not necessarily take a secondary position with respect to spoken language. The reason why Bacon characterizes Chinese characters as ‘real characters’ is precisely that these symbols refer to things and notions directly, that is, without spoken words being intermediate between written symbols and extra-linguistic reality. The discovery of Chinese character

¹ Bacon 1887-1901, IV:439. The following quotations are from the English translation of *De Augmentis Scientiarum* provided by Spedding, Ellis and Heath, the editors of Bacon’s works. The *De Augmentis* was published in 1623, and is itself a modified, Latin version composed by Bacon of his *The Advancement of Learning*, written in English and published in 1605.

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writing, as reflected in Bacon's work, thus revolutionizes the position of written language. As a consequence, the concept of 'real characters' introduces a sharp contrast among various kinds of writing. On the one hand, writing may symbolize spoken words and consequently belong to a secondary level; alphabetical writing is of this type. On the other hand, written symbols may be an alternative to spoken words, and just like the latter they may function as primary signs.

In the passage just quoted, Bacon goes on to mention a concomitant feature of Chinese character writing:

a number of nations whose languages are altogether different, but who agree in the use of such characters (which are more widely received among them), communicate with each other in writing; to such an extent indeed that any book written in characters of this kind can be read off by each nation in their own language (De Augmentis Scientiarum VI, ch. 1)

It thus appears that in the Far East the order of spoken and written language has been reversed. Written characters directly denote things and concepts, while spoken language results from pronouncing the characters. At the same time, written symbols are common to a larger group of language users than spoken words. Within this larger group, the borderline between universality of concepts and diversity of languages has moved up: both concepts and their representation in writing are universally shared; diversity resides in spoken languages alone.

However, Bacon is careful enough to observe that the use of Chinese character writing is limited to a certain region, and to distinguish the universality of Chinese characters from their being real characters. He points out that symbols other than words that are capable of signifying things and notions are of two kinds. They are either *ex congruo*, that is, they have 'some congruity with the notion', such as hieroglyphics and gestures, or they are *ad placitum*, that is, they are 'adopted and agreed upon at pleasure'. Real characters are of the latter kind, being purely conventional, adopted 'as by a tacit agreement'. Accordingly, Bacon perceived that the reputed universality of Chinese characters is a consequence of their being 'more widely received' than the spoken languages that can be 'read off' when these characters are used; the universality of these characters is not a necessary consequence of their being 'real'. Bacon adds that his considerations concerning the 'notes of things', that is, the broad class containing all kinds of symbols capable of conveying thoughts, mainly serve a theoretical purpose, "since words and writing by letters are by far the most convenient organs of transmission". In particular, writing by characters requires 'a vast multitude of them' (IV, 440). Nevertheless, he added the 'Notes of Things' to the list of topics to be further investigated in order to advance learning. These 'desiderata of learning' were very frequently referred to by scholars writing in the subsequent decades.

On the face of it, Bacon's discussion of real characters does not imply any recommendation to use this kind of writing as a new universal medium of

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communication. To begin with, the use of real characters is just as much dependent on their conventional acceptance by a group of users as any other language is. Further, it is a serious practical drawback that a very large number of symbols is required. Nevertheless, to the mind of his seventeenth-century readers Bacon's observations contained a powerful suggestion. The use of real characters seemed to open a new possibility that had not existed as long as written language had been solely viewed as a representation of sounds and hence as necessarily tied to a particular language. As the existence of real characters showed that the order between writing and speaking could be reversed, there seemed to be an easy way to overcome the diversity of languages: it seemed possible to devise a written symbolism that was to represent the common content expressed in different ways by different languages. Differences between languages would exclusively pertain to the spoken level in that speakers of diverse languages would associate different sounds with the same, universally shared, written symbols. The example of Chinese characters proved the practical possibility of this¹. Thus the step from a real character to a universal character was readily and often automatically taken.

In the course of the century the desirability and feasibility of a universal character became a commonplace. Numerous writers mentioned the possibility, and a number of attempts were made to implement the idea. An early example of the first is provided by Hermann Hugo, who, likewise under the influence of reports on Chinese characters, envisaged the following possibility:

If particular letters were assigned to signify not words, but things themselves, and if these letters were common to all people; then all people would understand the writing of diverse nations, although each nation would call particular things by diverse names (De prima scribendi origine (1617:60²))

As an additional proof that such a manner of writing could be created, Hugo mentioned the fact that astronomical signs possessed the desired feature already. Although the names of for instance the constellation Taurus differ from language to language, the same graphical symbol is understood to refer to this constellation by speakers of mutually unintelligible languages.

Listing Bacon and Hugo among his sources, Wilkins in the *Mercury: or the secret and swift messenger* (1641) propounded the same idea as Hugo had done, using the same arguments. It would be an excellent remedy against the curse of Babel, Wilkins says,

¹ There are some beliefs about Chinese characters involved in this which today are known to be mistaken. Cf. Robins 1990:127 for a short explanation, DeFrancis 1984:131-164 for extensive treatment.

² Quoted in Knowlson 1975:45 and Strasser 1988:91. My translation (from the Latin).

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if there were such an Universal Character to express Things and Notions, as might be legible to all People and Countries, so that Men of several Nations might with the same ease both write and read it (Wilkins 1708 [1641]:56)

The feasibility of this is made plausible by pointing at the fact that “such a manner of Writing is already used in some Parts of the World, the Kingdoms of the high Levant”. Further, “for some particulars, this general kind of Writing is already attained amongst us also”. As examples Wilkins mentions four types of symbols, namely Roman and Arabic numerals, astronomical and chemical symbols, and musical notes. Using the same example as Hugo, Wilkins illustrates the way this works as follows:

Suppose that Astronomical Sign ☐ were to be pronounced, a Jew would call it ☐; a Grecian, *Tauyron*; an Italian, *Toro*, a Frenchman, *Taureau*; a German, *Stier*; an Englishman, a Bull (1708[1641]:57)

All that was needed to attain a universal character was to extend this kind of writing so that all concepts would be expressable in a uniform manner. Thus the idea of a universal character as proposed by Hugo and Wilkins boils down to a virtual identification of real character and universal writing. Bacon's reservations were either implicitly or explicitly rejected: that a universal character must be accepted and learned by all nations for it to become effective is a point not directly addressed by Wilkins, but he brushes it aside by emphasizing the universality of concepts and the great advantages of a universal writing. The objection of the large number of characters required is given a twofold answer. Firstly, it is pointed out that only ‘radicals’, i.e. underived words, are to be symbolized by separate characters. For this reason, Wilkins suggests to take Hebrew as a basis for the character, “because that Language consists of fewest Radicals” (1641:57). Secondly, it is explained that learning the character will not be more difficult than learning a language, both involving mastery of several thousands of words or symbols. The effort to minimize the number of basic symbols and radical words was a common characteristic of most of the ensuing schemes for a universal writing, and also of the philosophical languages.

The main ingredients of the idea of a real and universal character may be summarized as follows. First, there is the assumption, ultimately deriving from Aristotle, that there is a set of concepts which are universally shared by all mankind, and which are identifiable independently of any particular form in which they may be expressed. Secondly, language is viewed as basically a collection of names which refer to these concepts. Thirdly, differences between languages consist for the most part of differences on sound level, arising from the fact that a different vocal symbol is used to express the same concept. If therefore, finally, a graphic symbol is assigned to each of the universal concepts, these symbols together will form a universal character which can be read off in any language.

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In view of these assumptions it is understandable why the seventeenth-century search for a universal medium of communication should at first have been solely directed to the construction of a universal writing rather than a language. The fact is remarkable, for even if it is assumed that a language is nothing but a set of names for universal concepts, there is no intrinsic reason why one should confine oneself to graphic symbols in creating a new symbolism to denote the universal concepts. Apparently, the impact of the Aristotelian framework which identified spoken words as the source of the diversity of languages was so strong that it ruled out the option to invent new words that could also be pronounced. Doing that, it was felt, would be tantamount to worsening rather than to remedying the curse of Babel by adding another language to the already vast number of existing ones. The possibility of reversing the order of speaking and writing seemed to suggest that there was an easy way to bypass spoken words, the obstacles to universal understanding. Using real characters as primary signs would make it possible to maintain the universality of things and their mental representations in writing. The diversity of languages would only take effect on the now secondary level of spoken words. Furthermore, the construction of a new writing seemed to have a great practical advantage in comparison with a new language, as nobody would have to abandon their native language while using this writing. The only thing one would have to learn was a new way of writing one's own language. All this created the illusion that a writing system, as opposed to a spoken language, could provide a simple means to overcome all language barriers.

Clearly, to assume the possibility of such a universal character is to wrongly presuppose that all languages are isomorphic with respect to lexicalized meaning, morphological apparatus, and syntactic structure. Given the vast differences between languages in these respects it is evident that what was conceived as simply 'reading off' some arbitrary language from the supposedly universal writing would in fact amount to a procedure equal in complexity to a translation from one language to another. Yet, as indicated, it was widely believed that the construction of such a writing was feasible and profitable, and several projects of this type were undertaken. Some of these will be discussed in the following section.

A final point to be noted here is that modern commentators have often neglected the importance of views on the relationship between written and spoken language for seventeenth century language planning activities. The concept of a 'real character' as discussed by Bacon, Hugo, Wilkins and many of their contemporaries was a clearly delineated one, pertaining to a set of symbols that refer to things in the real world, as opposed to symbols representing words. The term 'real character' as such was unrelated to specific evaluations of the symbols designated by it with respect to practicality or representational adequacy. As far as the nature of the relationship between real characters and their referents is concerned, it has been mentioned that Bacon expressly characterized this as conventional ('ad placitum'), as opposed to signs that bear some resemblance to what they signify. Yates's

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definition of Bacon's real characters as 'characters or signs which should be really in contact with the notions they expressed' (1966:378) thus amounts to a distortion of the proper historical sense of the term¹. In an article written a decade earlier, DeMott alleges that in 1668, "the phrase "real character" was understood to mean a contrived, universal set of symbols congruent with the true order of reality" (1955:1069), for which there is very little historical justification². Following up on this, Knowlson writes about 'a language of real characters' (1975:7-43)³, which in the seventeenth-century context he purports to describe is a contradiction: a language being primarily conceived as a system of sounds, real characters being by definition unrelated to sounds. Similarly, Coudert states that the term 'real character' "was widely used during the seventeenth century to describe a language in which words would have an essential relationship with the objects or concepts to which they referred" (1978:57), thus ignoring the basic distinction the term was quite unambiguously used to express, and ascribing a sense to it which is widespread only among modern commentators misunderstanding the issues at stake.

2.3.2 Schemes for a universal writing

A large number of schemes for a universal writing were proposed in the course of the seventeenth century, many of which drew on the myth of a real character. Some of these schemes were never made public, others were rudimentary sketches or mere programmatic proposals, such as the ones made by Hugo and Wilkins. Francis Lodwick published several treatises on a universal writing, one in 1647 (*A Common Writing*), another in 1652 (*The*

¹ Mungello (1985:183) likewise states that the proposal "to discover Real Characters or symbols and sounds whose representation of things and notions was natural or "real" rather than conventional ... was found in the writings of Francis Bacon". In fact, what seventeenth-century readers found there was the explicit statement that real characters are conventional.

² The sources DeMott adduces as examples do not warrant his allegation. One of these is Lodwick, *The Groundwork*, p. 2-3, which repeats Bacon's observation that figures 'stated at pleasure' that describe things, and not sounds, may be used for universal communication, thus echoing the idea of a real and universal writing once more. Lodwick does use the term 'real' in a deviant way to indicate pictorial types of script, that is, what is termed signs 'ex congruo' by Bacon. Lodwick's universal character is however explicitly presented as an example of a commonplace universal writing using conventional symbols: "the Characters intending by a generall consent, the representations of things, and not of sounds"(1652:3). DeMott adds that it is curious that nothing of what he thinks is involved in the concept of a real character is to be found in Bacon's writings. In fact, there is nothing curious about this since what DeMott thinks is involved in that concept is not to be found in the other authors he discusses either.

³ Similarly, Clauss 1992[1982]:56 refers to Wilkins's scheme as a 'language of real character'.

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Groundwork, or Foundation laid (or so intended) for the Framing of a New Perfect Language), both of which contained the outlines and the principles of such schemes rather than fully developed designs¹. In 1657, the Ipswich schoolmaster Cave Beck published a work entitled *The Universal Character*. The scheme consisted of an alphabetical dictionary of which the entries were numbered. Given corresponding dictionaries of other languages these numbers could be used as an international code². A similar scheme was published by Athanasius Kircher, the *Polygraphia Nova et Universalis* (1663), which also served cryptographical purposes³.

By way of illustration, two further schemes of roughly the same type are discussed below. Both of these schemes were described by Schott (1664), and it was through this description that Leibniz was familiar with these projects when he himself sketched the first version of his own scheme (cf. 5.2.6). It concerns a work by a ‘Spaniard’, and a scheme by Becher.

Bermudo

About the work of ‘the Spaniard’ we know at present nothing more than Leibniz did. The only fragments that are extant are precisely the ones printed in Schott’s *Technica curiosa*. The identity of the author has long been obscure. Schott remembers that he was in Rome in 1653, simultaneously with the author, and that the latter was a Spaniard, like himself a member of the Jesuit order, but he cannot recall the Spaniard’s name. It is now known that his name was Pedro Bermudo⁴. This Bermudo published a broadsheet containing a summary of his invention, which he called *Arithmeticus Nomenclator*. As Schott explains, it consists in “that any nation whatsoever expresses its words signifying the same thing by the same arithmetical characters” (p.484).

The method used by Bermudo is the following. Things which are most frequently talked about are reduced to 45 classes. A number is assigned to each of the things belonging to these classes, so that instead of a word of some language, a number can be used to designate things. It is clear from Schott’s summary account that Bermudo must have had a kind of logical classification in mind:

the Classes of things he [i.e. ‘the Spanish author’] calls Degrees [Gradus]; but the words joined to the classes he calls Determiners [Determinativa]. He says that the Gradus are like Genera, or Species; the Determiners are like differences, which determine the genera and species as particulars (Schott 1664:485).

¹ Cf. Salmon 1972.

² Cf. Salmon 1988[1976]:176-190.

³ Cf. Strasser 1988:139ff.

⁴ Knowlson 1975:226

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The words characterized as ‘particulars’ form an extremely heterogeneous group, comprising, among other things, mass nouns like ‘smoke’, names of natural kinds such as ‘lion’, adjectives such as ‘big’, and proper names, e.g. ‘Europe’. Schott proves to be completely insensitive to Bermudo’s logical considerations, as he states:

I reduce things to classes, and I place words under them, which is more convenient and more proper. I put Roman numbers with the classes (...) and I prefix ordinary numbers to the words (Schott 1664:485)

Thus Schott takes some liberty in his presentation of Bermudo’s scheme. However, this only concerns two minor points. The first is purely terminological: Schott replaces Bermudo’s term ‘gradus’ by ‘class’, and the term ‘determinativum’ by ‘word’. Secondly, Schott makes some alteration in the numbering system. It is not quite clear whether Bermudo numbered all words consecutively or that he started afresh from 1 with each class, as Schott does. Anyway, the use of Roman numerals is probably Schott’s own contribution.

Schott reproduces without change the words enumerated and classified by Bermudo. However, he finds Bermudo’s 38th class unnecessary, as it contains ‘metaphors and circumlocutions’, and consequently omits it. Further he remarks that the Spanish author arranged his classes very confusedly, and that many of the words listed are strange, being derived from Spanish words. Schott does not cite examples, but he undoubtedly meant words like ‘merluza’ (a fish) and ‘altezza’ (highness). It is only for lack of time, he adds, that he has refrained from providing a more appropriate arrangement.

Going through the list of 44 classes, which together comprise 1,205 words, one can imagine Schott was dissatisfied with the arrangement. It clearly reflects the personal taste and professional preoccupations of the Spanish author. Four distinct classes are concerned with clothing, whereas nautical terms are categorised together with names of spices. A separate class is formed by terms linked with ‘sacramental confession’. The words ‘road’ and ‘oats’ are in the same class, as they both refer to ‘things having to do with travel’ (*viatoria*). The arrangement is also unsystematical in another respect: from the 35th class onward, the classification follows linguistic rather than semantic criteria, grouping together adjectives, common nouns, proper names etcetera. Nevertheless, the most common ontological subdivisions are also present. Just as the tables of Dalgarno and Wilkins, Bermudo’s idiosyncratic classification contains such items as elements (including meteorological terms), stones, beasts, birds, parts of animals.

The idea behind this enumeration is simply to replace written words by numbers. Thus, instead of for example ‘horse’ one writes ‘XIV.4’. ‘XIV’ designates the class of beasts; number 4 of this class is ‘horse’. Bermudo uses accents and points, which are joined to the numbers signifying words, in order to indicate such grammatical categories as number, tense and case. As a specimen of how this ‘arithmetical writing’ works, Schott gives a transcription of the first lines of the creed, of which the first part reads as follows:

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XXXIX.₄ XLII.8 III.1.... XXXIII.47 XL.23....
Credo in Deum Patrem omni- potentem

‘XXXIX’ is the number of the class of ‘verbs bearing on the senses, the intellect, the will’. Number 4 of this class is ‘to believe’. A point above a numeral signifies present tense. Four points, ‘....’, indicate that the word preceding it is in accusative case.

Becher

In Schott’s opinion, the universal character he discusses next is ‘far more ingenious, easier and more universal than the previous one’ (p. 527). It was devised by Johann Joachim Becher, who published his invention in 1661, characterizing it by various titles: ‘a key to the conformity of languages’, ‘a character for the universal notation of languages’, and ‘a steganographic invention hitherto unheard of, by which anyone, reading his own vernacular, can interpret and understand diverse, nay all languages, after one day of instruction’. According to Schott, the device entails that one language is the key to all others. Anyone writing his own language by means of certain symbols, is writing all other languages at the same time. This is done by the following method. First, a Latin lexicon is set up. Becher supplies a list of 9,432 words, to which are added 283 proper names of persons and 569 names of cities and geographic regions. The entries in the lexicon are consecutively numbered, 1 to 10,283. Next, for each language a lexicon must be produced, in which to each number a word is assigned, which has the same meaning as the Latin word having this number. An alphabetical index will provide the possibility to look up the number of a given word. Thus, if all languages will have a numerically arranged, decoding list of words (which Becher calls the ‘lexicon’) and an encoding, alphabetical list (the ‘index’), all that is needed to write in a universally comprehensible way is to write the numbers instead of the words. In spite of Becher’s claim in one of his titles, this idea was by no means ‘hitherto unheard of’. Apart from Bermudo’s scheme, a similar scheme had been proposed by Cave Beck. The crucial step in the implementation of this scheme, that is, the production of the dictionaries, was taken by Becher nor by Beck.

2.4 PROPOSALS FOR A PHILOSOPHICAL LANGUAGE

It was in reaction to a proposal for a universal language scheme of much the same kind as the ones discussed in the previous section that one of the most influential and most often quoted letters of the seventeenth century was written. The letter was written by Descartes, as early as 20 November 1629, and it answered a request by Mersenne for comment on a scheme for a universal lan-

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guage or writing¹. Virtually all that is known about this proposal is what can be gathered from Descartes's comments, which quote six propositions that the unknown author put forward concerning the structure and the value of his design.

Pointing out that there are only two things to be learned in all languages, namely the meaning of the words and the grammar, Descartes says he does not expect that the proposal he is discussing has anything admirable to offer in either respect. The meaning of the words will have to be looked up in a dictionary, and the grammar will be strictly regular. The latter feature has the undesirable consequence of producing disagreeable and awkward sound combinations. Further, it is not to be expected that anyone will be prepared to learn the artificial words by heart. In conclusion, if a universal language is sought, it will be better to use some existing language for that purpose. Descartes does not exclude the theoretical possibility of contriving a universal writing system on the basis of assignment of symbols to equivalent words, but stresses the great practical inconvenience of such a system.

Having dismissed this proposal, Descartes added the following remark:

I find that one could add to this an invention, both for composing the primitive words of this language and for their characters, such that it could be taught in a very short time, and this by means of order, that is, establishing an order among all the thoughts that can enter the human mind, just as there is one naturally established among numbers; and just as one can learn in one day to enumerate all the numbers until infinity, and to write them in an unknown language, which are nonetheless infinitely many different words, so could one do the same with all the other words necessary for the expression of all the other things that enter the mind of man 1936[1629]:92

If such a language could be found, there would undoubtedly be many people willing to learn it. Descartes goes on to say that he thinks the construction of such a language is possible, but not until the 'true philosophy' has been found. If one succeeds in doing that, a philosophical language could be created "which would assist judgement, representing all things so distinctly that it will be almost impossible to make mistakes". Nevertheless, he added, it is totally unrealistic to suppose, even if the language were to be created, that it would ever be in use.

Descartes's brief remarks on a philosophical language by themselves are little stimulating, and they reflect his attitude towards linguistic knowledge in general: so long as the 'true philosophy' does not exist, the philosophical language is impossible; if the 'true philosophy' has been found, it will be trivial to construct the language based upon it. Nevertheless, many scholars were attracted by the idea of a philosophical language. A number of proposals, sketches and schemes for philosophical languages of various kinds were made in the subsequent decades, among others by Mersenne, Comenius,

¹ Descartes, Correspondance, I, 89-93.

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Campanella, Kinner, Urquhart and Newton. None of these schemes ever reached a final stage, and none of these proposals can be discussed here. The following chapters deal with two schemes that were completed, and one proposal constituting a new departure, respectively.

CHAPTER 3

DALGARNO: THE ART OF SIGNS

3.1 INTRODUCTION

On the title page of a tract called *Ars Signorum* appearing in 1661, its author, the Scot George Dalgarno, announces that he has accomplished something rather sensational. Offering a description of what he calls ‘a universal character and a philosophical language’, he asserts that by its means “speakers of the most diverse languages will in the space of two weeks be able to communicate to each other all their thoughts (in everyday matters), either in writing or in speech, no less intelligibly than in their own mother tongues¹”. This invention is not only claimed to be a highly effective and easy-to-learn means of communication, but also to provide an excellent introduction to philosophy and logic: “by this means also the young will be able to imbibe the principles of philosophy and the true practice of logic far more quickly and easily than from the common writings of philosophers”. Thus Dalgarno claims to have achieved at least three widely different goals all at once in constructing a language which is suited for universal communication, is capable of being learned quickly, and furnishes a means for enhancing knowledge and logical skills.

As the title indicates, the description of this remarkable language is presented in the context of a general theory of symbolization, the ‘art of signs’. Dalgarno derives the principles of this theory mainly from what he considers as logic. Arguing in a manner with an unmistakably scholastic flavour about it, he goes into detail to discuss the relevance of various parts of contemporary logic for the structure of his design. In the course of his argument, he takes issue with leading philosophers, notably Descartes and Hobbes, and he even takes pains to prove the existence of God and the immortality of the soul.

Within a seventeenth-century context, neither the claim to have invented a universal character of extreme utility, nor a logical proof of the existence of God were something exceptional. However, *Ars Signorum* has some features which were novelties to the mind of Dalgarno’s contemporaries. Firstly, in contrast with most of the earlier proposals in this area, the design expounded

¹ Quotations from *Ars Signorum* are from the English translation of the Latin text, which is currently being prepared for publication in Cram and Maat (forthcoming).

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in Dalgarno's treatise is almost complete. With the exception of Cave Beck's 'universal character' (1657), the schemes published thus far contained tentative sketches of what a new universal symbolism should look like. Dalgarno, by contrast, offers an almost fully elaborated design, which he claims to be usable for most communicational purposes. Dalgarno explains in a letter 'to the philosophical reader', why the claim that the language is complete is restricted to conversation about ordinary matters. When it comes to technical and specialized discourse, the principles laid down in the work need elaboration, since a single man cannot institute names for everything in a philosophical manner without the advice of experts in various fields. This qualification apart, Dalgarno is far from modest regarding his achievement. He states that "a foundation large and reliable enough has been laid. And there is little or no doubt that all the notions of nature and art can be defined clearly enough from the radicals here established".

A second feature, which probably was more perspicuous in the eyes of his contemporaries than it may seem to a modern observer, is the fact that Dalgarno propounds a fully-fledged language which can be both written and spoken, rather than offering some instance of the more familiar concept of a universal writing. Although the idea to add a spoken form to such a writing scheme was well-known, and was even implemented by Beck, the design of *Ars Signorum* is based on a widely different conception. Whereas Beck conceived his universal character as a convenient means for writing existing languages, with an additional, secondary provision for pronouncing the numerals he used for that purpose, Dalgarno does not offer any new way of writing at all. Using the ordinary alphabet, he constructs a completely new language, on a par with existing natural ones, and fully capable of eventually replacing them. As will be seen, Dalgarno did not start out with this goal in mind, but ended up constructing such a language as his views on the theory of signs underwent a series of changes he himself saw as revolutionary.

Another feature of *Ars Signorum* is one that modern commentators have unanimously and rightly regarded as most significant, namely that it proposes not merely a new artificial language, but a philosophical one, that is, a language approaching as far as possible a certain ideal of what a language should be like. The claim that a philosophical language is being offered obviously implies that such a language is purportedly better than existing ones, and that it would not just be convenient if such a language were universally used, but an improvement on the present situation. A philosophical language is designed not only to remedy the diversity of languages, but also their defects. As has been seen (2.4), the idea of constructing a philosophical language had been discussed earlier in the seventeenth century, notably by Descartes, who however had judged that such a language could not be hoped for, at least for the time being. Further, it was common practice for language planners to accompany their plans with a list of advantages - indeed, in several cases such a list was all they offered -, among which they habitually mentioned that their design avoided some of the defects of existing languages. Even Beck, whose professed aim was merely to provide a pocket-guide for travellers, claimed

that his universal character could help prevent the ambiguity inherent in natural languages (Salmon 1988:186, 187). Although *Ars Signorum* was thus not a complete novelty in this respect, it was certainly the first work to provide a fully developed philosophical language.

George Dalgarno was a native of Aberdeen who spent a large part of his life in Oxford where he ran a private grammar school. The date of his birth is uncertain, and biographical accounts have arbitrarily fixed it around 1626, on the basis of Wood's statement that Dalgarno was 'aged sixty or more' when he died in Oxford in 1687 (Wood 1691, Vol.2:506). However, Cram (1990:809) has shown that Dalgarno probably was born a full decade earlier than previously assumed, i.e. around 1616, since Dalgarno is recorded as having matriculated at the university of New Aberdeen in 1631. Apart from his occupation in Oxford, Dalgarno is known to have been Master of Elizabeth College in Guernsey, a post he held for two brief periods, one in the early 1660's and one in the early 1670's (Cram 1990:818). Further biographic information on Dalgarno is scanty. Wood records that he died 'of a fever' on the 28th of August 1687, and that he was buried in 'the church of St Mary Magdalen in the suburbs of Oxford'. Besides *Ars Signorum*, Dalgarno published in 1680 a tract providing a method for teaching deaf and dumb persons to read and write, and a finger alphabet to be used for communication face-to-face. This tract, called *Didascalocophus*, is accompanied by a Discourse of the Nature and number of Double Consonants, dealing with phonotactics. These two tracts, Dalgarno indicates in the introduction, were offshoots originating from his work on the philosophical language. Apart from the two volumes published during his life-time, Dalgarno wrote a series of unpublished papers, which have only recently been discovered by Cram. As will be clear from what follows, these papers are of crucial importance for understanding the nature of Dalgarno's project of creating a philosophical language¹.

In contrast with the sparse biographical data, the history of Dalgarno's project is rather well documented. In 1657, soon after he had started working on what eventually was to become a philosophical language, Dalgarno came into contact with Samuel Hartlib, and through him with a number of leading scholars interested in universal language. Hartlib solicited comments on Dalgarno's early plans, and much of the ensuing correspondence is extant. Besides this, a number of broadsheets have been preserved, which Dalgarno published as advertisements for his scheme, giving an impression of the project at various stages of development. On the basis of these sources², Salmon (1966) illustrates in some detail the evolution of Dalgarno's project,

¹ Cram traced these papers in the Gregory collection of manuscripts in Christ Church (MS 162, Christ Church, Oxford). Dalgarno's manuscripts have been transcribed and annotated by Cram, and will appear in print for the first time together with an edition and translation of *Ars Signorum* in Cram and Maat (forthcoming). In writing this chapter, I have greatly profited from Cram's transcription and notes.

² Most of the relevant papers are preserved in MS Sloane 4377. Funke (1929:46ff.) has briefly explored these papers.

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which started out as an endeavour to improve a shorthand system. This work developed into a scheme for a universal character, which was elaborated and modified so as to result in the philosophical language of *Ars Signorum*¹. Among the unpublished papers discovered by Cram is an autobiographic treatise written around 1685². The treatise confirms Salmon's main findings, and provides a wealth of details that were not available to her in 1966. Besides giving a detailed account of the development of his ideas, Dalgarno recapitulates his discussions with John Wilkins on the construction of a philosophical language. In the late 1650s, Dalgarno and Wilkins collaborated until their different views on how a philosophical language ought to be structured proved irreconcilable, and a 'breach of judgment' caused each of them to pursue their own design. In the autobiographic tract, Dalgarno argues at length for the superiority of his own language as compared to the one Wilkins proposed in his *Essay* (1668). Dalgarno thus provides a fascinating account of the major issues involved in the debate on philosophical language. This account will be discussed below (2, 3).

Although it is generally acknowledged that *Ars Signorum* is an important work for the history of seventeenth-century linguistic thought, it has been given relatively scant attention in the literature. A pattern common to various monographs on the universal language movement is to group the schemes of Dalgarno and Wilkins together as distinct from other projects in this area, and to focus on Wilkins as the best and most complete specimen of the two purportedly similar schemes. An extreme example of this procedure is Knowlson 1975, who justifies his disregard of Dalgarno's language by pointing out that both Dalgarno's and Wilkins's schemes "are founded upon a similar classification of ideas according to genera, species, and specific differences". Thus, Knowlson continues, "we shall look only at the *Essay*, partly because it was the more ambitious, complex, and succesful of the two, and partly because it was around this particular universal language scheme that much of the interest and activity of the time was crystallized" (1975:97-98). Many authors who have dealt with Dalgarno's language have made similar assumptions. Cohen (1954:58) for instance claims that Wilkins's project "was a much larger and more thorough undertaking than Dalgarno's, though on the same general lines". An influential statement of what has long been the consensus among historians is Couturat's summary description of the two works. After explaining that Dalgarno orders all concepts under 17 highest generic concepts, and that the artificial words reflect the conceptual hierarchy, Couturat goes on to explain that Wilkins perfected this system, and

¹ The sequence 'shorthand - universal character - philosophical language' was already known from Dalgarno's own retrospective account in *Didascalocophus* 1680:100. Cf. Funke 1929:43-44. Further, an account of this development is given by Dalgarno's contemporary Robert Plot (1676:282-283). Cf. Slaughter 1982:143.

² Christ Church MS 162 : 21-84.

that “in stead of 17 highest genera, he counted 40”(Couturat 1901:58-59)¹. Accordingly, the amount of space devoted to Dalgarno and Wilkins in general surveys of the subject is often proportional to the number of generic concepts their schemes are believed, rather inaccurately², to contain.

The alleged similarity between Dalgarno's and Wilkins's schemes is based upon the observation that the lexicon of each of the two languages is constructed on the same or closely similar principles, in that the artificial words reflect the structure of a previously established classification scheme. The majority of authors have concentrated on this particular aspect of both schemes as their most significant characteristic, and often as the only characteristic worth mentioning. The classic history of universal language by Couturat and Leau states this point explicitly: “The philosophical language of George Dalgarno is principally a vocabulary based upon a logical classification of all ideas” (1903:15). This approach remained the standard for subsequent writers such as Rossi, who observes: “In a not dissimilar fashion [i.e. to Wilkins's method] George Dalgarno had produced, in *Ars Signorum* (...), a logical classification of all ideas and of all things” (1960:226). Although some commentators have briefly drawn attention to other aspects of Dalgarno's language³, most recent discussions are limited to the classificatory foundation of the lexicon. Slaughter's influential book on ‘scientific taxonomy’ has reinforced this tendency⁴, although she explicitly recognizes an exclusive concern with nomenclature to be a limitation of her study⁵.

The two factors mentioned, i.e. the focus on taxonomic nomenclature and the concomitant evaluation of Dalgarno's language as basically similar to Wilkins's, have led many authors to conclude that Dalgarno's language is first and foremost an attempt to model language on the structure of reality. The feature that sets the philosophical languages of Dalgarno and Wilkins apart from other universal language schemes, it is frequently maintained, is the elaboration of a conceptual classification serving as a basis for the lexicon, whereas the other schemes use the vocabularies of existing languages. The goal of this classificatory basis is to free the lexicon from ambiguity and redundancy, by establishing a one-to-one correspondence between words and things. The meaning of a word, on this picture, is once and for all fixed by

¹ Cassirer 1923:69 echoes Couturat's account, writing: “Wilkins, der dieses System zu ergänzen und zu vervollkommen sucht, stellt statt der ursprünglichen 17 Hauptbegriffe deren 40 auf”.

² The number of generic concepts effectively used for artificial words reflecting a conceptual hierarchy in Dalgarno's lexicon is 11, the number of such concepts in Wilkins's lexicon is 40, but both authors avow these to be not the highest, logically speaking. Cf. 3.4.5 and 4.3.8 below.

³ Thus Funke 1929:13, 44-45 and Funke 1959:213-214, Cohen 1954:57 and Salmon 1972:29.

⁴ Thus Asbach-Schnitker 1984:xxv-xxvi, Large 1985:31-32, Strasser 1988:212-217, which depend heavily on Slaughter's account.

⁵ Slaughter 1982:vii. Further, on the basis of Cram (1980) she points out that Dalgarno's approach is fundamentally different from Wilkins's (1982:173).

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being tied to a definite position in an all-embracing classification scheme. Viewed from this perspective, Dalgarno's language inevitably seems to be an extremely modest and tentative sketch of what was to be much more completely and impressively achieved by Wilkins's grand philosophical language. For this to be concluded the two books need hardly be opened, Dalgarno's lexicon being contained on a single broadsheet appended to his tiny volume of less than 150 pages, whereas Wilkins's bulky folio volume amounts to more than 450, not counting the voluminous dictionary.

However, a slightly more than casual inspection of the text of *Ars Signorum* is quite sufficient to cast serious doubt on the adequacy of common assumptions regarding the nature of this work. For instance, if it were true that Dalgarno was trying to make a language which is the 'mirror of things'¹, it would be difficult to understand why he argues against the possibility of establishing a single complete classification of things, since "the aspects of things are so multiply varied that their method, following various suppositions and perspectives, is accordingly variable" (*Ars Signorum* (henceforward: AS):28). And if it were correct that he wanted each type of things to be designated by a single word of his language, it would be hard to explain why he explicitly states that in his language a single concept can often be expressed by a number of different compound words, a feature he amply illustrates with examples (AS:41, 69). It thus appears that the standard picture emerging from existing scholarship stands in need of drastic revision.

In a seminal article, Cram (1980) has drawn attention to Dalgarno's views on the differences between his own enterprise and that of Wilkins. On the basis of Dalgarno's autobiographic tract, Cram provides a lucid though summary account of the fundamental disagreement between the two rival authors on the principles underlying a philosophical language². Cram further calls for a re-evaluation of *Ars Signorum* 'in the framework of its own aims and objectives, rather than those of the Essay' (1980:120). It is such a re-evaluation which forms the main objective of the present chapter. To this end, a fairly extensive account of Dalgarno's ideas on philosophical language will be given, and the way he put these into practice will be investigated in some detail. First, a topic will be discussed which as yet has hardly received systematic treatment, in spite of its importance for seventeenth-century linguistic ideas, namely the relation between spoken and written language (3.2). Secondly, it will be shown how Dalgarno's views on the structure of a philosophical language went through a number of stages of development (3.3). Thirdly, the philosophical language described in *Ars Signorum* will be examined. An explanation of the lexicon (3.4) is followed by a discussion of

¹ Cf. Padley 1985:325ff.

² Salmon 1996:923-925 is the first general survey treating Dalgarno's and Wilkins's approaches as basically distinct, rather than as two alternative routes towards the same end, as a series of authors suggested after Cram 1980 had shown that the two schemes were different.

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the grammar, which has hitherto been largely ignored (3.5). Finally, section 3.6 presents some conclusions.

3.2 A UNIVERSAL CHARACTER AND A PHILOSOPHICAL LANGUAGE

3.2.1 The Problem Posed by the Subtitle

The subtitle of *Ars signorum* reads ‘character universalis et lingua philosophica’. Viewed in isolation, this may either be taken to mean that the work contains a description of two distinct things, a universal character and a philosophical language, or it may be interpreted as a double characterization of one and the same thing. Contrary to what may be expected, inspection of the text does not instantly disambiguate the subtitle preceding it, since evidence for both interpretations can be found.

In support of the first interpretation one finds that Dalgarno occasionally refers to a character distinct from the language, noting that the symbols used were simple and elegant. However, apart from these brief indications, he does not explain this character any further, while providing a detailed description of the language. This is, he says, because anyone who has grasped the use of the language can be taught the use of the character within a single hour (AS:17). And at the end of the book, he indicates that there were other practical reasons for omitting an explanation of the character, saying that if he can raise enough funds, he will provide a ‘philosophical character’, consisting of figures which immediately signify things themselves (AS:127). Thus it seems that Dalgarno’s invention consisted of two separate symbol systems, only one of which is described in *Ars Signorum*, the other being omitted for financial reasons.

On the other hand, the second interpretation is supported by a passage in which Dalgarno argues at length that the art of audible and visible signs is one and the same, and that whatever can be expressed in figures can equally well be expressed in sounds. Dalgarno admits that he at first did not perceive this important truth himself. But once it is grasped, the widespread opinion that a universal character is desirable while an artificial language must be rejected, turns out to be a mere prejudice. As Dalgarno points out, the written form of his language in fact constitutes a ‘universal character’: “if anyone does not wish to communicate by means of this art using *words*, let him hold his *tongue*, block up his *ears*, and it will be possible thus to communicate purely in *mute figures*” (AS:15). This clearly suggests that both ‘universal character’ and ‘philosophical language’ are names of the one symbol system described in *Ars Signorum*.

This obscurity in the text of *Ars Signorum* may seem to concern a trivial point, but within the context of seventeenth-century language planning the distinction between spoken and written language was of primary importance. It has been seen that it was central to the concept of a universal character (2.3.1), and it is noteworthy that Wilkins’s *Essay*, to be discussed in the following chapter, in fact provides two distinct symbol systems, one which can only be used in writing, the ‘real character’, and another which can also be pronounced, the ‘philosophical language’. The ambiguity of *Ars Signorum* at this point reflects the fact that Dalgarno’s thoughts on the subject changed

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while he was working on the project. At an earlier stage, he had planned to produce only a universal character. Shortly afterwards, he envisaged providing both a character and a language. By the time he published *Ars Signorum*, he was on the verge of realizing that a distinct universal character is superfluous once a language having both a written and a spoken form has been constructed. In this particular as in others, Dalgarno proved to be a more original and independent thinker than Wilkins, who never gave up the assumptions Dalgarno perceived to be prejudices. To explain this, it will be illuminating to trace the history of Dalgarno's efforts in some detail.

3.2.2 From Shorthand to Universal Writing

The history of Dalgarno's project has been described by various authors (Funke 1929:43-48, Salmon 1966, Shapiro 1969:210-213, Slaughter 1982:141-144, Strasser 1988:208-212), who have based their account on the broadsheet advertisements for Dalgarno's early plans and on a series of letters discussing these plans, as well as on contemporary comments by Wallis, Plot and Wood. The present section and some of the following ones (3.2.3, 3.2.4, 3.3.1-3.3.4) are primarily based on Dalgarno's autobiographical tract written around 1685¹, and thus supplement earlier accounts. In accordance with Dalgarno's main concern in this tract, the following sections focus on internal, intellectual aspects of his project, while external influences and personal relations are taken into account only if they are important from this perspective.

In the 1650s, Dalgarno was a schoolmaster in Oxford taking interest in shorthand. He was familiar with the way this art was commonly practised at the time, which in his opinion was not quite satisfactory. In that year, a visitor of now unknown identity came to Oxford, who claimed to know the most compendious method of writing ever developed. This method stimulated Dalgarno to compare various shorthand systems for the purpose of advancing the art. In his first attempts he was guided by a property of Hebrew which struck him as useful, namely the extensive use of affixes where other languages use particles. This suggested a method for rendering the particles of the English language by means of points positioned around a 'radical' word. At this stage, Dalgarno considered nouns and verbs as radical words, and the other parts of speech as particles (cf. 3.3.4, 3.5.2, 3.5.5). But this method encountered a difficulty: the usual systems of shorthand used the very same method of placing points around a major character for indicating vowels. So how could the points signifying vowels be distinguished from the points that were to signify particles?

A solution could be found in representing the meaning of the radical words by 'such Characters as were Real and not literal', that is, symbols

¹ Christ Church MS 162 ff.21-84. Further references in these sections are by folio number only.

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which do not represent sounds, but things. Common systems of shorthand used some symbols of this kind to signify things to which reference is very frequently made. Obviously there was no provision for vowels to be made when such symbols were used, so that no confusion could arise if points indicating particles were positioned around them. However, there were so few of these symbols that the problem concerning the representation of particles was not solved. But Dalgarno found the idea of designating particles by points so promising that he was unwilling to give it up. Observing that most particles are combined with verbs, and that the number of verbs used in ordinary discourse is not very large, he decided to make a collection of verbs and to assign a distinct real character to each of the selected verbs. In this way the problem could be partly solved, as many particles could now be expressed by points placed around the real characters. Thus Dalgarno was led to invent real characters as a solution to a technical difficulty he encountered when endeavouring to improve the art of shorthand.

However, a new problem emerged when he had run over a dictionary selecting the verbs required for his design. In Dalgarno's words, the problem was the following: "I was again discouraged to see a heap of words, for which I thought it would be difficult to provide easy and distinct characters; and thoe this were done, yet they would be a great burden to the memory" (f.23r.-f24r.). This problem was nothing other than the one Bacon and others had identified in discussing 'real characters', such as were reputedly used by the Chinese: the large number of characters required makes this type of writing impracticable and hard to learn. The problem now faced Dalgarno in practice¹. He soon perceived that it could be solved by imposing a structure of some kind on the disorganized 'heap of words' he had assembled. He considered four methods of doing this: first, an alphabetical order, second, a thematical arrangement by grouping words with related meanings together, third, a logical order by genus and species, and fourth, a mnemotechnical disposition. These methods will be discussed more fully below (3.3.2). Dalgarno at first opted for the mnemonic method as most suited for his purpose. Thus he arranged his collection of radical words by means of a series of stanzas, each consisting of seven lines, and each line containing six radical words. From a broadsheet² Dalgarno published as an advertisement for his project, we can get an impression of this method of arranging radical words. The broadsheet contains thirteen stanzas, the first of which reads as follows:

When I *sit down* upon a *hie place*, I'm *sick* with *light* and *heat*
For the *many thick moistures*, doe *open wide* my *Emptie* pores
But when I *sit* upon a *strong borrowed* Horse, I *ride* and *run* most *swiftly*
Therefore if I can *purchase* this *courtesie* with *civilitie*, I *care* not the *hirers*
barbaritie

¹ On a broadsheet published in 1657 Dalgarno claims that the universal character he proposes is unlike "the laborious and almost infinitely burdensome (as it is reputed) Chinese script" (British Museum 4377, f144r.).

² *Tables of the Universal Character*, British Museum 4377, ff.145-146.

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Because I'm *perswaded* they are *wild villains*, *scornfully deceiving modest man*
Nevertheless I *allowe* their *frequent wrongs*, and will *encourage* them with *obliging*
exhortations

Moreover I'll *assist* them to *fight* against *robbers*, when I *have* my *long crooked*
sword.

The italicized words are radicals, which Dalgarno designated by certain characters, on which more below (3.2.3). Among the radical words are not only verbs, but also substantives and adjectives. The other words are there to make complete sentences, which supposedly can be more easily memorized than a list of unconnected words. In an explanatory text, Dalgarno even claims that, mnemotechnically speaking, the very nonsensicality of these sentences is an advantage¹. As a further help to the memory, every second line of each stanza begins with 'for', every third with 'but', and so on.

Having organized the radical words in this way, Dalgarno brought them together on the lower part of a sheet of paper. On the upper part, he listed a 'numerous collection of particles', to be expressed by points surrounding the characters for the radical words. Looking over what he had achieved thus far, Dalgarno was especially pleased with his treatment of the particles, while the arrangement of radical words seemed rather awkward. As will appear later (3.3.4), he was to take a similar attitude towards the philosophical language he eventually constructed, and which he described in *Ars Signorum*. Thinking further about the value of his achievement, Dalgarno made a shocking discovery, which had as a consequence that he subsequently had "not one heures natural rest for the 3 following nights together". He suddenly perceived that what he had designed for English, "was equally applicable to any Language whatsoever" (f.25r.). In other words, he realized that his intended system of shorthand could equally well be used as a universal character. It has been seen that the possibility of constructing such a character was widely believed to follow from the use of 'real characters', as opposed to alphabetic writing. It is interesting that when Dalgarno became aware of what was so much as a commonplace, he experienced this as an exciting new insight. If his autobiographical account is accurate at this point, it shows that his first attempts to construct a universal writing were quite independent of earlier proposals in this area. However, as soon as Dalgarno realized that shorthand was not his only concern, he came into contact with a circle of leading scholars, who took great interest in his plans (see 3.3.2 below).

3.2.3 From Writing to Language

Before Dalgarno's universal writing, which he had discovered by chance, was transformed into a language, a new series of what he himself felt to be coinci-

¹ The memorability of bizarre connections is part of the tradition of the art of memory (Yates 1966:10 and passim).

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dences occurred. When he had recovered from his amazement, he set out to rework and complete the tentative scheme he had drawn up, in the conviction that “the body of Language, by which I understand the commone notions of familiar and ordinary intercourse and dayly use (...) might be exhibited both Dictionary and Grammar upon one face of a sheet of paper” (f.26r.). From the broadsheet just referred to, containing the radical words arranged in mnemonic verses, it can be gathered what shape the project had taken at that point. Its title is ‘Tables of the Universal Character’, to which is added: ‘so contrived, that the practice of them exceeds all former ways of short-hand writing, and are applicable to all languages’. The broadsheet shows that Dalgarno had in fact managed to bring three tables together on one side of the sheet: a ‘table of particles’, a ‘table of Radicall verbs and adjectives’, and a ‘table of Radicall Substantives’. The two latter tables of radical words consist of mnemonic stanzas. Dalgarno’s universal character / shorthand system consisted of 13 basic signs, each referring to one of the stanzas. Additional strokes were in various ways attached to the basic sign to indicate each of the 7 lines of the stanza¹. Finally, each of the 6 radical words in a line was indicated by the direction in which this additional stroke pointed. For instance, the basic sign for the first stanza looked like this:



A stroke attached to its upper part indicated the first line², while this stroke pointing upwards to the left indicated the first word³, resulting in the following symbol:



signifying ‘sit down’.

It may at present be hard to understand Dalgarno’s enthusiasm for having invented a writing of this sort. However, the principle underlying his universal shorthand symbols proved to be important for subsequent developments. It was to be the basis of the artificial words of both his own and Wilkins’s philosophical languages. This principle is that each symbol picks out a place in a systematically arranged list: the symbols codify the items listed. Each of the basic symbols is associated with a group of items, while the additions to the basic symbol systematically refer to the *n*th subgroup, and the *n*th member of that subgroup respectively. The same principle of codification could, and in fact was, applied to quite different lists, established according to standards other than mnemonic ones. As will be seen in the following section, Dalgarno was well aware that this method of codification had only a limited

¹ A detailed explanation of this method is contained in a letter Dalgarno wrote to Pell, December 1657, British Museum 4377, ff. 150r.-152r.

² The same stroke attached to the middle part and to the lower part of the basic sign indicate the second and third line respectively. For the fourth to the sixth lines, and for the seventh, different strokes are used.

³ The second to the sixth words are indicated by the same stroke pointing straight left, downwards on the left, and by the same vertical directions on the right part of the basic sign.

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value for the construction of a philosophical language. His further exploration of the method also made him see that other symbols than so-called real characters could equally well, or better, be used for its implementation. As he had ‘occasion to consult the Table often’ (f.35r.), he found that the character could not serve as a convenient index to the table. For this reason he decided “to imitate the Mathematicians, who name all their lines and Angles in their operations by Alphabetical letters, by naming my Stanza’s and lynes at first from letters appropriated to them” (f.36r.). After experimenting a little with this method, it occurred to him that he could use a consonant to designate the stanza in which a radical is to be found, a vowel to designate the line, and again a consonant to identify the place of the radical in the line. In this way, monosyllabic words consisting of three letters were formed. For instance, if B designated the first stanza, A the first line, and D the third word in a line, the artificial word ‘BAD’ would symbolize the radical word ‘place’¹. Again, Dalgarno’s project had taken an unexpected turn. Unlike the codification by means of the universal shorthand symbols he had initially designed, the use of letters obviously suggested a method of pronouncing the symbols used to refer to radical words. In other words, the universal character had automatically turned from a ‘dumb character’ into a language. Just as the use of ‘real characters’ for the purpose of a shorthand system had surprisingly led to a universal character, so did the use of letters unexpectedly lead from a writing to a language. In the middle of these developments, Dalgarno gives the appearance of being the sorcerer’s apprentice, tinkering with materials the power of which he does not know.

3.2.4 The Character and the Language of *Ars Signorum*

By the time Dalgarno published *Ars Signorum*, his project had undergone some other, more fundamental changes, to be discussed below (3.1-3.4). One thing that was retained from earlier work, was the method of representing ‘radicals’ by means of artificial words, mostly monosyllabic ones, each of which indicates a place on a previously established table, in the same way as in the earlier stage of the project. Since these artificial words could be both written and pronounced, they constituted an artificial language rather than merely a script. Dalgarno devotes an entire chapter of *Ars Signorum* to this aspect of his invention, defending it against objections. He first points out that both communication by sounds and by figures each have their own

¹ In the autobiographical manuscript, Dalgarno is not entirely explicit about the exact method he used. He says: “e.g. supposing I had followed the alphabetical order of letters (which I did not) then Bad was the first Stanza, first line, and third word” (f.36r). Following the printed tables, from which the first stanza was quoted above, ‘Bad’ would designate ‘place’. Cram notes that a copy of the tables in the Bodleian Library (Wood 276 a 20) contains annotations, probably in Dalgarno’s hand, which presumably show the letters Dalgarno actually used to indicate stanzas, lines, and words.

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advantages. Sounds are more expedient between people face-to-face, while figures enable one to communicate with an absent person at any distance. However, “the art of *audible* signs and *visible* signs is one and the same”. This is because “no one can produce an art of communicating by *figures* where the principles underlying the *characters* are not equally applicable to *sounds*” (AS:13). For, Dalgarno explains, an art of this kind presupposes some methodical enumeration of the referents of the figures. Reference to this enumeration can be made in an equivalent way when the figures are replaced by sounds. Clearly, this explanation reflects the history of Dalgarno’s own efforts.

Dalgarno had to emphasize that a language and a character are in fact equivalent, because he knew he had to overcome a strong resistance to the idea of constructing a new language, whereas the invention of a universal character was widely regarded as a legitimate and desirable undertaking. The equivalence of written and spoken signs, Dalgarno admits, is a ‘mystery of art’, into which it is hard to penetrate, and which he himself did not perceive until the character had been completed. “Nevertheless”, he adds, “I am irked to hear people very nearly unanimously expressing their desire for a *real* and *mute character*, while recoiling from the idea of a *language*” (AS:14). He goes on to point out that any language, when written, constitutes a form of communicating with mute characters, too. The fact that these characters might be pronounced does not detract from this. Hence, there is “no difference at all between any *character* which can be devised (by art) for the purposes of communication, and a *language*”. These arguments, evidently, are directed against the theoretical framework which made the idea of a universal character so popular. This framework makes an essential distinction between real characters, which designate things directly, and alphabetic letters, which designate things indirectly, through the medium of the sounds they directly signify (cf. 2.3.1 above). Dalgarno’s various attempts to construct a universal character made him realize that the distinction between, as he puts it in the autobiographical manuscript, “a Character either Real and immediate or mediat and vocal (...) has not that *fundamentum in re* that many doe erroneously imagine” (f.34r). After he had started using letters of the alphabet as a convenient index to his tables, he saw that there was no systematical difference between the written form of a spoken language and a writing consisting of symbols for which no pronunciation has been defined. Although this time there is no record that he experienced this new insight as a shock¹, it constituted a radical departure from suppositions that were widely taken for granted.

¹ Possibly this insight developed more gradually. The broadsheet *News to the Whole World* of 1658 shows that Dalgarno was thinking along ordinary lines at that time, claiming that “This Character shall immediately represent things, and not the sounds of Words, and therefore universal, and equally applicable to all Languages”. He adds that “by the same Rules it shall be made effable” (British Museum 4377, f.143r.).

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When he wrote *Ars signorum*, Dalgarno was far from viewing his language as anything like a universal writing, purporting to be capable of being read off in any existing language. In the autobiographical manuscript he is quite explicit about this point. Learned men, he says, have had false notions of a universal character, when understanding this as an extension of the use of such written symbols as those which are universally used for numbers, weights, etcetera. For such a system of symbols can never be “fitted to reach all the ends and uses of Language” (f.72v). Though this manuscript was written much later than *Ars Signorum*, it is clear that Dalgarno held similar views when writing the latter. Thus he states that the invention of a new symbolism, either language or character, should follow from a general theory of communication, ‘the art of signs’, aimed at establishing the most efficient and most rational medium of conveying thoughts from one person to another. He further explains that, although the principals underlying a language and a character are the same, a language is to be preferred. For the obvious advantage of existing languages to have both a spoken and a written form, should certainly be retained in the symbolism based on the ‘art of signs’. Furthermore, the invention of alphabetic writing was the single most admirable achievement in this field; it would have been against reason not to use it. Besides, using the letters of the Latin alphabet makes the language easy to learn, especially for Europeans, who are already familiar with them.

These arguments show that Dalgarno viewed his philosophical language as equally capable of performing the functions a universal character could perform, and as having additional advantages that such a character lacked. A natural consequence of this view would have been to forget about a separate character, which must have seemed redundant, being in one respect equivalent to the language, and inferior in others. However, when he published *Ars Signorum*, Dalgarno had not yet taken this final step. He apparently still regarded the earlier invention of an ‘art in mute characters’ as a useful one, and he only omitted a description of these characters for practical reasons. Thus the subtitle of *Ars Signorum* reads ‘Character Universalis et Lingua Philosophica’, at least partly because there actually was a character, apart from the philosophical language. It is very likely that Dalgarno also mentioned a universal character because this would instantly convey to his contemporaries what the book was about, whereas few people had any idea of what a philosophical language was. He reveals that friends had urged him to put forward the art in mute characters and to say nothing about the language, so as to arouse more curiosity. Though he did not follow this advice, strategic considerations were certainly on his mind. A language, he says, is more useful than a mere character, and it is to be expected that the perception of usefulness will outlast curiosity.

However, Dalgarno later realized that once a complete language had been constructed, a universal character would be superfluous. Looking back at the matter in the autobiographical manuscript written about 1685 he acknowledges that it was a mistake to think that offering both a character and a language could be useful. Invoking Ockham’s razor he declares:

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I look upon as the most considerable improvement of my thoughts set down in *Ars Signorum*: that my present judgment is that a Real Character provided distinct from the Character of the Language is quite to be rejected. [...] For seeing the Real Character and the Alphabetical [...] are virtually the same thoe differing in figure, it is a manifest redundancy to provide for the same thing twice (f.74r.)

It can be speculated that the deterring example of Wilkins's *Essay*, which Dalgarno is concerned to criticise throughout the manuscript, has been instrumental in this 'improvement of his thoughts'. However, the text of *Ars Signorum* shows that he had already very nearly reached this conclusion in 1661.

3.3 THE EMERGENCE OF THE PHILOSOPHICAL LANGUAGE

3.3.1 The Early Scheme versus *Ars Signorum*

Setting out as a modest attempt to devise a new method of shorthand, Dalgarno's project was transformed into the ambitious enterprise of constructing an entirely new language, based upon rational principles. The present section is concerned with the question how this major shift was brought about. As in the previous section, Dalgarno's autobiographical tract written circa 1685¹ provides the main source material, together with various broadsheets published between 1657 and 1660. The differences between the various stages of Dalgarno's project become clear if one compares the early scheme displayed on a broadsheet of 1657 with the language which was described in *Ars Signorum* four years later. This broadsheet is the one that contains the 'tables of the universal character', consisting of mnemonic verses, mentioned above (cf. 3.2.2, 3.2.3)². Two differences between the 1657 scheme and the language of *Ars Signorum* are especially significant in the present context. Firstly, in the tables of 1657 the ordering of radical words follows mnemonic principles, whereas in *Ars Signorum* the table of radical words follows a predicamental method, that is, it is based upon a classification scheme modelled on the theory of categories. Secondly, the early scheme makes a fundamental distinction between 'radicals' and 'particles'. The broadsheet contains two different kinds of tables, namely tables of radicals, listing items which are to be designated by primary symbols, and a table of particles, which are to be symbolized by diacritic signs placed around the primary symbols. In *Ars Signorum*, there is only one kind of table, namely, the table of radical words, which serve to express the notions of both 'radicals' and 'particles'. Modern scholarship has focused exclusively on the first of these changes, and largely ignored the second. As will be seen (3.3.4), in Dalgarno's own view the second change was by far the most considerable, as it concerns an aspect

¹ Christ Church MS 162 ff.21-84.

² BM 4377, ff. 145-146.

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in which the philosophical nature of his language mainly resides, namely its ‘formal part’, expressed by the particles.

3.3.2 From Mnemonics to Predicaments

Regarding the first point, the replacement of the mnemonic method by the predicamental one, the autobiographical tract is remarkably silent. It will be remembered that when Dalgarno had first collected a ‘heap of words’ for the purpose of his shorthand system, he considered four possible methods of ordering the collection (cf. 3.2.2). The first was to order the words alphabetically. The second, to group words together whose meaning has some relation to a certain theme, or which denote the same kinds of objects. Examples of such thematically arranged word lists Dalgarno was familiar with, were Junius’s *Nomenclator* and Comenius’s *Janua Linguarum*. The third method was to order them in a ‘predicamental series’ of genus, difference and species, as exemplified in logic books. The fourth was an order which would be easy to memorize, by using a mnemonic technique. Although Dalgarno discusses at length the development from a shorthand system to a philosophical language in the autobiographical manuscript, he does not explain why he changed his mind regarding the ordering of radical words. He does mention that the predicamental method was his final choice, and he does state, again without further explanation, that the first two methods soon appeared to be unsuitable. As far as the alphabetical method is concerned, it can be easily gathered from other sources why Dalgarno rejected it. It was the method eventually used by Beck, whose character consists of numerals referring to an alphabetically arranged word list. Dalgarno judged negatively about Beck’s design, because, among other things, it is virtually impossible to learn the list of radicals by heart. For the rest, Dalgarno considered Beck’s character as nothing more than an enigmatical way of writing the English language¹. Why Dalgarno rejected the second, thematic, method just as readily as the alphabetical one is less obvious, but he probably thought that such an ordering could not so easily be codified as an ordering following either the third or fourth method. Dalgarno further suggests that, having rejected the first two of the four methods, the choice between the two remaining ones was not particularly important. As far as the institution of a character or a language is concerned, he says, these methods are ‘in all respects the same’. Besides, the mnemotechnical ordering is nothing but an imitation of the predicamental ordering by genus and species: the verses of which the mnemonic tables consist, correspond to genera, the lines of the verses correspond to differences, and the radical words correspond to species. Dalgarno’s point seems to be that the only thing that matters for the ordering of the radical words is that some kind of hierarchical grouping is established,

¹ Dalgarno to Hartlib, 20 April 1657. BM Sloane MS 4377, f.148r. Slaughter 1982:121.

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the rationale of this grouping being of minor importance. For when this is done each radical word can be easily codified by means of a sign indicating the place it occupies in the hierarchy, which method, as has been pointed out above (3.2.3), is in fact used in the early scheme of 1657, as well as in both *Ars Signorum* and Wilkins's *Essay*. Of course, it may well be that Dalgarno had specific reasons for emphasizing this similarity between his early scheme on the one hand, and both *Ars Signorum* and the *Essay* on the other, that is, he may have been concerned to downplay Wilkins's influence on the structure of the language of *Ars Signorum*. Nevertheless, Dalgarno's overall view of the structure of a philosophical language is fully in accord with the conviction that the ordering of the radical words is of relatively minor importance. Tracing the development of Dalgarno's design a little further will help make this clear.

The history of Dalgarno's project as described thus far evokes the picture of a soloist, who is grappling his way through a series of problems posed by various changes the project happened to undergo. Although in essence this is the picture emerging from the autobiographical tract, Dalgarno also reports that his plans were studied and commented upon by a number of scholars¹. After a short period during which he was a stranger in Oxford, Dalgarno relates, his plans were developed in close association with others, especially with John Wilkins, although he carefully avoids to mention the latter by name. This was undoubtedly a consequence of what Cram has called an 'understandable sense of pique' (1980:117), since Wilkins in his *Essay*, in a retrospective account of the same period, had failed to credit Dalgarno by name, referring to him as 'another person'. The reason for this omission has never been clarified². It is known from both the *Essay* and Dalgarno's unpublished papers that Dalgarno and Wilkins disagreed on how a philosophical language should be structured, and that Dalgarno refused to use the tables Wilkins had drawn up for him. However, according to Dalgarno's

¹ It is known from independent sources that Samuel Hartlib solicited and obtained comments on Dalgarno's early scheme from, among others, Robert Boyle, John Pell, Nicholas Mercator and Francis Lodwick (Pell's and Lodwick's comments are preserved in British Museum MS 4377 ff.154-159, MS 932 ff. 13-15; two letters from Mercator to Hartlib are preserved in the Hartlib collection at Sheffield, MS 56/1/74A and 56/1/114A-115B). Cf. Salmon 1966. Cram (1989) has discussed exchanges with Comenius on Dalgarno's early scheme.

² Funke 1929:37-43 discusses the issue at length, accusing Wilkins of scholarly self-satisfaction in failing to give the schoolmaster Dalgarno due credit for his contribution. Salmon (1966:369-370) speculates that Wilkins might have seen a letter Dalgarno wrote to Hartlib, containing some rather unfavourable remarks about Wilkins. Salmon (1972:31) even claims that this is "no doubt the reason why Wilkins made no acknowledgements to Dalgarno". Equally speculative, but more straightforward, is the assumption that Wilkins might have been irked by the fact that he was not mentioned by name in *Ars Signorum*, which does contain an account, be it a brief one, of the previous history of the project, mentioning Ward and Lodwick by name (AS:78-79). It is not unlikely that Wilkins felt Dalgarno's failure to record his name in that context to be a blatant omission, which he avenged in the *Essay*.

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account, the ‘breach of judgment’ which ended the collaboration did not influence personal relations. This is confirmed by the fact that Wilkins appears in the list of persons contributing funds for the publication of *Ars Signorum*. It is more important for present purposes that the disagreement on the structure of a philosophical language was fundamental, as is clearly shown by Dalgarno’s account of his discussions with Wilkins.

When Dalgarno made the energising discovery that his shorthand system was at the same time a universal character (cf. 3.2.2), he began to expect that his invention would bring him fame and fortune. An old school-fellow, the only acquaintance Dalgarno had in Oxford at the time, advised him to contact John Owen¹, who referred Dalgarno to Seth Ward, professor of astronomy and a member of the group of scholars who were later to form the nucleus of the Royal Society. Ward was actively involved in the development of various schemes for artificial languages. His precise rôle in this regard is still unclear, but it is well known that in the *Vindiciae Academicarum* (1654) he sketched a program for a philosophical language to be based upon the analysis of concepts. He was a friend of Wilkins, who credited him in the *Essay* with directing him into the proper course for an enterprise of this sort. Ward was known to have been working on a scheme himself, which was eagerly awaited, but never brought to public light². Ward received Dalgarno in a very friendly manner, told him that he liked his scheme, and gave him access to his own notes on the subject. He promised to support Dalgarno’s work, and to recommend it to others. Further, he advised Dalgarno to become acquainted with Wilkins, whom Ward of course knew to be very much interested in schemes of the kind Dalgarno had made.

Through Ward, Dalgarno’s papers came into Wilkins’s hands. Wilkins was very much pleased with Dalgarno’s scheme as well, for when they first met, Wilkins and Ward ‘casually walking the streets’, Wilkins promised Dalgarno to present the latter’s labours ‘to the supreme powers of the nation’. Wilkins, who was warden of Wadham College, invited Dalgarno to the college, and he introduced him and his work to a circle of scholars. Of course, Dalgarno was ‘overjoyed’ with these developments. A humble schoolmaster, and stranger in Oxford, he found that his work had suddenly received active support from leading figures in academic circles. In order to promote his design further, and to attract sponsors, Dalgarno published an advertisement announcing ‘a new discovery’, namely a universal character which was at the same time a method of shorthand (BM 4377 f.144r). To heighten his credibility, he referred to the fact that Wilkins and Ward were involved in the project. This advertisement was followed by the broadsheet of 1657 (BM 4377 ff.145-146), containing the early scheme, with the tables arranged in

¹ Cram notes that John Owen (1616-1683) was vice-chancellor of Oxford from 1652 to 1658.

² Cram (1994) has argued that this may be explained by the fact that Ward is a representative of a ‘radical’ position regarding universal language, according to which the construction of a satisfactory new language is not impracticable, as the sceptic position claims, but unnecessary.

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mnemonic verses. This broadsheet contains a dedicatory letter to Wilkins and Ward, in which Dalgarno again acknowledges his debt to them, and appeals to their authority. He further draws attention to the following :

my present designe is to give a prooffe of my undertakings, by presenting so much as may be sufficient to expresse the common intercourse of mankind: my method is simply memorative abstracting altogether from Philosophy: the periods of my table are composed more of nonsense than sense, so that he who carps at them upon this account, seems not to comprehend rightly the scope of the whole designe

Again, it appears that Dalgarno was not in the first place concerned with the order among the radical words in his tables. More important in his view is their selection: together they should allow the expression of all notions involved in discussions of everyday matters. The choice for the ‘memorative’ method, he indicates, is arbitrary, the alternative being ‘Philosophy’, by which he doubtless means the predicamental method. It is known that by the time Dalgarno produced the scheme displayed on the broadsheet, Wilkins was trying to persuade him to use the predicamental method. Dalgarno, however, had his misgivings. In December 1657 he wrote in a letter to Pell:

Manie learned persons here [i.e. Oxford] advyse me to order the simple notions in a philosophical method withal joyning the memorative helps, chiefflie Doctor Wilkins advyses this and is taking paines himselff to put them in praedicamental order. This method I did choose in the beginning but thereafter deserted it for two reasons, first I found all the mnemonicke helps wold not answere to the philosophicke method, 2dlie I feared if I did pretend a philosophicke order ther wold be quot capita tot sententiae among philosophers which might occasion alteration and so the chieffe intended end of the designe to be lost (BM 4377 ff.151r-152r)

Both arguments against establishing a predicamental order among his radical words were still important to Dalgarno when he wrote *Ars Signorum*, in which he nevertheless adopted this method. The first argument, that a predicamental order would make the language hard to learn, could be bypassed by recommending an alternative means for committing the radical words to the memory, as Dalgarno does in chapter 7 of *Ars Signorum*. For the second argument, that the theory of categories (or predicaments) was not sufficiently clear to yield an uncontroversial predicamental series, Dalgarno had no solution, other than to emphasize, as he does in *Ars Signorum* (p.27-28), that any ordering of this kind is necessarily arbitrary. The reason why he eventually abandoned the mnemonic method in favour of the predicamental one can only be guessed at. His concern with learnability remained, and his original mnemonic method proved to be successful: in May 1658 he published a leaflet containing the testimony of Richard Love from the university of Cambridge that two students had mastered the universal character within two weeks (BM 4377 f.157r). In any case, it is clear that when he wrote *Ars Signorum*, Dalgarno was

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convinced that some version of the predicamental theory should play an important part in establishing a truly rational language (AS:18).

The autobiographical tract contains a passage, in which Dalgarno admits, though rather cryptically, that he at first reordered his tables along predicamental lines only to yield to Wilkins's pressure, for fear of losing the latter's support. The story is the following. After Wilkins had learned the details of Dalgarno's plans, he suggested that the tables were defective, especially in 'the predicament of Substance', which traditionally comprises the 'species of natural bodies'. Wilkins "was so zealous for hastening the work and so much concerned for this part of it that he offered his assistance in drawing up a Scheme of Natural bodies, which he did and put into my hands". Dalgarno however was unwilling to use Wilkins's tables, as they destroyed "that which was my grand principle, to finde out the shortest, easiest and distinctest Medium of communication for the commone use of all mankind" (f.30v). Dalgarno and Wilkins

argued the case often but without conviction on either side. My Lord of Sarum [i.e. Ward] did hear our reasons on both sides but was not free to interpose. I was willing and offered so much, for preventing a breach which [I] foresaw would prejudice the design much and me more in the profite I promised myself from it, in things of arbitrary institution to submit to his judgment, but this was not thought submission enough. Hence followed a perfect and declared breach of judgment, though not of friendship (ff.30v-31r)

It seems likely that Dalgarno's offer to submit to Wilkins's judgment, 'in things of arbitrary institution', entailed the adoption of the predicamental method. For in Dalgarno's view, as has been seen, the ordering of the radical words was an arbitrary matter, and of little importance if compared to the question which words are to be selected as radical ones. The disagreement with Wilkins centered on this latter question. The main topic of the debate was not whether the theory of predicaments should guide the ordering of the radical words at all, but how, given that this was granted, it should be used for establishing the lexicon of the philosophical language.

3.3.3 The Debate concerning the Radicals

When Wilkins suggested to order all the 'species of natural bodies' predicamentally, Dalgarno's first reaction was that, for the time being, he wanted to restrict his vocabulary to what he called 'the body of language', that is, those words needed for ordinary discourse. He saw that if he followed Wilkins's suggestion, his tables "would swell ... to such a Bulk as to discourage any to learn it" (f.44v). From the start, it had been Dalgarno's concern to keep the number of radical words as small as possible. Wilkins's suggestion amounted to quite the contrary, for a list of the 'species of natural bodies' was to comprise all sorts of inanimate things, such as minerals, stones and metals,

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and animate things, that is, all the various kinds of animals and plants. The tables Wilkins presented to Dalgarno consisted of extensive enumerations of all these sorts of things, containing many hundreds of items. We know this, because Wilkins testifies that the tables of substance he drew up for another person, i.e. Dalgarno, were very much like the ones expounded in the *Essay*¹. Fourteen out of a total of the forty genera enumerated in this work pertain to the species of natural bodies. In these fourteen genera 1,606 species are enumerated. To devise a radical word for each of the items in Wilkins's tables would run counter to Dalgarno's principal goal: to construct a rationally instituted language, which implied, among other things, that it was easy to learn and easy to use.

Wilkins argued that if Dalgarno's lexicon failed to provide for the various kinds of animals, plants etcetera listed in the tables he had established, Dalgarno would "fall under the censure of learned men for putting forth a lame design" (f.44v). Dalgarno replied that he intended to make his lexicon capable of expressing all the notions to be found with some author, and he considered using the bible for this. The lexicon of radical words as Dalgarno conceived it was to be a basic vocabulary, by means of which more specialized expressions could be formed through composition and derivation. Wilkins however urged "that in a Philosophical Language that part was not to be omitted that was most capable of a Philosophical Institution"(f.46r). In his opinion "a Philosophical Language should containe a regulare enumeration according to the received Theory of all the Notions of Nature and Art, that so the Lexicon of Radicals might be a Synopsis or Index of the whole Encyclopedia of Arts digested in a Predicamental Series"(f.47r). Thus it appeared that Wilkins and Dalgarno had incompatible views on the nature of a philosophical language. Wilkins's main concern was to establish a scientific nomenclature, which was to be as comprehensive as possible, so that the vocabulary of the language would be a kind of encyclopedia. Such a language could be called philosophical, as it reflected 'natural philosophy', that is, scientific knowledge. Dalgarno on the other hand was chiefly concerned with the structure of the artificial language itself. The language he envisaged could be called philosophical, because it was constructed following principles resulting from an abstract consideration of how a language should ideally be structured. In this context, 'philosophical' is for the most part synonymous with 'rational'. In Dalgarno's view, 'the dictates of right reason' ordained that the number of radicals, rather than being equal to the number of things, should be small, not just for the sake of learnability, but for other reasons as well, which will emerge below.

¹ Cf. *Essay*, the epistle to the reader (Sig.b2v.): "for the helping of whom [i.e. 'another person', i.e. Dalgarno] in so worthy an undertaking, I did offer to draw up for him, the Tables of Substance, or the species of Natural Bodies, reduced under their several Heads; which I did accordingly perform, much after the same Method, as they are hereafter set down".

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Against Wilkins's encyclopedic conception of the lexicon of radical words Dalgarno adduced a series of arguments. First, he doubted "if any one single man, or society of men, could presume to be either so wise or so happy as to finde this out to that perfection as to have all mankinde to subscribe to their judgment" (f.47r). The argument that Wilkins's all-embracing classification scheme consists of arbitrary distinctions has been put forward time and again, centuries after its completion. We now know from Dalgarno's tract that the argument was brought to Wilkins's attention when he had just started working on it, and that, ironically enough, this was done by the man who has often been erroneously charged with having attempted something similar. Secondly, Dalgarno maintained that it was impossible to establish 'an exact and full predicament', because the number of things to be classified by such a scheme is far too large. Thirdly, even if it were possible to establish an indisputable and sufficiently comprehensive predicamental series, it would be "ridiculous to attempt to build a Language upon so large a foundation" (ff.47r - 48r). It would be tantamount to imitating the Chinese, "for other nations can use 24 letters to as good purpose as they doe 24 thousand"(f.48r). In other words, just as alphabetic writing is superior to Chinese character writing because the former requires a much smaller number of basic signs, so is a language having few radical words better than a language having many. In Dalgarno's opinion, this was a fundamental point, on which he enlarges elsewhere in the manuscript (ff.78r - 83r).

In all arts, he claims, paucity of elements is a mark of excellency. An example from the art of signs, besides alphabetic writing, is formed by numbers: "ten numerical figures can perform the whole business of numeration"(f.78r). Accordingly, the lexicon of the philosophical language should consist of the smallest possible set of primitive or radical words, by means of which expressions for all notions can be formed through combinations of radicals. As a consequence, the philosophical language should to a large extent rely on compound words and periphrastical expressions. As Dalgarno argues, this is wholly in accord with reason. For it is the only way of coping with the multiplicity of things, and hence it is used by all existing languages. Even the *Essay*, Dalgarno emphasizes with satisfaction, cannot escape resorting to compound expressions. Furthermore, he adduces two examples to prove that this way of naming things is unquestionably rational. First, "God himself named Adam, thoe a single individuum and the most perfect of all corporeal beings, by a derivative not primitive word". Second, Adam, when giving names to all creatures, did not use primitive words, but 'words of a secondary institution inflected from other words', the sense of which contributed to the description of the thing named. "For unless this be granted, the commone opinion of Adams giving names to all living creatures suited to their natures will be absurd" (f.83r).

This argument is interesting, as it shows that Dalgarno had stripped off the mystic connotations from the myth of a perfect Adamic language without destroying the myth itself. In his view, a name that is suited to the nature of a thing must necessarily contain at least a partial description of that thing. It

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would be absurd to suppose that there is any other respect in which a name may be suited to the nature of a thing. It follows that such descriptive names are compounds, deriving their descriptive content from the meaning of their component parts. On this view, the nature-convention debate regarding the relation between a sign and the thing signified is pointless without a distinction between primitive and compound signs. The meaning of primitives depends on arbitrary institution, while the meaning of compounds is a function of the meaning of the primitives composing them and hence is, in a certain sense, less arbitrary. This view was shared by Dalgarno and Wilkins, and it plays an essential part in Leibniz's philosophy of language. A recurrent tendency among modern commentators to associate seventeenth century plans for a philosophical language with mysticism proceeds largely from a lack of appreciation of this basic point. Dalgarno's reference to the Adamic language further shows that he also had a positive reason for requiring the primitives to be few, namely that the number of compounds should be as large as possible. For unlike a primitive, which by its very nature has no descriptive content, a compound is informative, and therefore 'suited to the nature of the thing' it signifies. Moreover, to understand the meaning of a compound requires no additional effort if the meaning of its component parts is known. Thus the practical need for learnability fitted in neatly with the theoretical requirement of philosophical adequacy, both favouring the use of compound expressions whenever possible. Dalgarno's conception of a philosophical language, then, was guided by "a fundamental principle. That no notion is to be expressed by a primitive Sign, which by its nature is capable of being exprest by a derivation or composition" (f.84r).

Wilkins's tables listing the species of natural bodies clearly flouted Dalgarno's principal maxim. For this reason, Dalgarno maintained against Wilkins that a philosophical language should be based upon an enumeration of 'the fewest Notions of things, which (...) should be the *Genera* and *communes rationes rerum*' (f.48r), while the 'appellations of the numerous proles of inferior notions' (f.46v) should be deduced from the generical notions by means of derivation, composition and periphrasis. Stated in terms of the theory of predicaments, the controversy between Dalgarno and Wilkins concerned the question whether words denoting species should be admitted as radicals or not. According to the spatial analogy connected with the Porphyrian tree, the species are lower than the genera: the tree grows downward. While Wilkins suggested to go all the way down to the species, Dalgarno refused to descend below the level of genera. However, although both disputants seemed to understand very well what they were talking about when referring to 'the predicament', a 'predicamental series' and so on, they had widely different conceptions of what such a series could and should look like. It has been seen that Dalgarno doubted if a full predicament as Wilkins conceived it could be satisfactorily established. When Dalgarno proposed to use only words denoting generical notions as radicals, it was Wilkins's turn to be sceptical. If it were possible, Wilkins said, to give accurate definitions of the species in terms of genera and essential differences, he would agree. But

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since the forms of things, if they exist at all, are unknown to us, this method is impracticable. He was inclined to follow the 'new philosophy', according to which these forms were in fact 'a multitude of modes of matter'. If definitions of the species were to sum up all these modes, the definitions would be too long to serve as radical words. The most rational method therefore, Wilkins argued, was to put the species, in Dalgarno's words, "in predicamental rank and file, and give them their names by instituting such words and Characters as might denote their numerical place and order"(f.47v). When talking about the 'forms of things', Wilkins was undoubtedly thinking of the Scholastic doctrine of substantial forms, which were believed to determine the essence of a thing. In accordance with the new mechanistic philosophy, he could make little sense of this kind of essentialism. As a consequence, he gave up most of the ontological pretensions which traditionally were connected with the theory of predicaments. In his view, a predicamental series is a more or less systematical ordering of a large number of items, rather than an ontologically correct hierarchy of essences.

As Dalgarno admits, this was Wilkins's strongest point. He fully agreed that "essential definitions by formal differences expressable in one or few words seemed to be, if possible at all from the nature of things, yet to be above the reach of human skill, and so impracticable in our present case" (f.48v). But it did not follow from this, as Wilkins believed, that it would be best to simply list all the species belonging to a genus in an arbitrary order, assign a number to each species, and derive the names of the species from the name of the genus by adding '*n*th species' to it. Rather, the species should be distinguished by the difference best known to us, that is, by some accident which is most obvious to our senses. The name of a species, in Dalgarno's view, should accordingly be composed of the name of the genus to which it belongs and the name of some salient feature which sufficiently distinguishes the species from others belonging to that genus. In this way, Dalgarno retained the pattern of the essential definition by genus and specific difference known from Aristotelian logic, without being committed to essentialism in any way. He fully realized that the names formed by this method could not be regarded as complete definitions of the things they refer to. As he repeatedly states, he was merely following the practice of all existing languages here.

Thus it appears that neither Wilkins nor Dalgarno believed that it was possible to state a perfect theory of predicaments, such that the essence of each kind of thing occurring in the 'predicamental series' was defined. They both were acutely aware that classification alone is an insufficient basis for definition¹. Nevertheless, they were convinced that some version of the theory of categories should underlie the lexicon of radical words. However, they disagreed on how this should be implemented. Wilkins envisaged using the predicaments as the main categories of a systematic encyclopedia, classifying, as far as possible, the various kinds of things existing in the world. Dalgarno was more inclined to regard the predicaments as constituting a comprehensive

¹ This point will be explained more fully below (3.4.6).

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conceptual scheme, of which the generic notions can be used to compose the notions of the species. They each emphasized one of the two aspects that had characterized the Aristotelian theory of categories from the start, namely an extensional, classificatory aspect and an intensional, conceptual one. The disagreement at this point reflected a more general difference of opinion concerning the role of the radical words within the philosophical language. In Wilkins's view, the principal feature which distinguishes a philosophical language from others is that its radical words are derived from a scheme classifying the things they designate. For this reason, it was his primary concern to establish a comprehensive predicamental series. Dalgarno's interest lay primarily with the use of the radical words for the expression of more complex meanings. The predicamental foundation of the radical words remained secondary. As Dalgarno puts it:

I designed as my chief and ultimate end the easiest medium of Interpretation, and subordinatly to that the most natural order of the *Summa genera rerum* which were to be the Radicals. On the other hand the Reverend and learned author of the *Essay* seemed to me, and I have often told him so much, to invert this order, that is, to make the Grammatical part subordinate to the Philosophical, or at least to carry on both *pari passu* (f.55r)

As it turned out, both methods of constructing a philosophical language were put into practice. The debate did not lead to agreement, a 'breach of judgment' put an end to the collaboration, and thenceforward Dalgarno and Wilkins pursued their own design independently.

3.3.4 The Particles and the 'Great Change'

More than the collaboration with Wilkins itself, its ceasing had a decisive impact on the development of Dalgarno's scheme, at least according to his own retrospective account. As soon as the news of the breach had spread, both intellectual and financial supporters started to withdraw. Dalgarno lost his hopes of making a fortune out of his invention and considered abandoning the project. Returning from a journey to Scotland he found that rumours went round accusing him of plagiarism. This was mainly due to a book by Owen, in which it was announced, without reference to Dalgarno, that Wilkins was ready to publish a universal character¹. When Dalgarno complained to Owen about this, the latter assured him that he knew very well that Dalgarno was the initiator of the project. He had only left him unmentioned because he had heard that he had given up his design and had gone to Scotland. This answer, Dalgarno relates, "did at least comfort me that I should not lay it down dishonourably" (f.34r).

¹ John Owen, *Of the Divine Originall, Authority, self-evidencing Light, and Power of the Scriptures*, 1659:277.

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It was not until this time that Dalgarno formed what he considered his best thoughts on the matter. Recognizing the perennial truth that marketing objectives may clash with sound philosophy, he realized that “hitherto the hope of gaine had had a great influence upon, and bin the confusion of my thoughts” (ff.37r - 35v). Reconsidering the whole design ‘not in the Goldsmiths but the Philosophers Scales’ (f.37r), then, he perceived that the purposes of shorthand were incompatible with those of a philosophical language. This implied that what had seemed the best part of the design, both to himself and to others, had to be completely reworked. This part was formed by the tables of ‘particles’. The early scheme of 1657 contained a list of 228 words, classed as particles, which, as mentioned in 3.1, were to be expressed by various diacritic signs placed around the characters signifying a radical word. The table of particles comprised pronouns, determiners, adverbs, prepositions and conjunctions, and besides a list of ‘derivatives’. The latter list contained 24 items, among which were grammatical categories, such as ‘female gender’, semantic features, e.g. ‘actor’, ‘instrument’, and parts of speech: substantive, adjective and adverb. *Ars Signorum* contains a brief passage in which Dalgarno looks back at this characteristic of his early scheme (AS:79-80). The particles, he explains, were meant to express the formal notions, as opposed to the material ones, expressed by the verbs and nouns listed in the tables of ‘integrals’. Thanks to this distinction, he was able to achieve a greatly abbreviated method of writing. Whole sentences could be written by a single character with a number of points positioned around it.

However, if the notions expressed by particles are logically analyzed, it appears that they are either composite or derivative. As he puts it in the autobiographical tract: “to speak strictly and logically there is no such thing in nature as a primitive and underived particle, but are all of them contrived for compendiums of speech” (f.39r). It would go against the principles guiding the construction of a philosophical language to express such notions by a primitive sign. Rather, the sign should indicate the nature of the composition or the derivation. Thus a choice between the antagonistic goals of shorthand and those of a philosophical language had to be made: “Short-Hand required the particles (...) to be provided for by distinct marks from the Integrals. Philosophy teach[es] that they ought not to be so, but that all the particles as they derive their signification from the integrals so they ought their Signs” (f.38r). Since Dalgarno no longer hoped that his project would make him rich, the choice for the philosophical method was easy. Consequently, the table of particles was discarded and replaced by a logically motivated method of deriving particles from the tables of radicals. This method will be discussed in detail below (5.5).

To Dalgarno’s mind, this last change was by far the most drastic one he ever made to his design. As he emphasizes in *Ars Signorum*, the particles constitute the formal, most difficult and indeed the most important part of speech. For this reason, he claims that the analysis of the particles forms the ‘key to the invention’ (AS:78). Clearly, if one takes into account that the ‘particles’ comprise all prepositions, determiners, conjunctions, and many

3.3 THE EMERGENCE OF THE PHILOSOPHICAL LANGUAGE

adverbs of natural languages, Dalgarno's claim seems justified. It is true that this part of his design is elusive, and as far as it is clear, it appears to be crude and fundamentally misguided. Nevertheless, it is also its most interesting and most unique aspect, in that the expression of the particles purports to reflect an analysis of the logical structure of thought. It is astonishing that this most noticeable characteristic of Dalgarno's language has been almost wholly lost upon modern scholarship.

Having introduced the new method of treating the particles, Dalgarno altered this design very little. He "made all haste possible to forme that model of them which appears in *Ars Signorum*". He probably feared that others would produce a similar scheme on the basis of his ideas¹. The text of *Ars Signorum* bears some signs of this haste, being sometimes inaccurate and at times less explicit than one would wish. Nonetheless, Dalgarno regarded the views expressed there as definitive, for he states in the autobiographical tract: "I cannot yet after the experience of near 30 years (...) discern any considerable blemish in *Ars Signorum*, but remaine still fixed in the same judgment, wherof I was then" (f.41r). The following sections (3.4, 3.5) contain an exposition and discussion of the philosophical language described in *Ars Signorum*.

3.4 THE LEXICON OF THE PHILOSOPHICAL LANGUAGE

3.4.1 Introduction

When *Ars Signorum* was published in 1661, the monarchy had just been restored. Dalgarno opens his book with a dedicatory letter to king Charles II, written in the philosophical language². This is followed by a letter of recommendation (in English) by the king, in which he refers to the 'Testimonies of divers Learned Men from both the Universities of our Kingdom of *England*', including Wilkins, Wallis and Ward, who approve and commend Dalgarno's invention³. In a letter 'to the philosophical reader' Dalgarno solicits comments aimed at improving his design, and he appeals to experts for help in making the lexicon complete. The prefatory matter is completed by a table summarizing 'the alphabet of this philosophical language' (cf. 3.4.2, 3.4.5)

² In the Bodleian library, there is a copy of *Ars Signorum* containing word-for-word glosses to this letter in a seventeenth-century hand. Shumaker 1982:167-170 prints the letter, the word-for-word-rendering and provides a proper English translation.

³ In a transparent attempt to rewrite political history, the letter is signed '26th of November, in the 12th Year of Our Reign', bluntly ignoring the republican period which lasted from 1649, when Charles I was beheaded, until 1660.

¹ Dalgarno wrote to Hartlib (3 November 1659): "I feare my too much friedome & openes while I conversed with men may be by some not made good use of" (Sheffield, Hartlib MS 42/7/1). He further asked Hartlib to keep him informed about any publications by Comenius, Urquhart and Wilkins (from Cram's notes).

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and a list of thirty sponsors, who are reported to have contributed an amount between one and ten pounds each. Next Dalgarno proceeds to explain his language, interspersing the description with various observations on logic, language and philosophy. The present section is concerned with the lexicon of Dalgarno's language, the following one (3.5) with the grammar. *Ars Signorum* further contains two word lists, which it is important to distinguish: first, the 'lexicon grammatico-philosophicum' which is printed on a fold-out sheet, containing the tables of radical words, amounting to 1,068 words (cf. 3.4.4, 3.4.5); secondly, the 'Lexicon Latino-Philosophicum' at the end of the book, listing c. 1,500 Latin words with their equivalents in the philosophical language (cf. 3.4.7).

3.4.2 The First Elements of Signs

It is characteristic for Dalgarno's primary concerns that *Ars Signorum* starts with a discussion of the first elements of signs. Clearly, his main objective is to provide a language which is based upon a general theory of symbolization: the art of signs. Leaving little doubt about his pretensions, he claims himself to have discovered, where others have failed, the key to this 'primary and most necessary art'. Expressing his admiration for the inventor of alphabetic writing, he notes that an analysis of speech sounds into simple elements must have preceded it. However, the alphabet currently in use has some defects. For one, symbols and speech sounds are not related one-to-one as they ought to be, and for another, there is no system in the order of the letters.

Dalgarno proceeds to present a phonological theory in which these errors are avoided, and which establishes the alphabet of simple sounds that is to be used in his language. The theory is explicitly restricted to the principal simple sounds, ignoring minor distinctions. With a view to the universal utility of the language, only those sounds are taken into account which are easy to pronounce by any nation. In what he calls a 'natural and real analysis of sounds' (AS:5), Dalgarno applies two criteria for distinguishing simple sounds. The first and main one is formed by 'the various ways of opening and closing the organs of speech' (AS:2). In cases where this criterion is not distinctive enough, it is supplemented by observing acoustic differences. Probably Dalgarno assembled his empirical data simply by personal experiments, for he notes that it took him a lot of time and trouble to identify the difference between *n* and *l*: "although I could hear two quite distinct sounds with my ears, for a long time I was scarcely able to perceive, and far less able to describe, any distinction at all in the contact of the organs" (AS:5).

This analysis of sounds leads first to a major distinction between open and closed sounds. The group of open sounds comprises seven vowels, which divide again into four gutturals: *a*, *h*, *e*, *i* and three labials: *o*, *u*, *u*. Dalgarno's alphabet starts with these letters, in this order, which is justified by the fact that *a* represents the most open sound, the other gutturals ranging by steps to *i*, which is produced with the throat most narrowed. The same holds for the labi-

als, *o* being the most open sound, *u* requiring the greatest contraction of the lips. The seven vowels can be combined in many ways to form diphthongs, of which Dalgarno mentions six for their being easy to produce and distinguish: *ai*, *ei*, *oi*, *au*, *eu*, *ou*. The precise status of these diphthongs in the philosophical alphabet is not clear. They do not occur in the table summarizing this alphabet which is among the prefatory matter, presumably because they are not simple sounds. However, the first three are used in forming lexical items according to the ‘lexicon grammatico-philosophicum’ (cf. 3.4.5) and in words designating numbers, and also to form various affixes (cf. 3.5.3), whereas the latter three are not used in the philosophical language at all. This slight inconsistency between the text of *Ars Signorum* and the accompanying tables which it is supposed to explain is one of the inaccuracies that are probably due to the book being rushed into press.

Of the sounds made with the speech organs closed, that is, consonants, Dalgarno selects twelve, three of which are semi-closed: *s*, *r*, *l*. The remaining nine sounds are fully closed, while the closure is either made by the lips: *m*, *b*, *p*, or by the tongue: *n*, *d*, *t*, or finally by the throat: *f*, *g*, *k*. These nine are further differentiated by ‘the different type of sound made in producing them’, which leads to the following result:

	labials	linguals	gutturals
nasals	m	n	f
suffocates	b	d	g
muters	p	t	k

table 3.1

Dalgarno notes that he at first intended, on phonological grounds, to use what today is called the velar nasal, written as ‘ng’, this sound being as easy and distinct as *m* and *n*. Since this is a simple sound, its representation in common orthography by a composite symbol ‘ng’ is erroneous. Furthermore, the symbol ‘ng’ combines symbols for sounds which cannot follow upon one another within a syllable. In order to avoid this error, Dalgarno at first used the letter *f* to designate the velar nasal. However, observing that all nations use this sound only within specific phonological contexts, he decided to reject it from his language and to use the sound commonly represented by *f* in its place.

As a result, the alphabet of the philosophical language looks like this: a, h, e, i, o, u, u, s, r, l, m, n, f, b, d, g, p, t, k. In addition, Dalgarno uses the letter *v* for various purposes (cf. 3.4.5)¹. The alphabet is intended to be phonetic in that each letter represents exactly one sound. Further, the order of the letters is derived, as far as possible, from articulatory principals. Unfortunately, it would nevertheless be hard to determine exactly which sounds Dalgarno intended to be represented by his letters. He does say that *a* should be pro-

¹ According to Dalgarno, *v* derives from *b* by aspiration (similarly, *f* derives from *p*).

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nounced as in *law*, and *i* as in *peel*, but gives no further examples. Apart from this, the use of the Greek eta and upsilon is likely to impair a clear word picture, and proved to be a source of typographical errors.

3.4.3 The Predicamental Series

Before explaining how the simple elements of signs are combined to form integral signs, and how these are assigned to things, Dalgarno gives a brief sketch of his program. Unlike existing languages, whose words have been assigned to things haphazardly, a philosophical language should take the nature of things themselves into account. Since we make signs stand for things, he says, the art of signs, i.e. grammar, should follow the art of things, i.e. the one single art constituted by logic and metaphysics. More specifically, the words of the philosophical language should be based upon the ‘predicaments’, that is, that part of medieval logical theory that derived from the Aristotelian theory of categories. Although in this context Dalgarno identifies the predicaments with a ‘series of things’, it is clear that in his view they do not only model nature, but cover the realm of ideas as well¹. Thus he says: “whoever wishes to assign *names* to *things* according to reason must first, by an act of logical creation as it were, introduce form, beauty and order into that chaos of the world of ideas existing in the mind”. This ‘form, beauty and order’ does not result from a free creative act, but reflects the order to be found in the outside world: “the grammarian must assign names to things according to the ideas and logical rules derived from the nature of externally existing things themselves. This regular series of things is commonly called the Praedicamentum” (AS:18). It thus appears that in sketching his program, Dalgarno presupposes that reality has an intelligible structure, that this structure is reflected in our ideas, and that these are adequately, and even beautifully, ordered by a theory of the kind exemplified by the predicaments of scholastic logic. The words of a philosophical language should be modelled on such a theory.

However, it would be a mistake to view Dalgarno’s language as a straightforward implementation of this program. Although he argues at length for the soundness of its epistemological starting-points, he voices serious doubts about its practicability. As will be seen, he not only establishes that an adequate predicamental theory does not exist, but he also argues that such a theory is beyond human capacity. More surprisingly still, he states that even if

¹ Dalgarno indiscriminately refers to the predicaments as ‘a series of things’ (AS:28) or as a ‘series of things and notions’ (AS:27). He further describes the predicaments as an ordering of notions (AS:29) and at one point he refers to ‘a series of things (...) comprising all the principal and known notions’ (AS:28). The relation between things and notions is never given systematic consideration, apart from the remark that “the apprehensions or perceptions of the human mind are rightly called conceptions of things. For things themselves are like a father, begetting his image in our minds; the intellect is like a mother conceiving these images” (AS:27).

it did exist, it could not serve as a proper foundation for the words of his language. At this point, the text of *Ars Signorum* suffers from a substantial inconsistency, which, as could be expected, few of Dalgarno's readers have recognized. As a consequence, the nature of his project has been widely misinterpreted as an endeavour to carry out his programmatic statements.

The doctrine of the predicaments, it has been seen, lost most of its prestige in the course of the seventeenth century, associated as it was with a medieval conception of knowledge. Dalgarno however mounts a vigorous attack on 'some writers of this century', who deny that the predicamental doctrine is of any use. He is undoubtedly hinting at Hobbes here, and he proceeds to criticise the latter's materialism, which according to Dalgarno either implies atheism or is inconsistent. Giving the impression of being carried away by the subject, Dalgarno inserts a metaphysical discussion, purportedly proving the immortality of the soul and the existence of God (AS:20-24). The most conspicuous aspect of these arguments is that they are explicitly set forth in syllogistic form. The proof of God's existence ranks among the shortest and most trivial ones ever proposed: the first cause exists, God = the first cause, therefore God exists. Further, the soul is immortal because otherwise it could not have the idea of God. Perhaps more interestingly, Dalgarno points out that Descartes's maxim 'I think, therefore I am' is based upon a fallacy. For supposing, as Descartes does, that nothing beyond my own mind exists, entails that it is impossible for me to think, since an act of thought, just as an act of perception¹, necessarily requires an object. Although the mind may have its own acts for an object, such reflective acts presuppose direct acts having external objects (AS:21-23).

Against Hobbes's scepticism concerning the doctrine of predicaments, Dalgarno defends a scholastic conception of logic, maintaining that it is "the duty of the logician to bring together the scattered parts of philosophy treated of by others in the subordinate disciplines and to organise them by a regular hierarchy into a single system, which can properly be called a *praedicamentum* or *orderly series* of all *things*" (AS:19). Furthermore, he asserts that without such a series there is no basis for the distinction between definition and description. A definition, according to classical logical doctrine, tells us what a thing really is, whereas a description merely provides a list of properties of a thing². Since a proof relies on definitions, and definitions in turn presuppose a series arranged by genus and species, Dalgarno concludes that without such a series there can be no real proof³. Having thus shown that, epistemologically speaking, a logical theory of this type is of central importance, he notes that it is as yet non-existent. Although Aristotle laid

¹ Cf. Aristotle, *Categories* VII, 7b 35-38: "The perceptible seems to be prior to perception. For the destruction of the perceptible carries perception to destruction" (Ackrill 1963:21).

² Cf. Blundeville 1599:50; Arnauld & Nicole 1970[1662]:216 (II, XVI).

³ It is however unclear to what extent Dalgarno himself believed in the possibility of giving such real proofs. Elsewhere (AS:44) he actually gives up the distinction between definition and description (cf. 3.4.6, 3.4.7).

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some foundations for the ‘predicament’, these are unsatisfactory. His ten categories are arbitrary and not accurately distinguished, since often the same notion can be assigned to several predicaments. Unfortunately, Dalgarno does not illustrate this point by examples. Further, Aristotle allowed notions which are called transcendentals to fall outside the predicamental series, which contradicts the requirement that all notions ought to be subsumed under one highest genus. It is not clear why Dalgarno should attach so much value to this non-Aristotelian requirement (AS:25; cf. 27, 36-37). Aristotle argued that “it is impossible for either Unity or Being to be one genus of existing things”¹. Porphyry followed Aristotle in denying the existence of a single highest genus². And the topic of ‘transcendentals’ was a standard ingredient of scholastic doctrine. Anyway, Dalgarno takes pains to show that the classical transcendentals ‘one’, ‘true’ and ‘good’ should all be subsumed under the one highest genus ‘being’ (ens). The importance of a theory of predicaments, together with the lack of an accurate theory of this type, lead Dalgarno to the conclusion that “a great *reformation* in philosophy would consist in a proper ordering of the predicamental series” (AS:26). He thus combines a familiar seventeenth-century call for a renewal of learning with the suggestion to return to the basic concepts and procedures of scholasticism.

With respect to his program for a philosophical language the non-existence of an adequate logical theory presents a serious difficulty: there is no way, it seems, for Dalgarno to escape being committed to a position similar to that of Descartes, who had concluded that a philosophical language could not be constructed until the true philosophy was found (cf. 2.4). Dalgarno’s solution is to give up the program rather than the project. His first move is to emphasize that a perfect predicamental series is unattainable for human beings. Just as a perfect historian should be able to recite each and every action of all people who have ever lived, so should a perfect philosopher be able “to recite the whole number of things or notions, which are no less numerous than Adam’s offspring, (...) and compute all the various mutual connections between them. From this it appears how little we humans know, and how much we do *not* know” (AS:27). Given the infinite number of things and their mutual relations on the one hand, and on the other hand the feebleness of the human intellect, “it is not to be expected that a series of things could be constructed by human art such as would be absolutely perfect” (AS:28). Nevertheless, he adds, it would be useful if learned men would agree on a predicamental series ‘comprising all the principal and known notions of *nature* and *art*’ (AS:28).

Dalgarno next distinguishes between two methods which can be followed in constructing a predicamental series. The first is to identify, through logical analysis, a number of primary and most simple notions, from which all other complex notions are composed. The second method is to reduce all notions of nature and art, complex and simple ones alike, to a

¹ Metaphysics 998b 22, Loeb:119.

² Porphyry, *Isagoge*, translation Warren 1975:39

uniform predicamental series. Although it is not over-clear to which results these methods would lead, it will be convenient to term the first an ‘analytic’, and the second an ‘encyclopedic’ method. According to Dalgarno, the analytic method is the most truly philosophical one, but he asserts that both of these methods could be profitably used in philosophy. However, at this point it appears, rather suddenly, that the purposes of philosophy do not coincide with those of grammar. As Dalgarno argues at length, neither of the methods mentioned will lead to a practicable foundation for the lexicon of his language¹. As to the analytic method he offers two arguments, one of which is drawn, in accordance with scholastic practice, from the thing, the other from the sign. First, then, the analysis of a concept into its elements will necessarily reveal an extremely complex network of relations between the various elements, from which it will be extremely difficult to recognize the analyzed concept. This matches the difficulty one would have in recognizing a person from the separated, minute parts of a body after dissection. In this context, Dalgarno assumes that one and the same set of primitive elements can be composed in diverse ways to form different composite notions. Further, he makes a fundamental distinction between the theoretical explication of what is involved in a concept and ‘the immediate apprehension of a notion as a single unified whole’. While emphasizing the importance of such explication for philosophy, he is convinced that using its results as a foundation for his lexicon will lead to an impracticable language. Instead, the language should express whole notions, which can be grasped by a single act of the mind. As will be discussed in 5.6.2, Leibniz read this passage of *Ars Signorum* with special attention. This is understandable, since the method Dalgarno is sketching and rejecting here, looks very much like the one Leibniz considered the only viable one. Leibniz fully acknowledged the psychological reality of the distinction between grasping a concept as a whole on the one hand, and analyzing it into its constituent parts on the other hand. But he refused to conclude, as Dalgarno did, that the philosophical purpose of conceptual analysis is incompatible with the purpose of constructing a practicable language. Dalgarno’s second argument, drawn from the sign, is simply that the words representing completely analyzed concepts would be far too long. Assuming that a notion may be decomposed into a hundred, or maybe a thousand parts, and that each of these parts must be designated by a letter, it follows that a single word would fill a whole page.

The second, encyclopedic, method of organizing the predicamental series is an equally unsuitable foundation for the lexicon, for if each item listed in such a series were designated by a distinct primitive name, the number of these names would be almost infinite. Clearly, Dalgarno is repeating his objections to Wilkins’s approach here. The botanist Bauhin, he points out, enumerates 6,000 species of plants, the number of animals is vast, and the number of man-made things is even larger. Furthermore, philoso-

¹ This essential point has been overlooked by Slaughter (1982:144), who claims that while Wilkins chose the second method, Dalgarno used the first.

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phically speaking, all numbers, colours, sounds, passions of the soul etcetera, can be subdivided by an infinite number of differences. Again, a philosophically useful predicamental series proves to be unfit as a basis for the lexicon.

Thus it appears that the initially announced program for an art of signs that was to be based on the art of things is impracticable. The purposes of logic and metaphysics prove to be inconsistent with those of grammar after all. Dalgarno finds the solution, or rather, he finally reveals what had been his starting-point all along, in redefining the ‘art of things’. Rather than a scientific description of reality, a synopsis of the most common aspects of things as they appear in the daily experience of an ordinary language user is to underlie the list of primitive words of the language. He explains:

nature herself teaches every man to consider the natures of things from a common and universal respect, and to describe the particular natures of things on the basis of a small number of common grounds. For which reason it is entirely appropriate that art (which is nothing other than cultivated nature) should teach the most common grounds of things, on the basis of which the natures of particular things can be described (AS:35)

The lexicon of Dalgarno’s language, then, is the result of taking a middle course between the two extremes formed by the analytic and the encyclopedic method. The encyclopedic method is followed in the construction of a lexicon of radical words, consisting of 1,068 entries. These words signify ‘a select number of principal notions, drawn from the first and foremost sciences’. These notions are ordered by genus and species in a classificatory scheme. The analytic method is followed in forming words for the expression of all notions that are not designated by a radical word. The radical words are used as primitives from which the words signifying the other notions are to be composed. This method is of course defective by Dalgarno’s own philosophical standards. As for the encyclopedic approach, the number of notions classified in the lexicon of radical words is much too small, and their selection arbitrary. Likewise, since the analytic method is only half-heartedly applied, the notions used as primitives are not truly primitive, logically speaking, so that the expression of a composite notion in terms of these primitives does not reveal the logical structure of this composite notion as it should. Dalgarno was fully aware of this, and he accordingly disclaims in so many words any philosophical adequacy for his design. How many notions exactly are to be represented by a primitive word, which notions are to be selected as such, and in which order they are to be brought together, “none of these questions can be determined without a great deal of arbitrariness”. This is because “this art of signs does not admit of strict philosophical rules” (AS:36).

3.4.4 The Classificatory Scheme

In spite of Dalgarno's disclaimer regarding philosophical adequacy, he puts forward detailed arguments to justify the structure of the classificatory scheme underlying his lexicon of radical words. These arguments are aimed at showing that it was sometimes necessary to deviate from standard theory, which he claims is logically erroneous in various respects. The precise structure of the classificatory scheme cannot be determined on the basis of the text of *Ars Signorum* alone, but must for the most part be gathered from a large fold-out broadsheet containing the 'lexicon grammatico-philosophicum', which consists of tables enumerating the radical words. Unfortunately, most of Dalgarno's explanations are very brief, which is, as he says, because he is 'writing only for the learned, for whom few words suffice', and 'partly for other reasons' (AS:36,49), that is, probably, for lack of time and money. As a result, there is some obscurity about minor details.

The scheme starts out from one first and most general concept, following a requirement set by 'all of the more sound philosophers'. This highest genus is called 'being' (ens) or 'thing' (res). However, Dalgarno objects to the common practice of subdividing the highest genus first into substance and accident, since this has logically undesirable consequences. The explanation runs as follows:

whenever a genus is predicated of a lower species, either directly or indirectly, just as it excludes from its concept the difference of any opposed genus, so it also excludes the same from the concept of the species of which it is predicated. It is thus proper to argue: *a stone is a body*, therefore it excludes any concept of *spirit*; (...) but it is false to argue: *a stone is a substance*, therefore it excludes any concept of *accident*, for the concept accident is no less essential to stone than substance (AS:37)

In order to clarify this argument, it may be convenient to reformulate it in 'extensional' terms, assuming that a genus is simply a class of objects, a species a subclass of a genus, and that opposed genera are mutually exclusive classes. On this assumption, saying that 'to predicate a genus of a lower species excludes the difference of an opposed genus' means the same as 'to say that a class contains a subclass implies that no object belonging to that subclass belongs to an opposed genus of that class'. Thus, since 'body' and 'spirit' are opposed genera, to predicate the genus 'body' of the lower species 'stone' entails that no object belonging to the class of stones belongs to the class of spirits. Now what Dalgarno objects to, is that the standard theory treats 'substance' and 'accident' as though they were opposed genera like 'body' and 'spirit'. That this is wrong, appears from the fact that objects belonging to the class of stones, which is a species of 'substance', also belong to some of the species of 'accident', such as e.g. 'white' or 'heavy'¹. The

¹ Strictly speaking, it may be objected that stones do not belong to species of accident: a list of all accidents, that is roughly, of properties of things, will certainly fail to include stones. However, Dalgarno's point, on the present interpretation, is that

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terms ‘substance’ and ‘accident’, then, refer to sets of concepts such that a member of the one and a member of the other may both apply to one and the same thing. For this reason it would be erroneous to use the terms ‘substance’ and ‘accident’ as labels for mutually exclusive categories of things. Dalgarno’s argument can thus be construed as a just recognition of the difficulties involved in the scholastic merger of the predicaments and the predicables into a single comprehensive classification of things.

Obviously, this interpretation of the argument departs considerably from Dalgarno’s own way of expressing it. Wholly in accordance with the tradition he draws upon, Dalgarno fails to observe a systematic distinction between concepts and the objects falling under them¹. In the present context, he consistently speaks of concepts excluding other concepts, which accords with his view on predication. Dalgarno views predication as a mental act, by which the concept of the subject is compared with the concept of the predicate (cf. 3.5.2). Nevertheless, the extensional reformulation in terms of the objects falling under the concepts compared in predication, seems to be justified by Dalgarno’s own frequent equation of a predicamental series with a series of things. If this interpretation is correct, it may illustrate a more general point. As mentioned, Dalgarno was convinced that a perfect predicamental series cannot be established because of the multifarious aspects of things themselves². The present argument, as interpreted here, clearly supports this. For if a perfect predicamental series is conceived as a proper taxonomy in the sense of a hierarchy of partitions, it follows that one of any two sets having the same individual thing as a member must be a subset of the other. If however each and every one of the multifarious aspects we may discern about things is to be used for identifying a category of things, it will be impossible to order the thus established categories into a single taxonomy comprising all things. Though none of this is explicitly stated by Dalgarno, he certainly intended something of this sort.

Instead of the usual dichotomy dividing *Ens* into substance and accident, Dalgarno proposes to divide the highest genus by ‘broader differences’, which he calls ‘to be abstract’ and ‘to be concrete’, or alternatively ‘simple’ and ‘composite’, or finally ‘the complete’ and ‘the incomplete state of a thing’. The first member of this pair, which is thus called either ‘abstract’ or ‘simple’ or ‘incomplete’, is next subdivided into ‘substance’ and ‘accident’. Schematically, the division looks like this:

some of the concepts listed under ‘accident’ are such that they define a class of things to which stones belong.

¹ As far as the present context is concerned, this indeterminacy may appear greater than it really is, because the translation necessarily uses determiners (articles) not occurring in Latin: ‘a stone is a body’ vs. ‘lapis est corpus’.

² Cf. AS:28: “It is not to be expected that a series of things could be constructed by human art such as would be absolutely perfect both as regards number and method, so that nothing could be added, taken away or rearranged. For the aspects of things are so multiply varied that their method, following various suppositions and perspectives, is accordingly variable”.

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table 3.2

This division was intended as a solution to the problem just discussed, which was posed by the observation that e.g. a stone may be characterized by a predicate subsumed under ‘substance’ as well as by one or more of the predicates listed under ‘accident’. Since for this reason concrete things like stones cannot be assigned to either one of the categories ‘substance’ and ‘accident’, the solution consists in providing a separate class of concrete things. It is hard to see, however, how this procedure could solve the problem, for clearly, the same argument as Dalgarno adduced against the division into substance and accident applies to his own division: since a stone is concrete, it excludes any concept of the opposed genus ‘abstract’, and hence of both substance and accident.

Dalgarno goes on to point out that the dichotomous division of ‘ens’ into ‘abstract’ and ‘concrete’ is equivalent to a trichotomous one, which is obtained by deleting the genus ‘abstract’, resulting in the following division:

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table 3.3

It is this division which is actually used for the lexicon of radical words. The status of ‘substance’ in the scheme is not very clear. It is not subdivided any further, and moreover, Dalgarno indicates that he uses the term ‘concrete’ in place of ‘substance’ (AS:38). Thus in effect, the scheme contains a basic distinction between concrete things such as stones on the one hand, and accidents such as sensible qualities on the other hand, which is very similar to the more usual distinction into substance and accident criticized by Dalgarno. This is not the only instance in which he deviates in practice from his own theoretical principles. For although he had earlier remarked that dichotomous divisions are the best (AS:29), he states in the present context that sometimes

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a division by trichotomy is just as good (AS:37)¹. Further, he had asserted that a division is only legitimate if it is made by positive differences, since a negative difference cannot constitute a positive species (AS:30)². However, he does not hesitate to make such divisions in his own scheme, e.g. complete vs. incomplete and perfect vs. imperfect.

The category of concrete things is subdivided first into ‘more imperfect’ and ‘more perfect’, the former dividing into ‘concretes commonly known as corporeal substances’ and ‘spirits that are separated from the body’. The category of ‘more perfect’ has one member: man. Following an analogous reasoning as in the case of concretes, a separate category for the notion ‘man’ was created since it cannot be properly subsumed under either ‘body’ or ‘spirit’, man consisting of both. Schematically:

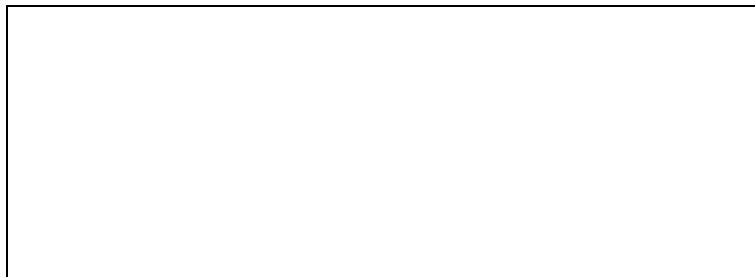


table 3.4

Again, the scheme actually used for the lexicon is obtained by abbreviating this into a trichotomy, as follows:

¹ The popularity of dichotomous divisions derived mainly from Ramus (Pierre de la Ramée 1515-1572) whom Dalgarno mentions favourably (AS:31, 46). That division by trichotomy is often equivalent and sometimes preferable to a dichotomous one is pointed out in the logic of Port Royal, whose authors argue that the Ramist zeal for dichotomies is pointless (Arnauld & Nicole 1970[1662]:214 (II, XV)).

² This argument is not convincing, if a species is thought of as a collection of individual things. A set may well be characterized by complementation, i.e., by telling which things are not in it. In using ordinary language, we often make convenient use of expressions characterizing ‘species’ by means of ‘negative differences’, such as ‘the rest’, ‘the others’ etcetera. Dalgarno’s point might be inspired by some vague remnant of essentialism, according to which membership of a species entails having characteristics that are intrinsically connected to that species. On this view, a proper description of a species should mention these characteristics rather than simply stating that members of the species do not belong to some other species. Dalgarno further notes that the use of negative words for positive differences reflects a defect in the vocabulary: thus Latin *par*, *impar* is defective, as compared to English *even*, *odd* (AS:30). Elsewhere, Dalgarno rejects essentialism (AS:37,44; Christ Church MS 162 f 49r; cf 3.3).

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table 3.5

Of these categories, only ‘corporeal’ is further subdivided¹, namely into mathematical, physical, and artificial. Dalgarno indicates that it is an innovation to treat mathematical notions like ‘point’, ‘line’, ‘surface’ etcetera as concretes, but he regards it logically necessary to do so. The category of ‘artificial’ is a complete novelty, since man-made things are usually excluded from the predicaments, which in Dalgarno’s view is utterly unfounded². The physical concretes, finally, comprise the kinds of things commonly enumerated under ‘substance’, that is, stones, plants and animals.

Turning from the concretes to the other broad category of Dalgarno’s scheme, the accidents, it appears that this is subdivided into 8 subordinate categories, each of which is in its turn further divided. The main categories of the scheme, then, are ordered as follows:

¹ However, the broadsheet containing the lexicon grammatico-philosophicum lists in addition to the category ‘spirit’, three categories of obscure status that seem to belong to ‘spirit’. These three categories are the ones designated by diphthongs mentioned earlier (cf. 3.4.2). The first of these is called ‘spiritual concrete’, which seems to be simply a double of ‘spirit’. The other two categories, ‘soul’ and ‘angel’, are probably intended to fall under ‘spiritual concrete’.

² Leibniz later argued against Locke, who made a similar point (Locke 1689:III, VI, §41), that there are good reasons for excluding artefacts from the predicamental tables: first, these tables only serve to give a general survey of our ideas; secondly, artificial substances do not have the same real unity that natural substances have (NE III, ch VI, §42).

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Being, thing

Substance

Accident

*Common Accident

*Mathematical Accident

*General Physical (Accident)

*Sensible Quality

*Sensitive Accident

*Rational Accident

*Economical (Accident)

*Political (Accident)

Concrete (composite, complete)

Man

Spirit

Body

*Mathematical

*Physical

*Artificial

table 3.6

The categories marked with an asterisk comprise subordinate genera and species. Unlike the other genera listed here, these categories function as genuine genera in the lexicon of radical words, as will be explained in the next section.

3.4.5 The Lexicon of Radical Words

The classification scheme is combined with the alphabet of the philosophical language so as to form the lexicon of radical words. Dalgarno tried his best “to establish the same number of highest genera of things as there are simple sounds¹, in establishing a correspondence between *sign* and *signified*, but there were many things that stood in the way of this” (AS: 50). This shows once more that Dalgarno’s priorities were linguistic rather than ontological: he tried to adjust the number of genera to the previously fixed number of simple sounds, not the other way round. Since he did not succeed in keeping the number of genera equal to or smaller than the number of simple sounds, he used combinations of simple sounds to designate the supernumerary genera.

¹ This remark contrasts with the requirement Dalgarno elsewhere says a proper predicamental series should meet, namely that it has a single highest genus. Probably, by ‘highest genera’ he means those that are highest in the scheme, disregarding the mutual order among these. In fact, as will be explained below, the logical order between the genera that are highest in the scheme is not reflected in their names.

3.4 THE LEXICON

To begin with, the seven vowels are assigned to the highest genera of the scheme, in the order of the philosophical alphabet:

A - Being, thing
H - Substance
E - Accident
I - Concretes
O - Body
Y - Spirit
U - Man

table 3.7

To each of the seven vowels the letter *v* is added so that the radical word for e.g. ‘being, thing’ is *Av*. The *v* is added for making the words more distinct, and for enabling euphonic affixes indicating inflection. That these seven genera are the highest in the classification scheme is symbolized by their being designated by the first letters of the philosophical alphabet. Thus the most general notion is designated by the most open sound. Apart from this, the position of these seven genera in the classification scheme is not encoded in the radical words designating them. For instance, the word *Iv* ‘concrete being’ contains no code indicating that it is subordinate to *Av* ‘being, thing’. Neither is the fact that all the other genera and species are lower in the scheme than these seven encoded in the radical words designating these lower genera and species.

Of the three ‘semi-vowels’ *s*, *r*, *l* Dalgarno uses only *s* for designating a genus, reserving *r* and *l* for other purposes. This leaves 10 letters, namely *s* plus the 9 consonants, to signify the genera ordered immediately under the seven highest ones (cf. table 3.6, section 3.4.4). Since there are 11 of these, the combination *st* is used to designate the remaining genus. This is one case in which the number of simple sounds does not match the number of items to be symbolized. More instances occur on the level of lower genera and of species. The words signifying these 11 genera are made complete by adding the ending *-eis*, yielding the following list:

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Concrete, Body:

Meis - mathematical concrete

Neis - physical concrete

Feis - artificial concrete

Accidents:

Seis - common accident

Beis - mathematical accident

Deis - general physical (accident)

Geis - sensible quality

Peis - sensitive accident

Teis - rational accident

Steis - economic (accident)

Keis - political (accident)

table 3.8

From this point onward, Dalgarno applies the method he had developed when working on his early scheme (cf. 2.2 above). The words he constructs for the genera and species that are subordinate to the 11 genera listed here are such that all things and concepts falling under one of these genera are designated by a word beginning with the consonant signifying the genus. The method is most clearly displayed in the table of accidents. Of all radical words listed under the 8 genera comprising accidents the first letter indicates the higher genus, and the second letter the lower one. First, the words for lower genera are constructed by adding one of the seven vowels to the initial consonant. The words are again made complete by adding a servile ending, in this case *-s*. By way of illustration, this is the list of lower genera under *Geis* ‘sensible quality’, with the radical words signifying them¹:

GAs - touch

GHs - taste

GEs - smell

*GI*s - sound

GOs - colour

GYs - common affections

*GU*s - vegetal affections

table 3.9

¹ In this case, the number of simple sounds (7) is equal to the number of genera. Two other genera of accidents, namely *Peis* and *Keis*, contain more lower genera (9 and 8 respectively). This problem is solved by naming the extra genera ‘spas’ and ‘sphs’, and ‘skas’.

The names for the things classified by these lower genera, which may be called species with respect to this classification¹, are constructed by putting one of the 9 consonants in the final position². Singling out one of the lower genera again for illustration, the species of *GAs* ‘sensible qualities perceived by touch’ with their names are the following:

gam - heat; *gram* - cold
gan - humidity; *gran* - dryness
gaf - density; *graf* - rarity
gab - hardness; *grab* - softness
gad - thickness; *grad* - thinness
gag - aridity; *grag* - slipperiness
gap - toughness; *grap* - friability
gat - roughness; *grat* - smoothness
gak - fluidity; *grak* - solidity

table 3.10

This list illustrates another feature of the tables: often a single position on a table is shared by two terms, which are opposed in meaning. This opposition is indicated by interposing the letter *r*. As Dalgarno admits, the grounds for the opposition are not always obvious, and sometimes notions are treated as opposites that strictly speaking are not such (AS:53). Nevertheless, the device of putting more than one term in a single place on a table has often been applied³. This has been done, Dalgarno explains, for mnemonic purposes, but mainly because it was easier this way to subsume various notions under a genus. Thus again Dalgarno overtly disowns the logical adequacy of his classification. He had already used this method of arranging radical words in the early scheme of 1657 (cf. 3.2.3, 3.3.1, 3.3.2). Wilkins borrowed the method, and used it extensively for the philosophical tables of his *Essay*. In *Ars Signorum*, sometimes⁴ three radical words share the same position in the classification scheme. This is done where in addition to two opposites, the

¹ In fact Dalgarno calls them species AS:52. But in general, and especially in the tables of concrete things, many of the items listed will be considered as genera in most contexts. It was precisely Dalgarno’s intention to construct radical words only for genera; names of the species should be composed out of generic names and words signifying a conspicuous feature of the species. Cf. 3.3.3 above and 3.4.6 below.

² In the tables of accidents, none of the lower genera contains more than 9 species, if ‘opposites’ (cf. immediately below) are disregarded, so that no special provisions for excessive numbers of things are required.

³ About a quarter of the places on the table are occupied by more than one radical word. In the table listing the ‘physical concretes’ opposites are absent, with the exception of the lower genera containing parts, i.e. parts of figures, parts of plants, of animals and of artefacts.

⁴ I counted 23 instances.

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medium between them is designated. This is indicated by inserting the letter *l*. For instance, under 'economic accident', one finds the lower genus 'various denominations of persons and things', which has a species '*sthm* - superior; *stlhm* - equal; *strhm* - inferior'.

The tables of concretes are more complicated than the table of accidents. For present purposes, it is enough to note that Dalgarno was apparently concerned to express more levels of classification than the three he uses for accidents. It is plausible that he wanted to follow standard theory here¹, and that hence such commonplace categories and distinctions as animate - inanimate, and under animate: plant, animal, again under plant: herbs and trees, etcetera could not be omitted. In order to symbolize the various subdivisions, Dalgarno uses several ways of combining consonants with the diphthong *ei*, resulting in such radical words as *neidbeig* signifying 'plant', which has lower genera like *neibeid* 'herb' and *sneig* 'tree'. It is sometimes hard to determine the precise structure of the classification, and in some cases Dalgarno himself got lost². It may further be noted, that the genera of concretes contain a number of lower genera comprising parts. The parts of animals were a standard topic of Aristotelian biology. Dalgarno further includes analogous genera of 'parts of figures' and 'parts of artefacts'. In an apparent attempt to make the signs correspond to the signified, Dalgarno designated the species of parts by truncated words. For instance, the word for 'tree' is *sneig*, the word for 'leaf' is *ag*. Finally, words denoting numbers are not derived from the classificatory tables, but a special provision is made: the initial letter is *v*, and two lists of letters, one consisting of vowels and diphthongs, the other of consonants, are used to represent the individual digits making up numerical expressions in Arabic notation. Thus '0' may be represented either by *i* or by *l*, so as to enable forming pronounceable words; e.g. '10,000' is *valili*.

Apart from minor inaccuracies and inconsistencies obscuring the nitty-gritty of the classification, it is not even easy to determine the precise number of highest genera in Dalgarno's scheme. The point is worth noting, since commentators have almost unanimously asserted without qualms that Dalgarno established 17 highest genera, which is certainly a mistake. In fact, depending on what one wants to consider as a highest genus, there are either 1, 11, 18, or 21 of these genera. To begin with, there is strictly speaking just one highest genus, which comprises all the others. However, as the logically motivated order among the genera is not encoded in the radical words, one may consider only the 11 genera performing a generical function in the assignment

¹ This point has also been made by Slaughter 1982:147.

² For instance, the genus *feim* - 'food and clothing' comprises two genera: *fleim* - food and *freim* - clothing, which is odd already, while elsewhere there is a list of 'household furniture' containing species like *fam*, which on account of their form should be subsumed under *feim* (in the tables of concretes, species are designated by the vowel, genera by the consonants). More seriously, the names of the higher genera *meis*, *neis* and *feis* recur as names of lower genera: *meis* means either 'mathematical concrete' or 'head'; *neis* either 'physical concrete' or 'mouth'; *feis* either 'artificial concrete' or 'trunk'.

3.4 THE LEXICON

of radical words as the highest genera of the scheme (i.e., those marked by an asterisk in table 3.6, section 3.4.4). Alternatively, the seven genera designated by a vowel may be included in addition to these, yielding 18 highest genera. Finally, if the three categories signified by initial diphthongs ‘spiritual concrete’, ‘soul’ and ‘angel’ are counted in, the total¹ will be 21. Of course, the figure in itself is uninteresting, but the fact that there is no straightforward way to determine it shows that the often repeated allegation that Dalgarno established 17 highest genera is an oversimplification, apart from being false. The source of the erroneous number of 17 is no doubt a summary table, which is among the prefatory matter of *Ars Signorum* (Sig. A8r, see table 3.11).

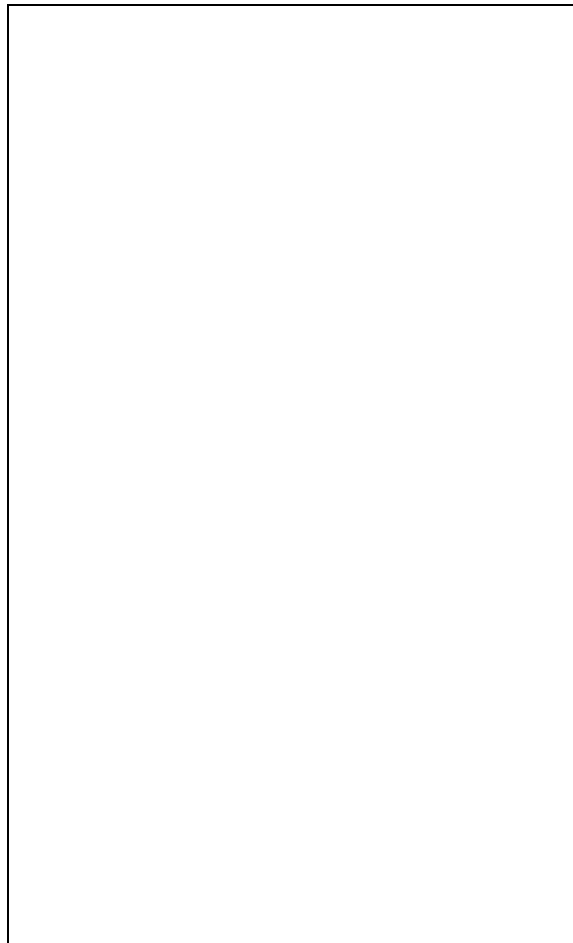


Table 3.11

This table is clearly intended to give a survey of the alphabet, listing its 20 letters (including the letter *v*), and indicating of which genus each letter, if initial, is characteristic. The letters *r*, *l*, and *v* are said to be servile. The figure 17 has evidently been calculated by subtracting the 3 last servile letters from the 20 items listed here. This is why the majority of authors state that Dalgarno

¹ If ‘spiritual concrete’ is regarded as a double of ‘spirit’, the number will be 20.

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no's scheme consists of 17 genera¹. However, the table disregards the logical relations between the genera, and omits, deliberately or not, the genus 'Economic accident' which is designated by the combination *st*. Further, the three genera characterized by diphthongs are left out. It is obvious therefore that this table is not the right source to be used for determining the structure of Dalgarno's classification scheme. Funke's remark that, 'understandably', scholars have not taken the trouble of working through Dalgarno's system², has thus been reconfirmed time and again.

3.4.6 An Analogical Conformity between Thing and Sign

Regarding the semantics of the radical words the following may be observed. First, the meaning of each of these words is ultimately determined by a Latin equivalent. For instance, the word *gam* means 'calor' (heat), because *gam* is joined to 'calor' in the table listing the radical words. Secondly, the radical words contain additional information, the nature of which it is important to be clear about. On the one hand, the individual letters making up a radical word may serve to guide a person who wants to look up the meaning of a word in the tables. As the tables are arranged according to the order of the philosophical alphabet, the letters constituting the word *gam* signify '4th genus, 1st intermediate genus, 1st species'³. On the other hand, the combination of the individual letters constituting a radical word gives a clue to the definition of what the word refers to. Thus the initial *g* indicates that *gam* refers to some sensible quality, and the combination *ga* further indicates that this is a sensible quality perceived by touch. Finally, the letter *m* joined to *ga* serves to differentiate *heat* from other qualities of that kind, such as humidity (*gan*) or density (*gaf*). Though both types of additional information provided by the radical word, that is, both the indexical and the descriptive information, seem to coincide, it is important to distinguish them sharply. The indexing function of the radical words is semantically neutral, as it may in principle be applied to any kind of structured enumeration whatsoever. It will be remembered that Dalgarno actually discovered the device when he was looking for a convenient means of codifying positions of radical words in the nonsensical verses of his early scheme (cf. 2.3). The descriptive information contained in the radical words of *Ars Signorum* however, derives not from the position a radical word occupies in the scheme, but from what is symbolized by this

¹ Thus Gerhardt 1890:7; Couturat & Leau 1903:15; Cassirer 1923:69; Cohen 1954:57; DeMott 1955:1076; Rossi 1960:226; Salmon 1972:29; Slaughter 1982:145; Asbach-Schnitker 1984:xxv; Large 1985:31; Padley 1985:362; Pombo 1987:76; Eco 1995:231, to name a few. Funke 1929:10 notes the discrepancy between the summary table and the tables of the lexicon, but counts, wrongly, 23 genera in the latter (including the word for God - cf. AS:54 - and the lower genus 'skas'). Elliott 1957:4 follows Funke in this.

² Funke 1929:15.

³ For the sake of exposition, the tables of concretes will be disregarded here.

position, i.e. that each word listed under a particular genus refers to a thing that belongs to the class referred to by the name of the genus¹. Thus, in the tables of accidents, each word of the form *XYZ*, where *X* stands for any one of the consonants (or combination of consonants) *s b d g p t st k*, *Y* for one of the 7 vowels and *Z* for one of the consonants *m n f b d g p t k*, refers to a thing belonging to the class referred to by that word of the form *XYs* that has the same value for *X* and *Y*. Further, each word of the form *XYs* refers to a subclass of the class referred to by the word of the form *Xeis* with the same value for *X*. It is this rule which determines the descriptive content encoded in the radical words, not the position of these words on the table. For this rule is totally independent of any particular way in which the meaning relations between the radical words may be displayed on a table. Not only would the rule still hold if the order between the genera or the species were changed, but even an arbitrary listing of the radical words, e.g. following the ordinary alphabet, would make no difference. It is further to be noted that the rule is completely independent of any assumptions on what an imaginary user of Dalgarno's language knows about the meaning of individual words. In order to know that the first two letters of a word denote a class such that what the whole word refers to is a member of it, I need not know what any of these letters in fact denote.

The radical words, then, are not the smallest meaningful units of the language. In Dalgarno's view, only a compound sign can be 'suited to the nature of the thing' it signifies, in that its constituent parts signify aspects of the thing signified (cf. 3.3.3). Accordingly, his claim that the radical words are constituted 'observing an analogical conformity between thing and sign' pertains to the fact that the letters making up the radical words contribute to the meaning of these words. However, not all individual letters do so in the same way. Taking the word *gam* as an example again, the first two letters provide a partial description of heat, whereas the final *m* merely points at heat, not to some property of heat that distinguishes it from other sensible qualities perceived by touch. The radical words *gam* and *gan* contain the same descriptive information about their different referents, which are distinguished by being *mentioned* rather than being *described*, *gam* referring to 'that sensible quality perceived by touch called heat', and *gan* to 'that sensible quality perceived by touch called humidity'. The final letter thus performs another function than the two other letters. It has been arbitrarily assigned to one of the members of the class designated by the first two letters and hence does not carry any descriptive content. For this reason *gam* is no more 'suited to the nature of the thing' it signifies than *gan* would have been so suited had Dalgarno decided to enumerate humidity as the first, and heat as the second

¹ Probably Dalgarno would have preferred to say that his words for species signify notions that are predicamentally subordinate to generic notions, but in the present context it is assumed, for expository purposes, that this is equivalently expressible in terms of inclusion relations between the sets of things referred to by the radical words.

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item under *gas*. It is important to note that a similar observation can be made with respect to the radical words designating things belonging to other levels of the classification. At the level of intermediate genera, the vowels in words like *gas*, *ghs* etcetera merely point at various kinds of sensible qualities. There is no systematic reason why 'touch' should be designated by *a* and 'taste' by *h* rather than the other way round. The descriptive content of the words *gas* and *ghs* is solely provided by the initial *g*. Finally, at the level of genera, there is no systematic reason why 'sensible quality' should be called *geis* rather than *deis*. Names for generic notions are completely arbitrary and devoid of descriptive content. In general, as a consequence of the method followed in constructing the radical words, the rightmost of the significant letters, that is, all letters except those occurring in the servile endings *-s* and *-eis*, is an arbitrarily assigned pointer to one of the things belonging to the class designated by the letters left of this letter. Since in words designating genera there is nothing on the left of the rightmost significant letter, these words are mere names, not partial descriptions of their referents. Although at each level of the classification the assignment of letters to classes of things is completely arbitrary, the classificatory foundation of the radical words guarantees that the combination of these arbitrarily assigned letters is significant. For given the arbitrary decision to name sensible qualities by words beginning with *g*, it is not arbitrary that sensible qualities perceived by touch are called *gas*. And although the latter class of things is arbitrarily called *gas* rather than e.g. *ghs*, it is not arbitrary that, given the decision to call these things *gas*, the word meaning heat should begin with *ga*. In this way, arbitrarily instituted, conventional signs turn into 'natural' ones, on account of how they function in combination. As will be seen below (5.4.2), Leibniz was to make a similar point against Hobbes's thesis that since words are arbitrary signs for things, truths expressed in words must be arbitrary too.

On the other hand, the classificatory foundation of the radical words accounts for the fact that their descriptive content is insufficient as a definition of the things they designate. The radical words, semantically speaking, are abbreviations of longer expressions. When the abbreviated expressions are completely spelled out, a partial definition of the thing referred to by the radical word emerges. As has been said, the word *gam* is an abbreviation of the phrase: 'a sensible quality, (perceived by¹) touch, i.e. heat'. Expressions of this type necessarily provide an incomplete definition. This is because the things designated by the radical words are themselves part of the classification reflected in the radical words. Thus since 'heat' is itself one of the items falling under the classification, the longer expression of which the radical word is an abbreviation explicitly refers to heat rather than providing a sufficiently precise description of the phenomenon. Clearly, if this longer expression were to be a definition, it should not, as it actually does, contain the definiendum as part of the definiens. What this shows is that classification never completely coincides with definition. This is not surprising, for

¹ Strictly speaking, Dalgarno's table merely says 'tactus' - touch.

classifying a thing is ultimately telling what *kind* of thing the classified item is, not *which* thing of that kind it is. Of course, a classification might be so fine-grained that it defines things to a sufficient level of precision, but this is irrelevant here. The thing is that if the definiendum is itself subsumed under the classification, the definition provided by the classification stops one level higher than that where the definiendum is mentioned.

Recalling the debate between Dalgarno and Wilkins, it might now be clearer what the issue was when Dalgarno rejected Wilkins's proposal to put the species "in predicamental rank and file", and give them names denoting "their numerical place and order" (f.47v, above 3.3.3). In the context of the debate, the species talked about were those of 'natural bodies', which in Dalgarno's scheme are called 'physical concretes', that is, particular kinds of stones, plants, animals. Wilkins's proposal was to classify as many of these species as possible and assign names to them indicating their place in the classification. Doing so, both disputants clearly saw, would be to give up providing a full definition of the species. For the final letter indicating the place of a species within its genus would entirely depend on an arbitrary numerical institution. The classification scheme specifies which things belong to which class, but is silent about the differences between things belonging to the same class. A complete definition requires mentioning these differences in addition to classification. As has been seen, Dalgarno and Wilkins agreed that such complete definitions were unattainable. But they disagreed on the merits of artificial words reflecting the structure of the classification. Wilkins defended his proposal by pointing out that the resultant radical words would not be completely arbitrarily assigned to things. According to Dalgarno's autobiographical treatise, Wilkins maintained that unlike the radical words of other languages, "here, after the Arbitrary Institution of a few Generical words and Characters all the rest are by rational inference deduced from them and so are not *signa ad placitum* [arbitrary signs]" (ff.48v - 50r). Dalgarno, though claiming the same advantage for his own radical words, was less impressed. He preferred another method of endowing the words of his language with as much descriptive content as possible, namely by the generous use of compounds consisting of radical words.

Especially for expressions referring to the species of 'natural bodies' or 'physical concretes' Dalgarno relies on the method he regarded as superior. For instance, the lexicon of radical words does not contain words for kinds of animals like horse and elephant. The lowest level of the taxonomy expressed by radical words is that of 'whole-footed terrestrial beasts', designated by *nhk*. Words for the species falling under genera like these should be formed by adding another radical word expressing some difference to the word for the genus. E.g., the word for horse is *nhkpot* - 'whole-footed terrestrial beast animosity' (more on this below, 4.7). As Dalgarno explains, it may happen (though not very often), that expressions designating species require a lengthy periphrasis. In such cases, one may either add some ad hoc difference to the genus, or retain the lengthy periphrasis. Both solutions are more logical and a better aid to the memory "than making all of the lowest species primitives and

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arranging them in numerical order” (AS:42). Dalgarno is obviously repeating his objections to the method proposed by Wilkins here. In what is possibly an attempt to give further evidence for the superiority of his own design, Dalgarno inserts the following remark:

if by chance anyone should prefer to construct definitions for the species of *nature* and *art* from the genus and a numerical position for the posited difference, rather than by attaching to the genus some additional difference derived from other radicals, this can be done without any change in the tables, namely by adding to the generic word a final letter indicating the numerical order, e.g.

<i>Nhka</i>		1. Elephant
<i>Nhkh</i>	for	2. Horse
<i>Nhke</i>		3. Ass
<i>Nhko</i>		4. Mule

(AS:42)

It is unclear why Dalgarno mentioned this alternative method at all. Perhaps marketing objectives were still on his mind and he wanted to underline that his overall design could be implemented in various ways. Anyway, there is no doubt that he regarded the alternative method as inferior to the one he proposed himself. Further, Dalgarno’s description of this alternative illustrates some of the points just made. The numerical alternative consists in carrying the classificatory procedure used for naming the generic notions further down to the level of species. It is precisely because in this way these species are merely classified, i.e. enumerated in an arbitrary order as belonging to some genus, that this Wilkinsian type of procedure is inferior to the one Dalgarno proposed. In Dalgarno’s design, some characteristic of the species is mentioned in addition to the generic name. This is avowedly still insufficient to define the species, but gives a better description of it than the purely classificatory method.

When Leibniz read this passage of *Ars Signorum*, he immediately recognized that Dalgarno was hinting at the method favoured by Wilkins. Leibniz noted in the margin next to ‘1. Elephant’ etc.: “ita fecit Wilkinsius [thus did Wilkins]”. Regrettably, modern scholarship has proved less perceptive. Eco (1995:232-233) presents this alternative method as though it was the one actually followed by Dalgarno. Worse, he comments: “since the dichotomic division does not reach the lower species, Dalgarno is forced to tack on lists in an alphabetical or almost alphabetical order” (Eco 1995:234). In fact, few if any of Dalgarno’s divisions are dichotomic, and it is precisely because the lower species are reached by the division that the final letters of the words are assigned according to an alphabetical order, which in the present context is equivalent to a numerical one. As has been seen, this holds generally for each level of the classification. Further, the arbitrariness of the words denoting species that are constructed following the Wilkinsian, numerical method was one of Dalgarno’s objections against this method, the other, major objection

being that it is mnemotechnically disastrous¹. As he says on page 42 of *Ars Signorum*: “nothing is a greater burden on the memory than a numerical ordering”². Eco however explains to his readers: “Dalgarno (p.42) noted, however, that this procedure was simply a mnemonic artifice for those who did not wish to learn the defining name” (1995:234). Though fortunately such accumulations of misreadings are rare, modern authors in general have poorly understood the semantics of the radical words.

Slaughter (1982:148) has argued that Dalgarno’s “artificial words and taxonomical tables create a double-layered nomenclature not unlike the one later developed by Linnaeus”. On the one hand, “the letters for the higher taxa name the genus. The ‘speaker’ of the language memorizes these”. On the other hand, “the letters/names for specific epithets (...) do not name a class of objects directly. Rather (...) they indicate that each of the subclasses is different from the other and that each occupies a separate place on the taxonomic table”. This distinction between direct, generic names and indirect names for subclasses is obviously based upon an arbitrary assumption on what a speaker of Dalgarno’s language has memorized. As has been argued, such assumptions are irrelevant for explaining how the meaning of the radical words is defined. It appears that in addition such assumptions may be misleading. For what if we assume that a speaker of Dalgarno’s language has memorized not just the generic names but all names? Does it follow that the names have all become direct names? Conversely, do the generic names not indicate that each genus occupies a separate place on the table? In fact, there is no reason to ascribe a special status to generic names at all. Both names for genera and names for species are defined by joining a Latin equivalent to them, and both types of names can be equally well memorized or looked up on a table. Further, the position on the table is only relevant insofar as it represents relations of class membership and class inclusion; for the rest, this position is wholly arbitrary, as both Dalgarno and Wilkins knew very well. Slaughter continues by explaining that the indirect names are codes which refer to places on the tables where the names of the objects are to be found. These latter names are ‘self-defining’, ‘diagnostic’ names, which “not only name the taxa but the name is at the same time a definition”. At the level of species, she adds, “we find the diagnostic, self-defining names which state the essential properties of the species”. It has been shown that on the contrary the names for the species, or rather, for the things enumerated at the lowest level of the classification whichever it is, are at most partially diagnostic, let alone

¹ Couturat & Leau (1903:18) have likewise treated the numerical method exemplified by ‘*Nhka* - 1.elephant’ etc. as though this was Dalgarno’s, and used the example as an argument showing how difficult it is to learn his language. Commentators have remarkably often been inclined to argue that Dalgarno’s language has certain disadvantages which it in fact does not have for the very reasons adduced by them.

² In the autobiographical treatise Dalgarno enlarges upon the difficulty of learning numerical orderings. He adduces the testimony of Ward, who said that if someone was to mention one of the ten commandments, he “could not readily tell its numerical order” (f.51r).

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self-defining, and that the essential properties are never expressed. The erroneous assumption that classification and definition are identical has misled Slaughter into thinking that the radical words provide a complete definition of the things they designate. Accordingly, her main criticism of Dalgarno's language, which has been echoed by Eco and other subsequent writers, is that the classification is incomplete: "what he [Dalgarno] did not perhaps realize was the inherent contradiction in his scheme. He dismissed classification as a means of analyzing complex beings; yet to make definitions of them presupposed a classification" (1982:152). As a matter of fact, Dalgarno fully realized that although classification may be useful and even necessary for definition, it is never sufficient. The only contradiction in his scheme, at this point, is that it fails to be in accord with a plan Slaughter unwarrantedly thinks it should have followed¹. This point will be taken up again in 3.4.7. Apart from this, it was never Dalgarno's intention to provide complete definitions of the things referred to by the words of his language, as he clearly perceived that if this were possible at all, it would be undesirable to do so, since this would be incompatible with the construction of a practically useful language.

For all this, it remains partially obscure what is actually said when a radical word of Dalgarno's language is used (this point applies equally, and more pressingly, to Wilkins's artificial words). For it is unclear to what extent a user of the language is committed to the classification scheme of the author of the philosophical language. If it really were the case that in every context of use the descriptive content of these words is part of what is said, this would have awkward consequences. Pragmatically speaking, the Gricean maxim of quantity would be continuously flouted in that obviously redundant information is given. But perhaps language users can get used to that. More seriously, descriptive confusion may arise as soon as the slightest doubt on the correctness of the classification arises. For instance, Dalgarno classes 'thickness' under 'sensible qualities perceived by touch'. In a context where perception of thickness by sight is relevant, it will be at least inconvenient if one is forced to be talking about 'that sensible quality perceived by touch

¹ Slaughter was probably misled by Dalgarno's rather ambiguous position with respect to the doctrine of predicaments. Against Hobbes, he maintains that without a predicamental series the distinction between definition (as a statement of essence) and description (as an enumeration of properties) cannot be made (AS:24; cf. 3.4.3). But elsewhere he explicitly rejects the doctrine of essential forms, equating these forms with the sum total of the accidents of a thing (AS:44; cf. 3.4.7). It thus appears that Dalgarno in fact gives up the traditional distinction between description and definition. Slaughter (1982:144) quotes Dalgarno's argument against Hobbes as though it were an unambiguous statement of his own position, which it is not. Most importantly, the argument is aimed at establishing the theoretical point that a predicamental series, if adequately constituted, is useful for philosophy. But not only is Dalgarno sceptical about the practical realization, he also emphasizes that philosophical objectives are often inconsistent with the construction of a practicable language (cf. 3.4.3).

called thickness' all the time. In general, having to use a description instead of a term which neutrally refers to an object or a class of objects might be a serious drawback rather than an advantage. One of the excellent properties of natural languages is that they enable us not only to describe things, but also to avoid being descriptively specific if we wish.

Dalgarno does not explicitly address this point, but it can be gathered from the text of *Ars Signorum* that he took it for granted that users of his language were not going to be constantly aware of the logical etymology so to speak of the radical words. He inserts a separate chapter 'on mnemonic aids' in which he describes a method of committing the radical words to memory that bypasses the classificatory tables. Although it is possible, he explains, that a person may find a radical word by logical steps, e.g. recalling that 'animosity' is a physical, sensitive accident, occurring under the fifth intermediate genus as the seventh species, "it would be an excessive torture for the mind to run through such a long process for every individual word" (AS:59). To be able to communicate readily, it is required that words are recalled 'spontaneously and without any act of thought or judgement'. The mnemonic method consists in connecting each radical word with some English or Latin word that is formally similar. Thus the radical word *fran* 'table' is connected with *France*, and *grum* 'to feed' with *grumble*. It is supposedly easier for the memory to connect 'table' with *France* than with *fran*, the latter word being unknown. Setting mnemonic questions aside, it is clear that Dalgarno did not think that his radical words, when used in practice, would function in any way differently from their Latin equivalents.

3.4.7 The Largest Part of the Lexicon

Since the lexicon of radical words consists of no more than 1068 words, it does not provide direct equivalents for most words of natural languages. For this reason, the largest part of the lexicon of the philosophical language consists of compounds, made up by combining two or more radical words. Dalgarno never produced a complete dictionary of his language, but he gives many examples of compound words both in the text of *Ars Signorum* and in a short dictionary following the text, which contains about 1,500 entries (Lexicon Latino-Philosophicum, AS:95-117). The method Dalgarno mostly relies on, is to combine a word signifying a generic notion with a word designating some salient feature of the thing to be denoted by the compound word. It is this method which he preferred to the method proposed by Wilkins (cf. 3.3.3 and 3.4.6). How this works in practice is shown in a separate section of the dictionary, listing words that designate 'physical concretes', that is, those things the debate with Wilkins centered on (AS:115-117). Table 3.12 reproduces part of this section.

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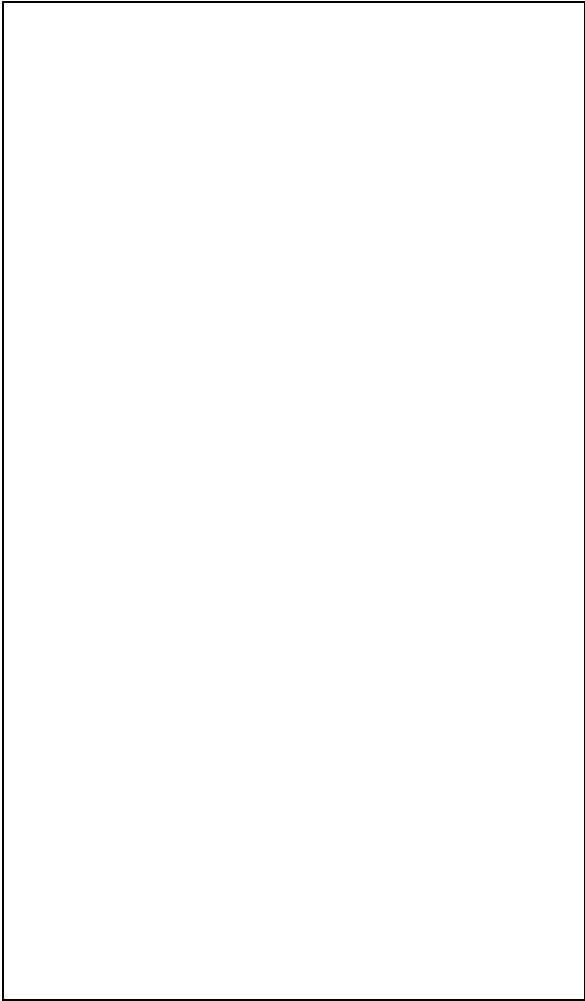


Table 3.12

As Dalgarno notes, the words mentioned are meant to exemplify a general rule for creating names for all the other things of this kind. Some samples from this section are the following:

- marble - nhfgrat - stone smooth
- tufa - nhfgrap - stone friable
- diamond - snhfgab - precious stone hard
- sapphire -snhfgrob - precious stone blue
- gold - nefsis - metal perfect
- iron - nefgab - metal hard
- gourd - nib moba - plant edible as to the fruit conic
- cucumber - nib muba - plant edible as to the fruit cylindric
- fir - sneg bab - cone-bearing tree right
- cedar - sneg bam - cone-bearing tree long

3.4 THE LEXICON

cicada - snhkspan - exanguious terrestrial beast with few feet sing
ant - snhkpeg - exanguious terrestrial beast with few feet provident

swan - nupsuf - aquatic bird largest
heron - nupsumspis - aquatic bird very much winged¹

elephant - nhksuf - whole-footed beast largest
ass - nhkpim - whole-footed beast simple

As is clear from these samples, the names formed following this method are unlike complete definitions of the things they name. Yet they are structured according to the pattern of what was traditionally regarded as the best method of definition, i.e. by mentioning the nearest genus and the specific difference. As has been mentioned (3.3.3), Dalgarno did not believe in essential forms, and in *Ars Signorum* he expressly dismisses the doctrine of forms, allegedly concealed in things, as absurd. In fact “a *form* is nothing other than the sum total of all the accidents of a given thing” (AS:44). This seems to imply that the distinction between definition and description, the importance of which Dalgarno had adduced against Hobbes (cf. 3.4.3), cannot be made after all. Since the forms, in the redefined sense, are inadequately known to us, it is enough “if the difference added to the genus is an accident such as will serve to distinguish the one species from all the others” (AS:45). Both contemporary and modern critics have pointed out that Dalgarno’s compound words do not satisfy the latter requirement (cf. below).

The same method is used in constructing words for ‘artificial concretes’, as is shown by the following examples (AS:43-44):

cup - frenpraf - utensil drink
spoon - frenneis - utensil mouth

palace - fankan - house king
cottage - fanstrhf - house common people

cap - freimmeis - garment head
glove - freimsmus - garment hand

It appears from the dictionary that many words signifying something other than concrete things are similarly structured. Some samples:

grammar - temtos - art sign
philosophy - temtef - art wisdom

night - dangrom - time darkness
day - dangom - time light

¹ It is not quite clear what the final s means. In the tables of radical words the following can be found: *nup* - aquatic bird; *sum* - very much (valde); *spi* - wing (ala)

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pleurisy - grugfal - disease breast
scabies - gruggupihf - disease corruption skin

It further appears from the dictionary that this method of forming compounds consisting of 2 or 3 radical words, one signifying the genus and one or two denoting a conspicuous accident, is not the only one Dalgarno uses. In some cases, he simply uses a single radical word as a translation for words that are more or less synonymous to the word defining the meaning of the radical. In this way, substantial meaning distinctions are ignored. For instance, the radical word *tos* 'sign' is also used for translating 'symbol' and 'omen'. In a number of other cases Dalgarno resorts to more elaborate periphrastical expressions. For example, 'to be imminent' is rendered by *lul tim ben meis dedemp*, which literally translates as 'which is above head likely to fall'. The word for 'nonsense' reads *tinu pifa sofshama* 'heavy pointless talk'. For 'to migrate' the dictionary gives *shhdesu stidu bemdam*, which, if translated word for word, is equivalent to 'change habitation distance motion'.

On the face of it, the lexicon of Dalgarno's language is incomplete. If all the (Latin) words listed in the lexicon of radicals are taken together with the words for which a translation is given in the dictionary by means of compounds, synonyms and periphrases, the sum total is still less than 2,600. For most words of natural languages no equivalent in the philosophical language has been defined. On the one hand, this is due to the fact that Dalgarno confined himself to presenting only the principles of the philosophical language. He repeatedly states that he is writing only for the learned, relying on the abilities of his readers to complete what is wanting. He emphasizes that the radical words and the rules for combining them are merely the groundwork on the basis of which experts are supposed to coin terms for specialized fields of discourse (AS:Sig.A7r, and 40). He further announces the production of an enlarged dictionary for the use of the man-in-the-street (AS:94). On the other hand, Dalgarno assumes that in principle the lexicon of radical words is quite sufficient for the expression of any concept whatsoever, so that the lexicon of his language can be said to be complete after all. There are various passages in *Ars Signorum* showing that Dalgarno leaves it to the users of his language to form compounds out of radicals, granting them unlimited freedom to compose words 'as the circumstances require' (AS:70). The only constraints on such compositions are, first, that the meaning of a radical word occurring in a compound is the same as when it stands alone, and second, that combinations of terms are 'meaningful and to the point', so that 'the reason for the composition is clear and plain to see' (AS:70, 71, 94).

As to the meaning of the compound words the following may be noted. First, it could be assumed, as Slaughter does (1982:150-151), that an explication of the meaning of a compound should include all the classificatory information contained in the radical words constituting the compound. In the examples given above, this information has been omitted as far as possible, i.e., when a single English word was available to render the term for the genus

this has been used, e.g. ‘house’ rather than ‘concrete artefact, building, house’; in other cases several words corresponding to different levels of classification were used, e.g. ‘beast’ and ‘whole-footed’. If the whole classificatory surplus were to be included, the complete translation of a compound would result in long, and often obscure expressions. For instance, *nefgab* ‘iron’ would be ‘physical concrete, mineral, metal, sensible quality, touch, hardness’. Conspicuously lacking in such a list is an indication of the different ways in which the terms listed are related to the thing referred to by the whole compound word. E.g., the generic term ‘sensible quality’ is quite differently related to iron than is the term ‘physical concrete’: whereas iron is a physical concrete, the term ‘sensible quality’ only enters into the list as it partially defines a quality found in iron¹. This is the kind of thing Aristotle had in mind when he observed that the definition of things present in a subject is never predicated of that subject, which observation underlies his distinction between substance and accident (Categories V). What is minimally required in addition to the list of terms explicating the meaning of *nefgab*, is an indication of the fact that *nef* and *gab* each constitute an independently meaningful unit. Dalgarno undoubtedly assumed that this was sufficiently secured by the fact that both these words are radicals. He clearly considered the meaning of radical words like *nef* and *gab* as unanalyzed primitives from which the meaning of compound words is composed.

Secondly, a similar question as the one raised in connection with the radical words applies to the compounds listed in the dictionary. Again, it is not quite clear whether a user of Dalgarno’s language is actually using a descriptive expression or an unanalyzed equivalent to a Latin word, when using a compound word. For instance, is a person saying ‘whole-footed beast largest’ when using *nhksuf*, or simply ‘elephant’? If the latter were the case, one could regard the compounds listed in the dictionary as similar to words such as ‘handbook’ and ‘rainbow’, which have a conventionalized meaning in their own right. Knowledge of the meaning of their constituent parts is neither necessary nor sufficient for knowing what such words mean. It is very well imaginable that likewise Dalgarno’s compounds such as *nupsumspis* ‘heron’, *fankan* ‘palace’ etcetera, are learned and used irrespectively of what the component parts mean. This is a course of events Dalgarno certainly foresees. In a somewhat different context (namely talking about the particles, cf. 3.5.5), he says that “one and the same sign may be rational from the viewpoint of one person, while for another who does not understand the reason of the institution it may be simply arbitrary” (AS:85). However, he certainly thought that, in general, knowledge of the meaning of radical words is quite sufficient for knowing what a compound means, although it may not be strictly necessary. This appears from the fact that he sometimes provides various alternative

¹ For this reason, Dalgarno’s compound words are never ‘taxonomically correct’ as Eco (1995:234) thinks they are. On the contrary, since these words combine elements belonging to different, mutually exclusive categories, they destroy the taxonomy.

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translations for a single Latin word. Thus, ‘university’ may be rendered by the compounds *dadtem* ‘place art’, or *fantem* ‘house art’, or *dadtas* ‘place intellectual act’. Even names for natural kinds like ‘elephant’ can be formed in various ways: besides *nhksuf*, given in the dictionary, he mentions *nhkbeisap* and *nhksofprhk* as alternatives in the text¹. He repeatedly emphasizes that in his language a certain concept can be expressed by a number of different compound words: “just as 4 plus 4 or 5 plus 3 or 2 plus 6 all make eight, so the same meaning can be expressed by combinations of different simple notions” (AS:69). It is clear, then, that Dalgarno supposes the meaning of compounds to be completely determined by the meaning of the radical words composing them. Nevertheless, in some cases he makes an exception to this, introducing special conventions for the meanings of compound words. For instance, words signifying the figure of corporeal substances are to be made by combining words like ‘point’, ‘line’ and ‘surface’ with a word denoting that substance, such as *mamnham* ‘point (of) fire’ for ‘spark’ and *mannhf* ‘point (of) stone’ for ‘sand’ (AS:39). Further, he distinguishes five stages of life in man, to be designated by adding a numerical word to the word for ‘man’, so that ‘man one’ means ‘infancy’, and ‘man five’ means ‘old age’ (AS:91).

It is obvious that the meaning of the compound words is often not as straightforward as Dalgarno supposes. In many cases, it is hard to determine these meanings on the basis of their constituent parts alone, without the Latin equivalent translating the whole compound. The short descriptions resulting from substituting the meaning of the radicals composing a compound are mostly not specific enough to identify the thing designated. Thus it is generally insufficient to say ‘a hard metal’ for designating iron. The same holds for saying ‘singing insect’ rather than ‘cicada’ and ‘aquatic bird with large wings’ rather than ‘heron’. Sometimes Dalgarno’s compounds are outright riddles. A word-for-word translation of *grugdogmeis* for instance, gives ‘disease to open head’ (*morbus aperire caput*), which may suggest anything from a pathological habit of talking too much to an illness requiring brain surgery. In fact, it translates *oscitare* - ‘to gape’, ‘to yawn’. Examples like these could be multiplied.

¹ AS:41. Both of these expressions are cryptic. The best I can make of the second one, *nhksofprhk*, is ‘whole-footed beast without rising’. The first one, *nhkbeisap*, provides a good illustration both of the awkwardness of the truncated words denoting parts (cf. 3.4.5), and of the creativity displayed by commentators in trying to make sense of Dalgarno’s artificial words. The few modern commentators who have examined these words in detail have taken the element *ap* to be the truncated radical word meaning ‘tignum’, which is enumerated under ‘part of a building’ and hence doubtless means ‘beam’. Shumaker 1982:150 translates ‘tignum’ as ‘trunk’ in an obvious attempt to render the use of *ap* a sensible procedure. With some reservation, I followed him in this (Maat 1995:164). Eco (1995:235) similarly assumes that *ap* is an ‘architectural metaphor for the proboscis’. However, it is also possible to interpret *ap* as a suffix indicating superlative (cf. 3.5.3), resulting in ‘whole-footed beast, mathematical accident, superlative’ for *nhkbeisap*, clearly not the summit of perspicuity either.

This unsatisfactory aspect of Dalgarno's lexicon was immediately seized upon by a contemporary critic, who published a caustic attack on Dalgarno's language in the following year, 1662. The critic was Roger Daniel¹, who confesses to have been irritated by the arrogance displayed by Dalgarno in degrading natural languages while boasting his own petty contrivance. Among a series of wide-ranging arguments, Daniel points out that Dalgarno's compounds often consist of lengthy periphrases, which nonetheless are insufficient to specify exactly which thing they designate. For instance, an 'aquatic bird with large wings' might equally well refer to a goose, a swan, or a heron. Modern commentators have made a similar point. Thus Slaughter (1982:152-153) observes that since Dalgarno leaves the formation of names for most things up to the individual speaker of his language, such a speaker may be unable to communicate: "If he wanted to communicate about an avocado, for example, he would determine the proper genus and the appropriate characteristics (appropriate to him). He would then join the words for each of these. His definition is simultaneously his name for the avocado. The only problem is that it may not be anyone else's name. The name is self-defining relative to the speaker's individual taxonomy, but the taxonomizing and the definition are left to the individual". Since variation between individuals can be expected, and as there is 'no common set of names fixed by common definitions and a common taxonomy', Slaughter concludes: "Except for the few names given in Dalgarno's lexicon, there is no common language" (1982:152-153). Although Slaughter's argument has impressed subsequent commentators², it is unsatisfactory on a number of counts. Firstly, it wrongly presupposes that Dalgarno's compound words reflect a taxonomy, be it an individual one. In fact, the method Dalgarno uses in forming compound words is diametrically opposed to a taxonomic procedure: it consists in joining words for things which are categorized as quite distinct. Secondly, Slaughter suggests that the ambiguity of Dalgarno's compound words proceeds from a failure to establish a classification scheme which is comprehensive enough. But this is not the real problem. What matters is the too small amount of lexicalized meanings; the method of defining these meanings is irrelevant. Dalgarno could have used his own quite different method in establishing a large dictionary of compound words prescribing a fixed meaning for them, and thus he could have solved the problem without an extensive classification scheme. Thirdly, the specific example chosen by Slaughter may illustrate a point mentioned earlier, namely that Dalgarno purposefully confined himself to 'the body of language'; more special terminology was to be elaborated by experts. He even provides some general directions for coining terms denoting things like avocados: the descriptive name should exhibit the most general and well-known properties of the thing, and should be as short as possible

¹ Daniel was a printer and publisher who translated Comenius's *Janua Linguarum* into English. The attack on Dalgarno's language is contained in the preface to the edition of this translation. For details and discussion, see Cram and Maat 1996.

² Asbach-Schnitker 1984:xxvi, Large 1985:32, Strasser 1988:216, Eco 1995:234.

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(AS:Sig. A7r). In view of the examples Dalgarno gives in the ‘Lexicon Latino-philosophicum’, it is clear enough how a name for ‘avocado’ in his language is supposed to be made: it could have been ‘fruit pear-shaped’ for instance¹, and more specific properties could be added if needed. Fourthly, the anachronistic avocado example shows a further, and positive, feature of Dalgarno’s design, which proves to be flexible enough to deal with new developments and discoveries. The method chosen by Dalgarno guarantees that a newly imported fruit can be named using the existing vocabulary; had he followed the taxonomic method favoured by Slaughter, the classification would have had to be adjusted again and again to accomodate new items².

Dalgarno was aware of the objection that his language relies too much on compound words, which must often be very long if they are to be unambiguous. It is not unlikely that he was familiar with Daniel’s attack and he might have been responding to this when he wrote in the autobiographical tract:

There are some considerable objections here to be answered. 1. Thoe it be allowed that the Institution of Ars Signorum may doe well enough for naming some species, yet will it not be able to reach them all by single words, no more many of them without long periphrasis. To this I answer first that this is unavoidable by any Institution whatsoever, the differences of things varying so infinitely" (f 80r).

For this reason, Dalgarno explains, all existing languages make extensive use of compound words, especially in “those parts of Natural History where the species of natural bodies are numerous, such as Insects and plants” (f 80r). Probably Dalgarno was thinking of words such as ‘apple tree’, ‘cherry tree’ etcetera, which are formed according to the pattern he often uses for his compounds. Moreover, he argues, compound words are to be preferred to primitives, since compounds provide a partial description of their referents; even God himself named Adam “by a derivative not primitive word”, and Adam in his turn, while giving names to all creatures must have used compounds (f 83r, cf. 3.3.3).

These arguments are insufficient for solving the problem of the ambiguity of compound words in Dalgarno’s language. It is clear that Dalgarno underestimated the number of lexical items with a conventionally fixed meaning that users of natural languages have at their disposal for efficient communication. His own compound words are often similar to the concise descriptions to be found in monolingual dictionaries. For instance, his word for scabies ‘disease corruption skin’ is not unlike the dictionary description

¹ This obviously presupposes a name for ‘pear’ which as yet is lacking.

² In the autobiographical tract, Dalgarno explicitly mentions this point as a drawback of Wilkins’s taxonomic method: “if there be any single species omitted, as cannot be denied but many are omitted, these Species when known cannot be provided for in the Tables without disturbing the order of the other Species” (f.52r). To support this, Slaughter’s avocado is an excellent case in point.

‘contagious skin disease causing itching’¹. Descriptions like these are characteristically less specific and longer than the single word whose meaning they explain. It is obvious how awkward it would be, outside a dictionary, to use explanations of word meanings rather than the words themselves. Nevertheless, the validity of the objection first voiced by Daniel does not detract from the fact that Dalgarno had an open eye for the flexibility and the potential for change which is characteristic for natural languages. Indeed, he was so much impressed by the productivity of their morphology that he failed to see the limitations of semantic composition at the lexical level. Thus he states that the greatest excellence of a language resides in ‘the capacity of its words for derivation and composition’ (AS:70). In this respect, the Greek language stands out. He further observes that “the more refined nations are constantly increasing the capacity for derivation and composition in their own vernaculars. The English use *self-denial*, *fellow-feeling*, etc. and an almost infinite number of similar words are invented daily” (AS:71). For this reason, Dalgarno concluded that “in this language it is permitted to combine any given term with any other, so long as this is meaningful and to the point, as otherwise an absurdity would result” (AS:71). It is a consequence of this central starting-point that, as has been mentioned, the same thing may be designated by a number of different words. The users of Dalgarno’s language have the freedom to choose on each occasion the expression which is best suited to the context of utterance. Thus it is clear that in constructing the lexicon, Dalgarno intended to provide a versatile tool for the expression of any concept whatsoever, rather than to prescribe the use of a set of exact definitions.

3.5 THE GRAMMAR OF THE PHILOSOPHICAL LANGUAGE

3.5.1 Logical Form as a Basis for the Grammar

Dalgarno’s explication of the grammar of his language is terse and summary, even more so than his explanations concerning the lexicon. He relies extensively on the capacities of his readers to grasp grammatical rules either from a vague and general indication or from a few examples. This excessive brevity is probably again due to haste and a limited budget, but there is also an intrinsic reason. Dalgarno’s main principle of grammar is that speech should reflect an adequate analysis of thought, and he apparently assumed that such an analysis should be largely left up to the individual speaker rather than being fixed by grammatical rules. Analysis of thought, in Dalgarno’s view, is the logician’s business and hence it requires a skilled logician to form elegant expressions in the philosophical language:

¹ The Oxford Guide to the English Language, Oxford 1984:489

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In this language all elegance resides in the fact that the external *logoi* is fully in accord with the internal one, so that speaking is in itself a logical analysis of our concepts. And no one can speak ornately and elegantly in this language, and fashion discourse in it, unless he is a good logician who knows how to resolve it into its parts (AS:68).

In describing thought itself in linguistic terms, Dalgarno follows a long-standing tradition which conceived thinking as an internal mental discourse¹. Although it remains for the most part implicit how Dalgarno thinks a logical analysis of thought is to be conducted, it is clear that in his view existing languages are sometimes in conflict with what he calls logical rules. For instance, many languages allow the formation of derivative words which logically speaking are superfluous, whereas on the other hand morphological rules are often unduly restrictive. Thus in Latin it is not permitted to say e.g. ‘tenebile’, ‘dabile’, ‘scribile’ (‘holdably’, ‘givably’, ‘writably’), which shows that “anyone speaking in contradiction to received usage, even if he speaks in accord with logical rules, will be held guilty of a barbarism” (AS:67). Further, the so-called rules of elegance and adornment of existing languages “in many respects should rather be called rules of absurdity” (AS:68). Furthermore, natural languages provide numerous instances of ‘phraseology’, “which is often absurd and meaningless” (AS:69). Dalgarno is thinking of idioms here, whose meanings do not follow from combining the meanings of their constituent parts. That idioms are pervasive in ordinary language shows that language use and logical analysis are quite distinct: “before people have been taught the principles of logic they speak mostly in the manner of parrots. They have inherited certain formulae by tradition and fall dumb if the freedom to use them is taken away” (AS:69). The reason for this is that they have learned certain phrases for the expression of complex concepts, without being able to make a logical analysis of these concepts². However, Dalgarno does not claim that natural languages in general are illogical. Although there is a contrast between expressions of these languages and the logical form of thought, this is mainly a consequence of the fact that these expressions contain various abbreviations. In principle, it is possible to identify the underlying logical form by spelling out these abbreviations. Nonetheless, Dalgarno claims that, in contrast with ordinary languages, the grammar of his language is designed to allow and to support the direct expression of the logical form of our thoughts: it is “the height of logical acumen to be able to express one’s thoughts accurately in this language”. Accordingly, Dalgarno does not hesitate to equate the use of his language with ‘the true practice of logic’ (AS:69).

The grammar no less than the lexicon of Dalgarno’s language, then, is based upon logical considerations. In his art of signs, logic is assigned absolute primacy over the other two arts traditionally forming the ‘trivium’,

¹ Cf. Nuchelmans 1976:153-172; Broadie 1993:15-16.

² Leibniz had a similar concern for the fact that idioms resist regular decomposition. He further similarly observed that language use is often intellectually vacuous, a phenomenon he called ‘psittacisme’ (‘parrottism’). Cf. 5.4.4.

grammar and rhetoric. As far as grammar is concerned, most of its doctrines are discarded as irrelevant for the philosophical language: of the parts of speech only one is retained (cf. below 3.5.2), cases are to be substituted by particles expressed by radical words (cf. 3.5.5), and the major rule of syntax is that word order must reflect the order of thought (cf. 5.4). However, as will appear below (3.5.3), Dalgarno does not completely carry out his logicist program, borrowing a number of grammatical constructions and inflexions from Latin. As for rhetoric, Dalgarno boasts that in his language “one cannot express oneself in such a way that the ears are caressed while the mind is left vacant” (AS:72). As mentioned, Dalgarno maintains that the beauty of what is said in his language resides in its logical precision.

However, the nature of the logic underlying the grammar appears to be extremely crude. Whereas the foundation of the lexicon was formed by an accepted logical theory, be it a freely modified version, Dalgarno disregards, or even rejects as superfluous, most of what was treated by the logical theory traditionally concerned with sentence structure, or the combination of terms into propositions. All that is necessary for the ‘true practice of logic’ according to Dalgarno is to explicitly mention, using a radical word, the logical operations one is performing. This will be clearer from what follows.

3.5.2 The Part of Speech

A first conspicuous feature of Dalgarno’s logical grammar is the assumption that there is, or should be, only one part of speech. Traditional grammatical theory usually distinguished eight different parts of speech¹, but in logic it was common to distinguish only two principal ones, namely noun and verb, and to class the others as ‘syncategoremata’ or ‘consignificantia’². Dalgarno however grants himself the freedom to deviate from tradition, acknowledging only the noun as a primary part of speech, while “the others which are traditionally so termed should be counted as inflexions and cases of the noun” (AS:62). Dalgarno thus follows the logical tradition in excluding most of the word classes distinguished by grammarians from the rank of principal parts of speech, while going one step further in moving the verb from the class of primary

¹ Thus the fundamental text called *Technē Grammatikē* attributed to Dionysius Thrax (c. 100 B.C.) and Priscian’s extremely influential *Institutiones Grammaticae* (c. A.D. 500). However, Priscian distinguishes the interjection as a separate word class, and omits the article since this is absent in Latin; Robins 1990:39, 66.

² Not surprisingly, the distinction derived from Aristotle, and remained a commonplace throughout the medieval period. Priscian c. A.D. 500 wrote: “The parts of speech according to the dialecticians are two, noun and verb, because only these if joined together make a full proposition, the other parts they call ‘syncategoremata’, that is consignificants” (*Institutiones Grammaticae* II, 15, quoted by De Rijk 1962:22 (Vol.1)). Broadie 1993:22 quotes the 15th-century logician Paul of Venice for an explanation of the distinction between categorematic and syncategorematic terms.

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words to the class of secondary words, leaving only the noun as a genuine part of speech. What Dalgarno probably means when saying that the other parts of speech are inflexions of the noun, is something similar to what led logicians to their distinction between categorematic and syncategorematic terms, the former signifying complete notions, the latter expressing modifications of or connections between these notions. In order to establish that the noun is the only primary part of speech, he provides an intricate argument purported to show that the verb, just as the other parts of speech enumerated by grammarians, is a 'case or inflexion of the noun'.

Dalgarno first tacitly assumes that all verbs can be analyzed into 'copula plus adjective (or participle)', for he states that in order to establish that the verb is not a real part of speech it will be sufficient to show that the 'substantive verb', that is, the copula 'esse' ('to be') is derived from a noun. If this can be proved, it has been proved for all verbs. He offers two arguments to show that 'to be' is derived from a noun, a negative and a positive one. The negative argument states that 'to be' is not derived from 'being' or 'entity' (ens). This statement is roughly equivalent to saying that the copulative function of the verb 'to be' should be distinguished from its existence-stating function. To prove this point, Dalgarno analyzes the sentences 'man is a being' and 'man is'. If it is admitted that the first consists of subject, copula and predicate, the point is already established, since the copula proves to be different from the predicate indicating existence. If alternatively it is maintained that the two sentences mean exactly the same thing, and that 'a being' is redundant in 'man is a being', Dalgarno replies that the meaning of 'man is' should consist of three parts, for otherwise the sentence would not express a proposition at all. Thus 'man is' must be analyzed as 'man is a being'. Again it appears that "the copula in a proposition is distinct from the notion *being*" (AS:63). This argument is plainly circular. As Michael (1970:245) rightly comments, "this is not much of an argument, as the conclusion is identical with his [Dalgarno's] preliminary distinction between the two uses of *be*".

The positive argument for showing that the noun is the only real part of speech depends on the 'true origin of the substantive verb'. This verb is "nothing other than the *formal* part of the proposition, that is, the sign of the mental act of judging" (AS:63). Since judgement is made in two ways, namely by affirmation or by negation, the copula is twofold, "corresponding to the twofold mental act of judging; and the two verbs are cases of the notions *affirm* and *negate*, which following predicamental rules are to be conceived as essentially nominal" (AS:64). Dalgarno's point is thus that since 'affirm' and 'negate' signify notions that are classified under the predicaments, these notions are typically signified by nouns. And as the copula signifies in fact either one of these notions, the copula itself is reducible to a noun. At the outset Dalgarno summarizes his argument as follows: "every *entity* of whatever kind must of necessity have a place in the predicamental series; but every predicamental notion is a noun. From this it follows that the Verb (...) is only a case or inflexion of the noun" (AS:62).

Concerning this argument it may be noted that strictly speaking it makes no sense to say that a notion *is* a noun, although Dalgarno may have believed that linguistic categories are in fact applicable to mental entities. In general, it is difficult to interpret his explanations on these matters, as he often seems to conflate linguistic expressions and the things signified by these expressions. However, in this instance the apparent use-mention confusion can be easily repaired: what Dalgarno probably means is that predicamental notions are most properly described by nouns, since nouns typically refer to complete and independent notions. This also appears from his other statement just quoted, saying that these notions are ‘to be conceived as essentially nominal’. But it is not fully clear why this should be the case. It is intriguing though obscure what Dalgarno means by saying that ‘predicamental rules’ prescribe the ‘nominal’ character of the notions classified by the predicaments¹. The most plausible guess seems to be that nouns by definition designate concepts of independent entities of some kind, and that the items listed under the predicaments must also be viewed as independent entities, since otherwise it would be impossible to classify them. All this remains rather vague and does not appear to be free from circularity. The overall picture however is clear enough: the only genuine class of words is formed by nouns, that is, names of things of any kind, or rather names of complete and basic concepts; all words belonging to one of the other word classes express variations of the concepts and aspects of the things named by nouns.

In a later chapter, Dalgarno explains that the radical words of his language, though expressed in Latin by verbs or substantives or adjectives, refer to radical notions which are ‘to be taken in an abstract sense’ (AS:87). For instance, the radical word *kan* ‘rex’ (king) does not refer to the concept expressed by the word ‘king’, but to that element of that concept which remains after subtracting the elements ‘person’ and ‘active’. The autobiographical tract sheds some additional light on this point. A fundamental principle for the philosophical language, Dalgarno says there, is “That evry Radical word must be a noun Substantive, or rather signifying the notion of the thing indefinitely” (f 38r). He further says that “the bare radical words without inflexion signify the notion indefinitely, and the modale variations of Substantive, adjective, active, passive, &c. are made off by terminations” (f 40r). Thus it appears that the radical words, rather than being substantive nouns, are names of pure notions without further specification as to how these notions are conceived. At the background of this seems to lie a distinction similar to the medieval one between ‘significatio’ on the one hand, and the ‘mode of signifying’ on the other hand, which, very roughly, is equivalent to a perhaps more familiar distinction between the lexical and the

¹ It is noteworthy that Wilkins similarly states that in his tables every radical word is supposed to be a substantive (*Essay*:299). He defines nouns substantives as “the names which are given to things, considered simply, and as subsisting by themselves” (*Essay*:302).

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syntactic or grammatical meaning of a word¹. Dalgarno's insistence that the noun is the only primary part of speech amounts to assigning lexical meaning absolute priority over grammatical or structural aspects.

Though Dalgarno's argumentation at this point is elusive, it has been misrepresented in Michael's discussion of it². Faced with Dalgarno's statement that every predicamental notion is a noun, Michael assumes that Dalgarno is talking about the ten notions known as (or as Michael says, expressed by) the predicaments rather than about all notions subsumed under one of the predicaments³. This mistake leads Michael into supposing that Dalgarno "does not bother to express the next step in his argument, assuming that his reader will at once remember that among the Predicaments are *Actio* ('the manner of doing') and *Passio*" (1970:244). Dalgarno's conclusion that the verb is an inflexion of the noun is supposed to follow from his taking the verb to express doing or suffering. In fact, Dalgarno expresses in detail the step in his argument Michael alleges to be implicit, namely by the negative and positive arguments described above, and ably summarized, at least as far as the first is concerned, by Michael himself. From this explicitly stated step in his argument it is very clear that Dalgarno does not take the verb to express doing or suffering. Michael's initial mistake engenders a series of others. He goes on to state that Dalgarno "proceeds to separate the idea of negation from the copulative function of the verb", whereas in reality Dalgarno explicitly identifies one of the two copulative functions of the verb with negation. Further, concerning Dalgarno's observation that 'there is no negation in simple terms'⁴. Michael wrongly surmizes this to mean that the negative

¹ Modistic grammatical theory used an extremely complicated technical vocabulary to cover a number of sophisticated distinctions which it would be digressive to take into account in the present context. Cf. Robins 1990:83-100 for a brief account, Bur-sill-Hall 1972 for a more extensive treatment.

² Michael (1970 : 241-246) to my knowledge is the only modern commentator discussing Dalgarno's views on grammar at some length. Shumaker 1982:154-162 provides a useful synopsis of the major characteristics of the grammar of Dalgarno's language, without adding much relevant commentary on theoretical aspects. Padley 1976 and 1985, though exclusively concerned with grammatical theory, confines his treatment of Dalgarno almost completely to the predicamental foundation of the lexicon (1976:192-193; 1985:361-363). However, Dalgarno's theory of the verb is briefly mentioned (1976:253; 1985:306, 375).

³ Michael accordingly mistranslates the phrase '*omnis Notio praedicamentalis*' (every predicamental notion) as 'the idea expressed by each of the predicaments'.

⁴ The clause "*nullam esse Negationem in terminis simplicibus*" (AS:65) is mistranslated by Michael as "negation is never expressed by means of simple terms" which may explain, or be explained by Michael's erroneous interpretation of it. In general, Michael's misunderstanding of Dalgarno seems to be due to a failure to take the logical background of most of Dalgarno's arguments into account. That such an eminent history of grammatical theory as Michael's book could be written without much regard of the logical tradition might be significant for the relative independence of logic and grammar in the period covered. However, it is understandable that theories such as Dalgarno's, which are expressly aimed at

copula has not the primary status of the affirmative one. In fact, Dalgarno is talking about expressions like ‘not-stone’ here, which he rejects as absurd (on which more below). Finally, Michael concludes that Dalgarno seeks to establish, among other things, that the copulative function of the verb ‘to be’, and therefore of other verbs, is distinct from its function to signify affirmation. This is quite the opposite of what Dalgarno seeks to establish. His argument hinges on the very observation that the copulative function is to signify affirmation (or negation).

Regarding the copula Dalgarno further observes that first, it should be distinguished from the tense-indicating element in a word, and secondly, that in a logical language the copula should be more clearly expressed than in ordinary languages. Since the copula is merely a sign of the act of judging, the words ‘yes’ and ‘no’ may be used to signify what Dalgarno calls the ‘logical verbs’, that is, the verbs denoting the mental acts of affirming and negating. Thus ‘Peter is in the house’ is expressed more logically as ‘Peter yes in the house’, and its converse as ‘Peter no in the house’. The latter expressions are more logical because they contain an element which directly signifies either the positive or the negative act of judgement. In ordinary languages these acts are confusedly expressed, as appears from the fact that in negative propositions there is an element which is also used to indicate positive judgments, namely the word ‘is’. Substituting the ‘logical verbs’ for their ordinary language equivalents shows that negative propositions are contradictorily expressed in these languages: ‘a man is not a stone’ gives ‘a man yes no a stone’. Logically speaking, there are two copulative verbs, one indicating a positive, another indicating a negative judgement. A language constructed on logical principals should therefore contain two distinct words unambiguously indicating either one of the judicative acts¹. Thus, in accordance with the medieval tradition of universal grammar, Dalgarno assumes a logical form which underlies the surface structure of natural language expressions². He further assumes that if the logical form is not directly expressed, this is done for the sake of abbreviation:

the copula can, for the sake of conciseness, be realised in one word together with the predicate, or together with both subject and predicate,

merging logic with grammar, tend to be misrepresented when viewed solely in the perspective of grammatical theory.

¹ In the autobiographical tract, Dalgarno notes that he later changed his opinion, and that three, rather than two judicative acts are designated by the copula, namely the ‘dubitative’ act in addition to the affirmative and negative ones (ff.61r - 63r).

² It is at present a matter of consensus among historians of linguistics that Chomsky’s claims concerning the Cartesian origin of the distinction between surface and deep structure are incorrect (Chomsky 1966). Cf. Salmon 1969 (=1988:63-85), Aarsleff 1970, Keith Percival 1972, Padley 1976:103-104. As in other instances, the linguistic community has learned from Chomsky’s mistakes, as appears from the ensuing literature on previously forgotten grammarians.

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e.g. the word *amamus* contains within itself four distinct notions; i.e. *we*, *present tense*, *are* (or rather *yes*) and *loving* (AS:65).

Dalgarno's own philosophical language is aimed at enabling a clear expression of this underlying logical form. However, it will be seen that he introduces a number of grammatical inflexions, borrowed from Latin, which serve to abbreviate the expression of the full logical form.

Concerning the logical structure of propositions Dalgarno remarks that negation "is an act of the mind, separating one thing from another" (AS:65). For this reason, negation is an operation belonging to the level of propositions, not to that of simple terms. Expressions coined by logicians such as 'not-stone' are to be rejected, just as the entire body of doctrines in the context of which these terms are used: "a very large part of logical theory, which treats of equipollence and the conversion of propositions is vain, useless and absurd" (AS:65). What Dalgarno is referring to, is the equivalence between e.g. 'no A is not-B' and 'every A is B'. Under 'conversion' logic books treated e.g. the fact that subject term and predicate term in 'some A is B' (particular affirmative), and in 'no A is B' (universal negative) may change places without affecting the truth value of the statement. In 17th century logic books, equivalence of propositions was no longer a popular subject, but conversion was quite justifiedly regarded to be important for logic¹. Since the conversion of propositions can be treated without resorting to negation of terms, it is not certain whether Dalgarno really wanted to banish the whole subject.

Dalgarno further maintains that each proposition necessarily contains a subject, a copula, and a predicate. The opinion that the substantive verb is not a necessary part of every proposition, he says, is absurd. One might just as well claim "that the subject or the predicate are not necessary either, for it [the substantive verb] is the essential and most important part of the proposition" (AS:65). With this, Dalgarno merely repeats a point most logicians of his day would readily agree with. However, by emphasizing the unique and indispensable function of the copula in the proposition Dalgarno seems to contradict the argument according to which only the noun is a primary part of speech. For in view of the special and important function performed by the copula it seems inescapable to assign it a special status as a distinct part of speech. In Dalgarno's view however this does not follow. He thinks that the special function of the copula is sufficiently indicated by the use of the radical word signifying this function. In his philosophical language, the word 'tim' - 'affirmation' is to be used for the copula in positive propositions, and the word 'trim' -

¹ On equivalence, cf. e.g. *La Logique ou l'Art de Penser*, II, ch. 4: "Je ne dis rien de la réduction des propositions opposées en un même sens, parce que cela est tout-à-fait inutile" (Arnauld & Nicole 1970[1662]:162. And Blundeville 1599:64: "The schoolmen doe give divers rules touching the equivalencie of speeches: but such as in mine opinion are neither necessarie nor profitable". Of conversion however, *La Logique ou l'Art de Penser*, II, ch. 17 says that "de-là dépendent les fondemens de toute l'argumentation" (Arnauld & Nicole 1970[1662]:219).

‘negation’ in negative ones. And, as seen, the crux of his argument was precisely that since ‘affirmation’ and ‘negation’ are nouns, the copula is a ‘case or inflexion’ of a noun.

Dalgarno’s theory of logical grammar, then, is of the utmost simplicity. There is just one part of speech, the noun, which names an entity. The lexicon of radical words contains a list of such names, including names of mental acts performed in joining various notions to form a proposition. All that is required for the expression of the logical structure of thought is naming both the notions and the mental act of joining them. It is clear that this crude scheme is insufficient to adequately represent the meaning of even the simplest sentences of ordinary languages. The core of the matter is the fallacious assumption that the structure of speech can be satisfactorily represented by a series of names indicating its structural aspects. Thus, since it is possible to describe the function of the copula using a radical word meaning ‘affirmation’, Dalgarno assumes that simply using this word is a logical way of expressing the copula. He does not bother to provide an account of the contribution of the copula to the meaning of the sentence in which it occurs. In allowing only one part of speech Dalgarno fails, or refuses, to recognize that referring to affirmation is something quite different from affirming itself. If he had consistently based his language on his grammatical theory, the language would have had no means to express this fundamental distinction, as it would have consisted of mere concatenations of names¹. In practice, the problem does not arise, as the Latin inflexions used by Dalgarno change radical words into expressions of various semantic types, distinct from nouns.

3.5.3 The Compromise between Logical Form and Inflectional System

Since Dalgarno’s grammar is aimed at a correct representation of the structure of thought, there is little room for distinctions based on linguistic form. Thus he maintains that most words classed as derivatives, on account of their consisting of a root word plus an affix, are in fact compounds. For instance the word ‘filiolus’, consisting of the root ‘filius’ (son) and the diminutive suffix ‘-olus’, is, as Dalgarno says, “a composite word formed from *filius* and *parvus*” (AS:70). It is only because the element ‘parvus’ (little) is expressed by a mutilate ending that ‘filiolus’ is called a derived rather than a compound word. For Dalgarno’s grammar, only semantic criteria are relevant².

¹ Michael is clearly making a similar point, though in somewhat obscure terms, when he says: “His [Dalgarno’s] contention is useless because in so far as a relation is being considered only as expressing a name it is prevented from fulfilling its only task - to relate. Putting it crudely, if the copula is regarded only as a form of the name junction it cannot join” (1970:245-246).

² He does not however reject the distinction between composition and derivation altogether, saying that compounds formed from preposed mutilate particles like ‘re-’ and ‘con-’ in Latin are more correctly called derived than compounded (AS:71), without explaining why this should be so.

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The contrast between linguistic form and semantic content is particularly elaborated by Dalgarno in connection with the degrees of comparison. Just as *filiolus*, so is *durior* a composite word; it consists of *durus* (hard) and *magis* (more). But these explicitly comparative words are not the only ones involving comparison. As Dalgarno explains, “the mental act of *comparison* is by far the most important one in acquiring knowledge of things. It is scarcely possible to find a sentence that does not involve arguments of *comparison* or of causes” (AS:46). The common grammatical classification of the degrees of comparison into positive, comparative, and superlative fails to account for the fact that words like *great* and *small*, although lacking a marker for this, “are no less properly comparative than *greater* and *smaller*” (AS:46). Dalgarno does not explain this further, but his point is probably that a word like *small* indicates relative size and hence implies comparison between the thing said to be small and other things. As comparisons are not consistently represented as such, Dalgarno adds that “in order to understand the true nature of the comparatives we must detach ourselves from everyday language”. Dalgarno distinguishes three basic notions involved in all comparisons, namely those expressed by the adverbs *more*, *equal*, and *less*. Apart from these three principle ones there are other ‘distinct logical arguments of comparison’ (AS:47).

Accordingly, his language is relatively rich in its means for expressing comparisons, which comprise fourteen radical words on the one hand and no less than nine grammatical inflexions on the other hand. The latter however seem to be redundant duplicates of the former, as will be explained below. As for the radical words, the lexicon contains under the genus ‘common accidents’ a lower genus ‘degrees of comparison’ consisting of five radical words, each of which is joined with one or two opposites, so that the genus in total contains fourteen radical words. Thus, *sum* means ‘valde’ (very), *slum* ‘mediocriter’ (moderately) and *shum* ‘parum’ (too little)¹. The word *sun* with its opposites signifies the three basic comparative notions ‘magis’, ‘aeque’ and ‘minus’. It is conspicuous that the meanings of twelve out of the fourteen radical words pertaining to comparison (exceptions are *sud* ‘excessus’ and *shud* ‘defectus’) are represented by Latin adverbs. Further, there are no radical words which are equivalent to the Latin adjectives meaning ‘great’ and ‘small’. As appears from the samples of texts written in Dalgarno’s language (cf. 3.5.6), the adjective meaning ‘small’ is to be rendered by *shum* ‘parum’ plus an inflexion indicating ‘adjective’ (on these inflexions more will be said immediately below). In this way, Dalgarno probably wanted to bring out that ‘great’ and ‘small’ signify comparative notions. On the face of it, it seems that Dalgarno’s using Latin adverbs to characterize the meaning of the radical words expressing comparison is pointless in view of his explicit statement that all radical words are nouns. But as the latter statement probably means

¹ This instance shows that Dalgarno sometimes uses interposition of *h* rather than *r* to indicate opposition, namely in cases where this is more euphonical. Cf. 3.4.5 above.

nothing other than that what is signified by radical words are complete notions, this need not be a problem. The idea is, presumably, that the notions expressed by 'great' and 'small' are better described by the adverbs 'valde' and 'parum'. This shows that it is often fairly obscure which complete notions are exactly designated by the radical words. This point is reinforced by Dalgarno's assertion, mentioned above, that the radical notions are to be taken 'in an abstract sense' (AS:87). Nevertheless, it appears that Dalgarno was led by sound semantic intuitions. For it can be plausibly argued that there is a difference in semantic type between an adjective like 'pink' and an adjective like 'small'. This appears from phrases like 'a small elephant'. Whereas 'x is a pink elephant' can be said to be equivalent to 'x is an elephant and x is pink', it is problematical to hold that 'x is a small elephant' is analogously equivalent to 'x is an elephant and x is small'. Rather than directly ascribing a property to an object, the word *small* functions as a modifier of the predicate 'is an elephant' and thus proves to be more akin to an adverb than to an adjective. Although Dalgarno is not explicit about this, his use of the Latin adverbs *valde* and *parum* for representing the notions designated by the adjectives *great* and *small* seems to be informed by a desire to indicate that these adjectives belong to a deviant semantic type.

The autobiographical manuscript shows that the subject of comparative expressions continued to interest Dalgarno. In this tract he investigates, among various other comparative expressions, the particles *tam* and *quam*¹. He observes that English is the only language expressing equality of two compared items in a logical way, namely by using twice the word 'as' in sentences like *Peter is as learned as John*². Rather than *Petrus est tam doctus quam Joannes*, in Latin this should likewise read *Petrus est aequè doctus aequè Joannes*. Further, in a philosophical language there ought to be a structural correspondence between sentences expressing equality and sentences expressing inequality. Thus *Peter is more learned than John* must be expressed as *Petrus est doctus magis, Joannes minus*, so that the particles *magis*, *aequè* and *minus* occupy a fixed place in sentences of both types. Dalgarno also notes that in negative sentences a complication arises: *Peter is not as learned as John* implies that *learned* is less properly predicated of Peter. He notes this in passing, without offering a solution (f 69r). Although it is obvious that there is little logical gain in Dalgarno's reductions of sentences expressing comparisons, it is remarkable that he was so much concerned with trying reductions of this sort at all. It shows that his general approach to language was similar to Leibniz's, who was likewise exercised by the problem how to reduce comparative statements to other, logically more manageable ones (cf. 5.5.3).

¹ Christ Church MS 162, ff.68r-69r. Cf. AS:85, where the same particles are briefly discussed.

² Although this example and others may create the impression that what Dalgarno presents as the logical structure of speech is in fact the structure of English as opposed to Latin, there are other instances in which he contrasts the structure of English expressions with logical structure.

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As has been mentioned, it is Dalgarno's purpose to eliminate the contrast between linguistic form or surface structure on the one hand, and semantic content or logical form on the other hand. More concretely, this entails that each element identified by logical analysis of thought is indicated by a separate word, so that every ingredient of our concepts is distinctly represented. Accordingly, a strictly logical language does not contain any grammatical inflexions. However, Dalgarno notes that "since it is impossible to express all the thoughts of the mind in terms of a few primary words without variation except by very long periphrases, it is therefore necessary for the sake of compendiousness to allow derivation and composition" (AS:70). Just as in the construction of the lexicon of radical words, Dalgarno, in defining the grammar, resorts to a compromise between antagonistic requirements set by logic and practice. On the one hand, he does not "follow logical rules so strictly that the same rigidity appears in composition and the structure of speech as it does in analysis, namely that all distinct parts are expressed by distinct words" (AS:66). Instead, he introduces a series of grammatical inflexions in order to prevent that expressions in his language become too long to be practicable. On the other hand, he does not "vary a word with distinct terminations to express various modes and circumstances as many times as I would have been able to by means of certain rules for the sake of compendiousness" (AS:66).

The result is summarized on the fold-out table containing the lexicon of radical words, under a head saying 'grammatical inflexions: the single examples are to be considered as rules incapable of any exception'. Using the radical words *sim* 'bonus' (good) and *pon* 'amor' (love) as a paradigm, Dalgarno exemplifies inflexions signifying noun substantive, plural, adjectives of various kinds, degrees of comparison, verbs with various tenses and moods, adverbs, person (not as a grammatical category), and proper names. The list starts as follows:

slim indifferens medium
srim malus oppositum
simu bonitas
simmu bonitates

This illustrates once more the device of interposing *r* to indicate opposition, and of *l* indicating the medium between extremes. Further, it appears that the suffix *u* signifies that a word is a noun substantive. Dalgarno's statement that every predicamental notion is a noun thus turns out to be irrelevant for the grammar. On the contrary, Dalgarno points out that a radical word without any inflexion, e.g. *sim*, signifies a particle. The particles will be discussed in 5.5. Finally, doubling the final consonant indicates plural.

Next, the following 'various adjectives' are presented:

pone amans activum
pono amatus passivum
Sima bonus neutrum
ponemp amorosus et *ax*
ponomp amabilis
ponomb amandus
ponemb amaturus

For most of these inflexions, Dalgarno could not use *sim* ‘bonus’ as a paradigm for lack of appropriate Latin equivalents. This is perhaps an instance of a phenomenon Dalgarno dislikes, as has been mentioned (3.5.1), namely that morphological rules in existing languages are often more restrictive than necessary. Yet he remarks that obviously “not every notion is capable of taking all of these inflexions” (AS:67). Indeed, though it is possible to imagine what could be the meaning of e.g. *sime*, namely ‘being good’, it is not at all clear what e.g. *simomp* (‘goodable’) could be supposed to mean. As a general rule, Dalgarno states that “variability in the notion is the basis for variation in the word”. This causes, he claims, his language to be in this respect superior to other languages, which are wholly dependent on ‘the whim and convention of our ancestors’ (AS:67). In fact, it is conspicuous that since Dalgarno offers merely a single Latin example for characterizing the meaning of derived words, this meaning is seriously underdefined. For instance, although the suffix ‘-bilis’ generally signifies capability of undergoing the act designated by the verb to the stem of which it is suffixed, Dalgarno’s example ‘amabilis’ (amiable, lovely) shows that there are exceptions to this.

The list of grammatical inflexions further contains nine ways of expressing the degrees of comparison:

simam valde bonus
siman mediocriter bonus
simaf parum bonus
simab melior
simad aequè bonus
simag minus bonus
simap optimus
simat mediocriter bonus
simak minime bonus

It is unclear why Dalgarno offers this list in addition to the radical words pertaining to comparison, as these inflexions are hardly shorter than a corresponding combination of radical words. For instance, both *sum sim* and *simam* mean ‘valde bonus’. It is likely that Dalgarno considered both methods of representing comparisons and that in his haste he accidentally presented both alternatives. Conspicuously, eight of the nine inflexions listed here are defined by combinations of the paradigmatic word *sim* with the first eight of the relevant radical words (namely *valde*, *mediocriter*, *parum*, *magis*, *aequè*, *minus*, *maxime*, *minime*), the exception being *simat* (‘mediocriter bonus’) which is

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redundant as its meaning is indistinguishable from *siman* ('mediocriter bonus'). Moreover, in the texts Dalgarno offers as samples of his language these inflexions are not used. It is not unlikely, then, that Dalgarno simply forgot to discard this list. On the other hand, the inflexion *ap* indicating superlative is sometimes used, e.g. in *nhkbeisap* (cf. 3.4.5) and in *shubapdan* (cf. 3.5.5).

Next follows a list of 'inflexions of tense and mood':

ponre facio amare
ponesa amavi
ponesh amaveram
ponese amabam
ponesi amo
poneso amato
ponoso amator imperative
ponesu amare
ponosu amari
ponesai amanter
ponompai amabiliter

There are thus four inflexions indicating tense (present, perfect, pluperfect, imperfect), four moods (future imperative active and passive and infinitive active and passive), and a suffix *-ai* turning adjectives into adverbs. The simple future tense is missing, which is probably an error. In the samples of Dalgarno's language sometimes an undefined suffix *-esu* is used which might have been intended to indicate future tense¹. The imperative forms 'amato' (love - in the future) and 'amator' (be loved - in the future) are presumably included since they occur frequently in the Lord's prayer, which Dalgarno translates into his language by way of specimen.

A final series of inflexions are the following:

ponel persona amans
sunilli omnes personae
ponor amatum vel res amata
sunirri omnia vel res omnes
nhfim magnus lapis
nhfif lapillus
nhfind cumulus lapidum
oi Exoticum Angloi Galloi

Suffixing *l* or *r* indicates that the thing referred to by the radical word is a person or a thing respectively. As Dalgarno briefly indicates in the text (AS:87), the vowel between the radical word and the suffixed *l* or *r* is significant too, *e* signifying the agent, *o* undergoing. Thus *ponel* is 'loving person' and *ponol* is

¹ Following a suggestion by Shumaker (1982:166).

‘person loved’¹. If neither an active nor a passive thing or person is designated, *i* serves as a neutral link between suffix and radical word. As a general rule, Dalgarno states that *i* may be inserted everywhere if euphony requires without resulting in any meaning change (AS:73). The plural is again indicated by doubling of consonants, this time of the suffixed *l* and *r*. These double consonants together with euphonic *i*’s are suffixed to the radical word *sun* ‘totum’ (whole) to form *sunilli* ‘all persons’ or ‘everybody’ and *sunirri* ‘all things’ or ‘everything’ (cf. AS:86). Further, there are suffixes indicating small or large size, and a suffix which signifies ‘aggregate’ or ‘heap’. The suffix *-oi*, finally, indicates that the word to which it is added is a name of inhabitants of some country. In the samples of his language Dalgarno uses this suffix to indicate proper names in general.

It thus appears that the compromise between logical accuracy and practical utility has led Dalgarno to re-introduce almost the full range of word classes he had dismissed as being logically superfluous. As a result, his language is more a simplified natural language than a language modelled upon the logical structures supposedly underlying expressions of natural languages. The discrepancy between Dalgarno’s program for a logical grammar and the practice of his language is particularly evident in the way Latin or English verbs are to be translated into the philosophical language, namely by simply adding the suffix *-esi* (or a similar suffix for other tenses than present) to a radical word. The logical analysis of the verb into copula plus adjective (plus tense and person) is thus disregarded, and the essential function of the copula in the proposition is not marked in any way. In practice, the words designed for expressing the ‘logical verbs’ of affirmation and negation, *tim* and *trim*, function as equivalents to English ‘is’ and ‘is not’. Further, *trim* is used as equivalent for ‘not’ in sentences containing a verb other than ‘to be’². Dalgarno however was convinced that since the inflectional system of his language is extremely limited, the possibilities of creating logically sound expressions by means of composition are copious. And he repeatedly emphasizes that the greatest excellence of his language is its capacity for composition (AS:67,83; cf. 3.4.7).

3.5.4 Syntax

Quite in accordance with common grammatical practice at the time, Dalgarno is very brief about syntax. In his view, “the structure of speech is quite straightforward for those who know how to analyze their concepts”. Accordingly, there is one general principle of syntax: “the order of signs and of

¹ There are also radical words meaning ‘person’ and ‘thing’: *krem* and *kem* respectively.

² Dalgarno also notes that if ‘to be’ is inflected for tense, and hence the proposition is not eternal, or as Dalgarno claims is more correct, is not a proposition of necessary connection, ‘to be’ is to be rendered by *dan* ‘time’ plus a suffix indicating tense, e.g. *Petrus danesa* ‘Peter was’ (AS:76-77).

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speech is the same as that of concepts of the mind or acts of reason” (AS:72). Existing languages often distort the natural order of words. Latin especially is liable to this objection, as it is sometimes arduous to reconstruct the meaning of a whole sentence even if each of the individual words is understood.

In addition to the general principle, Dalgarno gives three special rules concerning word order:

1. the substantive preceeds the adjective
2. the agent precedes the active verb, and the object follows
3. the adverb follows the verb (AS:73).

Dalgarno does not attempt to justify these rules. Apparently, he took it for granted that it is natural to first think of something and subsequently of a property or a modification of the thing thought of (rules 1 and 3). Further, if transitive verbs are viewed in terms of an actor, an act and an object of the act, it is perhaps most natural to consider these elements in this order. That the SVO order prescribed by rule 2 accords with English surface structure seems to be irrelevant, in view of the fact that rule 1 disagrees with English word order.

Dalgarno further allows a construction like the Latin ablative absolute, in English often expressed by a clause introduced by *having* or *being*. As this construction “can almost always be resolved into tense, by means of the words *when*, *while*, *after* etc., a tense particle will be the indicator of such a clause” (AS:73; on the particles, see 5.5). Dalgarno is talking about constructions like “having said these things, he was silent”. In his language, the first clause is to be rendered as (literally) “after these things said”. For “having done this” Dalgarno gives a translation literally meaning “when this done he” (AS:73-74). Thus the temporal particle together with a reversal of the prescribed word order is indicative of these constructions.

As a subject belonging to syntax Dalgarno also treats the question how to render the genitive, dative and ablative cases. In general, these cases are expressed in Dalgarno’s language by means of particles. The genitive is expressed by a particle equivalent to ‘of’¹, the dative by a particle meaning ‘to’ and the ablative by a particle meaning ‘from’. Although Dalgarno seems to be merely following English as opposed to Latin here, the use of these particles is motivated by a typical Dalgarnian analysis. Concerning the genitive he notes that “the adjectival noun and the genitive case, by strict logical analysis, constitute one and the same notion, or inflexion of the radical noun, and they add to it the aspect of pertaining” (AS:74). Thus the same semantic content is associated with various methods of realization in the surface structure. For instance, Hebrew expresses by the genitive case what is usually expressed by an adjective in English, saying literally ‘a wall of whiteness’ where English says ‘a white wall’. Both adjective and genitive signify the relation of pertaining, possession or state over and above the

¹ This particle is derived from a radical word meaning ‘pertain’ or ‘belong’. Shumaker 1982:155 draws attention to a parallel with Pidgin English having ‘hand-belong-master’ for ‘master’s hand’.

notion designated by the inflected word. Using a method he relies on throughout (cf. 5.5), Dalgarno expresses what might be called the ‘grammatical meaning’ of the genitive by a word with a corresponding lexical meaning, namely the radical word *shf* ‘pertain’ which is a particle in Dalgarno’s language by virtue of its being uninflected. Although adjective and genitive are logically equivalent, Dalgarno allows both ways of expression in his language ‘for the sake of compendiousness and clarity’ (AS:75). He further suggests that the genitive be used when the notions related by means of it are conceived as distinct and separate, and the adjective when ‘we conceive of two things as being concrete, composite and unified’ (AS:75)¹. In connection with the use of genitive and adjective Dalgarno criticizes as illogical the adjectival use of the word ‘whole’ in phrases such as ‘the whole body’. The word ‘body’ should be inflected rather than ‘whole’: in analogy with ‘a part of the body’ it would be appropriate to say ‘the whole of the body’ (AS:85-86).

A final topic concerning syntax is the method of translating impersonal verbs in clauses such as ‘it is proper’, and in clauses such as ‘it is raining’. For the first type of expression Dalgarno designed a special inflexion of radical words, namely what he calls the ‘adjective of the thing’. It is expressed by adding *a* to a radical word, which is the usual way of indicating adjective, followed by *r*, which as a suffix signifies ‘thing’². Thus to the radical *sed* ‘oportere’ (to be proper) *ar* is suffixed: *sedar*. The sentence ‘oportet omnes homines mori’ (‘all men must die’) reads *tim sedar sunilli shhpesu*, which word-for-word means: ‘is proper thing everybody to die’. The second type of expression is translated by supplying the name of the relevant subject: ‘it is raining’ reads *nen nenesi* (‘the rain rains’)³ (AS:76).

3.5.5 The Particles

It has been mentioned (3.3.4) that Dalgarno considered his treatment of the particles in *Ars Signorum* to constitute the most drastic modification of his early scheme, and its greatest improvement. Whereas at first he had divided the words designated by the symbols of his universal character into two classes, namely radical words and particles, the lexicon of *Ars Signorum* consists exclusively of radical words. Although the initial twofold division

¹ In the autobiographical tract (f.86r, f.15r), Dalgarno elaborates on the various relations expressed by the genitive, in much the same way as the grammar of Port Royal (Lancelot & Arnauld 1676 [1660]:46-48).

² This has escaped Shumaker’s usually alert attention, for which reason he finds the paragraph on impersonal verbs obscure (1982:156).

³ The existence of impersonal verbs had led Humanist grammarians to note a discrepancy between surface and deep structure. Accordingly, Linacre (c. 1460-1524) and Sanctius (1554-1628) assumed a ‘nominative of related signification’ to account for the equivalence: “pluit = pluvia pluit” (it rains = the rain rains). Padley 1976:105.

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was made to facilitate abbreviation in writing, it was clearly dependent on a traditional distinction between major and minor parts of speech. In logical terminology, the major parts of speech were called ‘categorematic terms’, the minor ones ‘syncategorematic terms’. Dalgarno associates the distinction with the Aristotelian opposition of ‘matter’ and form’, the major parts of speech signifying the matter of discourse, that is, the objects of thought, while words belonging to a minor word class signified formal aspects, i.e. modifications of and connections between these objects of thought. Accordingly, when explaining in *Ars Signorum* the structure of his early scheme, Dalgarno says the radicals were the material elements, and the particles the formal ones (AS:79). It is also significant that in the autobiographical tract (f.38r) he describes the two word classes of his early scheme as ‘integrals’ and ‘particles’, indicating that the major words or material elements of discourse signify whole notions, independently from the sentences in which they occur, whereas the meaning of the particles consists in their contribution to the meaning of larger wholes. As will be seen (cf. 4.4.4), Wilkins’s philosophical grammar makes the same major distinction, using the same terms¹.

The analysis of the particles, Dalgarno emphasizes, is of the utmost importance for the art of signs. For they “are to speech what the soul is to man, what the nerves and ligaments are to the body, or what cement is to the building”. Without the particles, speech is like a dead body, or a heap of unconnected limbs, or ‘a pile of stones without the form of a house’. Since the whole practice of logic and grammar resides in their correct use, “the particles constitute the formal and most primary part of speech, and indeed likewise the most difficult one”. The analysis of the particles, therefore, is the ‘key to the invention’ (AS:78). At first sight, this statement contradicts Dalgarno’s extensive argument showing that the noun is the single primary part of speech. This apparent contradiction however is purely terminological. When arguing that the noun is the only primary part of speech, Dalgarno is trying to establish, roughly speaking, that the noun is the only word class pertaining exclusively to the matter of discourse, as nouns signify notions of things without admixture of other notions modifying the notion signified. When saying that the particles are the most primary part of speech however, he is merely emphasizing the importance of the formal part of discourse expressed by the particles. This is not to say that the particles should constitute a word class in their own right. On the contrary, following a reasoning analogous to the one concerning the copula, Dalgarno combines a full recognition of the distinct functions performed by various types of words with the emphatic assertion that a philosophical language should not contain any other part of speech than the noun. Recapitulating the history of his project, Dalgarno relates:

¹ Dalgarno’s use of the term ‘integral’ in the autobiographical tract may well be derived from Wilkins’s terminology. The point here is merely to underline that the traditional distinction expressed in these terms was taken for granted by both Dalgarno and Wilkins. Leibniz made a similar distinction (cf. 5.5.3).

Examining more closely the logical analysis of all the notions, I perceived that there is no particle that does not derive from some predicamental noun, and that all particles are really cases or modes of nominal notions (AS:80)

What Dalgarno perceived was that, for instance, the conjunction ‘because’ indicates that the clause introduced by it describes a cause. And ‘cause’ is a ‘nominal notion’. Likewise, the preposition ‘with’ is often used in phrases describing the application of some instrument, and ‘instrument’ is again a ‘nominal notion’. In a similar fashion each particle can be shown to be in this sense derived from a ‘predicamental noun’. Once Dalgarno had realized this, he saw that in a strictly philosophical language the particles should not be treated as a separate word class, designated by primitive signs, but that their derivative nature should be clearly expressed. Although special signs for particles are convenient for the purpose of shorthand, this is not relevant for the structure of a philosophical language. Consequently, Dalgarno “dismissed all the particles from the rank of radicals” (AS:81), leaving only predicamental notions to be designated by radical words of one and the same type.

Dalgarno acknowledges a debt to ‘the opinion of learned men’ with whom he discussed the method of setting up words to signify the particles (AS:82). It is unknown whom Dalgarno is referring to here, but in any case Wilkins was not among these learned men. In the autobiographical tract Dalgarno reveals that he never discussed his change of opinion on the particles with Wilkins, adding rather maliciously that this explains why the latter in his *Essay* used a completely wrong method (f.65r). Some of the participants in the discussion favoured the method of Dalgarno’s early scheme, for practical reasons: since the particles are frequently used, it is convenient to have short words functioning as such. Moreover, the longer words proposed by Dalgarno, which were meant to represent the complex meaning of some particles, proved to be obscure, e.g. *sunsum* (whole-unity) or *sunshum* (whole-part) for *unusquisque* (every single one). Dalgarno continues:

Others on the other hand agreed with me that since the notions of all the particles are by the nature of the thing itself derived from radical notions of nouns (which those of a contrary opinion were not able to deny) it is appropriate that they should be formed from them, and that in a philosophical language it is altogether absurd to admit any notion that is not originally a noun (AS:82)

Accordingly, the method Dalgarno uses for expressing the particles can be summarized by the following rule: “a word from the table of accidents used in speech without any suffix is a particle” (AS:83). Dalgarno provides a list of particles made in accordance with this rule on the large fold-out sheet containing the lexicon of radical words and the list of grammatical inflexions. The list of particles consists of 82 entries, each entry containing a Latin particle, i.e. a preposition, or an adverb, a pronoun (determiner), or a

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conjunction, and one or more equivalent words of the philosophical language. The following samples may serve as an illustration¹:

ab - *sod, sam, bem* (actio, causa efficiens, distantia)
[by, from - action, efficient cause, distance]

e, ex - *san, bed* (materia, extra)
[out (of) - matter, outside]

in - *bred, dan* (intra, tempus)
[in - inside, time]

per - *sod, sam, sab, sag, slam, brhn, blhn* (actio, causa efficiens, instrumentum, exemplum, medium, transversum, secans)
[through, by, by means of, by way of, because of - action, efficient cause, instrument, example, medium, transverse, intersecting]

denique - *shubapdan* (posterius + superlative - time)
[finally - latest time]

fere - *sufshun, sumshuf* (maxime pars, valde minime)
[almost - greatest part, very least]

tandem - *shub dan bam* (posterius tempus longum)
[at last - later time long, or: after long time²]

praeterea - *thf, sun, shub* (multiplicare, magis, posterius)
[besides, hereafter - multiply [=and], more, later]

aliquis - *sum, shun* (unitas, pars)
[someone - unity, part]

ullus - *av* (ens, res)
[any - being, thing]

omnis - *sun* (totum)
[all, every - whole]

ac - *thf* (multiplicare)
[and - multiply]

aut - *trhb, slom* (opposite of probare, diversum)
[or - disprove?, different]

¹ The first word is the Latin particle, the italicized words are the equivalents in the philosophical language, the words in parentheses are the Latin words defining the meaning of the radical words in the lexicon which function as particles here; in square brackets the English translation of Latin words is given.

² Since *shub* also means 'post' (after), and following the syntactic rule that the noun precedes the adjective.

at - *slo*m, *trhf*, *trimshaf* (diversum, dividere, negare-impedimentum)
[but - different, divide, deny-impediment]

ut - *sham*, *slun* (finis, aequae)
[in order to, as - end, equally]

These samples show that a single Latin particle is often rendered by several particles of the philosophical language. In many cases, the various alternatives Dalgarno provides are clearly meant to account for different senses of the Latin word. The preposition *ab* for instance is rendered by *sam* 'efficient cause' if *ab* means 'by', and by *bem* 'distance' if it means 'away from'. Conversely, one and the same particle may translate various Latin words, e.g. *thf* 'multiply' is used to render *ac*, *et* (and), *etiam*, *item* (also), *praeterea* (besides). Although these words are associated with multiplication, this is probably due to some error; Dalgarno undoubtedly wanted to represent these words by a particle meaning 'addition' (*thn* in his tables)¹, which is confirmed by his using *thn* for 'and' in the texts written in his language (cf. 3.5.6).

Apart from the 82 particles which are expressed by means of radical words, Dalgarno uses 6 'pronominal particles' which have been designed especially for representing pronouns. These six particles are unconnected to the tables of radicals and thus are a relic of the method used for the early scheme. They are: *lal*, *lhl*, *lel*, indicating the personal pronouns *I*, *you*, *he* respectively, and *lol*, *lul*, *lul* signifying the demonstrative, reflexive and relative pronouns *this*, *self*, and *who*. These pronouns, Dalgarno emphasizes, are introduced merely for the sake of brevity. In principle, the nouns these pronouns are replacing could be used. For instance: "*I am writing* is equivalent to *George Dalgarno is writing*" (AS:81). Besides a list of particles that are explicitly defined, Dalgarno offers a rule for interjections such as *ecce* 'behold': these are to be expressed by a radical word designating one of the 'passions of the soul'. For example, 'behold' is *puf* 'observare', a sign of wonder is *pom* 'admiratio', and a joyful 'aha' is *prob* 'laetitia' (joy) (AS:87). Thus even those speech sounds which serve primarily to give vent to emotions are replaced by words designating the relevant emotions.

It is not altogether clear whether Dalgarno granted the users of his language the freedom to use other words than the ones in the list as particles. On the one hand, it would be in accord with his overall approach if he had done so. Moreover, his list is far from providing an equivalent for every Latin particle. On the other hand, he probably was aware that without explicit definition by means of a Latin equivalent the meaning of the majority of particles would be extremely obscure (the exception being words like 'ante'

¹ It would be illusory to look for a Boolean type of connection between logical conjunction and logical product here. See Dalgarno's translation of 'or' (*aut* and *vel*) which is unclear, but in any case unlike 'sum' or 'addition'. Likewise, Shumaker's suggestion that "the addition of something is construed as multiplication, if only by two" is far-fetched though amusing (1982:158).

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(before) which occur in the tables of radical words as well as in the list of particles). It is perhaps significant that he says that for those who are able to make a logical resolution of speech it will be easy to understand and recall the meaning of the particles, whereas the less learned should learn these words ‘as if they were instituted without reason’ (AS:85). He does not say, as he does in the case of compounds, that at least the learned will know how to form appropriate expressions by themselves. Further, he concedes that the particles do not always explicitly enough express the notion they represent (AS:84), while he is confident that “the particles are determined clearly enough from the tables” (AS:87). It thus seems that Dalgarno supposed a special convention to be required for the use of a radical word as a particle. However, as noted, he states explicitly (AS:83) that any word from the tables of accidents may be used as a particle.

Two objections that were raised in his discussions with learned men about the particles are similar to the ones discussed above (4.7) in connection with compound words: first, the particles were said to be too long, and second, they do not adequately describe the mental operations they designate. As to the first objection, Dalgarno maintains that since certain particles have a very complex meaning, it is appropriate to have compound words for them. This is wholly in accord with his general principles. He further observes that “natural logic has dictated to men that they institute complex words for the complex notions of particles”, such as *quandoquidem* (in as much as) and in English *nevertheless*, *whensoever* (AS:84). As for the second objection, he admits that the whole notion is not always explicitly expressed, because “it is not expedient for brevity and ease of communication that we should always express all of our simple notions by long periphrasis following strict logical analysis”. Interestingly, he gives an example of such a long periphrasis: the word *unusquisque* (every single one), if logically analyzed, means “all distributively with respect to the individual parts one by one”. As it would be too laborious to say all of this, a word compounded from the radicals *whole* and *part* or *whole* and *one* is used¹, “which is much more rational than to substitute [for the complex notion] a word of a simple institution” (AS:84). Again it appears that Dalgarno compromises between conflicting goals: he follows what he thinks is a logical method as far as possible, but carefully avoids a clash with the purposes of easy communication.

It will be clear that Dalgarno’s treatment of the particles has been guided by the same principles as those underlying his approach to grammar in general. The overall goal is to make the surface structure of the language correspond to the structure of thought. In Dalgarno’s view, this should be done by mentioning each element of the thoughts to be expressed. Since the function of the particles is to connect and unify the various concepts designated by ‘material’ words in a certain way, the nature of the connection

¹ Since *unusquisque* is not in the list of 82 particles, this remark may be taken to show that Dalgarno did not think a special convention for particles like these to be necessary.

made by a particle should be explicitly mentioned. Thus, since the conjunction ‘ut’ (in order that) designates a connection between an action and its goal, a radical word meaning ‘goal’ is used as the particle meaning ‘ut’. In this way, a partial description or at least an indication of the nature of the connection designated by ‘ut’ is given. Just as the function of the copula can be designated by a radical word, so can the contributions of the various particles to the sentences in which they occur be designated by radical words. Hence Dalgarno’s rule that such radical words should be used as particles. As a result, the distinction between material and formal parts of speech disappears: the function of the ‘formal’ words is supposed to be wholly catered for by the lexical meaning of the radical words.

3.5.6 The Philosophical Language in Practice

In order to show how his language works in practice, Dalgarno provides ten short texts, nine of which are translations of existing texts: the Lord’s prayer (see figure 3.2), the first chapter of Genesis, five psalms and two fables of Aesop. The only text originally written in the philosophical language is the dedicatory letter to king Charles. Shumaker 1982:162-170 offers a translation with detailed commentary of three of these texts. In the following the shortest of these, the Lord’s prayer, is presented with translation and commentary. Shumaker’s analysis has been extensively used, though not always followed. The Lord’s prayer was a paradigm for comparative linguistics in Dalgarno’s time and some centuries afterwards.



Figure 3.2

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Pagel	lalla	lul	tim	bred	Nammi
Father ¹	our ²	who ³	is ⁴	in ⁵	heavens ⁶

- 1 - mas gignere (male generate) + acting person (-*el*). Remarkably, the radical *pag* designates a compound notion.
- 2 - ego (I; one of 6 underived particles, cf. 3.5.5) + plural (by doubling *l*, cf. 3.5.3) + adjective (-*a*, cf. 3.5.3). The adjective follows the noun (cf. 3.5.4).
- 3 - qui (one of 6 underived particles).
- 4 - affirmare. If used without inflexion, it translates 'to be' in sentences expressing an 'eternal' proposition (cf. 3.5.2, 3.5.3).
- 5 - intra (in). Instance of a particle which occurs among the radical words (cf. 3.5.5).
- 6 - coelum (heaven) + plural (by doubling *m*) + euphonic *i* (cf. 3.5.3).

Tofu	lhla	skamroso
Name ¹	your ²	be hallowed ³

- 1 - As Shumaker 1982:162 notes, this is an error for *tonu*: nomen + substantive (-*u*, cf. 3.5.3).
- 2 - tu (you, one of 6 underived particles), + adjective (-*a*).
- 3 - *Skam* means gratia (grace), and -*oso* indicates future passive imperative. The *r* is probably meant to indicate 'make', since the suffix -*re* indicates *facio* 'to make' (Shumaker overlooks this possibility, and suggests *skadroso* 'be praised', but this is unacceptable as the *r* should be differently placed, the correct form being *skradoso*).

Kanu	lhla	prhdeso
Kingdom ¹	your	may come ²

- 1 - *kan* is glossed as *rex* (king) in the lexicon of radical words, but designates indefinitely the notion of reigning (cf. 3.5.2), a point which has been missed by Shumaker. The suffix -*u* turns this into a substantive meaning *kingdom*.
- 2 - venire (come) + future imperative.

Tusu	lhla	samoso	ben	Nommi,	slun	ben	Nammi
Will ¹	your	may be done ²	over ³	earths ⁴ ,	as ⁵	over	heavens ⁶

- 1 - voluntas (will) + substantive.
- 2 - causa efficiens; in the lexicon Latino-philosophicum given as equivalent to *facere* (to do) + future passive imperative.
- 3 - supra (one of the particles occurring in the tables of radical words, under *situs* (position); Shumaker translates 'in' without comment).
- 4 - nom (earth) + plural. Dalgarno's language has no articles.
- 5 - the radical *aeque* (equally), used as a particle: *ut* (as).
- 6 - nam + plural.

Stifeso	shod	lalli	loldanve,	flamu	lalla	danvesa
Give ¹	to ²	us ³	this day ⁴ ,	bread ⁵	our ⁶	daily ⁷

- 1 - *donatio* (gift) + future imperative.
- 2 - *passio*, as a particle *ad* (to), and sign of the dative (cf. 5.4).
- 3 - I + plural
- 4 - *lol* is the demonstrative particle *hic* (this); *dan* means time; *ve* is 3 (cf. 4.4); the word 'danve' is an instance of a compound whose meaning is determined by a special convention (cf. 3.4.7): 'time 1' meaning *minute*, 'time 2' *hour*, and 'time

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3' *day*. Obviously, the whole compound 'this-day' means *today* in ordinary contexts.

5 - *panis* (bread) + substantive.

6 - I + plural + adjective.

7 - *danve* 'day' + adjective.

Stupeso	shod	lalli	strekku	lalla,	slun,
Forgive ¹	to	us	debts ²	our,	as

1 - condonare + future imperative.

2 - the radical *strek* means 'debtor', but without the element 'person' indicated by the Latin affix '-or' (cf. 3.5.2): debt + plural + substantive.

lalli	stupesi	shod	strekkell	lalla
we	forgive ¹	to	debtors ²	our

1 - condonare + present tense

2 - *strek* 'debtor' minus 'person' (since *strek* is a radical) + plural + active person (-*el*).

Trim	phteso	lalli	thdosu	shom,	sobreso	lalli	sod	shimu;
Not ¹	lead ²	us	to be tempted ³	but ⁴	make free ⁵	us	from ⁶	evil ⁷

1 - negare (to negate); as a particle: not

2 - ducere + future imperative

3 - *thd* means comparare. As Shumaker suggests, probably *thb* probare (to test) was intended. This is confirmed by the lexicon giving *thb* as equivalent for Latin *tento*, which is the verb one would expect here; -*osu* indicates passive infinitive.

4 - oppositum, as a particle, among other things: sed (but).

5 - this is presumably a mistake for *sofreso*, *sob* meaning 'consistens' which makes no sense; *sof* means 'privativum', *sofre* means 'make devoid'; suffixing -*eso* with probable deletion of *e* results in the future imperative form. Shumaker, avowing that he does not understand *sobreso*, suggests *koneso*, the only reason being that he understands that word.

6 - actio, as a particle: ab.

7 - malum + substantive.

sas, Kanu	Sefu, thnu	tim	lhla,	loldan	thf	sundan.	Tuposo
for ¹ , Kingdom	Power ² , ? ³	is ⁴	yours,	now ⁴	and ⁵	forever ⁶ .	Amen ⁷

1 - causa; as a particle: nam (for)

2 - potentia + substantive

3 - *thn* means 'addere' (to add), + -*u* indicating substantive yields 'addition'. Shumaker supposes 'glory' to be intended, but none of the three possible renderings of *gloria* (*sthf*, *prog*, *sin*) provided in the lexicon is remotely similar to *thn*. Another possibility would be that *ten* 'scientia' is intended.

4 - hic-tempus: this-time.

5 - multiplicare, as a particle: and (cf. 3.5.5).

6 - totum-tempus: whole (or: all) time.

7 - credere (believe) + future passive imperative: let (it) be believed.

Shumaker (1982:164) plausibly suggests that some of the anomalies appearing above are due to tinkering Dalgarno made as he wrote, but not always carried

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through. Shumaker further remarks: “the system works; and in my experience respect for it increases with familiarity” (1982:167).

3.6 CONCLUDING REMARKS

In retrospect, it is easy to point out that Dalgarno failed to achieve the various ambitious goals he had set for his project. As a universal language, his design is not very attractive, if only because it often requires the use of long-winded expressions where existing languages use a single word. Further, without much additional stipulation, the meaning of a lot of Dalgarno's words is obscure. Though in some cases these obscurities are a consequence of obvious technical deficiencies, they are more often a direct consequence of the principles underlying his scheme. Moreover, it is questionable whether the meagre grammatical apparatus is sufficient to satisfactorily render more sophisticated natural language expressions. As for Dalgarno's claim that his language is easy to learn, it has been observed by various authors that the similarity between many of the radical words presents a serious difficulty for the learner. This similarity is also likely to cause errors and confusion, as Dalgarno's own samples show. However, this point should not be exaggerated: the English words *fun*, *gun*, *run*, *sun* for instance, being as much alike each other as are Dalgarno's radical words, are apparently learned and used without causing special problems. Finally, Dalgarno's claim that learning his language is the best introduction to philosophy and logic available is plainly extravagant.

Nevertheless, the importance of Dalgarno's work for the history of linguistic thought is evident. Presenting the first fully elaborated philosophical language in the seventeenth century, he offers an original contribution to the various issues involved in the debate on universal language. He abandons the widespread assumptions regarding the relationship between spoken and written language, which were at the basis of the myth of a universal character, conceived as a means of writing any language in a universally understandable way. He endeavours to construct a language imitating the excellent features the Adamic language was supposed to have had, without adhering to the mystical beliefs usually surrounding this ancient linguistic myth. And he draws extensively upon medieval logical and grammatical theories such as the theory of predicaments and the doctrine of a language of thought, while freely modifying these to make them suit his own insights and purposes. His use of these theories is especially interesting in that they are for the first time connected with a well-defined practical goal.

Dalgarno's starting-point is essentially linguistic. His primary aim is to construct a rational language, that is, a language which best serves the purposes of both accurate and efficient communication. As to accuracy, the words should reflect an analysis of the concepts expressed, and provide a description of the things designated by them; further, the structure of speech should be isomorphic with the structure of thought. As to efficiency, the words should be short, distinct, and euphonic; sentence structure should be perspicuous. Further, the language should be easy to learn. Although Dalgarno often displays a critical attitude towards existing languages, he also shows

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admiration for some of their characteristics, especially their compositionality. He was acutely aware that the various requirements set by his primary aim cannot be all completely satisfied by a single design. For this reason, he resorts to compromises, both in constructing the lexicon and in defining the grammar of his language.

As regards the lexicon, Dalgarno sets out by saying that the art of signs should follow the art of things, but he goes on to argue that both methods of constituting the latter art are unsuitable as a foundation for the lexicon of the philosophical language: neither a lexicon based upon a logical analysis of concepts into their primitive elements, nor a lexicon based upon an encyclopedic classification of things is feasible or desirable. Instead, he takes a middle course between the two extremes: the encyclopedic approach is followed in the construction of a lexicon of radical words, while the analytic approach is used for the expression of concepts not designated by a radical word. As a result, the lexicon of his language consists of a thousand odd radical words on the one hand, and on the other hand of an in principle unlimited number of compound words, to be produced by combining radical words.

Since the radical words have been designed to enter into combinations, the majority of them are monosyllabic. In the formation of these words a philosophical alphabet is used, in which only sounds are represented that can be easily pronounced by all nations. The radical words are claimed to have been established ‘not at random, but by art and deliberation, observing an analogical relationship between thing and sign’¹. This is because the form of the radical words indicates to which class and subclass the thing designated by a radical word belongs. However, Dalgarno explicitly disclaims the philosophical adequacy of the classification scheme underlying the radical words: a predicamental series is necessarily arbitrary on account of both the multifarious aspects of things and the feebleness of the human mind. Nevertheless, he goes into detail to justify the structure of his predicamental classification.

For the lexicon as a whole, this classification is of minor importance, since the largest part of the lexicon consists of compounds, in which the radical words function as unanalyzed primitives. These compounds are intended to be ‘so formed, that they contain descriptions corresponding to the nature of the things themselves’². Dalgarno thus relied on two quite distinct methods of making the words of his language to be descriptions of the things they designate, that is, as far as this is possible. For he was convinced that ultimately the purposes of philosophy do not coincide with the goal of constructing a practicable language.

As for the grammar, Dalgarno’s ideas on the subject are seldom completely explicit. Yet the assumptions underlying his logical grammar may be summarized as follows. To begin with, he assumes that ideally the ‘external logos’ corresponds to the ‘internal logos’. In other words, the surface structure

¹ Fold-out sheet containing the *Lexicon Grammatico-Philosophicum*.

² Ibid.

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of the philosophical language should correspond to the structure of thought. Although ordinary language represents thought, it is not structurally similar to it, which according to Dalgarno is due to pure chance on the one hand, and to a need of abbreviation on the other hand. The requirement that external and internal discourse should correspond boils down to a conflation of language use with a description of the semantic content of ordinary language expressions: using the philosophical language *is* to give a logical analysis of thought.

A further assumption is that thought is composed of homogeneous elements, namely notions or concepts: analysis of thought ultimately leads to primitive notions which are all of the same type. The functionally diverse elements of ordinary language therefore should be reduced to expressions of one and the same kind: nouns, or rather names of concepts. Since ordinary language expressions of a type other than nouns are in fact abbreviations for a sequence of names of concepts, the philosophical language uses these names rather than the abbreviations: grammatical function submerges in lexical meaning.

The weakness of this set of theoretical assumptions is apparent enough. It seems hopeless to attempt a reduction of the complete semantic content of natural language expressions to a series of names. However, just as in connection with the lexicon of his language, Dalgarno does not attempt to carry out his program, as he thinks this would lead to an impracticable language. Again, he takes a middle course between the extremes of logical strictness and practical utility, introducing a number of inflexions which indicate various grammatical functions the radical words may perform. As a consequence, Dalgarno's language results from simplifying a natural language rather than from what he supposed to be strictly logical analysis.

It will be clear that the usual assessment of Dalgarno's work as basically an attempt to model language on an all-embracing classification scheme does less than justice to the sophistication of his linguistic views. In fact, he rejected any such attempt as philosophically impossible and linguistically objectionable. His extensive discussions with Wilkins centered on this very point. Dalgarno took it for granted that the differences between his own scheme and that of Wilkins were apparent: in the autobiographical tract, he suggests that his disagreement with Wilkins might explain the lack of success of both philosophical languages¹. Ironically, some of the objections raised by modern scholars against Dalgarno's scheme are precisely the ones Dalgarno put forward against Wilkins. Thus the observation that the similarity between the radical words makes them hard to learn² was one of the reasons why

¹ "in a late treatise of near affinity with this [i.e. *Didascalocophus*, 1680] I promised to give some reasons why an Universal Character so much desired by the learned of former ages when discovered and brought to light and to greater perfection too than ever was thought possible, yet should meet with so cold entertainment by the learned of the present age. Its first appearance upon the stage from diverse hands and in diverse dresses made learned men suspect it for a Proteus or some greater Monster" (f 55r).

² Couturat & Leau 1903:18; Funke 1929:12-13,14; Strasser 1988:217.

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Dalgarno wanted to keep their number as small as possible, and it was his main objection against Wilkins's numerical arrangement of radical words. Moreover, he devised a special mnemonic method in order to bypass this problem¹. Further, Funke remarks that a major defect of Dalgarno's enterprise resides in the attempt 'to connect various incompatible functions of language [Sprachzwecke]', namely to create a philosophical language which is at the same time a practical means of communication (1929:14)². This is almost literally how Dalgarno characterizes, in the autobiographical tract, Wilkins's basic mistake: "if he [Wilkins] had not bin (as I conceive) under a strong prejudice of joyning two inconsistent designs into one [i.e. a philosophical classification scheme and a practicable language], he could have done either, or both of them apart, excellently well" (f.56r).

Although the theoretical aspects of Dalgarno's language have continued to interest commentators, the project did not have the slightest success in practice. When he wrote *Ars Signorum*, Dalgarno thought it not unlikely that his language would once be widely used by the educated as an international auxiliary language. As it happened, the only person other than himself using his language in print was Roger Daniel, the author of a venomous critique³, who used the language only to insult its inventor, calling Dalgarno *nhkpim sufa*: the greatest ass.

¹ Funke 1929:13 states that this method adds to the difficulty.

² Funke's other major objection is that Dalgarno's grammar consists almost completely of translations borrowed from existing languages, because Dalgarno allegedly had no idea that a philosophical language should designate elements and structures of consciousness (1929:14). This objection blatantly overlooks the principal objective of Dalgarno's grammar.

³ Cf. 3.4.7.

CHAPTER 4

WILKINS: THE ART OF THINGS

4.1 INTRODUCTION

The publication of an impressive volume by John Wilkins appearing in 1668 has been widely regarded as marking the culmination of the seventeenth-century universal language movement, and this is understandable on the basis of its mere outward appearance. The book, entitled *An Essay towards a Real Character and a Philosophical Language*, was printed under the auspices of the Royal Society. Running to more than 600 folio pages, it clearly surpassed everything that had been published on the subject thus far, with respect to both size and prestige. In university circles, it had been known for several years that the appearance of the book was imminent. Wilkins had finished his work in 1666, and printing was almost done, when a large part of the manuscript and most of the printed sheets were destroyed in the Great Fire of London. It took Wilkins a year and a half¹ to recover the loss.

The *Essay* contains 275 pages devoted to ‘universal philosophy’, that is, extensive classificatory tables describing and defining the referents of over 4,000 English words. Another large chapter explains ‘natural grammar’, that is, ‘the philosophy of letters and speech in the general’ (p. 297). In addition, Wilkins provides a thorough explanation of the two distinct symbol systems he devised, the ‘real character’ and the ‘philosophical language’, and in an appendix he compares these with various other languages. Furthermore, an introductory chapter discusses topics such as language change and the defects of existing languages. Finally, a sizeable dictionary shows how several thousands of English words are to be rendered in both the character and the language. As Wilkins amply acknowledges, in writing his book he profited from the assistance of experts in various fields: Francis Willoughby helped in drawing up the tables of animals, John Ray assisted with the tables of plants, and William Lloyd produced the dictionary. Thus Wilkins gave flesh to his conviction that the project of a universal and philosophical language was “rather the work of a *College* and an *Age*, then of any single Person” (‘epistle dedicatory’). He was typically more an instigator and organizer than a solitary writer and thinker.

¹ The fire occurred in September, 1666; the *Essay* appeared in April, 1668.

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Wilkins's interests ranged wider than linguistics alone: he published works on the art of preaching and other theological matters¹, in which he defended moderation, tolerance and 'natural theology'. Furthermore, he wrote two works on astronomical questions² and another on mechanics³, which were intended to educate a large audience on those subjects and in particular to promote the new science of Copernicus, Galileo and Kepler. Though his friend John Aubrey describes Wilkins as "no great read man, but one of much and deepe thinking"⁴, modern biographers have precisely been impressed by Wilkins's wide command of the literature and his ability to digest its substance into popular form⁵. Biographers further relate that Wilkins was a remarkably energetic personality, who managed his various duties with great success⁶. He served as a private chaplain to various employers, among whom was the Prince Elector Palatine. In 1648, he sided with the Parliament and was appointed warden of Wadham College in Oxford. His marriage with Cromwell's sister in 1656 added to his prominence in political circles. It was during this period that he first met Dalgarno; his promise to bring the latter's work to the attention of the 'supreme powers of the nation' (cf. 3.3.2 above) was not an empty phrase. Despite their later 'breach of judgment' (cf. 3.3.3), Wilkins kept this promise: he was one of the persons recommending royal support for *Ars Signorum*. The fact that king Charles II followed this recommendation confirms Shapiro's observation (1969:148) that the Restoration was not as sharp a disruption in Wilkins's life nor in the composition of the political establishment as one might suppose. Nevertheless, after a brief period in Cambridge where he became master of Trinity College in 1659, Wilkins was ejected from the university following the Restoration in 1660. Thereafter he held various positions in the Church, ultimately the see of bishop of Chester. His clerical occupations did not prevent Wilkins from pursuing his scientific interests. He was one of the leading forces behind the founding of the Royal Society and together with Henry Oldenburg he was its first secretary. He conducted mechanical and biological experiments in association

¹ *Ecclesiastes; or, A Discourse of the Gift of Preaching, as it falls under the rules of Art* (London, 1646); *Discourse concerning the Beauty of Providence, in all the rugged Passages of it* (London, 1649); *Discourse concerning the Gift of Prayer; shewing what it is; wherein it consists; and how far it is attainable by Industry, &c* (London, 1651).

² *The Discovery of a New World; or, A Discourse tending to prove, That ('tis probable) there may be another Habitable World in the Moon* (London, 1638); *Discourse concerning a new Planet; tending to prove, That ('tis probable) our Earth is one of the Planets* (London, 1640).

³ *Mathematical Magick; or, The Wonders that may be performed by Mechanical Geometry* (London, 1648).

⁴ Aubrey, *Brief Lives*: 320.

⁵ Stimson 1931:543; Andrade 1936:6; Aarsleff 1976:364-365.

⁶ *Life of the author in The Mathematical and Philosophical Works of the Right Reverend John Wilkins*, 1708:iv, repr. in Wilkins, *Mercury* 1984; Aarsleff 1976:366; Shapiro 1969:214

with other members of the society. He also devised and constructed instruments and engines of all sorts, such as an instrument for hearing, an engine that reduced wastage in the sowing of grain, and many others¹. It is especially because of his role as stimulator and co-ordinator that Wilkins is commonly regarded as a major figure in intellectual life in seventeenth-century Britain². As far as his writings are concerned, his fame rests primarily on the *Essay*.

The publication of the *Essay* came late in Wilkins's career, but he had been working on the project for at least a decade³. As mentioned (2.3.1), he had already made a programmatic proposal for a universal character in his early work the *Mercury* (1641). According to his own retrospective account in the *Essay* ('to the reader'), he did not have a clear idea of how such a character should be constructed until some years afterwards, when he thoroughly discussed the subject with Seth Ward. A universal character, in Ward's view, should be founded upon 'the *nature of things*, and that common Notion of them, wherein Mankind does agree', rather than upon 'a *Dictionary of Words*, according to some particular Language'. Perceiving that Ward was right, Wilkins admitted that his own suggestion in the *Mercury* to take Hebrew as a starting point was mistaken. The contrast thus sketched between the early proposal of the *Mercury* and the plan as worked out in the *Essay* has been described as a fundamental one by modern commentators⁴. Although this is not without justification, it will be argued below (cf. 4.2.3) that there is much more continuity between the early proposal and the scheme as expounded in the *Essay* than is frequently supposed. On the basis of Wilkins's account, the conversations with Ward on the subject should be dated in the late 1640s or early 1650s, as the publication of the *Mercury* is stated to have occurred 'some years before'. Further, Wilkins refers to Ward's description of the latter's ideas in the *Vindiciae Academicarum*, which was published in 1654 (cf. 2.2.4), as the public counterpart of their private talks.

Wilkins goes on to relate that it was 'some considerable time after this' that he 'had any thought of attempting anything of this kind'. This was after he had assisted 'another person' who proved in the end to be unwilling to accept his help. This person undoubtedly was Dalgarno, and Wilkins's account at this point was recognized by contemporaries to be unduly and therefore deliberately vague: since Wilkins acknowledged debts to a number of persons mentioned by name, it was conspicuous that he avoided to identify the person who avowedly gave the impetus to the whole undertaking⁵. Modern scholars

¹ Stimson 1931: 554-557; Shapiro 1969:120, 134ff.

² Stimson 1931: 563; Shapiro 1969: 2-4.

³ Cf. Shapiro 1969:210-213; Salmon 1972:31-33.

⁴ E.g. DeMott 1958:2 [1992:170].

⁵ Cram 1980: 116 notes that several contemporaries "saw fit to rectify this blatant omission by giving him [Dalgarno] due credit in print elsewhere; cf. John Wallis (1678: 17), Robert Plot (1677: 283) and Anthony Wood (1691: 506)". The unnamed author of *An Abstract of Dr. Wilkins's Essay*, included in *The Mathematical and Philosophical Works of the Right Reverend John Wilkins* (1708), devotes almost two

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have proposed various explanations for this omission, none of which is conclusive¹. Be this as it may, it appears that the first steps towards what eventually resulted in the *Essay* were taken in 1657, when Wilkins offered his assistance to Dalgarno. Though Wilkins's account is brief, a comparison with the autobiographic tract in which Dalgarno later described the collaboration in some detail (cf. 3.3.2 - 3.3.3) is illuminating.

Interestingly, Wilkins acknowledges that when he started working together with Dalgarno they agreed on the target they were aiming at. As Wilkins puts it, the 'other person' was willing to engage in the 'worthy undertaking' of 'framing a *real Character*, from the Natural notion of things'. Wilkins's account is also informative in that he specifies his own contribution as follows:

I did offer to draw up for him, the Tables of *Substance*, or the species of *Natural Bodies*, reduced under their several Heads; which I did accordingly perform, much after the same Method, as they are hereafter set down.

As explained in the previous chapter (3.3.3), this indicates quite clearly what the ensuing debate on the radicals was about: in the *Essay*, the 'tables of substance' contain fourteen genera, together comprising over 1,600 species of stones, animals and plants. Each of these species is designated by a distinct radical word of Wilkins's language. In Dalgarno's view, most of these species should not be designated by a radical word at all. In Dalgarno's words, Wilkins's tables

did thwart that which was my grand principle, to finde out the shortest, easiest and distinctest Medium of communication for the commone use of all mankind².

Wilkins's wording of the same point reads as follows:

he for whom I had done this, not liking this method, as being of too great a Compass, conceiving that he could sufficiently provide for all the chief Radicals, in a much briefer and more easy way, did not think fit to make use of these Tables.

of the sixteen pages taken up by the abstract to the only digressive comment contained in it, and this concerns the question why Wilkins failed to mention Dalgarno by name (p.172-174).

¹ Cf. 3.3.2, p. 41 footnote 2 above. The author of *An Abstract of Dr. Wilkins's Essay* in Wilkins (1708) speculates that Dalgarno's scepticism with respect to the possibility of drawing up universally acceptable tables "gave the Bishop some Disgust", and that this may explain why Wilkins did not mention Dalgarno's name (p. 173-174).

² Christ Church MS 162, f.30v.

Dalgarno in his autobiographic tract judged that Wilkins's Epistle to the reader contained 'the same account for substance with this' (f.32r). This is correct if it is taken to concern the purely factual content, i.e. that Wilkins drew up tables for Dalgarno which the latter refused to make use of. These facts are however interpreted quite differently in both retrospective accounts. Wilkins's version contains a suggestion which certainly was unacceptable to Dalgarno. In claiming that he himself was in search of the medium of communication that was 'easiest', Dalgarno obviously meant 'easiest for its users'. Wilkins however suggests that Dalgarno intended to make things easier for himself while constructing such a medium¹. Accordingly, in Wilkins's interpretation both men shared the same general objective, until a disagreement on the method to be followed in achieving the common goal caused the end of the collaboration. Dalgarno however explains at length that the controversy concerned principles and objectives as much as method. Wilkins either never fully appreciated this point or was unwilling to admit it when he wrote his preface. Since we have Dalgarno's testimony that the issue was thoroughly debated (cf. 3.3.2), the latter possibility is by far the most likely one. In addition, in an evidently well-informed contemporary account, Robert Plot maintains that Wilkins "th[o]roughly understood and commended his [Dalgarno's] *Labours*, in the former part of the *Work*"². However this may be, two uncontroversial points emerge quite clearly from Wilkins's epistle to the reader: firstly, it was his assisting Dalgarno that occasioned the work eventually resulting in the *Essay*, and secondly, an unbridgeable disagreement on the 'tables of substance' caused two separate schemes to be constructed rather than a single one. The *Essay* being a widely studied text, it is surprising that the nature of the debate on these tables has received so little attention from modern scholars. This is the more so as contemporary commentators were acutely aware of the differences between Dalgarno's and Wilkins's schemes. Robert Plot gives a clear exposition of the issues at stake, and he points at the manner in which the 'species of natural bodies' are to be expressed as one of the major differences, Dalgarno opting for composition, Wilkins maintaining that they "ought to be provided for as Radicals"³.

¹ Eco has taken this suggestion for a historical fact (1995:228).

² Plot 1705 [1677]:289. It must be noted however that Dalgarno may have been the source of this information, for Plot hints that he has talked about the matter with Dalgarno in person, not long before writing the passage, as he says about Dalgarno: "His judgment then [i.e. when he worked on *Ars Signorum*] being, and as far as I can perceive, still remaining unshaken, notwithstanding what has been done since [i.e. the publication of the *Essay*, among other things], that from a few *general words* allowed to be *radical*, the names of the *inferior species* should be made off by *composition*" 1705[1677]:288.

³ Plot 1705[1677]:289. The author of an *Abstract of Dr. Wilkins's Essay* in Wilkins 1708 notes that "by Mr. *Dalgarno's* Book, it is evident that he was in his Judgment against those Tables, as being too tedious and difficult, and such as Philosophers were not agreed in, and by consequence other Men of different Languages and Nations, could not have the same Idea's about them" (Wilkins 1708:173). However,

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Just as Dalgarno claimed that the most important features of his language were created after the collaboration with Wilkins had ceased (cf. 3.3.4), Wilkins relates that he did most of the work on the *Essay* after Dalgarno had rejected the tables of substance. Convinced that he was following the only viable method, and ‘unwilling to loose so much pains’, Wilkins went on with ‘the other Tables of *Accidents*’. The latter tables contain more classified items (approximately 2,400) than those of substance (approximately 1,600). After completing the admittedly difficult task of drawing up the tables, the dictionary was compiled for two reasons: first, to check if the tables contained all necessary items and second, to help learners of the language in tracing the position of a word in the tables. Finally, the chapter on ‘natural grammar’ was added. Wilkins regarded his accomplishment as published in the *Essay* to be far from perfect. Emphasizing the provisional character of the work, he wrote in the ‘epistle dedicatory’: “I am not so vain as to think that I have here completely finished this great undertaking” and he ascertained that he was “sensible of sundry defects in the severall parts of this Book”. These assertions were more than just a rhetorical commonplace, following the rule that authors should display some modesty in a dedicatory preface. This appears from Wilkins’s making similar remarks elsewhere in the book (e.g., p. 21, p. 22), and also from his insistence on the appointment of a committee for the revision of the work. Moreover, we know that Wilkins continued working on an improved edition of the *Essay* after its publication. What bothered him most on his deathbed four years afterwards, was that he would have to leave ‘his darling’ uncompleted, as he called the philosophical language¹. On the other hand, the *Essay* contains several instances of Wilkins showing himself proud of what he achieved. Thus he claims that his classificatory tables, for all their defects, are “a much better and readier course, for the entring and training up of men in the knowledge of things, then any other way of Institution that I know of” (epistle dedicatory). And he concludes the book arguing that his character and his language are forty times easier to learn than Latin (p. 453-454).

The *Essay* has been discussed by modern writers from a variety of perspectives. It has been listed, together with *Ars Signorum*, as one of the earliest universal languages in the tradition which is still more or less alive in supporters of Esperanto². The more general importance of the *Essay* as a landmark in the history of linguistic thought has been pointed out by various authors³, while a number of studies have more specifically been devoted to

the author curiously concludes on account of what is said on the title page of *Ars Signorum* that “Mr. *Dalgarno*’s Design, tho’ he differ’d in the Method, was the same, in the main, with the Bishop’s”.

¹ Aubrey, *Brief Lives*: 320. Shapiro 1969: 1, 220.

² Couturat & Leau 1903:19-22. Besides being the author of some important works on Leibniz (Couturat 1901, 1903), Couturat was himself an advocate of Ido, and a heated opponent of Esperanto.

³ E.g. Mauthner 1910:498-502; Verburg 1952:297-301; Cohen 1977:30-34; Robins 1989[1967]: 127-130; Eco 1995:238-259.

Wilkins's connections with the linguistic views of scholars associated with the Royal Society¹. The merits of the *Essay* in the history of lexicography have been emphasized², and its significance for the history of grammatical theory has been examined³. In addition, Wilkins's contribution to phonetics⁴ and his views on semantics⁵ have been treated. Besides its relevance for linguistics proper, the *Essay* has been placed in a wider intellectual context. The motives underlying the work have been linked with those of some philosophers⁶; it has been treated as part of the history of cryptography⁷, and as the heir to the tradition of the art of memory⁸. Religious and political motives have been pointed out by some⁹, while others have emphasized scientific purposes¹⁰. Further, various aspects of the classification scheme included in the *Essay* have received special attention¹¹.

Just as Wilkins's own evaluation, modern assessments of the *Essay* are typically ambivalent as well. An important difference is that whereas Wilkins presented his achievement as an as yet imperfect implementation of a design that is sound in principle, modern commentators have rather concluded that it constitutes an admirable attempt to carry out an impossible plan. Thus the *Essay* has been praised as a 'unique achievement'¹², a 'masterpiece'¹³ and 'a work of genius'¹⁴, but few authors fail to point out its shortcomings, which are generally regarded to be obvious¹⁵. Wilkins's character and language, according to the critics, are impracticable as well as hard to memorize. Moreover, the classificatory tables on which both character and language are based are necessarily imperfect, as it is fundamentally impossible to draw up a complete and universally valid classification scheme encompassing the entire universe. Finally, and as a result, Wilkins's language is too rigid to accommodate to flexible needs of language users and to changes in our knowledge of the world. The apparent defects of the *Essay* have been explained as resulting from the attempt to combine incompatible goals:

¹ Cf. Christensen 1946; Jones 1951[1932]; Hüllen 1989.

² Dolezal 1985, Dolezal 1986.

³ Cf. Michael 1970, Padley 1985, Salmon 1975, Frank 1992[1979]

⁴ Funke 1929:63-94; Subbiondo 1987.

⁵ Linsky 1966; Subbiondo 1977.

⁶ Cassirer 1923; Cohen 1954.

⁷ Strasser 1988.

⁸ Rossi 1960; Yates 1966.

⁹ DeMott 1955; Clauss 1982.

¹⁰ Stimson 1931; Firth 1964[1937]; Mc Colley 1938; Funke 1959; Salmon 1966.

¹¹ Andrade 1936; Vickery 1953; Borges 1960; Slaughter 1982; Eco 1995.

¹² Funke 1959:214 [1992:189].

¹³ Frank 1992[1979]:274.

¹⁴ Salmon 1972:33. On the other hand, R.F. Jones (1951[1932]:154) maintains that "Wilkins' undertaking represents the lowest state to which language was degraded".

¹⁵ Cf. e.g. Couturat & Leau 1903:22, 18; Stimson 1931: 562; Andrade 1936:11; Knowlson 1975:101-102; Asbach-Schnitker 1984:xxvii; Robins 1990[1967]:129.

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descriptive adequacy required by the representation of knowledge clashes with efficacy of expression which is essential for a practicable language¹.

As has been pointed out above (3.1), much of the literature on seventeenth century artificial languages has focussed on Wilkins on the assumption that his scheme, besides being the largest and the most complete one of all, was exemplary for the whole intellectual movement it was part of. In fact, the *Essay* represented one of several alternatives which were considered and debated within that movement rather than the culmination of a unidirectional development. The contrary assumption has not only led to misrepresentations of Dalgarno's views, but also to a flawed picture of the movement as a whole, which overlooks the diversity of the schemes involved and underestimates the sophistication of the views underlying them. Furthermore, it has impeded an accurate evaluation of Wilkins's work. For it tends to obscure the fact that Wilkins knew full well that many of his presuppositions and aims were not unquestioned. As seen, each and every one of the objections raised by modern commentators: the problem of learnability and practicability of the language, the arbitrariness, necessary defectiveness and rigidity of the classificatory tables, and even the diagnosis of these defects as being symptoms of an attempt to combine conflicting goals - all this was brought to Wilkins's attention by Dalgarno. That Wilkins nevertheless pursued his design should therefore be considered as the result of a deliberate and argued choice rather than as the semi-automatic outcome of 'influences', 'sources' and 'debts', the discussion of which has occupied historians a little too much. Consequently, it would be an error to regard Wilkins's scheme as simply proceeding either from naivety or from beliefs commonly accepted in his time². Further, modern authors have been inclined not only to ignore that Wilkins was aware of the objections considered obvious today, but also to disregard his repeated acknowledgement that these objections are valid to some extent. In contrast with what has often been asserted³, Wilkins never claimed that he had created, or that it was possible for anyone to create, a language which perfectly mirrors the structure of reality. Several passages in the *Essay* indicate quite clearly that his claims were far more modest than that, and Dalgarno's autobiographic treatise strongly confirms this point. Both from the text of the *Essay* and from Dalgarno's treatise it can also be inferred that Wilkins was well aware that the requirements of adequate scientific description and those of creating a practicable language are at least potentially in conflict. However, unlike his critics, and completely in accord with his advocacy of moderation and his

¹ Cohen 1954:61-63 provides a lucid account of this point. As has been noted (cf. 3.6), Funke 1929:14 has raised a similar (and misdirected) objection to Dalgarno.

² Thus Mauthner 1910:500 states that it would be foolish to laugh about Wilkins's catalogue of the world, since this was "innerhalb seiner Weltanschauung ganz vorzüglich ersonnen". Subbiondo 1977:51 claims that "Wilkins never recognized that his system was arbitrary".

³ For example, Rossi 1960:216 ff. discusses both Dalgarno and Wilkins as authors trying to construct a 'perfect language' by means of 'perfect tables' (p. 221). Cf. 4.2.3 for discussion.

4.1 INTRODUCTION

talent for mediation, he believed that a compromise between these contradictory goals could lead to a valuable result.

The present chapter aims to supplement in two respects the many-sided picture of Wilkins's *Essay* that already emerges from the literature. Firstly, without pretending to be exhaustive, the chapter offers a description and analysis of the philosophical language which goes beyond the usual rough sketches of some of its basic characteristics. A close reading of the text of the *Essay* is amply warranted by the richness of its contents alone, but it is also imperative in order to obtain a balanced assessment of Wilkins's motives, aims, and achievements. It will be seen that various opinions about this have been put forward with great confidence, which prove to be either very doubtful or demonstrably false if the entire text of the *Essay* is taken into account. Secondly, the present chapter discusses the work within the framework of the debate that immediately occasioned its origin. Accordingly, in expounding the principles and some of the details of Wilkins's scheme, special attention will be paid to differences and similarities with respect to Dalgarno's scheme. In what follows, the first thing to be examined will be the presuppositions and aims underpinning Wilkins's project, including an aspect of his scheme that is conspicuously different from that of Dalgarno, namely his offering two distinct symbols systems rather than a single one (4.2). Next, the contents and structure of the extensive classificatory tables will be considered in the light of Wilkins's primary goals (4.3). Further, the lexicon (4.4) and the grammar (4.5) of the language will be discussed, as well as some issues relating to the evaluation of his project (4.6).

4.2 AIMS AND PRINCIPLES

4.2.1 A useful invention

In a preface 'to the reader', Wilkins justifies why he produced the *Essay*, which he himself characterizes as a work 'so unsuitable to my Calling and Business'. The explanation is that the work was started when he held an academic post, to which endeavours to promote useful knowledge are very suitable. Wilkins thus unambiguously characterizes his main objective in writing the *Essay* as unrelated to his religious concerns and clerical position. The point is of interest in view of claims by modern commentators that religious motives were foremost in the construction of universal languages¹. Wilkins goes on to relate that he frequently conversed with Seth Ward on 'the various *Desiderata*', or things 'wanting to the advancement of several parts of Learning'. The 'Universal Character' was one of the principal examples of such desiderata, Ward and Wilkins agreed. They were not alone in this, as Wilkins indicates elsewhere in the *Essay* (p. 13), citing Bacon, Vossius and

¹ Cf. DeMott 1955. Salmon 1988:137 [=1966:378] convincingly makes this point, among a number of other arguments.

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Hugo among the ‘abundance of Testimonies’ one could adduce. The primary driving force behind Wilkins’s work, then, appears to be simply the wish to produce a useful invention, the possibility and desirability of which was widely felt, and which he himself had emphasized in the *Mercury* (1641).

As he had pointed out in that work, the perfecting of a universal character “may very well deserve their Endeavours who have both Abilities and Leisure for such kind of Enquiries” (p. 58). In the *Essay*, he indicates that he started working on the project when he enjoyed the ‘vacancy and leisure’ of a university post. Although the *Essay* is the result of Wilkins’s carrying out the plan outlined in the *Mercury*, it is clear that whereas the early proposal considered only the provision of a new medium of international communication, the *Essay* is aimed in addition to create a language which represents knowledge. In the view of most modern scholars, the latter goal defines the project of the *Essay* as belonging to a fundamentally different type from that to which the *Mercury* belongs. Though the schemes are justifiedly distinguished, it would however be erroneous to overlook the continuity in them. For unlike some of his modern critics, and unlike Dalgarno, Wilkins believed the distinct goals of communication and representation to be quite compatible. And this can precisely be explained by taking into account that many of the principles and aims underlying the early plan were the same as those determining the structure of the scheme as eventually worked out in the *Essay*.

A first respect in which Wilkins’s starting point remained unaltered, obviously, is his dissatisfaction with the multiplicity of languages. In the *Mercury* he repeats the standard observation that the confusion at Babel was a curse, and that the possibility of instituting a universal writing, legible by every nation in their own tongue, would provide a much better remedy against this curse than Latin (p. 55-56). In the *Essay* he likewise points out that the curse of the confusion has had such ‘unhappy consequences’ that a remedy against it would be a great benefit (epistle to the reader).

Secondly, in the *Mercury* Wilkins articulates a critical attitude towards languages and linguistics in general: as he points out, the universal writing he envisages would have the great advantage of contributing to “the spreading and promoting of all Arts and Sciences: Because that great part of our Time which is now required to the Learning of Words, might then be employed in the Study of Things” (p. 56). Clearly the proposal to provide a new medium of communication was placed by Wilkins under the head of the ‘advancement of learning’. Subsequent writers proposing universal writing schemes, such as Beck in 1657, similarly claimed the propagation of learning as one of the advantages to be expected from their invention¹. Thus, contrary to what one might suspect, when Wilkins recounts in the *Essay* that he and Ward considered the universal character to be a desideratum of learning, he might well be referring to its mere utility as a means of communication. The same rather disparaging attitude towards linguistic knowledge is expressed in the *Essay*: Wilkins points at learned academies in Italy and France which had been en-

¹Salmon 1988:187 (1976:295).

gaged for decades in establishing national dictionaries, and he calls for assistance in furthering his own design, which is, he claims, to be preferred as much to dictionary-making “as *things* are better than *words*, as *real knowledge* is beyond *elegancy of speech*, as the *general good of mankind* is beyond that of any *particular Countrey or Nation*”. Accordingly, when he goes on to discuss the advantages of his scheme, he does so by pointing out the negative aspects of existing languages. Just as in the *Mercury*, he notes that their multiplicity requires men to spend much time and labour on learning foreign tongues.

The clearest expression of the continuity between the proposal sketched in the *Mercury* and the project as carried out in the *Essay*, as far as motives and aims are concerned, is to be found in the first chapter of the *Essay*, entitled ‘Prolegomena’. In a section containing a synopsis of the subject matter of the *Mercury* Wilkins discusses, among other things, writing systems such as the ones designed for brevity and for secrecy. Among the various types of writing systems he also lists proposals for ‘a *Real universal Character*, that should not signifie *words*, but *things* and *notions*, and consequently might be legible by any Nation in their own Tongue’ (*Essay*, p. 13). Thus he repeats the assumptions which were central to the idea of a real, ‘and consequently’ universal character (cf. 2.3.1), and he adds: “which is the principal design of this Treatise”. There is no doubt, then, that Wilkins viewed his scheme as a specimen of the type of symbol system widely discussed in the decades before the *Essay* appeared, and which he himself had outlined in the *Mercury*. It is also clear that the scheme of the *Essay* is different from the early plan in two important respects: in the first place, the foundation of the lexicon is formed by classificatory tables rather than by the vocabulary of some existing language, and in the second place, a language which can be spoken is provided in addition to the universal writing system. Wilkins saw these innovations as consequences of his improved insight into the method to be followed in implementing the original design, and as advantages added to it, not as results of an entirely new departure.

The advantages Wilkins expects to flow from general acceptance of his character and language, then, are facilitation of international commerce, improvement of ‘Natural knowledge’, and the availability of a means for ‘spreading the knowledge of Religion’. By the time the *Essay* appeared, there was little need to dwell upon these advantages, which had become so much as a commonplace. Wilkins correspondingly mentions them briefly, and continues to draw attention to an additional advantage, for which no parallel in the *Mercury* can be found, and which connects to the representational aspect of his scheme: he claims that his design could ‘contribute much to the clearing of some of our Modern differences in Religion’. This could be achieved

by unmasking many wild errors, that shelter themselves under the disguise of affected phrases; which being Philosophically unfolded, and rendered according to the genuine and natural importance of Words, will

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appear to be inconsistencies and contradictions. And several of those pretended, mysterious, profound notions, expressed in great swelling words, whereby some men set up for reputation, being this way examined, will appear to be, either nonsense, or very flat and jejune.

The last mentioned advantage alone would make his design worth while, in view of ‘the many impostures and cheats that are put upon men, under the disguise of affected insignificant Phrases’. Although Wilkins viewed the project expounded in the *Essay* as unconnected with his position in the church, he clearly envisaged religious advantages to be among the possible benefits. However, the pugnacious tone of this passage reveals a desire to attain total victory by means of superior arms rather than a zeal for religious peace. Apart from its specific application to religious quarrels, Wilkins’s concern with the treacherous character of natural languages is typical of an attitude which was prominent in the seventeenth century, though forming a constant element in the history of Western linguistic thought.

Certain passages of the *Essay* suggest that Wilkins regarded the encyclopedic information brought together in his tables as more valuable than the writing system and the language for the sake of which the tables were drawn up in the first place. This suggestion is very strong in the ‘Epistle Dedicatory’. Defining ‘the business to which it [the *Essay*] pretends’ as ‘the distinct expression of all things and notions that fall under discourse’, Wilkins’s first concern is to urge for the improvement of his tables classifying the ‘species of natural bodies’, as this “would very much promote and facilitate the knowledg[e] of Nature”. He indicates that the tables could be useful as a plan for the ‘Repository’: a kind of Natural History Museum set up by the Royal Society. As it happened, the tables were in fact used for that purpose¹. Wilkins further emphasizes that although universal acceptance of his character and language would have obvious advantages, he had no illusions about the probability of this to happen. He observes that the most useful inventions “make but a very slow progress in the World”, citing logarithms and shorthand as examples, and he expects a similar fate for his own design. He goes on to state that he has very slender expectations of the attempt to bring the real character into common use, and asserts that the reduction of all things and notions to classificatory tables such as the ones printed in the *Essay* “would prove the shortest and plainest way for the attainment of real Knowledge, that hath been yet offered to the World”. He also claims that even in the admittedly imperfect state as they are presented in his book, the tables constitute the best course available ‘for the entring and training up of men in the knowledge of things’. These statements suggest quite strongly that Wilkins was more concerned with the organization of the objects of knowledge into an encyclopedia for pedagogical purposes than with the creation of a symbol system designed for communication.

¹ Stimson 1992[1931]:92; Knowlson 1975:100.

However, the fact that Wilkins pointed out the utility of his tables to his fellow members of the Royal Society does not warrant the conclusion that the principal goal of the *Essay* was not international communication, but classification of knowledge¹. This conclusion contradicts Wilkins's own explicit statement just quoted, and disregards the fact that the classification was not only begun with a view to a linguistic goal, but was also determined and constrained to a large extent by considerations of linguistic utility. The latter point will be taken up below (4.3.2, 4.3.3, 4.3.4). The following sections (4.2.2, 4.2.3, 4.2.4) deal with the reasons why the two new elements, the classification and the spoken language respectively, were introduced.

4.2.2 The defects of existing languages

In the 'Prolegomena', Wilkins discusses some questions concerning existing languages: their origin, their changes, and their several kinds. The chapter exemplifies Wilkins's abilities to summarize a large amount of literature and to present a clear survey of the state of the art. As to language origin, it is not surprising that Wilkins follows the biblical account rather than speculations by 'the ancient Heathen', according to which language may have evolved in a long process from animal cries to articulate sounds. Since we have the revelation of Scripture, we know that "the first Language was concreated with our first Parents, they immediately understanding the voice of God speaking to them in the Garden" (p. 2). What is slightly surprising is that Wilkins thus states that he believes it was God rather than Adam who created the first language. However, he does not mention any implications of this belief. In particular, he sees no reason to assign a special status to some one language, nor to judge languages by standards derived from characteristics the first language is supposed to have had². Just as he had done in the *Mercury*, Wilkins rejects the idea that there is a language which is natural to mankind³. As far as language diversity is concerned, Wilkins likewise resorts to a biblical story: the confusion of Babel, which was habitually invoked to account for this phenomenon. Yet Wilkins's references to the Genesis stories seem to be perfunctory, as they play no crucial part in his further discussions of the diverse language families, for which he uses a wide range of sources, citing works by Scaliger, Brerewood and others. And when he goes on to discuss how languages may change, he allows for the possibility that new languages

¹ Cf. Shapiro 1969:223.

² In a later section, Wilkins does single the first language out from all others, but only to make the obvious point that it did not result from a long historical process and further to point out that just as all other languages "it was not made by human Art upon Experience" (p. 19). Any suggestion that the first language was perfect is absent from this passage too.

³ *Essay*, p. 2: "'Tis evident enough that no one Language is *natural* to mankind". Cf. *Mercury* (p. 2): "Languages are so far Natural unto us, as other Arts and Sciences. A Man is born without any of them, but yet capable of all" (p. 2).

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emerge through the same mechanisms that explain language change (p. 9). Though the truth of the story of the confusion at Babel remained unquestioned, it was certainly not the sole explanation used for the diversity of languages. It thus appears that the biblical framework determining seventeenth century linguistic theorizing did not impede a more scientific approach to be followed at the same time.

The factors causing language change are of a sociological, political or anthropological nature. Furthermore, all languages undergo drastic changes because of neologisms and alterations in pronunciation which are deliberately introduced for greater elegance of speech and also because new words are necessarily created for new discoveries and inventions (p. 6). Illustrating how radically languages change, Wilkins presents six versions of the Lord's Prayer in English, the first as it read in the year 700, the second in the year 900, and so on with intervals of one or two centuries up to the 1537 version. This shows that "If any English man should now write or speak as our forefathers did six or seven hundred years past, we should as little understand him as if he were a foreiner" (p. 6). Further, the process will go on, the example of the Lord's Prayer showing how much English has changed, "and consequently what is to be expected in future times" (p. 8). Wilkins's philosophical language scheme has been criticized for being unable to cope with changing circumstances and alterations in our knowledge. Whether this is justified or not, it is certain that this possible defect cannot be ascribed to his ignoring the fact that languages are subject to change¹. It is also clear that his evaluation of the phenomenon was mainly negative, for he states in so many words that "every change is a gradual corruption" (p. 8).

Wilkins explicitly places his survey of general linguistics in the context of his project of creating an artificial language, stating that special attention is paid to defects and imperfections, so that it will be clear what is to be avoided in a character or language 'invented according to the rules of art' (p. 1). With typical self-confidence and optimism, Wilkins supposes the products of human art to be superior to what results from blind, unregulated developments. Since existing languages are the outcome of a long historical process during which they have undergone various alterations, they must have all kinds of defects, "that in a Language at once invented and according to the *rules of Art* might be easily avoided" (p. 19). This conviction is so strong, that Wilkins uses the supposed imperfection of the Chinese language as a conclusive argument against the claim that it was invented by art (p. 10). Clearly, the 'rules of art' on which Wilkins relies cannot be those of ordinary grammar, since these are "of much *later* invention *than Languages themselves*, being adapted to what was already in being, rather than the Rule of making it so" (p. 19). Instead, Wilkins derives his 'rules of art' from

¹ Cf. Mauthner 1910:500: "Die Zeit des Bischofs Wilkins hatte noch keine Ahnung von moderner Sprachwissenschaft, noch weniger konnte sie wissen, wie zufällig der Bedeutungswandel der Worte vor sich gegangen ist".

standards he apparently assumes to be self-evident. What these standards are, can be inferred from what he considers to be defects in languages.

Wilkins divides these defects into two broad classes: first, those having to do with the 'first Elements or Alphabets' and second, those concerning words. The list of shortcomings thus concerns both language, in particular the lexicon, and linguistics, in particular the phonological theory forming the basis of orthography. Both kinds of defects are presented as belonging to 'languages'. From a modern point of view, this lack of distinction between a critique of language structure and a critique of language description is remarkable. For Wilkins however, the distinction was of little importance, as he was concerned to completely reform them both at the same time, or more precisely, to found the structure of language on an abstract linguistic theory, as opposed to a purely descriptive one. Furthermore, Wilkins's treating 'alphabets' as items comparable to 'words' has a strong basis in contemporary linguistic theory. In grammatical theory as well as in logic, it was standard practice to start out with the discussion of first elements and to gradually proceed to the more complex. For grammar, the elementary unit was the 'letter', a concept comprising three explicitly distinguished notions: that of speech sound, called the 'power' of a letter, its graphical representation, called 'figure', and finally its name, e.g. 'alpha'. The concept of 'letter' thus comprised elements of speech, of writing and of language description. In discussing alphabets therefore, Wilkins was dealing with the basic elements of language as much as he was discussing spelling.

Wilkins lists five types of defects in existing alphabets. They relate to, firstly, the order, and secondly, the number of letters. The following three types of defects are connected with each of the properties of the 'letter' traditionally distinguished: their powers, names and figures respectively. Thus thirdly, the 'powers' of letters are "very *uncertain*, not alwaies fixed and determined to the same signification" (p. 15). Fourthly, in most alphabets the names of letters are very improperly expressed. Fifthly, the 'figures' of letters do not correspond to their 'Natures and Powers' as they should in an 'artificially invented Alphabet' (p. 17).

Wilkins's second category of imperfections, those concerning words, comprises, first, 'equivocals'. These "must needs render speech doubtful and obscure" and they indicate a '*deficiency*, or want of sufficient number of *words*.' Among the Latin examples is the word 'malus', which "signifies both an *Apple-tree*, and *Evil*, and the *Mast of a ship*". Equivocal words equally abound in the English tongue: "the word *Bill* signifies both a *Weapon*, a Bird's *Beak*, and a written *Scroul*: The word *Grave* signifies both *Sober*, and *Sepulcher*, and to *Carve*, &c". Apart from words like the ones mentioned, which are equivocal in their own right, there are two other sources of ambiguity in words: first, 'figurative construction' or 'metaphor', and secondly 'phraseologies'. These causes of ambiguity are so obvious "that it is needless to give any instances of it; every language having some peculiar phrases belonging to it, which, if they were to be translated *verbatim* into another Tongue, would seem wild and insignificant" (p. 17). The second

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imperfection in words consists of “Synonymous words, which make Language tedious, and are generally *Superfluities*, since the end and use of Speech is for humane utility and mutual converse (...) And yet there is no particular Language but what is very obnoxious in this kind”. A horrifying example is Arabic, which “hath above a thousand several names for a *Sword*, and 500 for a *Lion*, and 200 for a *Serpent*, and fourscore for *Hony*”. Moreover, “there are in most Languages several words that are mere *Expletives*, not adding anything to the Sense” (p. 18). Thirdly, every language contains so many “*Anomalisms* and Irregularities in Grammatical construction ... that Learned men have scrupled whether there be any such thing as *Analogy*”. By ‘grammatical construction’ must be understood inflectional variations of words, not syntax. The anomaly - analogy debate, to which Wilkins alludes, was carried on in Antiquity, and was mainly concerned with morphology. The focus on morphology inherited from the Latin grammatical tradition is further reflected in Wilkins’s listing irregularities in ‘grammatical construction’ under the head of ‘imperfections in words’. The fourth and last kind of defects in words consists in the difference ‘betwixt the *writing* and *pronouncing* of them’.

It is clear from this list of defects in words of existing languages what Wilkins’s primary concern in constructing an artificial language is. His central inspiration is well expressed by the maxim stated, though not consistently followed, by Dalgarno: the art of signs should follow the art of things. In other words, the structure of language should be derived from the structure of reality. The ‘rules of art’ following which a language ought to be constructed accordingly prescribe that the principal vices to be avoided are redundancy and deficiency. For the lexicon of the artificial language this boils down to the requirement that there should be a one-to-one correspondence between ‘things and notions’ on the one hand, and words on the other hand. In this way, the pernicious ambiguity of words may be banished. This starting point fits in well with Wilkins’s views on the value of linguistic knowledge. As ‘things are better than words’, knowledge of the world of nature is to be preferred to knowledge of language. The many anomalies and irregularities of existing languages require a lot of the time to be learned, while the knowledge acquired is of little value, pertaining as it does to properties which are completely internal to language. Hence, in Wilkins’s view the ‘rules of art’ further prescribe the elimination of all irregularities from the artificial language. Of course, an interest in order and regularity is also an independent consequence of the resolution to proceed methodically: that rules of art should be consistent was a premiss too evident to require justification.

Wilkins’s criticism of ‘alphabets’ is less directly relevant to the structure of his scheme than his enumeration of defects in words. This is because in his hierarchy of goals the construction of a ‘real character’, which by definition is unrelated to speech sounds, is prior to that of constructing a language capable of being spoken (cf. 4.2.3 below). Nevertheless, the discussion of ‘alphabets’ is relevant in two respects. Firstly, the same basic concerns clearly emerge from the criticism of alphabets as from the criticism of words. Alphabets as

well as vocabularies offend the rule that redundancy and deficiency should be avoided, and just as between words and things, there should be a one-to-one correspondence between sounds and the symbols used to represent them in writing. Secondly, Wilkins's discussion of alphabets is relevant in that he put of a lot of work in amending the defects he perceived to inhere existing alphabets. In his large chapter on 'Natural Grammar' he presents a phonological theory of remarkable sophistication, which he puts to various uses in his scheme: for the written form of his language he uses an improved Latin alphabet, and he presents several varieties of a phonetic alphabet (cf. 4.5.6).

4.2.3 Principles

Having outlined what should be avoided in an artificial language, Wilkins states the principles underlying his design. Since these are crucial for a proper understanding of both the aims and the structure of the philosophical language, the passage deserves to be quoted in full:

As men do generally agree in the same Principle of Reason, so do they likewise agree in the same *Internal Notion* or *Apprehension of things*.
The *External Expression* of these Mental notions, whereby men communicate their thoughts to one another, is either to the *Ear*, or to the *Eye*.
To the *Ear* by Sounds, and more particularly by *Articulate Voice* and *Words*.
To the *Eye* by anything that is *visible*, Motion, Light, Colour, Figure; and more particularly by *Writing*.
That *conceit* which men have in their minds concerning a Horse or Tree, is the Notion or *mental image* of that Beast, or natural thing, of such a nature, shape and use. The *Names* given to these in several Languages, are such arbitrary *sounds* or *words*, as Nations of men have agreed upon, either casually or designedly, to express their Mental notions of them. The *Written word* is the figure or picture of that Sound.
So that if men should generally consent upon the same way or manner of *Expression*, as they do agree in the same *Notion*, we should then be freed from that Curse in the Confusion of Tongues, with all the unhappy consequences of it (p. 21)

It is noteworthy, that the set of principles of Wilkins's universal language coincides completely with the theoretical framework derived from Aristotle, and broadened by Bacon, within which the possibility of a universal writing first appeared to be an attractive option (cf. 2.3.1 above)). All the ingredients are there: the universality of concepts, the arbitrariness of names signifying these concepts, the inconvenient lack of universality of names, and the derivative nature of written language are conceived in exactly the same way as in the Aristotelian framework. And Bacon's observation that all kinds of sounds besides spoken words and all kinds of visible signs besides written words might

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be used to convey the universal concepts is duly recognized. These principles are also the very same as the ones adduced in the *Mercury* in explaining the idea of a universally legible writing, and even the wording is very similar. Thus Wilkins explains that ‘the Picture of a Man, a Horse, or Tree’ expresses ‘the same Conceit’ to all Nations, ‘though each of these Creatures be stiled by several Names’ (*Mercury*, p. 57). It is clear that what Wilkins states to be the primary goal of the *Essay*, namely to provide a ‘*Real universal Character*, that should not signifie *words*, but *things* and *notions*, and consequently might be legible by any Nation in their own Tongue’ (*Essay*, p. 13) fits neatly into this framework. It is also clear that what he explicitly states to be the principles of his design are exclusively related to the provision of a new symbol system for the sake of communication; in the passage just quoted there is no mention whatsoever of an attempt to improve the representational function of language.

Wilkins goes on to point out that freedom from the curse of the confusion can only be achieved either by enjoining some language for the whole world, which is unattainable, or by proposing a system which “by its facility and usefulness (...) might *invite* and *ingage* men to the learning of it; which is the thing here attempted”. Next, he explains how the structure of his design follows from the principles stated. At this point, Wilkins emphasizes what he saw as a crucial improvement of his thoughts as compared to the project he outlined in the *Mercury*: rather than using the lexicon of some existing language as a point of departure, “The first thing to be considered and enquired into is, Concerning a just *Enumeration* and description of such things or notions as are to have *Marks* or *Names* assigned to them” (p. 20). The requirement that ‘things and notions’ should be one-to-one related to the words signifying them implies that the vocabularies of existing languages are unfit to be used as a starting point, since they are defective in precisely this respect. Therefore, an inventory of things and notions, established independently of any existing language, is to form the basis of the new lexicon. It is worth noting that this conclusion is quite consistent with the attempt to create a real character, and that the suggestion made in the *Mercury* to use Hebrew as a starting point is less so. The latter proposal rested on the additional assumption that some existing language could be used as a guideline in establishing the list of things and notions for which symbols were to be provided. That some such list should be at the basis of the real character was however implicit from the start, since the essential feature of such a writing system is precisely that it signifies things, not words. Hence, Wilkins’s rejection of Hebrew at the suggestion of Ward was an improvement not only by virtue of taking the defects of existing languages into account, but also by virtue of being more consistent with the original idea.

If the admittedly difficult task of enumerating all things and notions is completed, Wilkins explains, the next step will be to assign marks and names to them and to state ‘invariable rules’ for grammatical derivations and inflections, ‘and such onely, as are natural and necessary’. In such a way, both a real character consisting of marks and a language consisting of words will

4.2 AIMS AND PRINCIPLES

result, the latter being ‘a much more easie and convenient Language then is yet in being’ (p. 21). The ‘rules of art’ which prescribe that redundancy and deficiency be avoided and that regularity be established thus prove to tally very well with the communicational function of the character and the language. If these rules are followed, an easy and convenient medium of communication will result, and this facility is what might induce people to learn and use it. It is to be noted that at this stage of Wilkins’s admirably systematical explanation of his aims, no claims concerning representational adequacy are made in their own right. The enumeration of things and notions as well as the character and language based upon it are discussed with a view to communication solely. This shows that in Wilkins’s view there is no discrepancy whatsoever between the goals of communication and representation as far as the number of words is concerned; on the contrary, a strictly regular language, the words of which are one-to-one related to things and notions, is at the same time a convenient language which thus serves communicational purposes best.

When Wilkins finally addresses the representational qualities of the individual symbols and words of the artificial language, he is explicit in presenting these as an additional advantage:

But now if these *Marks* or *Notes* could be so contrived, as to have such *dependance* upon, and relation to, one another, as might be sutable to the nature of the things and notions which they represented; and so likewise, if the Names of things could be so ordered, as to contain such a kind of *affinity* or *opposition* in their letters and sounds, as might be some way answerable to the nature of the things which they signified; This would yet be a farther advantage superadded: by which, besides the best way of helping the *Memory* by natural Method, the *Understanding* likewise would be highly improved; and we should, by learning the *Character* and *Names* of things, be instructed likewise in their Natures, the knowledg of both which ought to be conjoyned (p. 21)

This leaves very little doubt about the order of priority between Wilkins’s aims: the first is to provide an easy medium of communication; the second, to create a writing system and a language whose characters and words provide information about the things designated by them. It should be noted that the latter goal is not only characterized as just an ‘advantage superadded’, but is also described in extremely cautious terms. Signs and words on the one hand, and things and notions on the other hand correspond because the former have properties that ‘might be sutable’ and that ‘might be some way answerable’ to the nature of the latter. That is much weaker indeed than the terminology used by many modern commentators in describing Wilkins’s purported aims. Further, the whole point is expressed in terms of a conditional: *if* the marks and the words could be contrived in such a way, this would be advantageous. Quite appropriately, this conditional is followed by an estimation of the extent to which the condition is fulfilled. And this is fairly disappointing: to do this accurately, Wilkins points out, “it would be necessary, that the *Theory* it self,

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upon which such a design were to be founded, should be exactly *suted to the nature of things*". But if the theory is defective, "this must needs add much *perplexity* to any such Attempt, and render it *imperfect*. And that this is the case with that common Theory already received, need not much be doubted". Wilkins is thus quite outspoken in disclaiming descriptive accuracy for the signs and words of his character and language.

Historians have been inclined to construe Wilkins's project as though his primary aim were what he himself unambiguously describes as an 'advantage superadded' to a scheme quite valuable without it, which moreover is difficult to achieve. For instance, DeMott (1955:1069) asserts that Wilkins aimed at contriving 'a universal set of symbols congruent with the true order of reality'. Rossi (1960:227) similarly points out that the validity of the artificial language depends on the extent to which it mirrors the order present in reality. Knowlson (1975) identifies the foremost attractiveness of the idea of a universal character as consisting in that "language ... would itself *be* knowledge, since each 'word' would provide an accurate description of the thing signified" (1975:8; cf. 43, 64, 74, 91). And Padley (1985:365) says: "The English language planners of artificial languages were attempting to produce a language which, like that spoken by Adam, had a perfect correspondence to phenomena". Similar statements have been made by other commentators time and again. These sweeping characterizations appear to be quite exaggerated if compared with Wilkins's own modest claims.

In this context, it often happens that a statement which in fact is meant to express a further reservation concerning the 'advantage superadded' is quoted as though it contained a description of his principal goal. Thus Wilkins is cited saying that 'the *Theory* it self, upon which such a design were to be founded, should be exactly *suted to the nature of things*', period¹. If read in context, it is crystal-clear that this statement serves precisely to deny rather than to assert that his own design is 'exactly suted to the nature of things'. Claims to the contrary abounding in the literature amount to a serious misconstrual of this central point.

4.2.4 A character and a language

The scheme of the *Essay* contains two distinct symbol systems: a 'real character' and a philosophical language. The real character is a system of newly devised written symbols. The philosophical language consists of words which can be spoken and written; in writing these words, the Latin alphabet is used, enlarged by three symbols introduced by Wilkins in order to consistently represent vowels that are insufficiently distinguished by the ordinary alphabet (cf. 4.5.6). Both the symbols of the real character and the words of the philosophical language are derived from the classificatory tables, in a way

¹ Examples of this procedure can be found in DeMott 1955:1068, 1957:5, 1958:2, Rossi 1960:227, Slaughter 1982:162, Claus 1992[1982]:54.

very similar to how this is done in Dalgarno's language. Wilkins's classification consists of three levels throughout: genus, difference and species. Each of the 40 genera of his scheme is subdivided into differences, and each of the differences comprises a number of species. The character accordingly consists of 40 basic symbols, one for each of the genera. A stroke added to the left side of the basic symbol designates a difference by its angle and length, and a stroke on the right side is similarly indicative of a species (cf. 4.4.1 and 4.4.2 for more detailed explanation). For instance, the symbol  denotes 'elephant'. In like manner, each of the genera is represented by a two letter word. Differences are indicated by the addition of a consonant, and words for species are formed by adding a final vowel to the word for the difference. Thus the word for 'elephant' reads 'zibi'.

It may seem fairly obvious that the character and the language are two independent and equivalent means of codifying the items listed in the classificatory tables, though a perspicuous difference between the two systems is that whereas both may be used for written communication, only the language is suited to oral conversation. If this is granted, one may wonder why Wilkins provides two symbol systems rather than a single one. In particular, the real character seems quite superfluous. The answer is that Wilkins had a different view on the relation between the character and the language than the one just sketched. His explanation runs as follows. Having completed the enumeration of things and notions, he addresses the question what would be the most convenient way of assigning names to them:

in order to which it may seem, that the first Enquiry should be concerning *Language*; Because *Writing* is but the figure of *Articulate sound*, and therefore subsequent to it: But though it be true, that men did first *speak* before they did *write*, and consequently *writing* is but the figure of *Speech*, and therefore in order of *time* subsequent to it; yet in order of *Nature* there is no priority between these: but *voice* and *sounds* may be as well assigned to Figure, as *Figures* may be to *Sounds* (p. 385)

Wilkins thus expresses the insight that lies at the heart of the concept of a real character: the validity of the Aristotelian schema which arranges four elements into the sequence: things-notions-speech-writing is acknowledged, but the possibility of reversing the order between the two latter elements is emphasized (cf. 2.3.1). He goes on to state that for this reason he will first describe a universal writing system, and in the second place a spoken language. This order is not restricted to the organization of the exposition, but is to be considered one of logical priority:

To proceed from the *Language* to the Character, would require the learning of both; which being of greater difficulty, than to learn one alone, is not therefore so sutable to that intention of ingaging man by the *Facility* of it. And because men that do retain their several Tongues, may yet communicate by a *Real Character*, which shall be legible in all Languages; therefore I conceive it most proper to treat of this in the first

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place, and shall afterwards shew how this Character may be made *effable*, in a distinct Language (p. 385).

Apparently Wilkins conceived his method to be the following: first, all things and notions to which names are to be assigned are enumerated, secondly, a real character is devised by means of which the things enumerated can be expressed, and thirdly, a way of pronouncing the real character is created, called the 'philosophical language'. Within this framework, the character is designed to enable written communication, and the language is regarded as a supplementary invention to make oral communication possible. Various writers had suggested that the provision of merely a written means of communication, which at first sight appeared to be a natural consequence of the concept of a real character, seemed unsatisfactory. As Ward put it in the *Vindiciae Academiarum*:

And to such a character as this, there is but one thing more desirable, which is to make it effable, because it is a dul thing to discours by pointing & indication (Ward 1654:21)

Accordingly, Beck (1657) had added a means of pronouncing his universal character consisting of numerals. The availability of a manner of pronunciation for the sake of oral communication did not detract from the primary attractiveness of the universal writing system, which was that it could be given any pronunciation, according to everyone's particular native tongue. It is obvious from the fragment just quoted that Wilkins believed his real character to be capable of functioning as such a universal writing, and that he saw the language as derivative, i.e. as one of many possible ways to pronounce the real character. Clearly, Wilkins's conception of his own design is misguided on both points.

In the first place, the claim that the real character is 'legible to any Nation in their own Tongue', is untenable. Of course, it is not theoretically impossible for the character to be universally used, but this would involve complex translation processes between the character and existing languages. And this does not seem to be what Wilkins had in mind. He apparently believed that his real character could be used as a universal method of notation for all existing languages. Rather than having to learn a completely new language, all one would have to acquire in learning the real character was a method of reading and writing one's own language. The supposed facility of this is quite illusory. Taking an example from Wilkins's character and language, it boils down to the assumption that linking the word 'elephant' to the symbol  is easy since it is a matter of pronunciation only, while linking the word 'elephant' to the word 'zibi' is a matter of translation from one language to another. It is remarkable that composing the *Essay* did not arouse any doubts about the myth of a universal character in Wilkins's mind. Since the *Essay* is consciously aimed at correcting the defects of existing languages, the real character is structurally different from other languages. It is therefore hard to

see how it could encode them all alike in a straightforward manner. As far as homonymy and synonymy are concerned, one might maintain that these are no major obstacles. In 'reading' the character 'off' homonymy is irrelevant: the character for 'bird's beak' will be pronounced as 'bill' by an English speaking person, and so will be the quite different character for what Wilkins calls 'scroll'. Synonymous words however present one with the necessity of a choice: Wilkins's Arab supposedly disposes of a thousand different ways to pronounce the single character meaning 'sword'. In writing the character the reverse holds: all synonymous words are written in the same way, and in writing a homonym like 'bill' one has to select out of various characters the one which is proper in the context. Thus if language is viewed, as Wilkins was certainly inclined to do, as being basically a collection of names, one might perhaps continue to believe in easy translatability from and to the real character even though the latter, unlike other languages, establishes a one-to-one mapping between things and signs. Nonetheless, one would have to ignore the far-reaching structural differences caused by the elaborate morphology and the specific sentence structure Wilkins defined for both the character and the language (cf. 4.5.2-5 below).

In the second place, Wilkins must have been victim to a curious but effective kind of self-deception if he really believed that only the character could be learned separately, while learning the language required learning the character first. The reason why he thought this to be the case no doubt was that the order between speech and writing had been reversed, so that the language belonged to a secondary level with respect to the character: it consisted of sounds assigned to figures. Consequently, it was possible for the character, but not for the language, to be learned regardless of pronunciation. However, this way of viewing the relationship between the character and the language has nothing to support it except for the gratuitous proclamation that the language is a way of making the character 'effable'. It is obvious that although Wilkins proclaimed the word 'zibi' to be the spoken form of the character , the word can in fact be interpreted, learned and used without any reference to the character at all. Further, in order to render the spoken language in print, Wilkins uses his improved Latin alphabet, so that the possibility of using the philosophical language for written communication, and therewith the superfluity of the real character, seems to be obvious. Yet it never occurred to Wilkins that he might as well have discarded the real character. He obviously saw the character and the language as complementary elements of his design, of which especially the first was indispensable. This view was forced upon him by the theoretical framework within which the idea of a universal character had first arisen. To give up the character would have meant to deprive the invention of its greatest appeal. Although Dalgarno had emphasized that alphabetical writing may equally well be used for a universal writing (cf. 2.2.1), Wilkins remained convinced that a new way of writing had to be devised for that purpose, probably because he thought that letters could

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only represent sounds¹. Unlike Dalgarno, Wilkins was unable to free himself from these deeply rooted assumptions even though his own efforts could have contributed to show that they were unfounded.

¹ If this is correct, it is precisely the failure to recognize that written language can be viewed as ideographic which explains a conspicuous feature of Wilkins's scheme. Slaughter 1982:86 considers the *Essay* as the culmination of a movement she thinks can be explained by observing, among other things, that in a 'literate culture' written language comes to be viewed as ideographic.

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4.3. THE TABLES

Although commentators have generally acknowledged that the tables form the core of Wilkins's scheme, their ancestry, structure and contents have seldom received more than perfunctory treatment in the literature. A more detailed inspection of the tables yields a fascinating and at times revealing picture of the assumptions, problems, and achievements involved in the project. For this reason, the present section discusses some general aspects as well as some of the details of the tables that take up the largest part of the *Essay*.

4.3.1 The predicamental method

Having decided that a regular enumeration of all things and notions should form the basis of the lexicon of both the real character and the philosophical language², Wilkins turned to the Aristotelian theory of categories as interpreted and amended by the Scholastics for a model. He does not justify this procedure anywhere in his book, but simply takes it for granted that the predicables and the predicaments treated by logic provide the proper method to be followed. It has been seen that in the late 1650s, when Dalgarno was still hesitant to use this 'predicamental' method, it was Wilkins who urged him to apply it (cf. 3.3.2). Further, it has been mentioned that logic, though regarded with suspicion by many on account of its being elaborated by the Schoolmen, still formed a standard element of seventeenth-century education. Wilkins's repeated references to 'the common theory already received'³ show that he assumed his readers to be familiar with the subject. Since methods of definition and division were among the topics treated by logic, and since the ten predicaments were thought of as providing a classificatory framework for everything

¹ If this is correct, it is precisely the failure to recognize that written language can be viewed as ideographic which explains a conspicuous feature of Wilkins's scheme. Slaughter 1982:86 considers the *Essay* as the culmination of a movement she thinks can be explained by observing, among other things, that in a 'literate culture' written language comes to be viewed as ideographic.

² For the sake of convenience, I shall in the sequel of this section use the expression 'words of the language' as short for 'symbols of the real character and words of the philosophical language', whenever this can be done without causing confusion.

³ E.g., p. 21, p. 289.

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that exists¹, it must have seemed obvious to employ these logical tools for the construction of a philosophical language. Although Wilkins also displays a critical attitude toward the ‘common theory’, he certainly did not dismiss its methods and concepts as useless. Characterizing his classificatory tables as ‘the great foundation of the thing here designed’, and describing them as constituting ‘the Scientifical Part, comprehending Universal Philosophy’, he explains that it is “the proper end and design of the several branches of Philosophy to reduce all things and notions unto such a frame, as may express their natural order, dependence, and relations” (p. 1). Rather than being typical for a proponent of the ‘new science’, this statement perfectly accords with scholastic conceptions of knowledge representation².

Although the predicaments and predicables of Scholastic logic provided a framework that seemed suitable to Wilkins’s purposes, it could not be used as a clear-cut model in establishing the lexicon for two reasons. Firstly, the classificatory tables of the logic books were rudimentary in that only the most general and the most familiar terms were included. To make these tables fit his design Wilkins had to expand them to a very large extent. It seems that he at first thought this was simply a matter of filling in the broad categories usually distinguished by logicians with more specific terms. This turned out to be less easy than expected, as he frankly admits in the ‘epistle dedicatory’: “in the doing of it, I found much more labour and difficulty, then I expected, when I undertook it”. In the course of this work, he thought fit to deviate from the traditional framework in various respects. Thus, instead of the traditional ten predicaments, he uses only five (cf. 4.3.8). Secondly, the logical theory dealing with terms was embedded in a set of presuppositions most of which Wilkins did not subscribe to. In particular, he did not believe in the possibility of defining things by stating their essence, or form. It has been mentioned in the previous chapter that Dalgarno’s autobiographic manuscript contains a clear description of this point (cf. 3.3.3). In Dalgarno’s words, Wilkins said the following about what he thought could be achieved by his classificatory tables:

If it were possible to give accurat definitions of the Species of Natural bodies and hence to take their names he [i.e. Wilkins] would be fully of my judgment. But sieing the formes of things, if there were any such, were unknown to us, and therefore there could be no definitons by essential differences by this Hypothesis; or if these formes were nothing else, according to that which is called new philosophy which he seemed to encline to, but a multitude of modes of matter Constituting the Species, their definitions would be [too] long for the purpose of Instituting Radical words, and therefore it seemed most rational to put them in predicamental rank and file, and give them their names by

¹ Cf. e.g. Blundeville 1599:12: “Predicaments are certaine titles or tables conteining all thinges that be in the world”.

² Cf. Howell 1956:20.

instituting such words and Characters as might denote their numerical place and order (Christ Church Ms 162, f.47v)

Thus, as the essentialist pretensions of the predicamental classification were given up, what remained was a framework in which items are ‘put in predicamental rank and file’, that is, arranged into hierarchically ordered classes, so that things that belong together are placed under the same head, while the superordinate categories indicate in which respect the categorized things belong together. This framework differs from the traditional classificatory structures called ‘predicaments’ in two important respects. In the first place, what constitutes a category is no longer supposed to be determined by the immutable structure of the universe. Rather, what strikes us as the most conspicuous similarities determines whether things are to be grouped together or not. In the second place, the framework does not provide the means to distinguish between items belonging to the same class. Such items are simply listed in an arbitrary order, and referred to by ‘their numerical place’. Both points concern crucial aspects of Wilkins’s scheme, and will be dealt with in the following section.

4.3.2 Genus, difference, species and the numerical arrangement

Wilkins’s classification scheme consists of three levels of generality, which are designated by terms traditionally used as names of predicables: genus, difference and species¹. At the highest level, there are 40 genera, most of which are subdivided into six differences. The differences in their turn comprise nine species in most cases. In all, the scheme contains 2,326 categories (40 genera, 252 differences, 2,034 species). Each of these categories corresponds to a word of the philosophical language. As will be explained below (4.3.4), in many cases more than one of such words are associated with a single category. Since Wilkins rejected the essentialist presuppositions intimately connected with the theory of predicables, the terms ‘genus’, ‘difference’ and ‘species’ as applied to his scheme have lost most of the connotations traditionally associated with them. In Wilkins’s usage, a ‘genus’ is just one of the 40 highest categories of his classification, not so much a property which can be essentially predicated of the things belonging to it. A ‘difference’ is a category falling under a genus, and a ‘species’ is a category under a difference. The term ‘difference’ as used by Wilkins therefore has become largely equivalent to what was traditionally called a ‘subaltern genus’: a class which is highest nor lowest in a hierarchy. Leibniz,

¹ The tradition distinguished five predicables, including ‘proprium’ and ‘accidens’ in addition to the three used by Wilkins. These three are treated separately from the two others in Wallis’s logic: Lib.1 Cap. iv is on genus, species, difference, Cap v on proprium and accidens (Wallis 1686). The definitions of the predicables were traditionally based upon ontological distinctions.

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who studied Wilkins's work very carefully (cf. 5.6.1), accordingly noted 'genus subalternus' next to the word 'differences' in his copy of the *Essay*.

However, the distinction between a 'difference' and a 'subaltern genus' is a subtle one, being based upon the function which the relevant term performs within the classification. Rather than as a name of a subclass, a 'difference' was thought of as referring to a property characterizing some subclass. A difference joined to a genus therefore constitutes a name of a subclass. For example, the difference 'rational' joined to the genus 'animal' constitutes the species 'rational animal'. For this reason, Boethius, who devoted a book-length commentary to the 'differences', states that "differentia is used now in place of genus, now in place of species"¹, since a subaltern genus such as 'rational animal' can be considered both as a species of the higher genus 'animal' and as a genus of the lower species 'man'². As Wilkins's 'differences' in most cases in fact consist of properties which characterize the members of a subclass of a genus, his usage of the term 'difference' may after all be considered just as appropriate as the term 'subaltern genus' would have been. Nevertheless, his tables contain quite a few instances in which the differences cannot possibly be said to perform their proper function (cf. 4.3.6).

Perhaps more significant is another contrast with the 'differences' figuring in the classifications frequently provided in logical treatises in order to exemplify the division of the predicaments: whereas the latter are usually dichotomous, dividing the genera into two opposite classes, such as 'with body - without body', 'animate - inanimate', Wilkins's differences divide the genera into at least six subordinate categories. Consequently, Wilkins's differences are never constitutive of a lowest species, as each of the differences constitutes a class which is further subdivided into several species.

Since the terms genus, difference and species as used by Wilkins serve primarily to refer to the highest, middle and lowest level of his classification scheme respectively, the categories of his scheme can equivalently be identified by means of a numerical notation. For example, 'elephant' occurs under the genus 'beast', and under the first difference, that is, 'whole footed', as the fourth species. To locate 'elephant' on the tables, one could write '18.1.4', since 'beast' is the 18th genus on the list of genera, 'whole footed' the 1st difference under that genus, and 'elephant' the 4th species under that difference. As a matter of fact, Wilkins uses a notation of this kind both in his dictionary and on a summary table listing his radical words, except that he

¹ Boethius, *De topicis differentiis* (about 520), 1178B5ff. An illuminating discussion of the issues involved is to be found in an essay on the text by the editor, Eleonore Stump, 1978:248-261.

² Porphyry and Boethius state that 'rational animal' is a genus of which 'man' is one of the species; an additional difference 'mortal' is required to distinguish 'man' from the other species of rational animal, namely 'god'. This division was unacceptable to Christian authors, who maintain that 'man' is the only species of 'rational animal'. E.g. Blundeville, p. 9. Clearly, this does not affect the general point that subaltern genera may have the status of both genus and species.

does not number the genera in those contexts. However, in a survey of ‘the general scheme of genus’s’ (p.23), the genera are actually numbered (cf. table 4.4 below). Thus, if one looks up how ‘elephant’ is to be rendered in either the character or the language, the dictionary provides: ‘BE.I.4’, where ‘BE’ designates the genus ‘beast’, the Roman numeral designates the difference and the Arabic numeral the species. As has been mentioned (4.2.4), both the character and the radical word ‘zibi’ are codes expressing the very same information, i.e. ‘beast, first difference, fourth species’. Similarly, the list of radical words as displayed on the summary table for the genus ‘beast’ looks like this (only the first two of the six differences are reproduced in full):

BEAST		
I	Whole footed	
1	Horse	
2	Asse	Mule
3	Camel	
4	Elephant	
II	Cloven footed	
1	Kine	
2	Sheep	Goat
3	Elke	Stagg
4	Buck	Rein deer
5	Roe Buck	
6	Rhinoceros	
7	Camelopard	
8	Hogg	
III	Clawed not rapaceous	
	(8 species)	
IV	Rapaceous Catkind	
	(8 species)	
V	Rapaceous Dog-kind	
	(6 species)	
VI	Oviparous Beast	
	(8 species)	

Table 4.1

This table may illustrate the significance of the fact that items belonging to the same class are referred to by ‘their numerical place’. For example, there is no intrinsic reason why ‘whole footed’ beasts should occupy the first place in the series of ‘differences’ rather than the second or any other, and the same goes for the species level: that ‘elephant’ should be listed as the fourth species is wholly arbitrary. Yet the arbitrary, numerical place within each category is

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precisely what is expressed by the symbols and words of the character and the language.

In terms of the logical tradition, the distinction between classification by genus and species on the one hand, and a numerical order on the other hand is fundamental: it marks the point where classification on the basis of essential differences ceases and distinctions on purely accidental grounds begin. Porphyry for example defines a lowest species as a class the members of which 'differ in number alone'¹. For instance, there is no real, essential difference between one individual man and another. Accordingly, a numerical order is appropriate on the level of individuals not differing in kind. By contrast, Wilkins introduces a numerical order both at the level of differences and that of species.

In the *Essay*, Wilkins expressly admits the numerical order of both differences and species to be a disadvantage of his classificatory tables. He describes the aim of these tables in the following way:

The principal design aimed at in these Tables, is to give a sufficient enumeration of all things and notions, as are to have names assigned to them, and withall so to contrive these as to their order, that the place of every thing may contribute to a description of the nature of it. Denoting both the *General* and *Particular head* under which it is placed; and the *Common difference* whereby it is distinguished from other things of the same kind (p. 289)

Wilkins is thus so careful as to say that things are distinguished from others of the same kind by a '*common* difference'. This is quite correct, because the differences of his tables do distinguish e.g. 'elephant' from 'sheep', both of which are beasts, by indicating that the former unlike the latter are 'whole footed', but this difference is common to a number of other species as well. If his aim had been to provide a definition of the things enumerated in his tables, he would have had to state the *specific* differences. The difference between a horse and an elephant is not reflected in the tables, both being 'whole footed beasts'. For this reason, Wilkins quite cautiously states that 'the place of every thing may contribute to a description of the nature of it'. This is an appropriately modest claim, which it is important to distinguish from the much more pretentious assertion that the tables provide a complete definition, or even a statement of the essence of the things enumerated. Again it appears (cf. 4.2.3) that it would be distortive to ascribe the latter pretensions to Wilkins².

He goes on to indicate that the classification reflected in his tables is not the ideal one:

¹ Porphyry, *Isagoge*, P. 2, 27-29; P 5, 21-22. Warren 1975:32; 38.

² On p. 22 he says that the species are enumerated "according to such an order and dependance amongst them, as may contribute to the defining of them", which is perhaps more ambitious, but still rather unpretentious. On p. 440 he claims that "every word [is] a description of the thing signified by it".

It would indeed be much more convenient and advantageous, if these Tables could be so contrived, that every *difference* amongst the *Predicaments* might have a transcendental denomination, and not depend at all upon a numerical institution. But I much doubt, whether that Theory of things already received, will admit of it; nor doth Language afford convenient terms, by which to express several differences (p. 289)

Although this passage has some puzzling aspects, it is clear that Wilkins considered the numerical ordering of the ‘differences’ in his tables as being less satisfactory. What exactly is meant by the statement that it would be better if every difference ‘might have a transcendental denomination’ is somewhat obscure. Wilkins’s tables do contain six (or possibly four, cf. 4.3.9) genera of ‘transcendentals’, that is, things or rather notions, which for various reasons cannot be classified under one of the categories called predicaments. The genus ‘transcendentals general’ contains three differences, in the sense of middle level categories of Wilkins’s scheme, which comprise ‘general differences of things’, i.e. differences in the sense of properties by means of which things may be distinguished. Examples of differences of the latter kind are ‘goodness’, ‘possibility’, and ‘easiness’. It seems, then, that Wilkins is saying that it were ideal if all things falling under one of the predicaments could be characterized by means of such transcendental terms, that is, by terms that themselves do not belong to one of the predicaments.

One possible explanation of why Wilkins makes the remark in the first place is that he might be referring back to his discussions with Dalgarno on the subject, and that he is repeating, rather cryptically, the point mentioned by Dalgarno in the quotation above (4.3.1), namely that, if it were possible to give accurate definitions of the species, Wilkins would agree with Dalgarno that names of species should consist of the name of its genus with the name of the distinguishing feature added. The names of such distinguishing features would be ‘transcendental’ in being applicable to various species, belonging to different genera. This would fit in very well with Wilkins’s usage of the term ‘transcendental’ in connection with particles (cf. the definition of the transcendental particles 4.4.3). However, it seems more plausible that Wilkins is referring implicitly to discussions with Ward rather than Dalgarno. Ward is known to have been working on a scheme in which a very small number of ‘transcendentals’ is used¹. Be this as it may, Wilkins’s point is to defend his admittedly defective, predicamental approach by declaring that the alternative, analytical option is superior in theory but infeasible in practice.

Another intriguing puzzle is what is meant by the statement that ‘language’ does not afford convenient terms for expressing several differences. Is this a shortcoming of existing languages, and of English in par-

¹ Cram 1994:225 quotes from a letter by Paschall to Aubrey (10 November 1676), both of whom were engaged in revising Wilkins’s *Essay* in the 1670s, in which Paschall says that he assumes that in the passage under discussion Wilkins is referring to Ward’s opinion.

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ticular, or are these differences hard to express in principle in any language? Probably the first possibility is meant, since elsewhere, in discussing the difficulties encountered in describing plants, Wilkins says these are caused by “the want of proper words to express the more minute differences betwixt them, in respect of colour, tast, smell, &c to which instituted languages have not assigned particular names” (p. 67). Rather than claiming his language to enable a more accurate description of nature than existing languages do, Wilkins thus on the contrary acknowledges the expressive power of his language to be constrained by that of existing languages.

Despite the puzzling aspects, the gist of this passage is clear enough: for various reasons, a classification which is logically sound cannot be provided; therefore, an inferior, numerical arrangement is used instead¹.

When Wilkins goes on to assess the way in which the species are accounted for in his tables, he explicitly rejects the possibility of stating the essence of things and hence of providing perfect definitions. In this instance as well as in others, the text of the *Essay* completely accords with Dalgarno’s retrospective account (cf. 4.3.1):

It were likewise desirable to a perfect definition of each species, that the *immediate form* which gives the particular essence to every thing might be expressed; but this form being a thing which men do not know, it cannot be expected that it should be described. And therefore in the stead of it, there is reason why men should be content with such a description by *properties* and *circumstances*, as may be sufficient to determine the primary sense of the thing defined (p. 289).

In accordance with the belief that humans are unable to know the substantial forms (if they exist at all), Wilkins had reason to cast doubt on the validity of traditional distinctions between what were supposed to be fixed classes of entities. For example, “the usual distinction betwixt *Shrubbs* and *Trees* ... doth not seem (at least so farr as these things have been hitherto described) to have any such distinct limits in nature, as were to be desired, and is to be found betwixt other things, there being several under each head, which seem to be of a doubtful condition” (p. 69).

A central thesis of Slaughter (1982) is that Wilkins’s project marks the culmination of what she calls the ‘taxonomic episteme’, in which classification on account of essential characteristics plays a central part. This thesis is obviously contradicted by Wilkins’s explicit statement that such essences cannot be described as they are unknown to men. In an attempt to evade this problem, Slaughter interprets the relevant statement as though it meant that “knowledge of those essential properties and essential natures had yet to be determined ... Wilkins does not deny the validity of classification as a method of defining essences. All he denies is that the proper classification

¹ Clauss 1992 [1982]:55 manifests a complete misunderstanding of the structure of Wilkins’s scheme in alleging that “Wilkins postulates a rudimentary correlation between linguistic functions and numerical values”.

has been made” (1982:163). It will be clear to any impartial observer that this interpretation is not warranted by Wilkins’s own words. Not only does he say nothing which one would expect him to say if he thought that the essences were still to be discovered, but the statement that ‘men should be content’ with descriptions of observable properties shows unambiguously that he expected human ignorance of essences to be permanent. Furthermore, we have Dalgarno’s testimony (cf. 4.3.1) that Wilkins was inclined to believe these ‘essences’ to be non-existent, and that he definitely regarded them to be unknowable. The reliance on observable rather than essential properties is also completely in line with the premises of experimental science conducted and promoted by Wilkins and his fellow-members of the Royal Society.

4.3.3 The number of categories and the convenience of the institution

The predicamental series Wilkins eventually established is clearly not based upon ontological or descriptive principles alone. Explaining the structure of his classification scheme, he says that he will first lay down a scheme of ‘Genus’s or more common heads of things belonging to this design’ (p. 22). This description of the genera is quite appropriate: there is not even the suggestion that they coincide with natural kinds. Wilkins clearly was well aware that the structure of his scheme was to a large extent determined by the fact that it was to serve as the basis of a practicable lexicon. If accurate description of nature had been his sole purpose, the classification would have turned out quite differently.

An instance which makes this very clear is Wilkins’s discussing the subdivision of his genera into differences as follows: “which for the better convenience of this institution, I take leave to determine (for the most part) to the number of six” (p. 22). The ‘convenience of this institution’ obviously required the number of subdivisions within each genus, and also within each difference, to be limited. Otherwise both the symbols of the real character and the words of the philosophical language would become very complex and hence hard to recognize and to memorize, because it would be necessary to define a large number of different additions and affixes to the symbols and words designating the genera. Further, the convenience of the institution required, on mnemonic grounds, that the classification should be as regular as possible. For this reason, Wilkins aimed at a regular pattern of subdivisions, for which six differences within each genus, and nine species within each difference seemed convenient.

This pattern could not be actualised throughout. In some cases, the number of items subsumed under a genus is less than 54 (6×9)¹, but in others, the variety of species is so large that their number greatly exceeds the maximum capacity of the tables. Such is the case “in those numerous tribes, of

¹ Disregarding for the moment the items joined by opposition or affinity, to be discussed below (4.3.4).

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Herbs, Trees, Exanguious Animals, Fishes and Birds; which are of too great variety to be comprehended in so narrow a compass” (p. 22). Most of these genera are divided into nine differences, and these in turn into seventeen species at most. For instance, the genus ‘fish’ has nine differences, which together comprise 87 species¹. This number of subdivisions being larger than the overall pattern causes inconvenient complications in the symbolism designed to encode the tables: double strokes in the symbols of the real character and additional letters in the words of the philosophical language are used to indicate differences and species whose numerical code is higher than nine (p. 387, 415).

In the case of herbs however this solution was not workable: the abundance of natural kinds distinguished by biologists greatly exceeded the maximum number of items compatible with a practicable result if Wilkins’s method of codification was followed. To resolve this, he split up the class of ‘herbs’, one of the standard categories distinguished in treatises providing examples of the predicament of substance, into three separate genera: ‘herbs considered according to the leaf’, ‘herbs considered according to the flower’, and ‘herbs considered according to the seed-vessel’. Originally, Wilkins had made another division of herbs, namely one classifying them with respect to their use, such as bringing pleasure, or being edible, or medicinal, but he finally opted for the more ‘truly Philosophical’ classification presented in the tables² (p. 69). However, that the class of herbs had to be divided into subclasses, and that each of these subclasses was to function as a separate genus, was evidently necessitated by the manageability of the symbolism to be based on the classification, not by philosophical correctness.

Although Wilkins does not address this point in this particular instance, he does so in another, clearly showing that he consciously sacrificed classificatory accurateness to representational facility whenever necessary. The relevant instance concerns the level of differences rather than that of genera, and, to make things complicated from an expository point of view, pertains to ‘differences’ in the sense of distinctive properties. About the latter type of differences, Wilkins says: “Those general Names which may be stiled Differences, are too numerous to be placed under one common Head according to the method designed in these Tables, and therefore are they here reduced unto three Heads” (p. 28). He is thus quite explicit in stating that whether a group of things or notions constitutes a category of his scheme depends as much on their number as on their having the same or similar properties. Considerations concerning the simplicity and regularity of the symbolism that was to be derived from the scheme of genera, differences and species were clearly decisive for the very structure of that scheme.

¹ Again disregarding the fact that often several species are connected with a single place on the tables. If all species of fish enumerated in the tables are counted in, the total number is 160. Cf. 4.3.4 below.

² It might well be that this more scientific classification was proposed by John Ray, who intensively collaborated with Wilkins in drawing up the tables of plants, after the Great Fire had destroyed the original tables.

4.3.4 Opposition and affinity

Each of the 2,326 categories of Wilkins's scheme corresponds to at least one radical word. In most cases, more than one radical word is joined to a single place in the classification. For the most part, two radical words correspond to a single place on the tables, but sometimes three, and in rare cases even four radical words are connected with a single place¹. Such pairs and triads are formed in the first place on the basis of antonymy. For instance, the radical word meaning 'laughing' is to be found under the genus 'corporeal action', and under the fourth difference, namely 'signs of passions', of which 'laughing' is the third species. Besides 'laughing', its antonym 'weeping' occupies the same place on the table. Sometimes radical words have what Wilkins calls 'double opposites'. This is when either an excess or a defect can be said to be present. For example, the radical word for 'modesty' has two opposites, one 'excessive extreme', namely 'sheepishness', and one 'deficient extreme', namely 'impudence'. A radical word may have a 'common opposite' in addition to the opposites indicative of excess or defect, so that four radical words are linked to a single place on the tables. For example, the radical 'justice' has a 'common opposite', namely 'injustice', in addition to its excessive extreme 'rigor' and its deficient extreme 'remission'.

This method of coupling several radical words could only be applied in a limited number of cases. For obviously, there is nothing opposed in any reasonable sense to such things as an elephant or a flower. Still, Wilkins wanted to make use of a similar device in these cases too: "Those things that have no Opposites, are paired together with respect to some *Affinity* which they have one to another" (p. 22). Examples of radical words coupled in this way can be found in table 4.1 above, where both 'mule' and 'asse' occur as the second species of whole footed beasts, and both 'sheep' and 'goat' are listed as the second species of cloven footed beasts. If items are assigned the same place on a table on account of affinity, their number is invariably two: there are no double or triple affinity relations as in the case of opposition. This is very probably because the relation of affinity is too vague and too diverse to admit of further systematical specification.

The coupling of several items to a single place on the tables obviously caused complications in the representation of radical words. Wilkins had to devise a special addition to the symbols of the real character and the words of the philosophical language in order to designate either opposition or affinity, and further additions were necessary for indicating deficient or excessive extreme (p. 387, 416; cf. 4.4.1). Nonetheless, almost half of the total number of radical words is joined to another by virtue of either affinity or opposition (to be exact: this goes for 1,868 of the 4,194 radicals enumerated in the

¹ The exact figures are: 1,626 species are joined to one other one, 70 to two, and 8 to three other ones.

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tables). This happens not only on the level of species, but also on that of differences and that of genera: to 59 out of the 252 differences an opposite or related concept is joined¹, and the same thing occurs with 18 out of the 40 genera.

According to Wilkins, the pairing of radicals was done ‘for the better helping of the Memory’ (p. 22). The idea behind this is obviously that items may be readily recollected through a relation of opposition or affinity, as for instance it is easy to link ‘narrow’ and ‘wide’, ‘big’ and ‘small’ etc. As often, this was already observed by Aristotle. In a treatise on ‘memory and remembering’ he says that in trying to remember something we may succeed by beginning from ‘something similar, or contrary, or closely connected’². Such connections were sometimes exploited as an expedient in language teaching, as Salmon notes³.

Apart from its mnemonic aspects, the use of opposition as an organizing principle for the lexicon must have suggested itself naturally, since its importance is straightforward⁴. Further, antonymy relations formed a standard ingredient of the logical theory of terms. One of the questions preoccupying Aristotle in the *Categories* is whether terms of a certain type have contraries or not. In the tradition built on the categories, opposition between terms was treated as one of the ‘postpredicaments’. Furthermore, other language planners had drawn attention to opposition between terms. Lodwick 1647:2 points out that “many Radixes have an affinity or relation in their signification”, such as analogical, synonymical or contradictional relations. And of course, Dalgarno likewise used opposition, though not affinity, as an ordering principle (cf. 3.4.5).

Besides mnemonic benefits, Wilkins seems to have perceived an additional advantage of the coupling procedure: it provided him with a possibility to endow his lexicon of radicals with a systematical means of expressing semantic relations regardless of the limits set by the vocabularies of existing languages. This appears for instance in the table of ‘natural power’, in which the ‘external senses’ sight, hearing, smell, taste, and touch are listed together with their opposites such as blindness and deafness. About this Wilkins says: “Though common Language have not affixed particular names to the impotencies of some of these, yet they ought to be provided for as well as the rest” (p. 196). He further states that all radicals having redundant and efficient extremes also naturally have an opposite common, although this may be not lexicalized by existing languages (p. 290). However, instances in which the device is exploited in this manner are rare (another one being the radical word ‘opposite to rapacity’ (p. 197). If this is an advantage at all, it is clearly a

¹ In one instance, a difference has a double opposite: ‘worship’ (4th difference under the genus ‘ecclesiastical relation’) is opposed to both ‘superstition’ and ‘prophaneness’.

² Yates 1966:34.

³ Salmon 1972:114.

⁴ Cf. e.g. Lyons 1977:271: “Binary opposition is one of the most important principles governing the structure of languages”.

minor one, as existing languages are capable of filling such lexical gaps by means of periphrasis of a type very similar to the one Wilkins uses.

However, it seems likely that Wilkins primarily resorted to the coupling device because it greatly increased the number of radicals that could be accommodated by his tables. The genus 'fish' for instance contains 160 species in all, since 73 out of the 87 places in the tables correspond to two radicals, paired by 'affinity'. Similarly, owing to the extra space created by the affinity device, the three genera comprising 'herbs' include 546 species in total.

Although the procedure of associating two or more radical words with a single place on the tables may have various advantages, it is clear that it further diminishes the descriptive accuracy of the tables. As a result of this procedure, the descriptive information encoded in the radical words of Wilkins's language is indirect in almost half of all cases, modified as it is by the restriction that the designated item is either 'something like' another, or 'the opposite' of another. As far as items are linked on the basis of affinity, it can be gathered from the tables that Wilkins tried his best to combine closely resembling kinds of things. For example, 'common sole' and 'spotted sole' are both listed as the first species of 'plain or flat fish'. In many other cases the relation between coupled radicals is less clear, as Wilkins readily admits: "it must be acknowledged that these Affinities are sometimes less proper and more remote, there being several things shifted into these places, because I knew not how to provide for them better" (p. 22). As for the pairing on account of opposition, this has the unfortunate consequence that in many cases the opposed radicals are listed under a head where by definition they do not belong. This drawback is also acknowledged by Wilkins, who emphasizes that "some of those which are placed as *Opposites*, do not alwayes fall out to be under the same Predicament or Genus with those things to which they are adjoyned; as it must be in such things as are *privatively* opposed, as *Blindness*, *Deafness*, *Darkness*, &c." (p. 290).

4.3.5 An encyclopedic lexicon

In view of the points made above, it is quite justified that Wilkins was modest in his claims about the descriptive adequacy of his tables. Nonetheless, he believed that the radical words derived from his tables constituted an improvement with respect to the words of other languages. In the debate with Dalgarno, the numerical, arbitrary order of the radical words was one of the main issues. According to Dalgarno's account, Wilkins maintained against Dalgarno's objections to this that whereas the radical words of other languages are completely arbitrary, the radical words of the language he envisaged would not be 'signa ad placitum', as they would express descriptive information. This argument will be discussed more fully below (cf. 4.4.2). Wilkins clearly saw this as one of the most important advantages of his philosophical language. For this reason, whereas Dalgarno endeavoured to keep the number

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of radical words as small as possible, Wilkins argued that the lexicon of radical words should be more comprehensive, constituting, as Dalgarno puts it, ‘a Synopsis or Index of the whole Encyclopedia of Arts digested in a Predicamental Series’¹ (cf. 3.3.3 above).

Wilkins also had another argument against Dalgarno’s objections to the numerical order of the items listed in his tables, namely that, as Dalgarno puts it, “the reason of the order appearing in the Larger Tables did facilitate the work of the memory much”². Correspondingly, the *Essay* contains the following direction for learners of the language: “all the differences are to be learned out of the larger Tables, where there is some reason to be seen for the order of most of them” (p. 441). In order to explain what this means, it is necessary to draw attention to an aspect of the tables which thus far has been left unmentioned for expository purposes. Table 4.1 above reproduces part of a summary table which provides the same information as that which is encoded in the words of the language. The ‘larger tables’, i.e. those contained in the second and largest part of the *Essay* which is concerned with ‘universal philosophy’, are much richer in descriptive and classificatory content. A comparison of table 4.1 above with table 4.2, which reproduces the corresponding ‘larger table’ from the text of the *Essay*, may illustrate this.



Table 4.2

This table presents a classification and description of the six differences into which the genus ‘beast’ is subdivided. It appears that, besides the numerical arrangement, various relations between the differences obtain. These relations probably constitute what both Dalgarno and Wilkins refer to as ‘the reason of

¹ Christ Church MS 162, f.47r.

² Christ Church MS 162, f.50r.

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the order'. Thus differences I to V all belong to the class of 'viviparous beasts', which is in opposition to the class of 'oviparous beasts'. Unlike the latter class, viviparous beasts are not a category that is encoded in the language. Further, 'whole footed' and 'cloven footed' beasts are the first two categories of a trichotomous division, the third of which is formed by 'clawed, or multifidous' beasts. The latter class again is not encoded in the language. It is divided into 'not rapacious' beasts, which forms the third difference under this genus, and 'rapacious' ones, another example of a superordinate class which is distinguished in the tables, but not represented in the language. Its two subordinate categories 'cat-kind' and 'dog-kind' are represented, forming as they do the 4th and 5th difference respectively.

Thus Wilkins's classificatory tables turn out to be much more intricate than the ordering into three levels which is expressed by the words of the language. In the present case, what appears as a single level in the words of the language, derives from four distinct classificatory levels in the table. Again it appears that the categories Wilkins picked out for representation were selected on the basis of comprehensiveness, not for their logical or ontological status. For instance, since the number of species belonging to the category of 'oviparous beasts' does not exceed the maximum number that could be accommodated by a single difference, it is made to constitute a category that is represented in the language. Its counterpart 'viviparous beasts' does not meet this condition and hence those of its subordinate categories that do are selected to function as differences expressed in the language.

Table 4.2 also illustrates that the tables contain a lot of extra descriptive information on the items classified, such as the description of the teeth of ‘rapacious beasts’. This is even clearer from table 4.3, in which the species belonging to the first difference are classified and described:

Sl. No.	Name of the Candidate	Grade	Score	Remarks
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2				
3				
4				
5				
6				
7				
8				
9				
10				
11				
12				
13				
14				
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99				
100				

Table 4.3

It thus appears that, for instance, 'elephant' is not simply listed in the table, but a fairly lengthy description of its properties is supplied in addition. None of this is expressed in the language, but the frequency and elaborateness of these descriptions make it understandable why Wilkins valued his tables as an achievement in their own right. His tables do provide an encyclopedic survey both of the world of nature and of the man-made and the social world. When the information surplus of the tables is taken into account, their descriptive adequacy proves to be much greater than it seems to be when only that part that is encoded in the language is taken notice of. This reflects the fact that Wilkins compromised between conflicting requirements that followed from the various goals he pursued simultaneously. One was to give an accurate description of the things and notions to which names are to be assigned, which requires the recording of as much information as possible. The other was to create a set of names which were to be easy to use and easy to learn, requiring the amount of encoded information to be limited.

Table 4.3 also illustrates another characteristic of the tables: it is often the case that beside the radical words that are printed in capitals other words, printed in italics, are enumerated. For instance, next to the radical 'HORSE' a series of words beginning with '*Mare, Gelding, Nag*' etc. is printed. Such italicized words are sometimes synonyms, which are to be rendered in the philosophical language by means of the word expressing the radical to which they are joined in the tables. If such a word is not synonymous, the radical word is likewise used, together with an additional particle which indicates a certain property of the thing designated by the italicized word in question, or a relation between that thing and the thing designated by the radical. For instance, the word 'mare' is to be rendered by the radical word for 'horse' together with a particle meaning 'female'. These so-called 'transcendental particles' will be discussed below (4.4.3). In conjunction with the alphabetical dictionary at the end of the book Wilkins's tables thus contain, besides a concise encyclopedia of contemporary learning, a description of numerous semantic relations between English lexical items.

4.3.6 Taxonomy

Wilkins's tables have often been characterized as taxonomic, and this is certainly justified to some extent by the elaborate distinctions and descriptions contained in it. Also, the similarity between his tables and classifications of the kind that were to be systematically applied in botany by Linnaeus is clear enough. It should be noted however, that the similarity breaks down on a number of points, if the notion of 'taxonomy' is rendered more precise. Kay 1971 provides a formal characterization of the notion of a 'taxonomic struc-

ture', which he convincingly claims to agree with general intuitions about it¹. Kay's definition boils down to the equation of a taxonomic structure with a hierarchy of sets that are related by means of strict inclusion. An essential consequence of this definition is that if two sets have any members in common, then one of these sets strictly includes the other. In other words, cross-classification is impossible.

Wilkins's tables do not represent a taxonomic structure of this kind for a variety of reasons. In the first place, Wilkins's tables often arrange general terms at the same level with terms denoting special kinds, and in many cases this is even indicated quite explicitly. For example, under the genus 'corporeal action', the first difference, one finds a list of actions belonging to 'vegetative bodies'. The first species is 'generation', which denotes in a 'more general' sense 'the making of a thing', while the second and third species are 'more particular' kinds of generation, namely 'impregnation' and 'parturition'. Similarly, the first species of the difference 'degrees' of the genus 'relation civil' is 'magistrate', defined as the general term denoting persons having governmental power. The second species is 'king', which is one of the 'kinds of principal magistrates'. Wilkins frequently resorts to arrangements of this type, which cannot occur in a strictly taxonomical structure, as it coordinates terms which ought to be subordinated.

Secondly, in many cases the terms enumerated as either differences or species cannot in any reasonable sense of the word be described as designating subsets of the relevant genus. For example, the first difference of the genus 'sickness' contains a series of 'causes of disease', among which are 'contagion' and 'poison'. Another example is the difference 'persons' under the genus 'judicial relation', containing species such as 'judge' and 'advocate'. In such cases, the arrangement of items in the tables is based upon thematic or causal connections which differ widely from relations of class inclusion. These instances also exemplify the above observation (4.3.2) that the differences do not always denote properties distinguishing one group of species from another.

Thirdly, as will be discussed below (4.3.8, 4.3.9), Wilkins's scheme contains a category of 'transcendentals', which includes words denoting very comprehensive classes of things, such as 'animal' and 'plant'. This leads to cross-classification in that subclasses, e.g. 'shrub', may be said to fall under both 'transcendentals' and under 'substance', without one of these categories being subordinated to the other. Obviously, this is a consequence of the very concept of 'transcendental notions'. Dalgarno objected to including transcendentals in a predicamental series precisely because he claimed that this is inconsistent with the definition of such a series, which he apparently conceived much as a taxonomic structure in Kay's sense (cf. 3.4.3).

¹ Kay's article originated from a need to clarify a number of issues arising from anthropological and linguistic research into semantic relations among words and the conceptual structures supposedly corresponding to these relations.

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The tables, then, only very remotely resemble a taxonomic structure in the strict sense. In view of Wilkins's endeavour to include in his scheme, in principle, not only 'all things', but also 'all notions' which are to have names, this could not have been otherwise. Taxonomic procedures may be sensibly and profitably applied to certain limited fields of investigation, such as botany, zoology, and the diagnosis of diseases. It seems hopeless however to try and encompass the entire universe, including a variety of perspectives on it, in a single taxonomy. For clearly, various notions may often be applicable to one and the same thing. The logical problems arising from the attempt to fit both things, typically falling under 'substance', and notions, normally falling under 'accident', into a single classification scheme will be discussed below (4.3.7, 4.3.8).

4.3.7 Scope of the tables

It was usual in the logical tradition to exclude concepts of things known to be non-existent from the predicamental series. Wilkins likewise omits 'fictitious animals' such as syren and mermaid. They are to be expressed as individuals are, that is, by transcribing the English word designating them by means of the phonetic alphabet especially devised for the purpose (cf. 4.5.6). This is because just as individuals, names for fictitious entities may be infinite, and also because they are 'but bare names, and no more' (p. 121). The latter argument confuses a concept without extension on the one hand with a word without meaning on the other. This may be a logical consequence of Wilkins's defining concepts as mental images of things: if a thing does not exist, it cannot produce mental images, so that concepts of non-existing things are non-existent too. The weakness of such a position is apparent as it cannot explain why it is possible to state in a fairly clear manner what the words under discussion mean.

As far as the selection of items to be represented in the tables is concerned, another criterion is far more crucial. In principle, only 'things and notions' that are 'of a more simple nature' are to be included, while the rest is to be expressed periphrastically (p. 295). This criterion is clearly a consequence of the desire to create a practicable and easy-to-learn language, which entails that the number of radical words should be as small as possible. In spite of Wilkins's encyclopedic concerns, the learnability motive determined the structure of his design to a large extent. As will be discussed below (4.4.3), Wilkins relied primarily on combinations of so-called transcendental particles with radical words in coining equivalents for a very large number of words of existing languages. If such combinations could not be used, more elaborate periphrasis was necessary. It might be argued that at this point the disagreement on principles between Dalgarno and Wilkins was not very deep, as both aimed at limiting the number of radical words, and both relied on periphrasis for the expression of words not included among the radicals. Wilkins even suggests that his tables, just as Dalgarno's, are the result of a

compromise between on the one hand a list of ‘purely simple’ words and on the other hand a comprehensive enumeration of both simple and compound word meanings:

Such words only, are absolutely necessary for such a design, as are *purely* simple; which if they could be accurately distinguished, would be much fewer then those here enumerated; But for the preventing of frequent and large periphrases, it may be convenient to take in some others that are not purely simple (p. 295)

Although remarkable, the similarity between Wilkins and Dalgarno at this point is rather superficial in that they had antagonistic opinions both on what was to count as ‘purely simple’ words and on the value of periphrasis, Dalgarno regarding this as a truly logical manner of speaking, Wilkins trying to avoid it whenever possible.

The introduction of the transcendental particles enabled Wilkins to omit a large number of items from the tables which are designated by separate words in most languages. In addition, he omitted all things which are peculiar to specific places, such as various national titles, law terms, and terms of heraldry, and things which change continuously, such as garments, kinds of stuffs, games, drinks, meats, tunes, tools, and sects (p. 295-296). In fact, the tables contain various lists of things of the kinds mentioned, though these concern the more common types: various games (chess, dice) are under ‘motion’, food and drinks (cheese, brandy) are under ‘provisions’, tools (knife, hammer) are under ‘possessions’, etc. The less common ones are to be expressed periphrastically, just as, Wilkins adds, often happens in other languages.

Concerning Wilkins’s list of omitted items, Leibniz pointed out that “whatever has a constant definition may be expressed in a universal character, for although things may be proper to certain times and places, still the notion of them is perpetual”¹. Wilkins did not state however that such things cannot be expressed in his universal character; he merely explained that they are excluded from the tables for being dependent upon institutions and customs not universally shared by all mankind. Words denoting them usually lack one-word equivalents in most languages, and the universal character likewise lacks such equivalents. Leibniz read Wilkins carefully enough to note this point², but modern commentators have misconceived it. Claus (1992 [1982]:57-58) construes Wilkins’s sound observation on the limited word-for-word compatibility of vocabularies as ‘one of the most conspicuous’ of ‘the many intrusions of self-criticism into the body of the *Essay*’³, adding that he “never knew the

¹ VE 923. Cf. Maat 1995:177.

² Leibniz added: “I concede what he says that these things can be periphrastically expressed”.

³ Similarly, Cohen states that Wilkins’s book is ‘the most honest’ linguistic work of the century, in admitting that the ‘areas of human life’ enumerated in the list of omitted items are excluded from his universal language (1977:31-32). In fact, only the lo-

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irony of his suggestion that the faults of his new artificial language could be supplied by conventional languages, especially Latin". No such irony is known to anyone reading Wilkins properly, for he clearly never suggested that Latin could supply the faults of his language. All he said on this matter, was that just as Latin has no one word exactly matching 'sheriff' or 'coffi', so the philosophical language contains no one-word equivalents, both Latin and the philosophical language using their own quite different resources to form periphrastical expressions rendering the meaning of such words. However, Wilkins's own introduction of the list of omitted items does suggest that he intended to disregard these altogether, as he says: "There are some kinds of things that are not capable of being provided for in a Character and Language, proposed for Universal use" (p. 295).

The selection of items to be enumerated in the tables, then, was made on the basis of three criteria for exclusion: non-existing things, things peculiar to certain times and places, and things of a more complex nature are all excluded. Of these, the latter criterion excludes by far the largest number of items if measured by one-word equivalents in English. Criteria for inclusion, according to Wilkins's own account in the epistle to the reader, are twofold: first, by a consideration a priori, an enumeration was made of 'all simple things and notions' that were eligible for being designated by a radical word, and secondly, a dictionary of English was produced, which, apart from facilitating translations of English into the philosophical language, served to test whether the enumeration was complete and if not, to supply defects. Wilkins thus acknowledges that the inclusion of items in the tables is in large measure determined by lexicalization of these items in English. The radical words accordingly constitute for the most part a subset of the English lexicon. Exceptions are formed by the words mentioned in connection with the 'opposition' device above (4.3.4), as well as by a single instance in which a Greek word represents the radical (EPIXAIKAKIA, that is, 'joy for the evil of others', rad. 29.6.7¹), and by several instances in which a short phrase rather than a single word represents the radical, such as 'joy for the good of others' (rad. 29.6.6)². Both latter radicals were likewise formed on the basis of antonymy, the former being opposite in meaning to 'pity', the latter to 'envy'³.

cal and changeable varieties of things belonging to these areas are excluded, and not from the language altogether, but from the class of radical words.

¹ That is, the radical word listed under the 29th genus, 6th difference, 7th species. For the sake of convenience, references to specific places of radical words in the tables will in the following be made by means of abbreviated expressions of this kind.

² Other instances occur under 'military relation', where the difference 'military events' contains the species 'coming off upon equal terms', 'stand his ground', 'keep the field', 'hold out', 'save one's own' (rads. 38.2.1 to 38.2.5).

³ A radical consisting of more than one English word which is not included on the basis of antonymy is 'moderateness in recreation', its opposite being 'immoderateness in recreation' (rad. 26.2.5).

4.3.8 The overall scheme

In the logical tradition, it was common to treat each of the predicaments as forming the highest category of a particular Porphyrian tree. The only more general division than those made within the ten predicaments was the division between ‘substance’, constituted by the single predicament of that name on the one hand, and ‘accident’, comprising the remaining nine predicaments on the other hand. By contrast, the 40 genera of Wilkins’s scheme are subsumed under an elaborate classification, which is reproduced in table 4.4.

It appears that Wilkins’s genera, strictly speaking, are not at all the highest categories of his overall scheme. For instance, the genus ‘ecclesiastical relation’ belongs to a higher category of ‘publick’ relation, as well as to the more comprehensive category ‘relation’, which falls under ‘accident’, which in turn falls under ‘creature considered distributively’, which again is a subdivision of ‘creature’, and this, finally, is a subcategory of things and notions which are more ‘special’. These superordinate divisions are dichotomous until they reach the level of the genera, except the divisions under ‘accident’.

The reason why Wilkins provides this classification of the genera is very probably the same as the reason for the insertion of all the additional information in the tables in general, namely to improve their classificatory and descriptive accuracy. Dichotomous divisions are used as far as possible to show how the various genera, rather than constituting a random list, form part of a coherent scheme. Further, all sorts of information relevant to the description of the things falling under the genera is recorded, although there is no provision in the philosophical language to express this information directly. Accordingly, when exemplifying the descriptions contained in his tables, he says: “The word *Diamond* doth by its place in the Tables appear to be a Substance, a Stone, a pretious stone, transparent, colourless, most hard and bright” (p. 289). The word for ‘diamond’ in the philosophical language expresses only ‘stone (genus), 4th difference, 1st species’. When completely spelled out, this amounts to ‘stone, more transparent precious, diamond’. The other characteristics enu-

Table 4.4

merated by Wilkins are not expressed by the word of the philosophical language, but they are recorded in the tables. In particular, that a diamond is a substance is a fact which is registered by the classification under which the genera are subsumed.

As Wilkins indicates in his comments on the philosophical tables (p.24, p.289), not all concepts used in classifying the genera are equally important. There are six 'principal heads' under which the genera are arranged, namely 1) 'transcendentals', encompassing six genera, 2) 'substance', which includes fourteen genera, and four categories belonging to 'accident', that is, 3) 'quantity', 4) 'quality', 5) 'action' and 6) 'relation', together comprising twenty genera. This grouping shows that the division of the predicaments into

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‘substance’ and ‘accident’, a standard ingredient of the scholastic theory of predicaments, was also Wilkins’s point of departure. He tells us in the epistle to the reader that after Dalgarno had rejected his tables of substance, he went on with ‘the other Tables of *Accidents*’. After the tables of both substance and accident, that is, of all predicaments, were completed, Wilkins still had to account for a rather large class of remaining notions. These were brought together in the tables of ‘transcendentals’, which, as Wilkins explains, “do comprehend such matters, as by reason of their Generalness, or in some other respect, are above all those common heads of things called Predicaments” (p.24; cf. 4.3.9). Although the terms ‘transcendentals’ and ‘predicaments’ are not used in the classification of the genera (table 4.4.) as names of superordinate categories, it can be established on the basis of Wilkins’s comments, and also of the fact that these terms occupy the place which is reserved for the most general concepts in the scheme itself (cf. 4.3.7), that he considered the structure shown in figure 4.1 to form the core of his classification of the genera:



figure 4.1

Although the Aristotelian categories were used as a model for this classification scheme, Wilkins’s version differs from the original in using only five of the traditional ten categories, as he emphasizes himself: explaining that 34 out of the 40 genera belong to the predicaments, he adds: “of which I reckon only five” (p.24). However, both Aristotle himself and the tradition following him assigned relatively little importance to the five categories omitted by Wilkins. Aristotle in the *Categories* discussed only four (substance, quantity, quality and relation) in some detail. In his other works, he refers frequently to the categories, but when listing them he often omits some of the ten enumerated in the *Categories*. In works giving a survey of scholastic logic it was common to draw tables of substance as well as of quantity, quality and relation, treating the other predicaments briefly and without corresponding classificatory tables.

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Wilkins's scheme thus contains the four categories traditionally considered to be the principal ones¹, adding the 'minor' one called 'action'.

The five Aristotelian categories not distinguished as such by Wilkins could apparently be accommodated by the scheme constituted by the other five. Thus 'place' appears in Wilkins's scheme as the second difference of 'space', one of the three genera belonging to 'quantity'. 'Time' is subsumed under the genus 'measure', belonging to 'quantity' as well. 'Attitude' or 'posture' is subsumed under the genus 'corporeal action', constituting the 6th difference. 'State' or 'Condition', a single Aristotelian category, appears as two distinct 'transcendental' notions in Wilkins's scheme (rad. 1.2.4 and 1.6.4). As far as the examples of 'state' given by Aristotle are concerned, that is, 'is armed', or 'is shod', they are to be rendered by radical words classified under quite different categories. Likewise, Aristotle's category of 'Suffering' is in Wilkins's scheme not an independent class of genera, but is related to 'action', by way of the opposition device discussed in 4.3.4 above.

There is also a more fundamental respect in which Wilkins's classification scheme differs from Aristotle's theory of categories. Although the latter is open to various interpretations, it is uncontroversial that the category of 'substance' has a special status within that theory. Things falling under this category, in Aristotle's view, have ontological primacy: individual substances are the things which basically and primarily populate the universe; they have an independent existence. Everything which falls under one of the other categories does not exist in an independent way; what we find here are either properties requiring an individual substance as subject of inhesion or relations that may obtain between various individual substances. A consequence of this distinction, or maybe the basis of this distinction, is that the relation between individual substances and predicates belonging to 'substance' is essentially different from the relation between individual substances and predicates of any other type. As Aristotle points out, in the case of 'substance' both a predicate and the definition of this predicate can be affirmed of an individual thing. For instance, whenever the predicate 'man' applies to an individual, then likewise will the definition of this predicate, that is, the superordinate genus 'animal', be applicable to the individual. By contrast, if a predicate of one of the other categories is asserted of something, the definition of this predicate is not applicable to that thing. For instance, whereas some material object can be said to be white, the definition of 'white' can never be predicated of a material object². For the definition of 'white' specifies that white is a colour, and it is impossible to say of some material object that it is a colour.

¹ McMahon (forthcoming) shows that Thomas Aquinas and Albert the Great among others made an explicit distinction between the three major categories of 'accident' and the other six. As McMahon explains, it was argued that the three major categories were necessary in that any mental representation of some substance necessarily involves specific properties falling under each of these categories. By contrast, properties falling under one of the other accidents may be left out without making the mental representation fundamentally defective.

² *Categories* V, 2a 19-33.

In other words, the hierarchy of concepts under ‘substance’ is the only one which partitions all existing things into ever more specific classes. The function of the predicates belonging to one of the other categories is typically to give an alternative characterization of the individual substances categorized by predicates belonging to substance. Thus a variety of predicates, belonging to different categories, can all be applied to one and the same individual substance.

Clearly, if it is granted that the category of substance has ontological primacy, and that terms belonging to one of the categories called ‘accident’ are normally used to characterize the very same things as those falling under substance by means of non-essential properties, it will be impossible to consistently maintain that the categories together form the highest level of an all-embracing taxonomy that neatly partitions all existing things, i.e. so that every existent is assigned exactly one place within the classification. Yet the latter view on the function of the predicaments was implicit in most seventeenth-century treatments of the subject¹. It is unclear whether or not compilers of logical textbooks were aware of a problem here. Dalgarno, as seen (cf. 3.4.4. above), objected to the division of all existing things into either substance or accident because this would preclude the possibility of subsuming one and the same thing under both substance and accident, which is precisely what is often called for. Consequently, Dalgarno saw, the terms ‘substance’ and ‘accident’ are to be understood as referring to abstract aspects, rather than to broad classes of things. Of course, Dalgarno was not the first to observe this point. Expounding the main concepts and distinctions made by Aristotelian logicians, Wallis in his logic explained the matter as follows:

By *Substances* they understand Things which properly subsist by themselves. Such as *Man, Horse, Star* ...

By *Accidents* they understand such things as seem rather to be considered as *Appendages of Things* than Things themselves; and therefore they are said to be called *Things* in an *Analogical* way. Such as *Colour, Figure* ...

Thus, for example, when a piece of *Wax*, or *Lead*, (which is indeed something by itself) which at first was perhaps Spherical or Round, is pressed into a wider form, or is reduced into a cube: there is not so much a *new Thing* produced, as that that which existed before, is brought into a *new Form*; and this (new form) is not so much a *Thing* as an *Appendage* of a thing, or a *Mode of a thing*. Neither is that *Roundness, Flatness, &c.* really distinct (as though it were another Thing) from the *Round, Flat, &c. Thing* itself.

And it is for this reason that they say that the Division of *Thing* (or *Being*) into *Substance & Accident* is not so much a division of a *Genus* into its *Species* (...), as of an *Equivocal* into *Equivocates*, or of an *Analogon* into its *Analogates* (Wallis 1686:27-28; my translation)

¹ Blundeville 1599:12. Wallis 1686:26.

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In Wilkins's classification scheme there is no trace of a systematical distinction between the category of substance and the other categories. There is nothing which indicates that things falling under 'substance' are of a type that differs ontologically from things falling under 'accident', at least, apart from their being labeled as either 'substance' or 'accident'. In particular, there is nothing which reflects the fact that many of the things enumerated under 'accidents' are properties which are typically possessed by things of the kind enumerated under 'substance'. Wilkins's classification professedly presents a classification of what he consistently refers to as 'all things and notions', and it does not bother about differences in ontological status between its objects. Accordingly, things such as stones are assigned a certain place within the classification just as properties such as colours are. That one and the same object may be described both as a stone and as white is disregarded: a stone is one thing, and the classification tells us what kind of thing, and whiteness is another, and again the classification shows what kind of thing that is.

Some passages in the *Essay* suggest that this aspect of Wilkins's scheme is the result of a consciously applied method. In his chapter on 'Natural Grammar', Wilkins points out that "Every Radical word in the Tables is supposed to be a Substantive". He explains that existing languages do not always allow their proper expression, so that some had to be expressed by adjectives, and others periphrastically. Nevertheless, "they are all of them to be understood as being simple Substantives" (p. 299). There is little doubt that Wilkins intended this claim to have ontological implications. Three pages further below he explicitly contrasts substantives and adjectives in the following manner:

As Noun *Substantives* are the names which are given to things, considered simply, and as *subsisting by themselves*: so Noun *Adjectives* are the names which are given to the *Adjunct natures* of things (p. 302)

These statements seem to show fairly unambiguously that Wilkins consciously maintained that the radical words of his tables all refer to 'things, considered simply, and as subsisting by themselves'. In principle, this is not an impossible thing to maintain. But it would follow that the universe represented by the philosophical language is an extremely populous one, in which whiteness, and many other un-thing-like entities such as a feeling of confidence, the act of throwing, the quality of newness etc. are all independent existents, in the very same way as stones, animals and plants are. It is of course uncertain whether Wilkins, if pressed on this point, would have agreed that this was what he meant when emphasizing that the radical words are all to be understood as substantives. It seems most likely that he wanted to stress that the function of the radicals is to refer to a clearly delineated concept of some kind, regardless of the ontological status of the thing to which the concept relates. As discussed in 3.5.2, Dalgarno laid a similar emphasis on the noun-like character of 'predicamental notions'.

However this may be, the claim that all radical words, whether classified under substance or under accident, refer to ‘things subsisting by themselves’ is certainly inconsistent with Wilkins’s own definition of the terms ‘substance’ and ‘accident’. Since the tables enumerate all things and notions to which names are to be assigned, they include these terms too. Under the genus ‘transcendentals general’ the term ‘substance’ is defined as denoting ‘such things as subsist by themselves’, and the term ‘accident’ is defined as denoting things “which (according to the old Logical definition) *require a subject of inhesion*: Though they are indeed nothing but the modes of Substance” (p. 26). The inconsistency of this definition with the remarks made in the context of natural grammar just quoted is apparent: to say that accidents are ‘nothing but the modes of substance’ is denying them even more emphatically an independent ontological status than to say that they require a subject of inhesion; both statements are incompatible with the statement that all radical words refer to things which subsist by themselves, i.e. by definition, to substances. The inconsistency is the more remarkable as Wilkins clearly is not simply repeating standard definitions, but expressly contrasts ‘the old logical definition’ with what he considers a more correct one. Hence mere inadvertence could hardly have been the cause of Wilkins’s contradicting himself at this point. In conclusion, Wilkins’s views on these matters prove to be elusive. Although he does address some logical and ontological issues, he is often not quite explicit about his own position in this regard, and in some cases it turns out to be impossible to combine his various statements into a consistent viewpoint.

4.3.9 The tables of transcendentals

The first six of the forty genera, as seen, comprise things which “are above all those common heads of things called Predicaments” (p. 24). Wilkins mentions several reasons why certain things or notions cannot be fitted into the tables of the predicaments. About all six of these genera he says that they comprehend matters which are too general, or ‘in some other respect’ above the predicaments. (p. 24). He specifies that the first three genera concern metaphysical notions, and the fourth comprises terms belonging to grammar and logic. About metaphysical terms he says that these “by reason of their Universality and Comprehensiveness, are either *above* all those Heads of things stiled Predicaments, or else *common to several of them*” (p. 24). The fifth and sixth genus, called ‘God’ and ‘World’ respectively, are treated before and separately from the predicaments for quite another reason, namely since they concern ‘more special kinds of beings’, which “are not (as Predicaments are) capable of any subordinate species” (p. 51). For this reason, it is not completely clear whether or not Wilkins considered the latter genera as concerned with ‘transcendentals’. In any case, only the first three are explicitly called ‘transcendentals’, the fourth being termed ‘discourse’.

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The distinction of a class of transcendental notions was common in the traditional treatment of the predicaments. Aristotle, possibly following Plato, noted that ‘being’, ‘same’ and ‘other’ as well as ‘one’ and ‘contrary’ have various meanings according to the terms with which they are combined¹. Moreover, he pointed out that the term ‘good’ can be applied in all the categories². Scholastic expositions of the theory of predicaments accordingly often mentioned these terms as examples of ‘pervasive’ or ‘transcendental’ terms, sometimes adding others, such as ‘one’, ‘true’, ‘part’, ‘whole’ (cf. Pinborg 1972:36). Scholastic writers further added terms of ‘second intention’ or ‘names of names’, that is, terms pertaining to grammar and logic, to the list of non-categorematic terms³.

Whereas Dalgarno rejected the idea of transcendental concepts altogether (cf. 3.4.3 above), Wilkins extended the number of transcendental terms far beyond the limited number traditionally offered as examples of such terms. In total, 508 radical words are listed in the first six genera of the scheme; the first three, which are explicitly concerned with transcendental or metaphysical notions, contain 311 radical words. That three genera are distinguished rather than a single one is another instance of the fact that the number of words to be accommodated rather than the nature of their meaning is decisive in the constitution of the genera.

Avowing that drawing up the tables of transcendentals had been a painstaking matter, Wilkins complains about the poor state of the ‘Science of Metaphysic’, which he thinks is ‘the most rude and imperfect’ part of philosophy, offering nothing but ‘confused heaps’ of general notions, whereas ‘a plain regular enumeration and description of these general terms, without the mixture of nice and subtle disputes about them’ would have been appropriate. Besides this, “the usual enumeration of such Terms is very short and deficient in respect of what it ought to be” (p. 24). Wilkins intended to make up for both defects, though he disclaims the accuracy of his enumeration once again, explicitly identifying the preconceived structure of his tables as one source of the problem:

by reason of the exceeding *comprehensiveness* of some notions, and the extreme *subtily* of others, as likewise because of the streightness of that method which I am bound up to by these Tables it will so fall out, that several things cannot be disposed of so accurately as they ought to be (p. 24-25)

The radical words listed in the tables of transcendentals are of various sorts, most of which, though not all, can be related to either one of the two reasons that Wilkins mentions for falling outside the ‘ordinary series of things’, i.e. being either above the predicaments or common to several of them. In the first place, a number of terms refer to concepts used by Wilkins in classifying the

¹ *Metaphysics* V, x 4 (1018a 35).

² *Nicomachean Ethics*, i. 6 (1096a 23ff). Kneale and Kneale 1962:29-30.

³ Pinborg 1972:36.

40 genera of his scheme, such as ‘substance’, ‘accident’, ‘quantity’, ‘quality’ etc. (cf. figure 4.1 above). The term ‘accident’ was usually thought of as being above the predicaments, but since the others are commonly known names of predicaments, which are also explicitly used by Wilkins as such, it is hard to see how they could be either above the predicaments or common to several of them.

As noted, the most general distinction of Wilkins’s scheme is that between transcendentals and predicaments. These terms are listed as the first two radical words in the tables, ‘transcendental general’ being the name of the first genus, to which ‘predicament’ is joined by means of the affinity device discussed above (4.3.4). It seems that the presence of these terms in the tables of transcendentals is a consequence of Wilkins’s decision not to encode more than three levels of his classification in the character and the language. This decision was necessitated by practical considerations. For it was clearly impossible, practically speaking, to construct artificial words which reflect each and every level of the extremely elaborate classifications provided by the tables. Such words would be very long and complicated, as well as unduly uniform in some respect. For instance, all words denoting some thing falling under substance would contain an element indicating this. However, a consequence of the decision to express no more than three levels was that the terms occurring at the highest levels of the classification scheme had to be expressible in some other way. The solution consisted in using the space created by the distinction of transcendental terms. Thus the very terms used in classifying the most common heads of the scheme occur as items classified by the scheme. This shows that the practicability of the language to be derived from the classification scheme determined the structure of the classification in yet another, and very fundamental, way.

A second type of terms contained in the tables of transcendentals are those that refer to the structure of the enumeration itself, i.e. the predicables ‘genus’, ‘species’, and ‘difference’. The purpose to enumerate all things and notions made it necessary to include these terms too. Wilkins probably regarded these terms not as ‘above the general heads of things’, but as being ‘common’ to these heads. For the terms ‘genus’ and ‘species’ clearly do not refer to concepts that are superordinate to the things which are subsumed under a particular genus or species. They are names of kinds of classes, not names of classes. This meta-level character of the predicables is what led the schoolmen to exclude them, as well as all other grammatical and logical terms, from the order of predicaments. Wilkins’s fourth genus, called ‘discourse’, is entirely devoted to such ‘terms of art’, but the names of the predicables, which one would expect there, are listed among the metaphysical terms, at the level of differences, in the first genus of ‘transcendentals general’.

The third kind of terms included in the first three genera are the ones traditionally identified as transcendentals. The concepts that struck Plato because of their pervasiveness are designated by radical words listed in the first genus: ‘being’, as befits the generality of this concept, occurs as the first

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species of the first difference; 'other' and 'the same' are represented by the radical words 'diversity' and its opposite 'identity', respectively (rad. 1.3). Aristotle's additions to the list of pervasive terms are also to be found here: 'goodness' (rad. 1.3.1) and 'opposition' (rad. 1.6.9), with the exception of 'one', which is subsumed under 'measure', one of the genera of 'quantity' (rad. 23.1.1). Additions by later commentators such as 'truth' (rad. 1.3.1), as well as 'part' and 'whole' (rad. 2.6) are also present.

Fourthly, the tables of transcendentals contain a series of terms which one would expect to be on a list of metaphysical terms, such as some key terms of Aristotelian physics and metaphysics. Instances are the terms 'matter' and 'form' (rad. 1.2.7), and 'actualness' and 'potentialness' (rad. 1.3.5). Although the new mechanistic philosophy to which Wilkins adhered, rejected the concept of 'final causes', the difference 'causes' (rad. 1.2) has 'end' as one of its species (rad. 1.2.6).

The fifth and last kind that may be distinguished in the present context is perhaps the most interesting one. It is formed by terms which frequently occur in everyday language use, such as 'great' and 'little' (rad. 2.1.1), 'high' and 'low' (rad. 2.2.4), 'like' and 'unlike' (rad. 2.5.1), albeit that Wilkins following his principle that every radical word is a noun substantive (cf. 4.3.8 above) lists the nominalized forms 'greatness', 'littleness', etc. What these terms have in common is that they indicate relative rather than absolute properties of things. Their application involves some other operation than picking out a constant class of objects. For example, to classify an object as 'big' presupposes the previous selection of some limited domain to which the object belongs. It involves the comparison of the object with others within the domain. Thus, within the domain consisting of elephants we may distinguish a subclass of 'big elephants'. Among mice, a subclass of 'big mice' may likewise be differentiated. However, when the domain is the class of 'animals' no single mouse will be a member of the class of big ones, but even small elephants will be. In other words, the concept 'big' in itself does not uniquely determine a class of individuals, as membership of the class is essentially dependent on the domain chosen. For this reason, the concept 'big' cannot perform a classificatory function in a scheme which tries to capture all things from a single point of view. Yet in view of the many contexts in which reference to the relative size of a thing may be important, a means to express this kind of concepts cannot be missed in a language which claims to be suitable for universal use.

Similar observations can be made concerning quantitative terms like 'many', 'few', etcetera. These terms are normally used to indicate the relative size of a subclass, or to express information about the amount of members of a class. They do not indicate some property possessed by individual members of a class, nor are they in any other way connected with a fixed group of individuals. For this reason, it is impossible to classify individuals on account of the quantitative concepts expressed by these terms. However, it is hard to imagine that any practicable language could do without an equivalent for them.

The characteristics of the terms just mentioned were neatly pointed out by Aristotle in the *Categories*¹. A comparison between things of the same kind, he says, is essential for the meaning of these terms: “as such, things are not great or small”. For this reason, ‘great’ and ‘small’, as well as ‘many’ and ‘few’, signify a relation rather than a quantity, and Aristotle accordingly treats these terms under the category of ‘relation’. As seen, Wilkins’s general scheme also contains this category, which comprises eight genera. However, he placed ‘great’ and ‘small’, as well as others that are treated by Aristotle under ‘relation’, in his tables of transcendentals. Wilkins does not specify which criteria he used in determining whether a relative term should be listed under ‘transcendental’ or under ‘relation’. Nevertheless, the arrangement is not arbitrary: it seems that in general terms signifying relations, or rather, terms signifying typically related items such as ‘father’ and ‘son’, are arranged under one of the genera of ‘relation’. Terms implying a relation, or presupposing a comparison, or involving the consideration of a thing from a limited perspective of some kind, are treated as transcendentals. To put it bluntly, terms *denoting* relations are under ‘relation’, terms *presupposing* relations are transcendentals. There are however many exceptions to this rule.

In other cases, the reason why certain terms are included in the tables of transcendentals is not quite as clear, although the pattern of organization of the three relevant genera is fairly transparent. The first genus contains ‘transcendentals general’, that is, for the most part terms of the first four kinds mentioned above: very general terms, predicables, traditional transcendentals, metaphysical terms. The second genus comprises ‘transcendental relations mixed’. The mixed character of this genus pertains to the fact that it contains both ‘transcendental relations of quantity’ and ‘transcendental relations of quality’. The third genus contains terms signifying ‘transcendental relations of action’. Transcendentals, then, are either general, or they are associated with one of the five predicaments contained in Wilkins’s scheme (cf. figure 4.1 above), albeit that there are no explicit connections with ‘substance’ nor with ‘relation’. Since most of the transcendentals of all kinds concern certain aspects of substances, it is not surprising that there is no type of transcendental specifically related to ‘substance’. As for ‘relation’, since the terms in the second and third genus are explicitly characterized as ‘relations’ themselves, it clearly would be overcomplicated if a specific type of ‘relations related to relations’ were to be distinguished.

In spite of this systematicity, for many of the terms listed as ‘transcendental relations of action’ in the third genus it is hard to find a criterion on the basis of which these should have the status of transcendental rather than predicamental terms. The four genera under the predicament of ‘action’ contain numerous terms which seem to be just as general and abstract as the term listed as transcendentals. In some cases, it even seems that the reverse arrangement would have been more appropriate. For example, ‘thinking’ (rad. 29.2.1), and ‘knowing’ (rad. 29.2.5) are under the genus ‘spiritual action’ i.e.

¹ VI, 5b, 14-30.

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under the predicament of action, whereas ‘being creditor’, ‘being debtor’ (rad. 3.4.7) and other specific terms having to do with commerce are under ‘transcendental relations of action’.

Although it is understandable that Wilkins was not entirely satisfied with his tables of transcendentals, it is apparent that they have been drawn up with considerable ingenuity. The following fragment of the tables may illustrate this:

“TRANSCENDENTAL *mixed Relations* belonging to QUANTITY considered more GENERALLY, may be distributed into such as do concern the measure of things compared either with

Other things of the same kind or company

Indefinitely ; as to

Being or Substance, namely when the things compared are considered *singly* and intire, Being either of an ordinary size, or *more* or *less than* ordinary.

I.INDIFFERENCE, *Pretty big, passable, reasonable, so so.*

GREATNESS, *Magnitude, ample, large, vast, huge, immense, grand, monstrous, prodigious, sound, swinging, whisker, main, much, magnifie, aggravate, exaggarate, a filthy deal, a foul deal, Gyant.*

LITTLENESS, *Smalness, Petty, Minute, Modicum, Scantling, diminutive, less, least, poor, abate, allay, extenuate, Elf, Dwarf, Shrimp, Tit, Dandyprat, Pigmy.*” (p. 32).

Table 4.5

Table 4.5 reproduces the definition of the radical words ‘greatness’ and its opposite ‘littleness’, which are somewhat artificially placed as double opposites of ‘indifference’ (which in this context clearly means ‘neither great nor little’). The definition consists of a series of elements, each of which is indicated by an indenting line in the table. These elements serve to differentiate the species ‘greatness’ from other terms of the same kind. Thus, other ‘transcendentals belonging to quantity considered more generally’ involve a comparison not with ‘*other things* of the same kind’, but with ‘*themselves*’. Among these are notions like ‘increase’ and ‘diminution’. Further, other terms do concern a comparison with other things, but ‘*definitely*’, like ‘equality’ and its double opposites ‘superiority’ and ‘inferiority’. Furthermore, some terms occur which are defined as involving an indefinite comparison with other things, but then not as to *being*, but as to *use*, that is, ‘sufficiency’, together with its double opposites ‘excess’ and ‘defect’. A final group of terms pertains to an ‘indefinite’ comparison ‘as to being’, however, not ‘*singly*’ but ‘*conjunctly*’, which includes ‘aboundance’ and ‘scarcity’. It is clear, then, that these tables result from a painstaking analysis of the terms enumerated in them.

Table 4.5 further illustrates the lexicographical richness of Wilkins’s tables. In this case, the amount of words that are joined to the radical words, that is, the words printed in italics, is fairly large. As has been explained (4.3.5), the italicized words are either synonyms to be rendered in the philosophical

language by the radical word to which they are joined, or they are to be rendered by means of a more complex expression. For example, the word ‘immense’ is to be rendered by a word representing the radical ‘great’ together with a suffix (a so-called ‘transcendental particle’, cf. 4.4.3) signifying ‘augmentative’. The italicized words often reappear at other places in the tables, according to various aspects of their meaning. The word ‘ample’ for instance is listed in two other places as well, being related in meaning to the radical ‘breadth’ (rad. 2.2.2), and occurring as the radical word ‘ampleness’ (rad. 22.2.5), defined as ‘taking up a great place’.

The three other genera that do not fall under the predicaments are of very different kinds. The first of these (‘Discourse’), as mentioned, contains ‘the several notions belonging to *Grammar* or *Logick*’ (p. 44). Conspicuously lacking in this context is a reference to the art of rhetoric, which together with logic and grammar had formed the unity of the trivium for centuries. This is probably significant for the low esteem in which rhetoric was held by Wilkins, and by the intellectual movement of which he was a prominent representative. Some key terms of rhetoric do occur in the fourth genus, such as ‘oration’, as well as names of some of its traditional parts, such as ‘narration’, ‘prologue’, ‘epilogue’, but the difference (in the sense of subclass) to which they belong, is called ‘mixed notions of discourse belonging both to *Grammar* and *Logic*’ (p. 49). Rhetoric, in Wilkins’s view, is clearly not among the disciplines which are primarily important for the study of language¹. Of the two disciplines that are important, a series of basic terms is subsumed under this genus. Under ‘logical notions’ terms such as ‘definition’ (rad. 4.4.3) and ‘syllogism’ (rad. 4.4.7) are listed. Among the grammatical terms one finds ‘letter’ (rad. 4.1.1), and ‘vowel’ (rad. 4.1.2), which are species of ‘elements’ of language, and the traditional parts of speech. As in several other places in his tables, Wilkins tried to account for both a traditional view and his own, different, one. As will be discussed below (4.5), Wilkins devised a grammatical theory on which his language was to be modelled. Major characteristics of Wilkins’s grammar are, firstly, the distinction between the word classes of ‘integrals’ and ‘particles’, and secondly, the analysis of the verb as being reducible to ‘copula plus predicate’. The table in which the parts of speech are listed contains the terms ‘integral’ and ‘particle’ (rad. 4.2.1), thus reflecting Wilkins’s own grammar, as well as the traditional definition of the verb as a word class ‘relative to the actions and passions of things’ (rad. 4.2.4). However, he adds in parenthesis:

which is here taken notice of in compliance with instituted Grammar, tho it [i.e. the verb] be not properly one simple part of speech, but rather a mixture of two, namely the Predicate and Copula (p. 46).

¹ As Wilkins’s dictionary indicates, the term ‘rhetoric’ is to be rendered in the philosophical language by means of a periphrastical expression meaning ‘the art of speaking ornately’. This manner of expression is analogous to the one used for the terms ‘logic’, to be rendered as ‘the art of reason’, and ‘grammar’, to be rendered as ‘the art of speaking properly’.

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The two final genera of things and notions that do not fall under the predicaments, as mentioned, are concerned with a very special type of entities: 'God' and 'World' respectively. Wilkins defines their peculiar status as follows:

Those more special kinds of beings to be treated of Antecedaneously to the Predicaments, because they are not (as Predicaments are) capable of any subordinate species, are GOD and WORLD (p. 51)

As for 'God', it is obvious that Wilkins should assign the Supreme Being a distinctive place within his grand scheme of things and notions. The specific justification for this is remarkable however in being primarily logically motivated: as Wilkins further explains, God's peculiarity consists in "that absolute Simplicity and Purity of the Divine nature, whereby 'tis distinguished from all other things, and therefore *incapable* of being divided by *Parts*, or by *Differences* and *Species* as the rest are" (p. 51). The nature of God, in other words, resists logical analysis. In the logical tradition, it was common practice to keep God out of the predicamental series, as it seemed contrary to his dignity to do otherwise. Dalgarno stated in accordance with this that he had not included God within the boundaries of the predicamentum (AS:54). Among the writers who explicitly justified this was Jungius, who explained, in a manner remarkably similar to Wilkins's, why God should be outside the predicaments:

For it is inconsistent with the absolute perfection and simplicity of God, to be composed of genus and difference (Jungius 1638:84)

In spite of the indivisibility of divine nature, Wilkins does not hesitate to use the analytical structure of his tables to bring out a division within the genus 'God', so as to account for 'that great Mystery of Christianity, the Sacred Persons of the Blessed Trinity': Father, Son and Holy Ghost each form a 'difference' of this genus, which contains six radical words in total, 'idol' and 'antichrist' occurring as opposites of 'God' and 'Son' respectively.

As far as the genus 'world' is concerned, it is far less clear why the terms enumerated under it should be treated separately from those falling under the predicaments. In particular, the characteristic purportedly setting this genus apart from predicamental ones, namely, incapability of being divided into species, is plainly not possessed by many of these terms. But perhaps Wilkins meant this to pertain to the generic concept 'world' only. Nevertheless, the genus does contain several dozens of species. It is possible, then, that Wilkins placed this genus apart from the predicaments because its species, in the sense of radical words enumerated at the lowest level of the classification, are not species in the logical sense. As he explains, the genus deals with 'the *Compages* or *Frame of the whole Creation*, with more especial reference to those *Principal* and more *General* parts of which it consists' (p. 51). The first

difference is called ‘spirit’ and contains, among other things, ‘angel’ and ‘devil’. The remaining differences concern heavenly bodies (the second difference), parts of the earth such as ‘mountain’ (the third), terms related to water, such as ‘ocean’, and ‘lake’ (fourth difference), animate parts of the world, e.g. ‘plant’ (fifth difference), and ‘imaginary circles’, such as ‘horizon’ and ‘equator’ (sixth difference). Of some of these terms, it is quite clear why Wilkins had to treat them separately from the predicaments. For example, ‘plant’ and ‘animal’ are superordinate concepts with respect to other genera of the scheme. Far from being incapable of subdivision into species, the trouble with these terms is that their subordinate species are so numerous that they are unfit to function as a genus within the three-level framework represented by Wilkins’s language. Just as ‘substance’ and ‘accident’, the terms ‘plant’ and ‘animal’ are excluded from the predicamental terms for their great generality. It seems, then, that Wilkins created the genus ‘world’ at least in part as a receptacle for predicamental notions that did not fit into the more specific tables of substance. As has been noted (4.3.6), this is one of the reasons why his tables cannot be regarded as representing a taxonomic structure.

In conclusion, the tables of transcendentals contain a heterogeneous collection of terms, the inclusion of which seems to be motivated by various considerations. Firstly, Wilkins followed the tradition in distinguishing a number of terms which are too general or abstract to be captured by the predicaments, or which belong to some meta-level with respect to predicamental terms, e.g. ‘genus’ and ‘species’, and other terms of logic and grammar. However, his enumeration of transcendental terms is much more elaborate than what could be found in manuals of logic. Secondly, Wilkins deviated from the tradition in assigning a number of relative terms a place among the transcendentals, rather than under ‘relation’. Thirdly, he used the ‘transcendentals’ to accommodate terms such as ‘substance’, ‘animal’, and ‘plant’, which, though commonly regarded as typically predicamental ones, could not be fitted into the other tables without causing representational complications for their comprehensiveness.

4.3.10 The tables of substance

The tables containing the fourteen genera of ‘substance’ are the ones that Wilkins drew up when he first started work on the philosophical language while assisting Dalgarno. At least, the original tables were very similar to the ones printed in the *Essay* (‘Epistle to the reader’). The category of substance must have seemed the natural starting-point for an all-embracing classification of things, as it formed the paradigm case of Porphyry’s tree, supplying the central and most complete inventory of types of existents.

Porphyry in his treatise *Isagoge* had merely sketched one branch of the tree, namely the one which ends with ‘man’, mentioning only four intermediate levels between ‘substance’ and ‘man’, as follows: substance - body -

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animate - animal - rational - man¹. The later tradition was eager to supplement the other branches, introducing a few additional levels in the tree. This resulted in a scheme which was remarkably constant over a long period of time, and which reflected a widespread and comfortable consensus 'on what there is'. According to this picture, the basic components of the universe form the following list:

- substances *without body*, such as angels and the human soul
- substances *with body*, which may be either *simple*, as the four elements fire, air, water, and earth, as well as the celestial bodies, such as the stars and the planets, or *compound*; the latter distinction constituting an additional level with respect to Porphyry's tree
- compound material substances are either *inanimate*, such as stones and metals on the one hand, and 'meteors' such as thunder and snow on the other hand, or *animate*
- animate substances are either *insensitive*, that is, plants, which divide into tree, shrub, herb, or *sensitive* (another additional level)
- sensitive animate substances are either *rational*, that is, man, or *irrational*, that is, beasts, birds, fish, or insects and reptiles².

As is shown in table 4.6, which contains the relevant fragment of the overall scheme (table 4.4), Wilkins's tables follow a closely similar arrangement:

Table 4.6

¹ P 4, 21-31. Warren 1975:35-36.

² Cf. Blundeville 1599:19, Wallis 1686:30.

The genera of substance are arranged in accordance with the Porphyrian tree as amended by the scholastics, albeit that both 'man' and the immaterial substances such as 'angel' have been referred to the genus 'world', which is outside the predicaments (cf. 3.7 above). Accordingly, the tables of substance deal with, as Wilkins puts it, the 'species of natural bodies'. A further deviation is that the genus 'element' alone constitutes the category of 'inanimate substance', its usual cognates 'stone' and 'metal' being categorized, rather oddly, as 'animate'. In accordance with this, he defines 'natural metals' as 'such as of themselves grow in the Earth' (p. 65). For the rest, Wilkins's genera coincide with categories which for centuries had been standard ones. In particular the division of the world of living nature into plants and animals, the threefold division of plants into herbs, shrubs and trees, and the fourfold division of animals into bloodless, fish, birds, and beasts were traditional. Apart from the genera that came straight from the logical tradition, the tables of substance contain two genera itemizing various 'parts', both of plants and of animals. These genera are clearly modelled on Aristotelian biology, which defined the 'parts of animals' as one of its special fields.

One of the tasks of the scholastic logician was to sketch a general scheme of things. The treatment of particular fields demarcated by the scheme was left to the scientific specialist. In drawing up his tables Wilkins used the general scheme as well as the expertise of the specialist. As appears from side remarks, he consulted works devoted to specific subjects for the purpose of selecting the radical words to be included in the tables. For instance, he refers to 'the Authors who write *de Lapidibus*' (p. 65) when itemizing stones, and he indicates that only a selection of the stones treated by these authors are listed in the tables. The resulting encyclopedia reflects the state of the art in contemporary natural history. At times, recent new findings by fellow-members of the Royal Society are recorded, such as the discovery that what is commonly called a 'toadstone' is in fact 'a tooth of the Fish called *Lupus marinus*' (p.63). Interestingly, the demarcation of subject areas as well as many of the distinctions and observations follow the lines of Aristotelian natural science, but in several places it becomes clear that the validity of its tenets was no longer generally taken for granted.

The emerging 'new science', of which Wilkins was an important promoter and popularizer, has often been described as being essentially quantitative, as opposed to the qualitative approach of Aristotelian science. Whereas the latter was concerned to establish qualitative differences between various types of substances, the new scientists assumed the homogeneity of substance or matter, seeking to explain the diversity of the forms in which it appears by means of quantifiable parameters, such as the size, shape, position and motion of material particles. However, it was (and, one could add, it still is) unclear how the new approach could be brought to bear on the morphological distinctions on which botanical and zoological classification is based. As for the world of non-living nature, Wilkins perceived that, if the new science had already yielded results which could satisfactorily replace the old concepts at

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all, these results were unsuitable as a foundation for a practicable language. A description of objects in terms of the ‘modes of matter’, according to Dalgarno’s account (cf. 4.3.1 above), would in Wilkins’s opinion be too complex to base artificial words upon (cf. also 4.3.11 on ‘quality’ below). Thus Wilkins, although dissatisfied with the lore of Aristotelian natural science, resorted to using its concepts as a basis for his tables.

Elements

A clear example of this is to be found in the first genus of substance, ‘element’, which deals with the four elements, as well as with ‘meteors’, which Wilkins defines in accordance with the Aristotelian tradition as ‘bodies of a more imperfect mixture’. The meteors were an accepted field of investigation for natural science in the framework of both the old and the new science, witness the fact that both Aristotle and Descartes devoted special treatises to them. The phenomena treated under this head ranged from earthquakes to haloes round celestial bodies, and included meteorological ones such as clouds, rain, and wind. Within the Aristotelian framework, the four elements were central in accounting for these phenomena. Wilkins also uses them as ordering principles in his tables, arranging for instance ‘lightning’ under ‘fire’, ‘wind’ under ‘air’ etc., but he starts out emphasizing that

men do now begin to doubt, whether those that are called the four ELEMENTS be really the *Primordia rerum*, First Principles, of which all mixed Bodies are compounded; therefore may they here be taken notice of and enumerated, without particular restriction to that Notion of them, as being onely the *great Masses of natural Bodies, which are of a more simple Fabric then the rest* (p. 56)

Doubts about the validity of the theory of the four elements had been influentially articulated by Boyle in his *The Sceptical Chymist* (1661)¹, and it seems likely that Wilkins is alluding to this work, given his close connections with Boyle². Nonetheless, the definitions supplied by the tables of ‘element’ agree quite well with Aristotelian science, and when Wilkins deviates from this, he records this in a note, stating that it “must be granted to be besides the common Theory” to arrange ‘flame’ and ‘spark’ under ‘fire’, as well as ‘drop’ and ‘bubble’ under ‘water’. He has nonetheless done this since these cases seemed similar to others ‘which are commonly received’ (p. 59). Aristotle maintained that “flame is burning smoke or dry exhalation”³ which seems to call for referring flame to air rather than fire. Wilkins’s definition of flame

¹ Dijksterhuis 1950:478.

² Shapiro 1969:124 states that Wilkins was probably responsible for bringing Boyle to Oxford in the 1650s. Boyle and Wilkins were both involved in meetings which eventually resulted in the foundation of the Royal Society.

³ *Meteorologica* III.1, 388a 2.

(rad. 7.1.1) differs from Aristotle's in stating that 'flame is a general part or kind of fire', but agrees in adding that flames 'seem to be enkindled air' (p. 57).

In some cases, Wilkins's definitions cannot be described as agreeing with either the old or the new science, simply because representatives of both paradigms provided similar explanations for some phenomenon. For instance, lightning, according to Wilkins's table (rad. 7.1.3), is 'the shining and flash of inflamed exhalations', which agrees with both Aristotle's and Descartes's explanation¹. On the other hand, Wilkins's definition of thunder agrees with neither, reading 'the sound made by such Inflammations', whereas Aristotle maintained that the sound of thunder precedes the flash of lightning, and Descartes observed that thunder may occur without lightning. Wilkins's tables thus attest that the far-reaching implications of the change from the Aristotelian to the new mechanistic world picture were sometimes outweighed by conceptual and methodological continuities.

Plants

The tables of plants are preceded by a section in which Wilkins emphasizes the difficulties in enumerating and describing the exceedingly large number of different kinds. These difficulties are enhanced, he admits, by "the straining and force that must sometimes be used, to make things comply with the institution of these tables into which they are to be reduced" (p. 67). Wilkins thus acknowledges once again that the structure of his tables is not based on scientific principles alone, and that considerations of linguistic practicability played an important part as well. John Ray, the expert on botany who did much of the actual work in composing the tables, was dissatisfied with this aspect of the work. In a letter to Lister, he wrote:

In arranging the tables I was not allowed to follow the lead of nature, but was required to fit the plants to the author's own system. I had to divide herbs into three squadrons or kinds as nearly equal as possible; I had to divide each squadron into nine lesser kinds of "differences" as he [Wilkins] called them, seeing to it that the plants ordered under each "difference" did not exceed a certain fixed number; and finally I had to join plants in pairs or otherwise couple them. How could anyone even hope that a method of this sort would be satisfactory, and not transparently absurd and imperfect? I frankly say that it was²

¹ Aristotle, *Meteorologica* II, 369b, 5-8. Descartes, *Météores*, Oeuvres, Adam et Tannery VI:319.

² Letter to Lister, 7 May 1669. Quoted and translated from the Latin by DeMott 1957:5. DeMott provides a lucid account of the clash between linguistic and scientific principles, although he unduly restricts the linguistic considerations to mnemonic ones. Ever since DeMott drew attention to these comments by Ray, they have occasioned historians to depict Wilkins as rigidly applying his preconceived method, being insensitive to critical objections by his scientific collaborators, a

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Wilkins's self-critical remark concerning the 'streining and force' just quoted was presumably motivated by discussions with Ray, who despite his misgivings continued to assist Wilkins in improving the tables even after the *Essay* was published. In another letter to Lister, Ray repeated almost literally the opening paragraph of the *Essay*'s chapter on plants, stressing the difficulty of making 'philosophical tables', adding that he was "not free to follow nature, but forced to bow and strain things to serve a design according to the exigency of the character"¹.

As the linguistically motivated structure of the tables posed problems to the botanist, the sheer abundance of botanical species raised even greater difficulties for the linguist. As Wilkins points out, the names of known plants greatly exceeds the maximum number of artificial words he intended to create for denoting things of *all* kinds. Just as Dalgarno had done, he cites a reference work by Bauhinus in making this point:

Gaspar Bauhinus doth in his *Pinax* reckon up about six thousand several plants, the particular names of which do amount to almost twice the number of words here intended for the whole body of language (p.67)

Dalgarno, as seen², referred to Bauhinus's 6,000 species in arguing that an encyclopedic basis for the lexicon of a philosophical language is impracticable. Wilkins however, being convinced that the encyclopedic approach should be followed, opted for carrying it to its limits. He accommodated as many species of plants as he possibly could, and he even extended the maximum number of nine species within each difference. This extension inevitably led to a complication in the character and the language, and Wilkins accordingly made a special provision for rendering the species numbered ten and higher (cf. 4.4.1). The number of species within a single difference is eighteen in one case, and fifteen in several others. In this manner, he succeeded in encompassing 759 species in the five genera of plants. Yet clearly this meant that the large majority of the species distinguished by Bauhinus was omitted. Wilkins quite rightly surmized that even the number of 6,000 was lower than the actual number of species (modern estimates are around 260,000), observing that "new kinds of Flowers and Fruits are continually produced (...) insomuch that

tendency rightly criticized by Clauss 1992[1982]:56-57. Aarsleff 1992[1976]:28 quotes the same passage from Ray's letter, slightly differently translated, from Raven 1950:182, adding: "It is a good question whether Wilkins knew of this criticism, which went to the heart of the matter; the *Essay* did not, as he had intended, follow the "method of nature"." (1992:28). This is only a 'good question' if one ignores that the text of the *Essay* contains a clear answer, as it abounds with evidence of Wilkins's being acutely aware that his tables did not and could not accurately follow the 'method of nature'.

¹ DeMott 1957:5.

² Cf. 3.4.3. *Ars Signorum*:34.

it may well be doubted whether there be any determinate number of these subordinate species” (p. 67).

Faced with such an unlimited profusion, Wilkins’s solution was “to take notice only of the *chief families* of Plants, to which the others are to be reduced”. Lower species are not recorded in the tables, both because it is impossible to fix such a changeable set of sorts, and because “they may as well be expressed Periphrastically here as in all other Languages” (p. 67). At this point, then, Wilkins had to give up his general procedure, viz. to ‘fully enumerate’ and to ‘accurately order’ the species of natural bodies. For the expression of most of the known species of plants he resorted to the method Dalgarno favoured throughout: lower species are designated by compound expressions, consisting of a radical word signifying the family to which it belongs, together with a word indicating some distinctive feature of the species. In his autobiographical tract, Dalgarno argued that all languages necessarily use compound expressions for most things, and he added with satisfaction that Wilkins was often forced to comply with his methodological precepts as well:

Neither has the *Essay* bin able to overcome this necessity; for it cannot be denied but there are many Species of Nature omitted, perhaps more than taken notice of, whose names must either follow the Institution of *Ars Signorum* or all pass under one of the ineffable Mysteries of nature (Christ Church MS 162, f.48v-f.49r)

The agreement at this point between the *Essay* and the *Ars Signorum* clearly concerns only the names of relatively rare plants. That the approaches underlying both works are markedly different is as clear here as in other cases. Dalgarno’s language contains in all 41 radical words, which denote only generic concepts, to cover the entire realm of plants, whereas Wilkins’s lexicon contains 759 radical words for plants, many of which denote very specific sorts. Wilkins carried his encyclopedianism so far as to include radical words for species such as ‘hairy riverweed’ (rad. 10.1.10), ‘narrow leaved friars cowle’ (rad. 10.5.10) etc., while Dalgarno relied so much on his compositional method as to lack even a radical word for ‘apple’.

Moreover, Wilkins apparently did not like the idea of leaving it to the users of his language to form periphrastical expressions ad lib. He supplied a classificatory table intended to serve as a guide to such periphrasis (p. 68). In appearance, the table closely resembles the ones in which radical words are defined, but it itemizes taxonomic criteria rather than species. Instances of such criteria are the season when a plant grows, its size, place and manner of growth, as well as all kinds of characteristics of its roots, leaves, flowers, etc. Whereas Dalgarno opted for adding distinguishing features that are ‘most obvious to our senses’¹ to the generic concepts, Wilkins typically attempted to extend his classificatory method even to names he could not include among his radical words.

¹ Christ Church MS 162 f.48v.

Animals

Apparently, plants constituted the only kind of existing things which defeated Wilkins's approach on account of their great number. One would expect the same problems with respect to animals, of which modern biology has recorded over a million different species. However, in Wilkins's view the situation is decidedly different here, since he believed that the entire animal kingdom consists of no more than a few hundreds of different species. He does mention a few problems with respect to their proper classification, such as incomplete knowledge of insects, and the fact that certain species are found only locally, which makes them 'hard to be enumerated' (p. 121), but these are obviously not fundamental. The four genera of animals are quite sufficient to accommodate all known species, and there is no need to split up, as in the case of herbs, any of the traditional categories with which they coincide. However, the number of species exceeds in various cases the maximum number of nine within each difference. Since a device for the representation of the supernumerary species was available because of the huge number of plants, it is obvious that Wilkins rather resorted to this device than to the expedient of splitting up natural categories. In addition, Wilkins amply used the device of coupling species on the basis of affinity (cf. 4.3.4), thus managing to comprise 144 species within the genus of exanguious animals, and 160 species in the genus of fish.

Wilkins clearly shared with his contemporaries the assumption that all creatures are ordered according to degrees of perfection, as appears from his classifying 'exanguious animals' as 'more imperfect' than the three categories of 'more perfect' animals: fishes, birds, and beasts. He further observes that "as it is amongst the other ranks of Beings, ... the more perfect kinds are the least numerous" (p. 121). Apart from these few remarks however, there is no indication whatsoever that Wilkins used the order of the 'Great Chain of Being'¹ as a principle of arrangement.

Both the genus of 'birds' and that of 'beasts' contain, in addition to regular tables in which radical words are listed and described, a deviant type of table. This type of table is similar to the regular ones in that it classifies and describes species of animals, but differs in that these species are not to be represented by radical words. The species listed here are subspecies of animals that are so represented. Thus a two-page long table (p. 146-147) following the table in which 'carnivorous birds' such as eagle and hawk are listed, contains a series of special kinds of eagles, hawks, etc., such as 'osprey' and 'falcon'. Similarly, after the table which contains 'swan' and 'goose', a more specific classification of these birds is provided. The genus 'beasts' likewise contains a table listing subspecies of the 'bovinum genus', such as buffaloes, sheep and goats. Further, special kinds of rats, mice, frogs,

¹ The classic treatment, as well as, one might say, the creation of the subject is to be found in Arthur Lovejoy's work of that title (Lovejoy 1936).

lizards, and dogs are enumerated in separate tables. These supplementary tables were clearly intended to guide the formation of periphrastical expressions. For instance, the expression of the philosophical language for ‘spaniel’ reads, literally translated: ‘dog hunting birds by smell’. ‘Dog’ is represented by a radical word, the additional descriptive information identifying ‘spaniel’ is to be expressed using other radical words as indicated by the supplementary table.

Although these supplementary tables are apparently intended to perform a similar function as the above-mentioned table of taxonomic criteria for plants, their inclusion in the tables is quite differently motivated. Whereas the use of periphrasis with respect to plants was necessitated by their overwhelmingly large number, the number of subspecies of animals that are enumerated in the supplementary tables is relatively small. A further contrast with the supplementary table of plants is that, accordingly, each subspecies in the tables of animals is mentioned by name. In all, 52 subspecies of birds are listed, and 31 subspecies of beasts. Since 146 species of birds and 68 species of beasts are to be rendered by radical words, it is clear that Wilkins could also have represented the subspecies by radical words if he had wanted to.

The reason why he preferred periphrasis in these cases is apparently that this is a descriptively more correct manner, as scientifically speaking, these subspecies do not count as distinct species of animals. Coining radical words for such subspecies might have obscured their fundamental similarity. If this conjecture is correct, the philosophical language, for all the avowals of defectiveness, is designed to be more true to the facts of nature than existing languages are. For instance, dogs vary greatly ‘in respect of accidental differences’, and since the dog is such a familiar kind of animal, it has ‘several names assigned to it according to these differences’ (p. 160). The philosophical language, by contrast, is not guided by merely accidental differences, and brings out in the first place that dogs of all varieties are still dogs. The supplementary tables of animals, then, are probably intended to show how the various names of the single species dog should be rendered periphrastically, guaranteeing the descriptive accuracy of such periphrasis.

After the tables of beasts Wilkins inserted ‘a digression concerning Noah’s Ark’, intending to demonstrate the truth of the Genesis story (p. 162-168)¹. “Some hereticks of old, and some Atheistical scoffers in these later times” he says, have affirmed that given its size “it was utterly impossible for this Ark to hold so vast a multitude of Animals, with a whole years provision of food for each of them”(p. 162). He goes on to show, by means of meticulous calculations concerning the space required for stables, cages and food storage, that the ark was too big rather than too small to contain a sample of all animals. A diagram showing a huge three-story barn floating on smooth water illustrates the argument. Its being over-sized is probably due, says Wilkins, to the existence of unknown species of beasts and birds ‘in the undiscovered parts of the world’. The conclusion is inescapable that the

¹ A fuller account of this passage is Emery 1948 [Subbiondo 1992:278-284].

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capacity of the ark, instead of furnishing an argument against the Scripture, “ought rather to be esteemed a most rational confirmation of the truth and divine authority of it” (p. 168).

Wilkins’s exposition on Noah’s ark is typical of the way he and the circles to which he belonged viewed the relationship between science and religion. Rather than a conflicting activity that was possibly harmful to religion, science was viewed as an enterprise that could safely be pursued independently and for its own sake. Reading the book of nature would eventually support the truth of the Scripture¹. The digression on the ark further illustrates Wilkins’s conviction that the seeming multiplicity of things may become quite manageable once it has been reduced to order. The stars, he says, may seem innumerable, but once they have been reduced into constellations, and “described by their several places, magnitudes and names, it appears, that of those that are visible to the naked eye, there are but few more than a thousand in the whole Firmament” (p. 162). His tone is somewhat triumphant when he establishes that this firm belief in the advantages of classification is confirmed by the number of animal species: even otherwise knowing and learned men think they are innumerable, “whereas upon a distinct inquiry ... it will appear that they are much fewer then is commonly imagined, not a hundred sorts of Beasts, nor two hundred of Birds” (p. 162).

One might suppose that the subsumption of various subspecies in supplementary tables rather than in regular ones was a strategy for downplaying the number of species so as to support the theory on Noah’s ark, but this would be erroneous. Wilkins probably could have found room to accommodate the subspecies in the ark as well. As a matter of fact, he does include a number of such subspecies, which he says are probably just varieties, not distinct species, in the list of animals that went on the ark, in order ‘to prevent all cavilling’ (p. 165). However, ‘dog’ is treated as a single species, evidently on the assumption that the offspring of the two dogs that joined Noah on his ark have taken on all kinds of varieties afterwards.

4.3.11 The tables of accident

After Dalgarno’s refusal to use the tables of substance, Wilkins decided to complete his own design independently and went on “with the other Tables of *Accidents*” (to the reader). Together these tables comprise 1,919 radical words, almost half of the total number. They are arranged under four predicaments, which are the ones, apart from substance, that Aristotle and the tradition following him treated in some detail: quantity, quality, action, and relation. In these tables as in the table of substance, Wilkins follows the logical tradition closely, as far as the selection of items to be arranged under particular heads is concerned. It is in comments inserted in some places, and at times in the definitions given of radicals, that the interests of the scientific

¹ Aarsleff 1992:4.

circles in which he was prominent shine through. However, it will be seen that these tables also contain the explicit statement that scientific theories are ultimately irrelevant for the lexicon of the philosophical language.

Quantity

The three genera of ‘quantity’ together contain 238 radical words, representing items traditionally arranged under this head, such as terms related to ‘continuous quantity’ (point, line, surface etc.), numerals, and terms connected with the measurement of space and time. How strictly the inclusion of terms under a certain predicamental head was determined by the tradition appears from Wilkins’s adding a note explaining why he did not include ‘oration’ under ‘quantity’. “In the usual systems”, he says, oration is enumerated under quantity, but this is “now by common consent acknowledged to be very improperly stiled Quantity; and therefore it is left out here” (p. 181)¹.

Further, the tables of quantity contain the observation that a numbering system using eight as a base would be more convenient than the common one using ten, “because the way of Dichotomy or Bipartition being the most natural and easie kind of Division, that Number [i.e. 8] is capable of this down to an Unite” (p. 190). However, since the decimal system is already in common use, Wilkins does not “insist upon the change of it” (p. 190). In a similar vein, before enumerating the various radical words pertaining to measurement of length (e.g. inch), weight (e.g. ounce), ‘valuation’ (e.g. shilling), and time (e.g. year), Wilkins discusses a method of reducing all measurements to a common fixed standard. This method is based on the movement of a pendulum and the length of its cord. As Wilkins notes, the method was first suggested by Christopher Wren, and experimentally refined by Lord Brouncker, President of the Royal Society, and ‘*Mon. Huygens*, a worthy Member of it’. Wilkins adds that he explains the details of this method “not out of any hope or expectation that the World will ever make use of them, but only to shew the possibility of reducing all Measures to one determined certainty” (p. 192). In his definition of the measures of time, Wilkins takes heliocentric astronomy as a starting-point in that he defines ‘year’ on the basis of the ‘revolution of the earth in its orb’ (p. 193). Wilkins did much to

¹ Blundeville 1599:23 includes ‘measure of speech’ in his table of ‘quantitie’. Wallis 1686:40 offers an explanation of why some authors have included ‘oration’ under quantity: this is because Aristotle says ‘somewhere’ (‘alicubi’) that oration is discrete rather than continuous quantity, which Wallis thinks he said because we do not produce a continuous sound in speaking, but proceed by successive sounds. In fact, Aristotle in the *Categories* (VI, 5a 34-37) mentions speech as an example of something whose parts have no position because of its transience. That this remark, apparently made in passing while treating quantity, has been sufficient reason for a vast number of authors through many centuries to maintain that ‘speech’ should be subsumed under quantity shows that the opponents of Aristotelianism had some point in charging its adherents with docility.

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promote and popularize the Copernican system (cf. 4.3.1), but during his lifetime the matter was still controversial¹.

Quality

The tables of quality show once more that Wilkins modelled his scheme quite faithfully on what he calls ‘the usual systems’, that is, on the classification of terms as found in logic manuals. The predicament of quality, according to the usual systems, comprises on the one hand qualities of persons, divided into attributes commonly called ‘habit’, physical capacities known as ‘natural power’, and passions (hope, fear, etc.), and on the other hand qualities of things, especially their form, or ‘figure’. Wilkins’s genera of quality largely cover the same ground, including a genus ‘habit’, and a genus ‘natural power’, with two exceptions: firstly, ‘figure’, under which geometrical terms such as ‘circle’ are listed, has been transferred to ‘quantity’ - a deviation from ‘the common theory’ which Wilkins records as such (p. 195); secondly, the passions are arranged under ‘action’. In all, the five genera of quality contain 478 radical words.

Perhaps the most interesting aspect of the tables of quality is the following introductory remark:

Whether many of those things now called *Quality*, be not reducible to Motion and Figure, and the Situation of the parts of Bodies, is a question which I shall not at present consider. ’Tis sufficient that the particulars here specified are most commonly known and apprehended under that notion as they are here represented, and are still like to be called by the same names, whatever new Theory may be found out of the causes of them (p. 194)

Wilkins clearly refers to theories of matter such as the corpuscular theory, of which Boyle was a prominent proponent, and which Wilkins was inclined to prefer to the Aristotelian one. It is very remarkable indeed that for all his scientific preoccupations, Wilkins should in a side remark dismiss scientific explanations as extraneous to the enumeration of items to be represented in the philosophical language. Startling as it may be, the statement is unambiguous: new causal theories about things do not affect the need to represent these things according to the commonly accepted concepts of them.

In Wilkins’s time, the world of ordinary experience and the world of scientific explanation began to drift apart, and the separation was to be permanent. Wilkins perceived that in order to construct a practicable artificial language it was imperative to stay in tune with the world as experienced by ordinary language users, and he consciously left the scientific world picture for

¹ Cf. Grant McColley 1992 [1938] for a detailed account of Wilkins’s controversy with Ross on the subject. Among Dalgarno’s unpublished papers, there is a treatise in which he aims to show that the heliocentric hypothesis is very improbable (Chist Church MS 162, ff. 105v-94v).

what it was. Clearly, this was the most sensible course he could take, and his expectation that the world as articulated by natural language would remain untouched by scientific theory has largely proved right: what physics teaches us about light or electrons has not changed our names for colours or iron. Consequently, Wilkins was well aware that the a priori consideration of things and notions purportedly forming the basis of his tables was to a large extent in conformity with vocabularies of existing natural languages.

This is confirmed by his discussion of ‘rational faculties’ and ‘internal senses’, about which he says:

Whether there be any such real Faculties in the Soul as are mentioned under this and the preceding Head, is not here to be debated. 'Tis sufficient that common experience doth acquaint us with such various operations of the Mind, and that general custom hath agreed upon such names for the expressing of them (p. 196)

Thus with respect to psychology as well as physics, scientific theory is explicitly stated to be ultimately irrelevant for the tables, which are rather based upon common experience and by names originating from it. It is unfortunate that these statements have been generally overlooked by historians, as they cast serious doubt on the widely held view that Wilkins was primarily concerned to provide a means for articulating new scientific knowledge.

Action/relation

The two final predicaments comprise over 1,200 radical words in all, the four genera of ‘action’ containing 407, the eight genera of ‘relation’ containing 796. Under ‘action’ one finds a genus dealing with ‘spiritual actions’ such as those performed by the understanding and judgment (thinking, believing etc.), and a genus comprising ‘corporeal actions’ such as speaking, standing, etc. Further, there is a genus ‘motion’ including many things that, as Wilkins acknowledges, might just as well be enumerated under ‘corporeal action’, “if there were convenient room for them” (p. 239). Instances of this are ‘going’, ‘blowing’, ‘dancing’, and many others. Finally, a genus ‘operation’ includes actions typically performed by persons practising their profession, such as grinding, painting, weaving, etc.

The predicament of ‘relation’ contains the largest number of species as far as the tables of accidents are concerned. This is, Wilkins notes, “by reason of their mixed natures” (p. 249). Under ‘relation’ there is a genus including words connected with family relations and social relations (parent, neighbour), a genus ‘possessions’, under which things ranging from farm to chair are listed, and a genus ‘provisions’, under which “some of the same kinds of things as under the former” are enumerated, albeit that ‘provisions’ are “more occasional and transient” (p. 258), such as clothing and bread. After these ‘more private’ genera of relations, five ‘more publick’ ones follow, containing terms having to do with politics (king, citizen), legal matters

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(judge, witness), military affairs (besieging, weapon), nautical (boat, captain) and religious matters (priest, worship).

The definitions of many of the terms enumerated under 'relation' are likely to reflect the biases of Wilkins personally, or of his social class and his time in general. However, in many cases these definitions are remarkably impartial. For instance, the definition of 'king' reads simply 'principal magistrate'; there is no trace of Wilkins's either trying to eulogize the monarchy or to covertly voice republican sympathies. Even in defining various religions he refrains from stating emphatically that Christianity is the sole true religion, although it is implicitly stated¹. Yet the existence of a list of 'crimes capital', that is, crimes "that are or ought to be punished with Death" (p. 272) is clearly not culturally neutral, nor is the inclusion of 'witchcraft', 'theft', and 'sodomy' ('unnatural coition with males') in that list.

¹ Describing 'natural religion' and 'paganism' as being 'wholly without any revelation of the true God and his worship', he arranges Judaism, Christianity and 'mohametism' under the common head of those religions that "Have revelations, or pretend to them, whether by *Moses*, in which they rest (Judaism) ..., *Christ* and his Apostles, added to *Moses* (Christianity) ..., *Mohamet*, superadded to the rest" (p. 284). According to the system consistently followed in presenting definitions in the tables, the phrase 'or pretend to them' unambiguously refers to the latter item, i.e. to 'Mohametism' only.

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4.4 THE LEXICON

The lexicon of the philosophical language (as well as that of the real character) consists of a set of radical words (symbols) on the one hand, and a set of compound expressions formed by combining radicals and transcendental particles on the other hand. Further, the lexicon comprises a number of grammatical particles. In the present section, the radical words and the compounds will be discussed; the grammatical particles will be dealt with below (4.5.4).

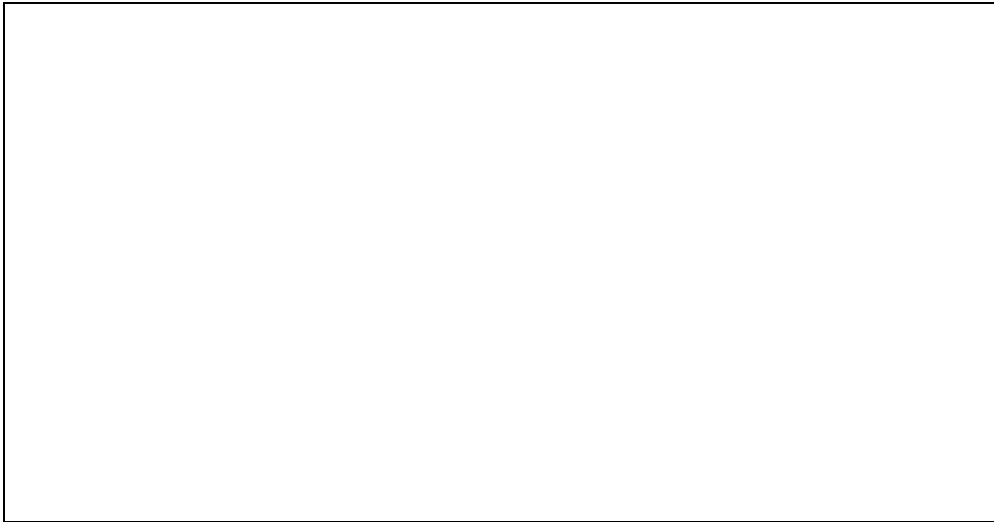
4.4.1 Radical words

¹ Describing ‘natural religion’ and ‘paganism’ as being ‘wholly without any revelation of the true God and his worship’, he arranges Judaism, Christianity and ‘mohametism’ under the common head of those religions that “Have revelations, or pretend to them, whether by *Moses*, in which they rest (Judaism) ..., *Christ* and his Apostles, added to *Moses* (Christianity) ..., *Mohamet*, superadded to the rest” (p. 284). According to the system consistently followed in presenting definitions in the tables, the phrase ‘or pretend to them’ unambiguously refers to the latter item, i.e. to ‘Mohametism’ only.

In representing the radicals enumerated in the tables by symbols of the real character and by words of the philosophical language Wilkins followed a method which is essentially the same as the one Dalgarno used for representing his radical words. The lexicon of both the character and the language consist of symbols and words that systematically refer to items in the tables.

The Character

The 40 basic symbols of the real character, each of which designates a genus, are the following:



It can be gathered from this list that Wilkins tried to bring out affinities between the various genera in their graphical representation. For instance, all genera of animals are represented by a symbol containing the same hook attached to the horizontal line which forms the basis of all characters. Likewise, each of the predicaments of accident are characterized by similar hooks and loops.

Additions to the basic symbols are used to designate the items falling under the genera: the differences within each genus are indicated by strokes added to the left side of the character, and the species within each difference by means of a similar stroke added to the right side, as follows:

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In this way, the position of radical words in the tables is codified. For instance, the symbol  designating 'elephant' which has been used for illustrative purposes above (cf. 4.2.4, 4.3.2), consists of the generic symbol  designating 'beast'. Adding the stroke on the left pointing upwards toward the right yields the symbol  which signifies the first difference, that is, 'whole-footed beast'. The stroke on the right side, finally, designates the fourth species within that difference, i.e. 'elephant'.

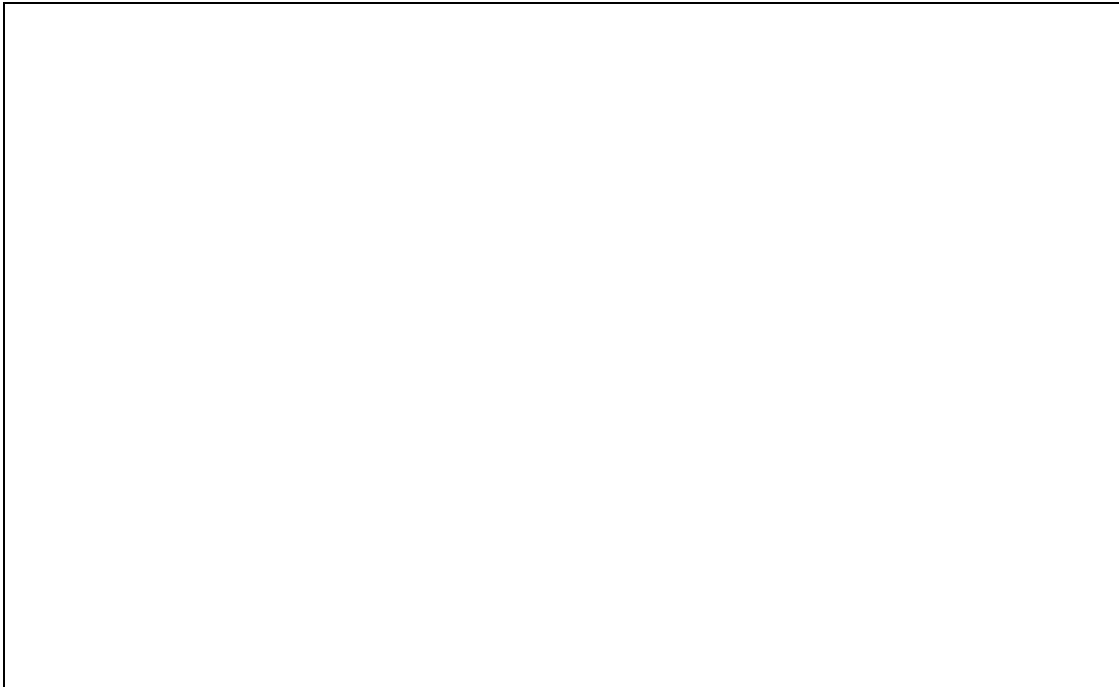
Two further provisions were needed in order to account for, firstly, radicals joined with others on account of either opposition or affinity (cf. 4.3.4), and secondly, the radicals whose number exceeds nine that occur in the genera of plants and animals (cf. 4.3.3, 4.3.8). As for the first point, opposition is indicated by a loop attached to the left end of the horizontal line that forms the basis of each symbol, while the same loop attached to the right end of the symbol indicates affinity. For instance, the symbol  designates 'happiness', and its opposite 'misery' is symbolized thus:  An instance of affinity is  'center', while  designates 'pole'. If more than one opposite is joined to a radical word, the transcendental particles meaning 'excess' and 'defect' are used (cf. 4.3.5; 4.4.5). As for the second point, the stroke or hook in the middle of the character is doubled to indicate that the tenth, eleventh, etc., species is designated rather than the first, second, and so on. For instance, the symbol  signifies the fifth species of the third difference of the genus 'herb according to the seed-vessel' (i.e. 'french honnysuckle'), while the symbol  signifies the fourteenth species of that difference ('camock').

No attempt was made by Wilkins to adapt the shape of his characters so as to make them iconic in one way or another, as had been suggested by other language planners such as Comenius¹. Nevertheless, Wilkins does state that it would be desirable if properties of the things denoted by the characters could be somehow pictured by them, thus constituting the graphical counterpart of sound symbolism. This statement is obviously not motivated by any mystical inclination (cf. 4.6), but completely informed by utilitarian considerations, as appears from his explaining that if words and symbols could resemble the things they denote, "men might easily guess at the sence or meaning of any

¹ Cf. *Panglottia* (1966:191-193, 202).

name or word, upon the first *hearing* or *sight* of it". Furthermore, attractive though the idea may seem, he did not think it feasible: "how this can be done in all the particular species of things, I understand not" (p. 386). Consequently, Wilkins looked for symbols meeting four conditions, all contributing to 'understanding, memory, and use': they should be easy to write, sufficiently distinguishable, graceful to the eye, and methodical, that is, similar things should be designated by similar symbols. It has been noted that Wilkins tried to comply with the fourth requirement. He must have been satisfied regarding the other three as well, since he adds that the character he eventually presented was chosen from a number of possible ones as it seemed in all respects the most convenient one.

Dalgarno in his autobiographic tract noted that the real character he used at an initial stage was the very same as the one later used by Wilkins: "All the difference between the Character which I used and that to be seen there [i.e. in the *Essay*], [is that] myne is perpendicular, that is horizontal" (Christ Church MS 162, f.35r). In fact, Dalgarno's characters are quite similar to those of Wilkins, although other differences than the one mentioned by Dalgarno might also be discerned. Some of the examples that are extant are the following symbols entered by hand on the printed broadsheet entitled 'Tables of the Universal Character' of 1657 (BM 4377 f.145v.; cf. 3.2.3):



Dalgarno explicitly disclaimed to have invented these characters himself, stating "I did not goe to the charge of founding a new Character" (ibid.), without however mentioning whence his characters came. Possibly Dalgarno assumed general familiarity with them, which is not implausible since Della Porta's *De Furtivis Literarum* (Naples, 1563 and 1602) was a well-known work, which

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was also cited by Wilkins in the *Mercury* (1641:12). It is probably this work which was both Dalgarno's and Wilkins's source, as may appear from the following illustration from Della Porta:¹



The language

In regard of the language, Wilkins lists a number of criteria similar to the ones mentioned in respect of the character: words should be brief, easy to learn, sufficiently distinguishable, euphonical, and methodical in that similar senses are signified by similar sounds and opposite senses by opposite sounds (p. 415). From an admittedly large number of possibilities, Wilkins chose the following assignment of two-letter words to the genera:



An ordered series of consonants is used for indicating the differences: b, d, g, p, t, c, z, s, n, where b signifies the first, d the second difference and so on². These consonants are added to the syllable signifying the genus to which the designated difference belongs. The species are indicated by adding after the consonant a vowel or diphthong from the similarly ordered list: a, a, e, i, o, □,

¹ 1602:133, printed in Shumaker 1982:115.

² It may be noted that the order among the consonants, as far as the first six of them are concerned, is the same as the order observed by Dalgarno.

y, yi, y□. The symbols a, □, □¹ are the ones Wilkins added to the Latin alphabet in order to make it better suited to his theory of speech sounds (cf. 4.5.6). The word for ‘elephant’ thus reads ‘zibi’, as ‘zi’ means ‘beast’, ‘zib’ means the first difference under ‘beast’, that is, ‘whole-footed beast’, and ‘zibi’ designates the fourth species, i.e. ‘elephant’.

To provide for the species numbered ten and higher Wilkins used insertion of ‘l’ after the first consonant, so that e.g. ‘gape’ signifies the third (tulip), and ‘glape’ (ramson) the twelfth species². Opposition and affinity are indicated in a slightly more complicated manner than they are in the real character. The method is clearly driven by the attempt to create what Wilkins calls ‘methodical’ words, i.e. to establish a conformity between expression and sense of the kind just mentioned. Thus affinity is expressed by repeating the vowel in monosyllabic words, and repeating the second consonant in disyllabic words: ‘de’ designates ‘element’, while ‘ede’ designates ‘meteor’ which in the tables is joined to ‘element’ on account of affinity; ‘dade’ means ‘planet’, while ‘daded’ means ‘comet’. Opposition, by contrast, is indicated by placing the opposite vowel before the first consonant in monosyllabic words, so that while ‘Da’ means ‘God’, ‘ida’ means ‘idol’. Opposition between vowels is discussed in Wilkins’s chapter on natural grammar (p. 375), and is based upon vowels being either of a middle sound (a and a), or of a more acute (e and i), or a more grave tone (o and □). There is one point, then, where Wilkins was able to use sound symbolism in his language. Like Dalgarno (cf. 3.4.5), he based it upon phonetic principles rather than on the gratuitous semantic associations found in writers such as Mersenne, Comenius, and also Leibniz. Further, the sound symbolism in Wilkins’s language is confined to words denoting things on the levels of genus and difference, for the words denoting species that form the majority of the radicals have two syllables, in which case addition of ‘s’ indicates opposition. For example, whereas ‘pida’ means ‘presence’, ‘pidas’ means ‘absence’. Double and triple opposites finally are indicated by means of adding the affixes denoting the transcendental particles of ‘excess’ (‘la’) and ‘defect’ (‘lo’).

4.4.2 Signa ad placitum

¹ In general, I use simple ‘y’ without stroke instead of the symbol □ (used in Welsh) for the sake of convenience. It designates a ‘guttural’ vowel as in ‘but’.

² Wilkins (p. 415) has ‘gade’ and ‘glade’, which does not match the tables. Eco 1995:249 noting this point argues that it shows how much Wilkins’s language is vulnerable to misprints and misunderstandings (cf. 3.6 for discussion of this argument). Wilkins further says that insertion of ‘r’ indicates the ‘third combination’ of nine species, i.e. those species whose numerical code is higher than 18. But such species do not occur in the tables at all. This mismatch between tables and text (left unnoticed by Eco) cannot be accounted for by supposing printer’s errors, and just as the former is probably due to slips in correcting earlier versions of the text.

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Debating the number and arrangement of radicals in the tables, as has been mentioned in 4.3.5, one of Wilkins's arguments in defense of comprehensiveness against Dalgarno's objections was that whereas the radical words of other languages are completely arbitrary, the radical words of the language he envisaged would not be 'signa ad placitum' (arbitrary signs). This is because "here, after the Arbitrary Institution of a few Generical words and Characters all the rest are by rational inference deduced from them" (cf. 3.4.7 above). The following example may elucidate Wilkins's point: whereas the relation between the word 'elephant' and the animal designated by it depends wholly on arbitrary institution, the word 'zibi' expresses descriptive information. For once it has been decided, although admittedly arbitrarily, that 'beast' should be rendered as 'zi', it is not arbitrary that the word meaning 'elephant' should begin with 'zi'. Furthermore, once it has been established, although on completely arbitrary grounds, that 'b' should signify 'whole footed' when affixed to 'zi', it is not arbitrary that the word for 'elephant' begins with 'zib'. In this sense, the radical words are not 'signa ad placitum'. As is the case with Dalgarno's radical words, the radical words of Wilkins's language express a partial description of their referent by virtue of being composed of elements which are meaningful in their own right. One of the major sources of disagreement between the two men concerned the assessment of this aspect of the radical words, Wilkins considering this to be a major advantage, Dalgarno being much more sceptical, and preferring to use the radical words as elements in composition rather than relying on their being compound themselves.

Clearly, the appraisal of this point depends on how one values the quality of the information expressed by the classificatory arrangement in the tables. Dalgarno never abandoned his scepticism in this regard, and Wilkins apparently never lost his optimism, in spite of his frequent avowals of defects. All the less felicitous aspects of the tables are obviously inherited by the radical words: the arbitrariness of many of the distinctions, the numerical order of items within classes, the fact that the number of species is a decisive factor in establishing what is to count as a genus, the arrangement of a large number of items on account of opposition or affinity, the flaws with respect to taxonomic structure - these are all factors detracting from the claim that "rational inference" may determine the place of items in the tables. In the section on the semantics of Dalgarno's radical words (3.4.6), it has been assumed for the sake of clarity that the radical words are indicative of a perfect taxonomic structure, so that it could be said that the first letter of each word (save the words designating genera) denotes a set of which the denotation of the entire word is a subset. In principle, the same holds for Wilkins's radical words (the only difference being that the genera are designated by a syllable rather than a letter), but in fact the relation of class inclusion is far too strict a notion to be applicable to the meaning of all radical words. As a consequence of the factors mentioned, it is often the case that the only thing that can be said to be expressed is some vague thematic relation be-

tween the denotation of the radical word as a whole and that of its constituent parts.

Another point mentioned in connection with Dalgarno's radical words (3.4.6) is equally applicable to Wilkins's. This is that it is unclear to what extent the classificatory information encoded in the radical words can be justifiedly regarded to be part of what the word means. For instance, do users of Wilkins's language simply refer to 'sodomy' when saying 'segꝑg', or are they saying 'the (judicial relation which is a) capital crime called sodomy' on every occasion of use? That there is no conclusive answer to this question as long as Wilkins's language has no actual users shows that any discussion of the meaning of his artificial words is hypothetical in a crucial sense. Wilkins himself may have believed that at least part of the additional information provided in the tables is somehow involved in the meaning of the radical words as well (cf. 4.3.8 and *Essay*, p. 289-290).

A point often raised by modern scholars (as well as by Dalgarno, cf. 3.4.7) in discussing the defects of Wilkins's scheme is that the lexicon is incapable of being enriched by neologisms. Although this objection has some validity, it should not be overlooked that this pertains to the radical words only and that these form just a small portion of the entire lexicon. Assuming, again hypothetically, that the philosophical language was to come into general use, it seems plausible that users of the language would primarily resort to compounds when confronted with the necessity to coin names for items not provided for by the author of the language. It is very probable that Wilkins omitted from his tables all kinds of things that constantly change and of which new varieties are constantly produced precisely because he intended the radical words to denote solely a core of permanent items.

Whether or not the radical words of Wilkins's language are hard to memorize or use without confusion is a somewhat moot point. On the one hand, it may be advantageous to denote similar things by similar words, especially for understanding a language that one does not fully master. If one knows just the generic word for 'beast', one may still get some idea of what somebody is talking about in referring to a 'zibi'. On the other hand, although words of existing languages often only differ from others in a single letter without causing confusion (bay, may, lay etc.), the situation may be different if the designated items are just as similar as the words are¹.

4.4.3 Compound words

Although Wilkins's lexicon of radical words is much larger than Dalgarno's, it is still far short of providing equivalents to all words of other languages that

¹ In the centre of Amsterdam, two parallel streets which are situated close to each other are called 'Handboogstraat' and 'Voetboogstraat' respectively. I am not the only person who keeps forgetting which one is which, and it seems plausible that things had been easier if the names would have been completely different.

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are used for ordinary discourse. Like Dalgarno, he uses three main methods in enlarging the lexicon. The first is the use of synonyms and near-synonyms, the second is periphrasis, and the third is composition. The latter method does not consist, as in Dalgarno's language, in combining several radical words, but in the use of a particle serving to modify the meaning of radical words: the transcendental particles. These particles constitute a novel word class and are discussed in Wilkins's chapter on natural grammar (cf. section 5 below). A large part of this chapter is devoted to the treatment of these particles, which are called 'transcendental' because they either generalize the sense of a radical word, or denote a relation to some other genus than the one under which they are placed. Transcendental particles, then, are designed to loosen the ties connecting radical words with a single fixed meaning as defined by the tables. In this way, Wilkins tried to achieve the advantage of 'copiousness and elegance' proceeding from varying word meanings, while leaving the main purpose of the tables, that is, avoiding ambiguity, intact.

The transcendental particles are modelled on existing languages. Wilkins points out that there are two ways in which languages vary the sense of words: firstly, by means of tropes, and secondly, by composition which "doth *alter the terminations* of them" (p. 318). As for tropes, he briefly defines some key terms of the rhetorical literature dealing with the figures of speech, namely metaphor, synecdoche, metonymy, and irony. The philosophical language accordingly has a transcendental particle indicating 'metaphor', and another meaning 'like'. However, there is no special particle signifying 'irony'¹. The other way in which languages vary the meaning of words is exemplified by a list of 17 Latin word endings such as the augmentative '-osus' in 'aquosus', the note of 'power and propensity active' ('-ivus', '-ivitas' in 'activus, activitas'), the note of 'person or agent' '-or', etc. Wilkins perceived that exploiting similar devices for the philosophical language "would exceedingly abbreviate the number of words, prevent much circumlocution, contribute to perspicuity and distinctness, and very much promote the elegance and significancy of speech" (p. 319-320). Accordingly, he presents 48 transcendental particles, arranged in eight groups of three pairs each, the first two groups being 'general', the remaining six being specifically connected with one of the five predicaments of the overall scheme (two groups pertaining to relation). He indicates that the selection of these particles is tentative, suggesting further inquiry to determine whether some of them could be profitably replaced by more useful ones (p. 351).

Wilkins illustrates the 'great usefulness' of these particles by means of a long series of examples. The particle 'metaphor' for instance enlarges the sense of a word, so that it acquires "a more universal comprehensive

¹ In the chapter on syntax, irony is discussed as being primarily a matter of pronunciation. The lack of a special mark for irony is another consequence of the 'deficiency and imperfection' of existing languages (p. 356). The philosophical language uses, quite appropriately, an inverted exclamation mark (¡) for indicating irony (p. 377).

signification: By this, common Metaphors may be legitimated, retaining their elegancy, and being freed from their ambiguity” (p. 323). The obnoxious influence of metaphor on the clarity of speech was a seventeenth century commonplace, and Wilkins was among the most influential promoters of a plain prose style in preaching as well as in scientific writing¹. It appears that Wilkins was moderate in this matter as he was in others, and that he saw that word meanings may be usefully extended by way of metaphor, while steering clear of the danger of ambiguity. Among the instances he cites are ‘evident, plain’, to be rendered as ‘light + metaphor’, and its opposite ‘mystical, obscure’, rendered as ‘dark + metaphor’ (reflecting Wilkins’s attitude towards mysticism quite clearly). Further, ‘way + metaphor’ represents ‘means’; the word ‘root’ modified by the same particle means ‘original’; ‘element’ may be modified so as to mean ‘rudiment, principle’, etc.

Most of the other transcendental particles are modelled on English and Latin affixes, such as ‘kind’, which has a function similar to the English affix ‘-age’ in ‘herbage’, ‘foliage’ (p. 325), and to the Latin affixes ‘-plex’, ‘-arius’, and ‘-genus’ (p. 319). Similarly, particles indicating specific additions to the meaning of a radical word such as ‘vessel’ and ‘house’ are derived from Latin ‘-bulum’ and ‘-arium’, respectively. Further, there are particles called ‘inceptive’ and ‘frequentative’ which copy Latin verbal affixes, and so on. The examples of how these particles are to be applied show clearly that they enabled Wilkins to greatly expand the use of his radical words. If modified by one of the particles, a radical word normally represents another English word than the one it is equivalent to according to the tables. Further, a single radical word may be modified by various particles, and sometimes the combination of a radical word with one of these particles may express a number of English words. A random sample of instances related to one particle of each of the eight groups may illustrate the general idea:

<i>particle</i>	<i>with radical word</i>	<i>means</i>
person	vile	rascal, varlet
place	washing	bath
instrument	digging	spade, shovel
vest	hand	glove
art ²	language	grammar
frequentative	bite	gnaw
augmentative	hate	abhor, abominate, detest
voice	sheep	bleating

¹ Cf Christensen 1992 [1946], Hüllen 1989.

² Interestingly, Wilkins suggests the use of an extra mark meaning ‘manteia’ in designating those ‘cheating arts’ “with which the world always hath been and will be abused”, such as astrology and chiromancy (p. 317).

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The transcendental particles constituted Wilkins's solution to the problem that had exercised other language planners as well, namely to find a way of keeping the number of radical words down for the sake of learnability while creating a lexicon with the same expressive power as that of existing languages. From the start, the solution had been sought in identifying a limited number of root words (or radical words, the term used by both Wilkins and Dalgarno), and for the expression of the other words in relying on devices similar to the morphological derivations found in other languages. By applying these devices more consistently and systematically, it was expected, fewer radical words would be needed. It will be recalled in connection with this that Wilkins's original suggestion in the *Mercury* to use Hebrew as a basis for a universal character was motivated by the fact that this language has few roots.

Wilkins's examples amply corroborate his claim that the use of transcendental particles may greatly reduce the number of radical words. The single particle 'voice' for instance if joined to a word designating some animal makes all words such as 'barking', 'bleating', 'neighing' etc. redundant. The claim that the particles also contribute to the distinctness of speech is less obviously supported by the examples. Wilkins was possibly thinking of words such as 'herd', 'flock', 'swarm', etc. which could arguably be considered as designating the same concept, and which accordingly are expressed in a uniform manner in the philosophical language by means of the particle 'aggregate'. However, even if this is conceded, it is clear that in many instances the meaning of compounds resulting from adding transcendental particles to radical words is, without additional stipulation, less specific and less distinct than the meaning of their English equivalents. Using 'digging instrument' instead of both 'spade' and 'shovel' may be workable in some contexts, but it is quite unconvincing to maintain that this is a more perspicuous and distinct manner of expression. In spite of Wilkins's claims to the contrary, his own examples testify that it is hard to combine economizing on the number of lexical items with reducing vagueness of expression.

The resemblance between Wilkins's radical words as modified by transcendental particles and Dalgarno's compound words is apparent. In fact, most of the English words representing the transcendental particles also occur as radical words in the tables. The list of transcendental particles may thus be viewed as a selection of radical words that seem particularly suitable to be used for composition on the lexical level. The only difference with Dalgarno's method at this point is that the latter allowed combinations of radical words with any other (if sensible), and that Wilkins devised special marks to distinguish the modifying function of the words he selected for the purpose from their ordinary use. This strategy was probably motivated by the wish to control lexical composition, and it may well be that the unsatisfactory nature of many of Dalgarno's compounds formed an additional impetus to the tendency towards systematization and regularization which is in any case present in Wilkins's work. Nonetheless, semantically speaking there is no difference between the way in which Dalgarno's and Wilkins's compounds

are defined. In Dalgarno's language the word 'grammar' is represented by a compound word consisting of two radical words, one meaning 'art' and the other meaning 'sign', while in Wilkins's language the compound word consists of the radical meaning 'language' and a particle meaning 'art'. In both cases, the meaning of the compound is established solely on the basis of the lexical meaning of its two components¹. Consequently, Wilkins's composite words are often liable to the very same objection of indeterminacy as Dalgarno's compounds are.

It is unclear whether Wilkins realized that the introduction of transcendental particles makes it possible to translate a single English word in several ways into the philosophical language. His own examples show clearly that the philosophical language may contain several words for one and the same thing. For instance, according to the dictionary the word 'kingdom' is to be rendered by the radical word 'king' plus the transcendental particle 'place' (which agrees, although not completely, with the rendering given on page 328: 'kings authority + place'), whereas on page 300 it is explained that 'king + adjective passive + thing', i.e. governed thing, may be used to represent the word 'kingdom'². Another instance is the word 'grammar', which according to the list on page 337 may be rendered as 'language + art', whereas the dictionary suggests a periphrastical expression meaning 'art of speaking properly'. That various equivalent expressions may be formed is an obvious consequence of the possibility of composition. It has been seen that Dalgarno emphasized this point. Wilkins does not address the matter explicitly, and it seems likely that he was not fully aware of this consequence, since it violates his rule that words and things should be one-to-one related. Although his language contains many more radical words than Dalgarno's, the relevance of the matter is considerable in view of the fact that a large number of English words are still to be represented in the philosophical language by means of derived or modified radical words rather than by simple radicals. Consequently, it may happen fairly often that one of the main defects of existing languages Wilkins wanted to amend appears to be present in his own language as well.

¹ That the representation of a meaning component as either a particle or a radical word is ultimately irrelevant for the meaning of the compound in which it occurs, is implicitly acknowledged by Wilkins. Discussing the possibility that two transcendental particles are needed to represent the meaning of some word, he suggests that the meaning of one of these particles be expressed by an integral and the other by a particle (p.351).

² Another sense of 'kingdom', namely 'regnation' is rendered as 'king + active'; cf. 4.5.7.

represented in the philosophical language by means of derived or modified radical words rather than by simple radicals. Consequently, it may happen fairly often that one of the main defects of existing languages Wilkins wanted to amend appears to be present in his own language as well.

4.5 NATURAL GRAMMAR

4.5.1 Aims

The grammar of the philosophical language is designed to provide the means for joining the ‘more simple notions’ defined by the tables into ‘complex Propositions and Discourses’ (p. 297). Just as the tables were claimed to be based upon an a priori consideration of things and notions, so is the grammar purported not to be derived from particular rules of existing languages, but to “contain all such Grounds and Rules, as do naturally and necessarily belong to the Philosophy of letters and speech in the *General*” (p. 297). Wilkins was aware that the construction of such a ‘natural’ grammar, which he says “may likewise be stiled Philosophical, Rational, and Universal”, had been envisaged by the Modistic grammarians of the thirteenth century, as well as by some seventeenth-century authors following up on them. Citing the *Grammatica speculativa* of ‘Scotus’ (now attributed to Thomas of Erfurt, written about 1300¹), as well as books by Campanella (1638) and Caramuel (1654)² as examples of works dealing with natural grammar, Wilkins points out that these authors “did not sufficiently abstract their rules according to Nature” (p. 297-298), so that he was forced to create a system of his own device. Although he did not think he had completely freed himself from the prejudices engendered by the theory of existing languages, he claims to have done better in this respect than his predecessors.

The resulting grammatical system has rightly been described by modern commentators as peculiarly hybrid, Michael characterizing it as a mixture of semantic, syntactic and rhetorical criteria arising from “an attempt to bring all aspects of the use of language within his scheme” (1970:250), while Frank observes that the scheme “proceeded along traditional lines while showing occasionally fascinating, if not always entirely convincing, novel approaches” (1992 [1979]:272). That Wilkins was in fact deeply influenced by Modistic grammar, as well as by Campanella and Caramuel has been shown by Funke 1959, and more thoroughly by Salmon (1979 [1975]:97-126), and Padley

¹ A modern edition with translation is Bursill-Hall 1972. The *Grammatica Speculativa* was one of the few complete Modistic works, and a sophisticated one.

² Campanella’s work is quoted by Wilkins under the title *Grammatica Philosophica*, by which he probably intends to refer to the former’s *Philosophiae rationalis partes quinque* (1638). Caramuel’s *Grammatica Audax*, to which Wilkins refers, was published in 1654. Cf. Salmon 1979 [1975]:102-106, and Padley 1976:160-184 for discussion.

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(1976:198-208). Wilkins's mixing various approaches did not in every respect lead to an unambiguous scheme. His chapter on natural grammar shows some signs of being hastily composed, ranging from printer's errors to presentational flaws, and contains several obscurities and inconsistencies. Although he claims that the 'true philosophy of speech' (p. 312, p. 316, p. 453) forms the basis of the grammar, most of this philosophy remains implicit. It is however clear that the structure of the grammar is supposed to be derived from the structure of both thought and reality, and occasionally Wilkins justifies the presence of certain rules in his system on ontological and logical grounds. Further, it is evident that on Wilkins's principles a rational grammar should not contain redundant rules nor admit of any irregularity (cf. p. 21, 453).

Wilkins divides his grammar into three main parts: etymology, syntax, and orthography/orthoepy. The division as well as the terminology is traditional, and the latter differs thoroughly from modern ones. 'Etymology' concerns what today is called morphology, but includes much which is now reckoned to belong to syntax, comprising the theory of word classes and of grammatical categories, as well as inflexion, derivation and composition. 'Syntax' deals with word order and punctuation, and takes up only two pages and a half (the whole chapter running to 87). 'Orthography' and 'orthoepy' together embrace what in modern terms would be called phonology, phonetics and spelling. The first two of Wilkins's three main parts of grammar bear primarily on the structure of the philosophical language, while the relevance of the third part consists mainly in that it prescribes its spelling, containing in addition two alternative phonetic alphabets for rendering names of things falling outside the scope of the philosophical language. As will be seen below (cf. 5.6.1), Leibniz made an extensive excerpt, interspersed with commentary, of the *Essay*'s chapter on natural grammar.

4.5.2 The parts of speech

Wilkins's 'doctrine of words' divides all words primarily into two classes: 'integrals' and 'particles'. The former "signifie some entire thing or notion" (p. 298), the latter are characterized as "less principal words, which may be said to consignifie, serving to circumstantiate and modifie those *Integral* words, with which they are joyned" (p. 304). This distinction was a very common one, both in the logical and the grammatical tradition, and also among the language planners in general (cf. 3.5.5). Wilkins's scheme deviates however from the tradition in omitting the verb from the class of 'integrals', while adding one of two types of adverbs he distinguishes: so-called 'derived' adverbs. The class of integrals, then, comprises nouns substantive, nouns adjective and derived adverbs.

The class of particles contains ten word classes, which are classified as follows: first, particles are either grammatical or transcendental. The transcendental particles constitute a single word class, and an entirely new invention.

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Their function has been explained above (4.4.3). The remaining nine types of grammatical particles are subdivided, first, into essential and occasional. The only essential particle is the copula, a necessary part of every proposition. The eight occasional particles fall into one of three classes: first, substitutive particles: pronoun and interjection, which serve as a substitute for a noun and a complete sentence respectively; secondly, connexive particles: preposition, adverb, conjunction, which connect words with words (preposition), or sentence with sentence (both adverb and conjunction); thirdly, particles that are declarative of some accident: article, mode, and tense, pertaining to integrals, the copula, or both, respectively. In summary, the scheme of word classes is as follows:

Integrals:	<i>substantive</i>		
	<i>adjective</i>		
	<i>derived adverb</i>		
Particles:	grammatical		
	essential:	<i>copula</i>	
	occasional:	substitutive:	<i>pronoun</i>
			<i>interjection</i>
		connexive:	<i>preposition</i>
			<i>adverb</i>
			<i>conjunction</i>
		declarative of some accident:	<i>article</i>
			<i>mode</i>
			<i>tense</i>
	<i>transcendental</i>		

Rather than the eight or nine traditional word classes, Wilkins's scheme thus contains thirteen¹. Apart from the absence of the verb and the introduction of a novel class of 'transcendental particles', the most remarkable about this is perhaps that 'mode' and 'tense', generally considered as categories applicable to verbs, are treated as word classes. It should however be noted that Wilkins is here presenting the word classes of his philosophical language, and that in

¹ Both Greek grammarians, such as Dionysius Thrax, and the tradition of Latin grammar as expounded in the canonical works of Donatus and Priscian distinguished eight word classes. However, the Latin grammarians omitted the article and added the interjection (Robins 1990:61). Wilkins's scheme contains both, but leaves out the traditional class of participle, which he regards as adjective. To the eight remaining traditional classes (the copula replacing the verb), five are added, since (i) substantive and adjective are separate classes, which traditionally were regarded as a single class, namely the noun; (ii) two types of adverbs are distinguished; (iii) mode, (iv) tense, and (v) transcendental particles are added.

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his language ‘mode’ and ‘tense’ function in exactly the same way as the other particles do¹.

The above scheme of word classes is related to the tables of radical words as follows: *integrals* either are radical words (if substantives) or are derived from radical words (if adjectives or adverbs), while *particles* are introduced by the grammar. The meaning of integrals, then, is defined by the tables of radical words, and in the case of derivational forms (adjectives or adverbs), by an additional component defined by the grammar. The particles are to be expressed by a separately introduced sign of the real character, or a word of the language, the meaning of each of which is defined by the grammar. Unlike Dalgarno, Wilkins thus keeps lexical and grammatical meaning apart, although lexical meaning interferes with grammar in various ways. This is clearest from the way in which the various kinds of integrals are to be formed.

4.5.3 Integrals and their derivations

All radical words, as has been mentioned (4.3.8), are supposed to be noun substantives, although in the tables they sometimes had to be expressed periphrastically or by means of adjectives “because of the defect of proper words for them in the present languages” (p. 299)². In his grammar, Wilkins introduces an astonishingly elaborate scheme of derivational forms for the radical words. In principle, each simple radical substantive is capable of no less than six different forms, depending on whether it is concrete or abstract on the one hand, and neuter, active or passive on the other hand. Further, each substantive can be modified so as to become either an adjective or a derived adverb, while both of these classes can in their turn be formally distinguished into six types (likewise either concrete or abstract, and either neuter, or active or passive). A single radical word, then, may take eighteen different forms, although it will be seen that the lexical meaning of the radical word may constrain the possible derivations.

¹ Michael’s reconstruction of Wilkins’s system of word classes (1970:247) is inaccurate, among other things, in including the verb and in ignoring ‘mode’ and ‘tense’. This is apparently a consequence of his taking the list of grammatical terms occurring in the tables (p. 46) as a basis rather than the chapter on natural grammar, which is the correct source.

² On inspection of the tables it appears that examples of this are rare, except for radical words referring to differences in the tables of plants and animals, which usually and quite naturally are expressed by adjectives. However, it may be that the full meaning of e.g. the radical ‘whole footed’ should be taken to be ‘whole-footed beast’, in which case this would provide an example of a periphrastical expression. It will be recalled that Wilkins was dissatisfied with the way the differences in his tables had to be expressed (cf. 4.3.2).

Neuter, active, passive

That each substantive should have an active and passive form in addition to a neuter one, is justified by Wilkins on ontological grounds as follows:

Though every Noun Substantive have not an Active or Passive belonging to it either in the *Greek, Latin, English, &c.* yet according to the Nature and Philosophy of things, whatsoever hath an *Essence*, must likewise have an *Act*; either of *Being* or *becoming* : or of *Doing* or *being done* : or of *making* or *being made* : to *be*, or *do*. And consequently every Radical Substantive which is capable of Action, should have an Active or Passive formed from it, which is commonly called a *Verb* .

As for such things which have not of their own any proper Act of *Doing*, they are not capable of the derivation of Active and Passive, *ob defectum materiae*; as in the words Stone, Mettle, &c. But the Verbs belonging to such Radicals can be only *Neuter*, denoting the Act of Being or becoming (p.300)

This passage illustrates very well that Wilkins's explanations of his natural grammar are at times hard to interpret. One of the problems here is that he is working simultaneously with two different concepts of 'active': one which is restricted to doing or making (action), and another which includes being and becoming (act). This explains why he maintains on the one hand that every distinct thing has a corresponding act, and on the other hand that some things, such as stones, are not capable of the derivation of active and passive, since they cannot do anything. It seems to follow from this that the derivation of active and passive adds the notion of doing or making to the meaning of a radical substantive, but not that of being or becoming. However, it is unclear how this is to be reconciled with the seemingly contradictory statement that radicals such as stones do have a corresponding verb, for a verb is defined as identical with 'an Active or Passive formed from a Radical Substantive'. Elsewhere, Wilkins states that verbs do not constitute a genuine word class of philosophical grammar, since they are composed of the copula and an adjective (p. 303). Although this analysis of the verb is inconsistent with its definition as an active or passive substantive, it does explain the possibility of forming a 'verb neuter', a term which on the alternative definition of the verb does not seem to make any sense.

The tortuous nature of Wilkins's statements on this point seems to be a consequence of his realizing halfway making a bold claim that it cannot be upheld. It looks as though he was going to say that existing languages are wrong in not allowing active and passive forms of every substantive, since the philosophy of things teaches us that every substance has a corresponding act. But then he realizes that there are exceptions to this, and retreats partially by restricting the requirement that active and passive forms should be possible to those substantives which are 'capable of action' (that is, obviously, which *refer* to things capable of action). Clearly, for this requirement to be justified it is not at all necessary that 'every essence must have an act'. Masking his

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retreat, Wilkins strains the concept of ‘act’ so that it includes ‘being’ and ‘becoming’, which is obviously artificial. However, the resulting smoke-screen, even though it is thickened by confusing references to verbs, cannot conceal the fact, also acknowledged albeit indirectly by Wilkins, that the ‘nature and philosophy of things’ does not warrant the construction of an active and passive form for every substantive.

For all its obscurity, the argument just quoted suggests quite clearly that one of the assumptions underpinning philosophical grammar is that the categories of grammar ought to be congruous to those of reality. The few modern authors who have paid any serious attention to Wilkins’s grammar at all have been rather unsensitive to this aspect in commenting on the above-quoted passage. Padley (1976:201-202) quotes part of it merely to illustrate the ‘philosophical hair-splitting involved’ in Wilkins’s claim that ideally, every substantive should have a corresponding verb. More perceptively, Frank comments: “The weakness of this formulation lies in the fact that Wilkins confounded the syntactic with the lexical plane: the transformation noun → verb (participle) operated on a purely syntactic plane; whereas some nouns *ob defectum materiae* cannot be transformed into normal verbs because of their lexical nature” (1992 [1979]: 269). Although Frank correctly observes that what according to him should be purely syntactic categories are characterized by Wilkins on a semantic basis, there is no reason to dismiss this as simply a matter of confusing two distinct planes, let alone that it is a correct diagnosis of the ‘weakness of the formulation’. The point of Wilkins’s philosophical grammar is precisely to establish a close match between the lexical and grammatical levels. From this perspective, the autonomy of syntax is far from being an incontrovertible principle of language description. The existence of things such as stones that are incapable of doing anything, then, poses a genuine problem to Wilkins’s approach, causing derivational forms of some radical words to be impossible on account of their lexical meaning¹.

However, the ontological basis of natural grammar is a very weak one, and obviously ad hoc. At this point Wilkins apparently relied heavily on the work of predecessors, in spite of his professed criticism. For instance, the argument that every essence must have an act is clearly inspired by Campanella’s work (Padley 1976:201). As Wilkins himself indicates, the categories of neuter, active, and passive are modelled on categories applicable to verbs in existing languages: “The same notion which in the *Greek* and *Latin* is expressed by the *Infinitive Mode* Active or Passive, is that which I here intend by the Substantive Active or Passive” (p. 300). The ontological principles supposedly underlying the grammar thus seem to be derived in a circular way from grammatical distinctions based on existing languages after all. In connection with this, one encounters a major difficulty in interpreting Wilkins’s explanations: it is often hard to distinguish semantically oriented descriptions of existing languages from definitions of the derivational forms

¹ Possibly Frank intended to make a similar point, and it may be due to a weakness in the formulation that I interpret him differently.

belonging to the philosophical language. Thus he defines the neuter, active and passive varieties of nouns as follows:

As those names which are assigned to signifie things themselves, and do not denote either Action or Passion, are stiled *Nouns neuter*: so those names which are assigned to signifie the Doing or Suffering of things are stiled *Active* or *Passive* (p. 300)

It is uncertain whether or not these definitions apply to words of the philosophical language. In both cases however they raise a problem concerning the fact that some radical words, rather than denoting things incapable of actions, denote actions themselves. It will be remembered that one of the five predicaments of the tables comprises actions (cf. 4.3.8), and in the four relevant genera dozens of them are enumerated, ranging from ‘dauncing’ to ‘believing’, and from ‘flying’ to ‘coughing’. One may wonder whether Wilkins would endorse the converse of the maxim that every essence has an act, and consequently maintain that each of these acts has a corresponding essence¹, but this is by the way. What is crucial in the present context, is that it cannot be determined on the basis of Wilkins’s directions for the use of the neuter, active, and passive forms whether he intended to represent radical words such as these by means of nouns neuter or nouns active, at least, as far as substantives are concerned. At one point he mentions “the Active of such Radicals as denote *Actions*” (p. 301), thus suggesting that such radicals may have both neuter and active forms. However, in that context he seems to be thinking of the way verbs of existing languages are to be translated into the philosophical language, and this is by means of expressions representing the copula plus an adjective. In the sample fragments of his philosophical language, radicals such as these do occur as expressions representing English verbs. In these cases, Wilkins consistently adds the mark of ‘active’ or ‘passive’ to the adjective.

Restricting the discussion to substantives for the moment for the sake of clarity, the problem is the following. If Wilkins intended substantives denoting actions to be represented by neuter nouns, it is obvious that they would not satisfy the definition of neuter nouns, which states that they ‘do not denote either Action or Passion’. It would follow that there is no transparent relation between neuter, active and passive forms of radicals of the philosophical language and the semantic categories they are designed to unambiguously denote. If on the other hand Wilkins intended radical words denoting actions to be represented by nouns active, it would follow that in these cases what he calls the ‘derivation of Active’ has a different function from the one it performs in others: instead of an optional, grammatically marked addition to the meaning of a radical word, it would be a grammatically obligatory mark of a component of the lexical meaning of the radical word. In both cases, it seems that at least one of the three forms called ‘neuter, active, passive’ is to

¹ Padley 1976:201 notes that Campanella assumes “that every verb is derived from an essence, even if that essence is not represented in the language by any noun”.

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be excluded from the set of acceptable expressions of the philosophical language; if such radicals are to be expressed by the neuter form, the active form would be unacceptable for being redundant or meaningless¹, while if they are to be expressed by the active form, the neuter form would be unacceptable for being inconsistent with the lexical meaning. In neither case, the interface between lexical meaning as defined by the tables and the semantic modifications as defined by the grammar appears to be as smooth as Wilkins seems to have assumed it to be.

The kinds of substantives

Although failing to provide sufficiently specific directions as to the derivation of 'active', the fact that a number of radical words denote actions plays an important part in Wilkins's discussion of substantives. As he points out, "Radical Substantives may be of various kinds, either 1. Of the Thing. 2. Of the Action or Passion. Or, 3. Of the Person" (p. 299). He goes on to explain that each of these three types of radical substantives may be transformed into both others by means of derivations. Thus if a radical word is 'of the thing' it may be transformed into a substantive of the action and into a substantive of the passion. For example, 'heat' is of the thing; adding a morpheme signifying 'active' changes the meaning of the radical into 'heating', and a morpheme signifying 'passive' yields 'being heated'. The same radical word may also be transformed into a word which is 'of the person', but for this two kinds of derivation are required: first, a morpheme indicating 'adjective active' is to be affixed, and secondly, a transcendental particle meaning 'person' is to be added, so that 'heater' or 'heating person' results. As has been explained (4.3.8), the function of the transcendental particles in general is to expand or modify the lexical meaning of radical words. It appears that in this case they also serve to transform an adjective derived from a substantive back into a substantive. Analogously, radicals 'of the person' may be transformed into active and passive ones (e.g. 'reigning' is the active of 'king'), and also, in the same roundabout way through adjectives active or passive plus transcendental particle indicating 'thing', into substantives of the thing (e.g. 'reigning thing' and 'reigned thing', i.e. kingdom). Now the radicals 'of the action' are quite symmetrically capable of being transformed into substantives of both other types, using the transcendental particles again. Thus 'binding', which is 'of the action' may be transformed into a substantive both of the person (binder) and of the thing (binding thing, i.e. bond). Schematically, the various derivations are as follows:

¹ At the risk of being justifiedly charged with philosophical hair-splitting, one could argue that actions may do things. Even if this is granted, it is very unlikely that Wilkins, who wanted his language to contain only necessary rules, would have felt the need of a morphological derivation to designate actions of actions, or that any natural language would ever contain it. In any case, the necessity of a rule prescribing the form that radicals denoting actions should take is apparent.

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substantives	are transformed into substantives	by means of
of the thing	-> of the person -> of the act/pass	+ adjective + act/pass + 'person' + active/passive
of the person	-> of the thing -> of the act/pass	+ adjective + act/pass + 'thing' + active/passive
of the act/pass	-> of the person -> of the thing	+ adjective + act/pass + 'person' + adjective + act/pass + 'thing'

About this scheme of transformations a few things may be noted. Firstly, Wilkins's introducing these transformations is clearly motivated by the wish to transfer morphological devices to be found in existing languages to his philosophical language, while strictly regularizing them. It is significant that he exemplifies each of the transformations by means of Latin and English words and phrases, not by expressions of his philosophical language. As has been seen, other language planners, notably Lodwick, were also concerned to exploit morphological derivations such as affixes indicating 'actor' in their artificial languages (cf. 2.4.2).

Secondly, these transformations involve an additional semantic categorization of radical words which further complicates the connection between lexicon and grammar. It is not quite clear how the threefold division into thing, action/passion, person relates to the logical divisions of the tables on the one hand, and the grammatical division into neuter, active and passive on the other hand. With respect to the logical classification it functions probably as a cross-categorization, so that anything which is not an action or a person, examples of both of which latter can be found in various logical categories, is supposed to be a thing. With respect to the grammatical division it is clear from Wilkins's explanations that the default representation of both radicals 'of the thing' and radicals 'of the person' is by neuter forms, while radicals 'of the action or passion', as has just been seen, present a difficulty.

Thirdly, as far as this difficulty is concerned, Wilkins's discussion of the transformations of substantives suggests that he assumes that substantives 'of the action' are normally expressed by substantives neuter just as the other two types of radicals. This is because he presents the various possible derivations of the three types of radical words as though they concern analogous cases. On the basis of this analogy one might suppose that just as the substantives of the thing and of the person are normally incapable of being modified so as to become 'of the thing' and 'of the person' respectively, for the obvious reason that they are already of that kind¹, so the substantives of the action would

¹ Explaining a sample fragment of his real character, Wilkins explicitly states that since 'parent' is a noun of person, it does not need the transcendental particle of person to be affixed to it (p. 396). He does not follow the same reasoning with

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seem to be incapable of the derivation of action, and hence be normally expressed by the neuter form. However, in Wilkins's examples of transformations involving modifications of substantives into adjectives, these adjectives are always marked for active and passive, whatever their semantic type may be. In particular, adjectives derived from substantives 'of the action' receive the mark of 'action' just as adjectives derived from the other types of substantives. Behind the seeming systematicity of the transformations, then, there is an incongruity pertaining to the function of the grammatical marker for 'active', which arises from the fact that 'action' is a component of the lexical meaning of some radical words but not of others.

Fourthly, the fact that 'person' and 'thing' are to be marked by means of transcendental particles, whereas 'active' and 'passive' are marked by derivational forms seems to call for an explanation. Why, in other words, did Wilkins not create a transcendental particle meaning 'active' and another meaning 'passive', omitting the derivational forms altogether? It would have made the interface between lexicon and grammar much more regular and surveyable. The answer seems to be that in constructing his grammar Wilkins tore the ordinary verb into various pieces, each of which he accommodated elsewhere. The active and passive forms were among the shreds remaining after dissolution of the verb, and they were assigned to 'integrals'. As appears from the sample fragments of the philosophical language, the function of these forms often coincides completely with that of the active and passive voice of verbs of English, and in his commentary Wilkins accordingly does not hesitate to speak of 'active voice' in referring to the mark for 'active' (e.g. p. 398).

Wilkins apparently realized that the semantic value of derivational affixes may be underdefined. He devotes a separate section to rules defining the meaning of the active and passive forms of radical words. The phrasing of this section clearly indicates that he makes no conceptual distinction between verbs of existing languages and 'substantives active' of the philosophical language. Thus explaining the rule that the active forms of words denoting things which have, 'according to common acception', 'any one *proper Act of Doing*' will denote this act, he adds: "For instance, the Verb or Substantive Active of the words *Fire, Water, &c.* is to burn, wet" (p. 300). Likewise, the active of 'tongue' will denote 'to lick', that of 'tooth' will denote 'to bite', and that of 'mouth', 'to devour'. As Wilkins's own examples show, the meaning postulate he offers is far from specific enough. Just as 'to lick' is only one of several possible, and typical, actions of the tongue, most things lack a single 'proper act of doing'. This latter point is admitted by Wilkins, for his second rule reads that if things do not have such a single act, the active forms of words denoting them "will signifie in the General to Act or do according to the nature of such things" (p. 301). Clearly, in many cases this will be even less sufficient as a definition of the meaning of the active forms of radical words. Wilkins does state some rules specifically applying to radicals be-

respect to nouns of action and the mark for 'active'. As has been said, the latter mark is always added to adjectives translating a verb.

longing to certain predicaments. For instance, the active of ‘inch’, which belongs to quantity, means ‘to measure by inch’, because ‘inch’ falls under the genus ‘measure’ (p. 301). Thus, in this instance as in others, Wilkins was concerned to fix the meaning of words of his philosophical language as far as possible. Nonetheless, as regards the derivations of active and passive his words are often liable to objections similar to the ones pertaining to Dalgarno’s compounds: without further conventions, such derived words are open to various interpretations.

The derivation of ‘abstract’

As has been mentioned in the beginning of the present section, Wilkins’s scheme provides for a derivation of ‘abstracts’ in addition to the derivations of active and passive. Whereas the concrete form of a radical substantive denotes the ‘ens’ or thing itself, abstracts such as ‘deity’ and ‘regality’ denote the ‘essence’ (p. 302). Abstracts are capable of active and passive forms as well, denoting a proclivity to action (e.g. ‘regnativity’) and a capacity for suffering or receiving action (e.g. ‘regibility’), respectively. Again it appears that this function of the active and passive forms, i.e. the modification of the lexical meaning of radical words, is the same as the one performed by the transcendental particles that Wilkins especially designed for the purpose. In this case, he seems either to have considered various options or to have simply confused the particles and the derivational forms, for on page 299 he says that the active and passive forms of abstracts denoting a proclivity or capacity are provided for by the transcendental particles, whereas on page 302 he states that such proclivity or capacity is indicated by the derived forms.

A similar problem as the one concerning the active forms of radicals denoting actions arises with respect to the abstract forms of radicals denoting ‘essences’ rather than ‘entia’. Again, it is not quite clear whether such radicals are to receive the mark for ‘abstract’ or not. If they are, this would entail that in such cases the mark for ‘abstract’ has an analytical rather than a modifying function. If they are not, this would entail that the ‘concrete’ and ‘abstract’ forms do not always correspond to lexical meaning. In the present case, Wilkins explicitly addresses the point without completely clarifying it. “Such Radicals as are *Concretes*”, he explains, “are capable ... to have all these three kinds of Abstracts [i.e. neuter, active, passive] formed from them. Whereas such Radicals, as are themselves *Abstracts* Neuter ... are capable only of the two latter kinds [i.e. active and passive] to be formed from them” (p. 302). This is still ambiguous as to the form the ‘abstracts neuter’ are to have, for in this context Wilkins’s characterization of radicals as either concrete or abstract is clearly based on lexical meaning. However, it seems clear enough that at least as far as the active and passive forms are concerned, radicals denoting ‘abstracts’ should also be formally characterized as abstract.

In his short discussion of abstracts, Wilkins does not mention the possibility that some radical words may be incapable of having abstract forms ‘ob defectum materiae’ (for lack of matter), as he did with respect to active

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forms. Yet in connection with abstracts this possibility seems to be worth considering as well. One could expect Wilkins to maintain that ‘every ens must have an essence’ and that therefore all radical words are capable of an abstract form, just as one may affix the ending ‘-ness’ or ‘-ity’ to every English substantive. However, this clearly opens the way to forming expressions which seem to be of little use, especially if active and passive forms are derived from them. For instance, from the abstract form of the radical ‘dog’, ‘dogness’, one may derive an active (‘dogativity’), meaning the proclivity to act as a dog, but also the passive (‘dogability’), that is, the capacity or fitness to suffer the acting as a dog. As appears from a scheme of derived forms Wilkins presents, he considered the possibility of these forms as a merit of his language (more on this immediately below). That Wilkins in fact assumed that all radical words should have an abstract form appears from a remark concerning the transcendental particles ‘power’ and ‘aptitude’. Noting that the function of these particles overlaps with that of the derivations of ‘abstract active’ and ‘abstract passive’, he states that these particles may help prevent ambiguity of such derived expressions. And he adds that the lack of variety of such derivations in other languages is a “defect of Language, for the things themselves are naturally capable of this kind of inflexion” (p. 340).

As will be seen in the following chapter, Leibniz was struck by this aspect of Wilkins’s scheme, which he apparently regarded as superfluous, pointing out that the process of imposing abstract forms may be iterated, yielding ever more vacuous expressions (cf. 5.6.1 below).

Adjectives and adverbs

As has been mentioned, the grammar of the philosophical language provides for the derivation of adjectives and adverbs from substantives, while the whole apparatus of concrete and abstract, as well as of neuter, active and passive is applicable to these derived word classes as well. As for adjectives, Wilkins follows the speculative grammarians in defining them in ontological terms: substantives are names of things ‘as subsisting by themselves’, and adjectives are names of the ‘adjunct natures of things’ (p. 302)¹. Wilkins further points out that the central notion expressed by adjectives is that of ‘pertaining to, or being affected with’. Both Wallis and Dalgarno similarly identified the notion of ‘pertaining’ as covering the meaning of adjectives in general. As for adverbs, Wilkins defines them as being ‘commonly adjoined to a Verb, to signifie the quality and affection of the Action or Passion’ (p. 303). He emphasizes that the derivation of both adjectives and adverbs should be possible for each and every radical word, adding:

¹ Cf. The *Grammatica Speculativa* of Thomas of Erfurt which characterizes substantives as nouns signifying ‘per modum per se stantis’ and adjectives as nouns signifying ‘per modum adiacentis’ (Bursill-Hall 1972:158).

though no Language in use doth admit of so general a derivation of Adverbs, yet the true reason of this is from their imperfection and deficiency; for the Signs ought always to be adequate unto the things or notions to be signified by them (p. 303)

This argument is odd in that if the existing languages Wilkins is presumably thinking of (Latin, English) constrain the formation of adverbs from adjectives at all, this is precisely on semantic grounds: that an adverb such as ‘greenly’ has not been consecrated by usage seems to be ascribable to the fact that it is hard to find a ‘thing or notion’ to which such a perfectly regular sign could be adequately applied¹. Rather than by the attempt to make the signs conform to the things signified, Wilkins’s requirement of unrestrained productivity of the adverbial affix seems to be informed by the desire to make the scheme of derivations completely regular, regardless of whether the derived forms can be sensibly used. This appears quite clearly from a scheme of derivations Wilkins presents as an illustration, listing all eighteen possible forms the radical words meaning ‘heat’ and ‘light’ may take. Conspicuously, Wilkins exemplifies these forms by means of Latin and English equivalents, thus showing, firstly, that the derivational affixes of these languages are as productive as those of the philosophical language (in spite of his remark that he has had to form several new words p. 303), and secondly, that in some cases it requires some effort to connect the resulting forms with any sensible meaning at all. For instance, the passive abstract adverb formed from ‘heat’ is ‘calefactibiliter’ or ‘calefactibly’, denoting ‘that quality or affection of some action or passion (adverb) which consists in the capacity (abstract) of being heated (passive)’. Although it is not impossible to construct a possible context of use for such forms (for instance, ‘to dress calefactibly’ could imply that a person is wearing thin clothes in cold weather), it is clear that these forms are not constructed on the basis of any necessity derived from the notion ‘heat’, but in order to safeguard the strict regularity of the scheme of derivations.

4.5.4 Grammatical particles

Proceeding to the discussion of the particles, Wilkins points out that words of this ‘less principal’ kind are numerous, ambiguous and hard to learn in all languages. The task of philosophical grammar is to select the ones which cannot be dispensed with, and to fix their meaning. As far as the particles are concerned, he does not even pretend to use an a priori method, for he explicitly states that the philosophical grammar of the *Essay* presents a selection of particles taken from ‘instituted languages’ (p. 304).

¹ There may be exceptions to this which do bear out Wilkins’s point: e.g. the unwell-formedness of ‘littely’.

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Copula

The first particle listed is “essential and perpetual in every compleat sentence”, namely, the copula. One may wonder why such an indispensable word is ranked among the ‘less principal words’, but this is clearly because it functions, just as the other grammatical particles, to indicate relations between, or qualifications of integrals without affecting their primary sense. The particular function of the copula is to unite the subject and the predicate, which Wilkins defines in purely syntactic terms as ‘all that which goes before the copula’ and ‘all that which follows it’, respectively (p. 304). The term ‘copula’ derives from the logical tradition¹, as well as the assumption that every categorical proposition must include it as a link between the subject and the predicate². Connected with this was the widespread analysis, both in logical and grammatical literature, of the verb as consisting implicitly of the copula plus a participle³. Wilkins identifies the participle with the adjective and consistently maintains that the verb “ought to have no distinct place amongst Integrals in a Philosophical Grammar; because it is really no other then an *Adjective*, and the *Copula sum* affixed to it or contained in it” (p. 303). Having dissected the verb in this way, Wilkins, as noted, retained the other function traditionally ascribed to the verb, namely to signify action and passion⁴, by transferring it to integrals, and assigned the copula a separate status as the one essential part of every complete sentence.

Pronouns

In enumerating the other particles of the philosophical language Wilkins goes through each of the remaining word classes of the traditional list, picking the words that he assumed would together form a necessary and sufficient set for the expression of all notions. As for pronouns, he lists twelve simple and three compound ones, as follows:

I	This	That	Any one
Thou	Same	Another	Every one
He	Certain one	Some one	All

The three compounds are ‘who’ (interrogative), ‘who’ (relative), and ‘whosoever’. Wilkins claims that these words are compound since they consist of a simple pronoun plus a conjunction. Thus ‘who’ (interrogative) “is the pronoun *All*, taken in pieces, with an interrogation; For he that enquires who did this, means, doubting of all, did such a one? or such a one? &c of all them that

¹ Bursill-Hall 1972:69 states that the term was introduced by Abelard (12th century); cf. Pinborg 1972:54.

² Broadie 1993:12

³ Cf. Padley 1976:47.

⁴ Robins 1990:39; Bursill-Hall 1972:71.

were capable to do it" (p. 307). The relative pronoun 'who' is resolved into 'and he', and 'whosoever' is analyzed as 'if any one'. Though semantically composite, these pronouns are represented by non-compound words of the philosophical language just as the twelve simple pronouns. From each of the fifteen pronouns a number of others may be formed by means of transcendental particles, in which cases the composite nature is reflected in the expression. For instance, 'some + place' represents 'somewhere', and 'another + manner' represents 'otherwise'. Further, the personal pronouns may be inflected to indicate plural (I -> we, etc.), and two further affixes may turn them into possessives (I -> mine, etc.), and 'reduplicatives' (I -> I my self, etc.).

Wilkins notes that the simple pronouns are all 'quantitatives' in that they make the proposition in which they occur either singular, indefinite, particular or universal. However, this is a loose remark without consequences for the philosophical language. It is conspicuous that precisely as regards the words which had always attracted the attention of logicians (and which were to remain of central concern for centuries afterwards) Wilkins was not able or prepared to make use of logical theory, in contrast with the method followed in defining the radical words. Logic manuals usually spelled out all kinds of relations between the various types of propositions mentioned by Wilkins, but there is no sign of an attempt to bring out any of this. The only logically motivated aspect of the list of pronouns is that he indicates of each item its 'quantity', e.g. 'I', 'thou' and 'he' are singular, 'another', 'a certain one', and 'some one' are 'singulars or particulars indeterminate' etc. However, this has not even been used as a rationale for the structure of the list, for the arrangement of simple pronouns in combinations of three is made 'for the better convenience of and compliance with the Characters' (p. 305). Just as was the case with the tables, the convenience of the signs once more proves to be a decisive factor.

Interjections, prepositions, adverbs

Wilkins further lists a series of fifteen interjections, neatly arranged into combinations of three and two times three just as the pronouns, and defined by means of the passions they express. Thus there is an interjection expressing admiration ('heigh'), another expressing love and pity ('Ah, alack, alas'), an interjection calling for silence ('st, hush'), etc. (p. 308). Next on the list are prepositions, of which 36 are enumerated and defined in much the same way as radical words, being arranged by pairs, and these again by 'combinations' of three pairs each. As for adverbs, Wilkins observes that this traditional word class contains so many divers words, some being derived from pronouns, others being modes of verbs, again others being conjunctions, that "according to the true Philosophy of speech, I cannot conceive this kind of words to be properly a distinct part of speech" (p. 312). Complying with 'the grammars of instituted languages' he lists 27 adverbs, just as prepositions grouped by pairs

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(except for the last three) into combinations. Similarly, 24 conjunctions are enumerated and defined.

Articles, modes and tenses

Articles are either ‘enuntiative’, such as ‘a, an’, or ‘demonstrative’, such as ‘the’. Though these articles are not strictly necessary, Wilkins includes them in his language for their great convenience.

Modes are expressed by short words in the philosophical language just as other particles, but their sole function is to ‘affect the copula’. As appears from the sample fragments in the philosophical language, words denoting modes replace the sign for the copula rather than being added to it¹. Modes are either primary or secondary. If primary they are either indicative, i.e. when the matter is declared to “be so, as the bare union of Subject and Predicate would import” or imperative, i.e. when the speaker “can do no more in words but make out the expression of his will to him that hath the thing in his power” (p.315-316). Consequently, three varieties of the imperative are distinguished on the basis of social scale, their use being dependent on whether the hearer is superior, equal or inferior to the speaker. If modes are secondary, they indicate modal propositions, which consider the ‘matter in discourse’ “not *simply by itself*, but *gradually in its causes* from which it proceeds either *Contingently* or *Necessarily*” (p. 316). Four modalities are distinguished, two of which are associated with contingency, viz., possibility and liberty, and two with necessity, viz., will and external necessity. Each of these four may be either absolute or conditional, so that eight distinct words are created, meaning can/could, may/might, will/would, and must (ought, shall)/must (ought, should).

Of tenses, finally, Wilkins distinguishes three: present, past, future, which are expressed in two ways: firstly, the sign for the copula may be varied, and secondly, three separate particles may be used to indicate the tenses. This double provision serves to enable one to express two tenses in a single proposition, one by means of the copula which indicates the state of the subject performing the action denoted by the predicate, the other by means of a particle joined to the predicate indicating the time of the action. Wilkins claims that “a Proposition thus expressed, is in the very expressing of it, resolved into its parts of *Subject*, *Copula*, and *Predicate*” (p. 317), but it is quite unclear why this logically satisfactory form should be a consequence of

¹ Frank 1992:270 notes that these samples “do not give us any help on this point”, but they clearly show that ‘be’ in the phrase ‘thy name be hallowed’ is to be rendered by the sign for the imperative mode directed to a superior, and that the copula is not separately expressed (p. 421, 422). It is however unclear from these samples whether in rendering combinations of modal operators with verbs as in ‘one might know’ the copula is separately expressed or not. The three words for the imperative mode (io, i□, iy) are clearly variations of the sign for the unmarked copula ‘ia’; in the case of the eight words denoting so-called secondary modes, that is modal operators such as ‘can’ and ‘might’ (‘□a’, ‘□a’, ‘□e’. etc.) this is less clear.

affixing tenses to both copula and predicate. Frank (1992:273) has objected that “Wilkins suggested no plausible theoretical explanation or justification for a way of looking at verbal tense that differed fundamentally from all previous treatments. How is one to conceptualize a phrase like ‘I (now) read (tomorrow)’?”. This seems to be less of a problem than Frank suggests, for the phrase may be easily conceptualized if read as ‘I am (now) going to read (tomorrow)’, which entails the predication of a future action to a simultaneous subject, and this is presumably the kind of phrase that Wilkins had in mind. Further, it is probably impossible to give a theoretical account of the tense system of most natural languages without using at least two temporal parameters (besides aspectual ones), and Wilkins’s suggestion to inflect both copula and predicate for tense may well be motivated by an intuition of this kind. Frank is however right in observing that Wilkins himself did not seem to be very sure at this point, since he adds that “if any should conceive this way needless or too laborious” one may mark just the copula for tense (p. 318). On the other hand, Wilkins does use tense markers for substantives in the sample fragments, and he seems very confident in claiming that the true philosophy of speech prescribes the possibility of such markers (p. 316). Thus he translates ‘maker’ (viz., of the world, i.e. God) by a word that reads, if Englished, ‘the having been creating person’ (p. 406, 428).

4.5.5 Syntax

About half of Wilkins’s short chapter on syntax is devoted to interpunction. The subject pertains to syntax as it concerns the marks for the boundaries of phrases and sentences. However, Wilkins treats the subject in relation to pronunciation only, discussing various signs for pauses such as the comma, and for various manners of pronouncing such as the question mark. As far as sentence structure is concerned, he distinguishes ‘costumary and figurative’ constructions from ‘natural and regular’ ones. By the former he means idioms such as ‘taking ones heels and flying away’ which are peculiar to a certain language. In the philosophical language such phrases are obviously to be rendered as they would be in any other language, namely according to the sense expressed by the whole phrase, not by a word for word translation.

As for ‘natural and regular’ sentence structure, three rules are provided which are claimed to reflect ‘the natural sense and order of the words’ (p. 355). Firstly, as for integrals, “That which governs should precede”, that is, the nominative case should precede the verb, and the accusative should follow the verb. Further, the substantive comes before the adjective, and the verb before the adverb. Secondly, grammatical particles “should naturally precede” the words inflected by or composed with them. Thirdly, transcendental particles are to be joined at the ends of words. The philosophical language does not strictly speaking contain verbs, but Wilkins’s usage of the term in this context is obviously to be understood as referring to the copula plus adjective which renders the verb. As for the nominative and accusative cases,

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these are elsewhere defined quite circularly as ‘that which precedes the Verb’ and ‘that which follows the Verb’, respectively (p. 352). Wilkins emphasizes that ‘natural syntax’ prescribes that of these cases “there ought to be no other sign or note then the very order”. It is clear that a definition of these ‘cases’ in terms of the functional categories of subject and object is implicitly presupposed.

Wilkins apparently believed that the naturalness of the word order he prescribes ipso facto does not need justification. Both the basic SVO order and the rule that adjectives follow substantives are the same as in Dalgarno’s language. That grammatical particles should precede the words with which they form a phrase, however, did not seem as natural to Dalgarno as it did to Wilkins, as in Dalgarno’s language such particles follow these words.

4.5.6 Orthography and orthoepy

The third major part of Wilkins’s natural grammar, which is concerned with ‘the doctrine of letters’, represents a high level of linguistic theorizing, incorporating the insights of leading linguists of the time. Quoting a large number of sources, Wilkins acknowledges a particular debt to the work of Wallis (whose grammar of the English language had appeared in 1653), and to unpublished papers by Holder and Lodwick. This part of the *Essay* clearly pursues phonetics beyond the immediate purpose of artificial language construction, as a subject interesting in its own right. A major purpose of Wilkins’s phonetic theory is to repair the defects of existing alphabets enumerated in the first chapter of the *Essay* (cf. 4.2.2). The theory has been examined in great detail by Funke (1929:66-94), who claims that Wilkins improved on Wallis’s phonetics in recognizing the importance of the feature ‘voiced’ in analyzing consonants (1929:68-69). Subbiondo (1987:267) has likewise drawn attention to original characteristics of Wilkins’s phonetics, the most striking of which he claims to be its binary distinctive feature model.

For present purposes, it will suffice to mention two aspects of the phonetic theory which are directly relevant to the philosophical language. First, the analysis of vowels leads to what Wilkins considers a necessary improvement of the ordinary alphabet. Distinguishing eight simple vowels, he introduces four characters which do not occur in the Latin alphabet, and which are meant to enable distinct representation of each vowel: a, i, □, □. Wilkins however does not consistently use i, often replacing it by ‘i’. The phonetic value of these characters is illustrated by a series of examples (p. 363), some of which require specialist knowledge of the history of English pronunciation for their interpretation¹. This improved alphabet, as noted, is used for the spoken form of the philosophical language. Secondly, Wilkins presents two additional phonetic alphabets, which are intended to cover all speech sounds

¹ Cf. Funke 1929:74-83 for an admirable survey of the various phonetic values that Wilkins probably intended to represent by his examples.

actually used in all existing languages, not just the ones that were selected for the philosophical language. These alphabets may be used for rendering proper names that cannot be transcribed accurately enough by means of the improved Latin alphabet. Displaying an interest in the shape of symbols that is typical of many language planners, Wilkins indicates that he devised a number of such alphabets, of which he presents “only two” (p. 375). One of these is especially designed to picture the position of the speech organs in pronouncing the sound designated, in that a circle shows the rounding of the lips in pronouncing ‘o’, two curved lines touching each other symbolizing the closure of the lips when pronouncing ‘p’ etc.

This pictorial phonetic alphabet may illustrate once more the strictly utilitarian character of Wilkins’s view on language, a wide gap lying between his approach and a mystical one (cf. 4.6). Since this alphabet is explicitly aimed at establishing a correspondence between sign and signified, it is easy to perceive a superficial resemblance with the goals of the mystics. In fact, van Helmont, a mystically inclined author often cited in this context, designed an alphabet on closely similar principles¹. Wilkins even adds that his own alphabet “may deserve the name of a *Natural Character* of the Letters” (p. 375), which may suggest affinities with the ‘language of nature’ favoured by mystical writers or with the Adamic language. However, for Wilkins the notion of a ‘natural character’ clearly lacked any connotation of being unique, special, or prototypical, let alone that it could serve for the discovery of deeper, hidden truths. He makes it very clear that this alphabet is just one of many possible ones, and that in judging the various alternatives the only considerations that matter concern utility and facility. He states that a correspondence between sign and signified is an advantage, but one which is easily outweighed by lack of simplicity. Thus the alternative phonetic script he presents lacks the pictorial qualities but is less complicated. Accordingly, in the sample fragments of the philosophical language he transcribes the name of Pontius Pilate using the ‘simple’ rather than the ‘natural’ one (p.427).

4.5.7 Practice

Wilkins provides samples of both the character and the language, translating the Lord’s Prayer and the Creed into both symbolisms. He also offers a detailed explanation of all words and morphemes (395-413, 421-434). In order to illustrate how the language looks in practice, and to enable easy comparison with Dalgarno’s language (cf. 3.5.6), the Lord’s prayer in Wilkins’s language follows below²:

¹ Coudert 1978:57-61; 105. Isermann 1996:55-60.

² In providing the English translation, I have followed Wilkins. Most of the explanation is also Wilkins’s, sometimes supplemented by information gathered from the tables. I have disregarded ‘i’, rendering it as ‘i’ throughout. In the phonetic theory no difference between these is specified (‘i’ not occurring at all), but in these samples

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Hai coba □□ ia ril dad,
Our¹ parent² who³ art⁴ in⁵ heaven⁶

- 1 - pronoun first person plural 'ai' - 'we' + possessive ('h')
- 2 - radical 33.1.2: oeconomical relation, of consanguinity, parent
- 3 - one of three 'compound' pronouns
- 4 - present tense of the copula (unmarked for person)
- 5 - one of 36 prepositions
- 6 - radical 6.2: world, heaven

ha babi io s□ymta,
thy¹ name² may it be³ hallowed⁴

- 1 - 'a' - 'you' + possessive (h)
- 2 - radical 1.1.4: transcendental general, kinds, name
- 3 - imperative mode addressed to a superior
- 4 - radical 40.5.5: 'syta' - ecclesiastical relation, discipline, consecration or hallowing + adjective ('s' -> 's□') + passive ('m')

ha salba io velca,
thy regnation or kingdom¹ may it be coming²

- 1 - radical 36.1.2: 'saba' - civil relation, degrees of persons, king + active ('l')
- 2 - radical 3.1.2: 'beca' - transcendental action, ition, coming + adjective ('b' -> 'v') + active ('l')

ha talbi io vemg□,
thy will or volition¹ may it be done or accomplished²,

- 1 - radical 24.1.4: 'tabi' - natural power, rational, will + active ('l')
- 2 - radical 3.3.6: 'beg□' - transcendental action, business, performing + adjective ('b' -> 'v') + passive ('m')

m□ ril dady me ril dad,
so¹ in earth as² in heaven

- 1 - underived adverb
- 2 - underived adverb

io velpi lal ai ril i poto
Maist thou be¹ giving² to³ us⁴ in this⁵ day⁶

- 1 - imperative mode addressed to a superior (the same particle as in the 2nd sentence differently translated into English)
- 2 - radical 3.4.4.: 'bepi' transcendental action, commerce, giving + adjective ('b' -> 'v') + active ('l')
- 3 - preposition
- 4 - we (pronouns are not declined for case as in English)
- 5 - pronoun
- 6 - radical 23.5.5: measure, time, day.

Wilkins uses both. I use 'y' instead of '□'. '□' is Wilkins's symbol for 'u' as it sounds in 'foot'.

hai saba vaty

our bread¹expedient²

1 - radical 35.5.2: provisions, sustentation ordinary, bread

2 - radical 1.5.7: 'baty' transcendental general, relating to the means, expediency + adjective ('b' -> 'v')

na io sēldyōs lal ai hai ba%olgas

and¹ maist thou beforgiving² to us our trespasses³

1 - conjunction

2 - radical 37.2.9: 'sedyō' - judicial relation, proceeding, executing + opposite ('s') (=pardoning) + adjective ('s' -> 'sō') + active ('l')

3 - radical 1.3.2: 'baga' - transcendental general, diversity, goodness + opposite ('s') (=evilness) + active (l) + plural (')

me ai ia sēldyōs lal ei

as we are¹ forgiving to them²

1 - copula (unmarked for plural)

2 - pronoun (third person plural; unmarked for case)

□ ia valgas r□ ai

who have been¹ transgressing² against³ us

1 - past tense of the copula

2 - radical 1.3.2: 'bagas' - 'evilness' as above but + adjective ('b' -> 'v') and without plural

3 - preposition

na mi io velco ai ral bedodl□

and not¹ maist thou beleading² us into³ temptation⁴

1 - adverb: 'no' or 'not'

2 - radical 3.6.5: 'beco' - transcendental action, ition, leading + active ('l') + adjective ('b' -> 'v')

3 - preposition

4 - radical 3.2.5: 'bedo' - transcendental action, comparate, comparing + affinity ('d') (=trying) + transcendental particle 'l□' - 'corruption'. In short: 'trying + corruption' - 'such temptation or trial as ought not to be' (p.425)

nil io c□albo ai lal vagasie

but¹ maist thou bedelivering² us from³ evil⁴

1 - conjunction

2 - radical 29.1.5: 'cabo' - spiritual action, of God, deliverance + adjective ('c' -> 'c□') + active ('l')

3 - preposition

4 - radical 1.3.2: 'bagas' - 'evilness' as above + adjective ('b' -> 'v') + transcendental particle 'ie' - 'thing'

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nor al salba na al tado,
for¹ the² kingdom and the power³

1 - conjunction

2 - article

3 - radical 25.2.5: habit, instruments of virtue, power

na al tadala ia ha al pi□by□.
and the glory¹ is² thine³ everlastingly⁴.

1 - radical 25.2.2: 'tada' - habit, instrument of virtue, reputation + transcendental particle 'la' - 'augmentative'

2 - copula (present tense)

3 - pronoun singular second person + possessive (h); (no marker for independent occurrence in predicative use as in English)

4 - radical 22.1.9: 'pi□by□' - space, time, everness + adverb ('□')

□ m□ io.

Amen¹ so may it be.

1 - In one of the two phonetic scripts.

A few conspicuous points emerge from this. Firstly, the elaborateness of the various derivations at times causes radical words to become almost unrecognizable. Secondly, since the grammar has no provisions for case, word order is essential for syntax, even as in English. Thirdly, since the grammatical particles are borrowed from English, as far as their function is concerned, sentences of Wilkins's language are structurally very similar to English ones.

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When Wilkins as a young man followed the suggestions made by Bacon and Hugo in proposing the creation of a universal character he was convinced that this could add to the list of inventions contributing to the benefit of mankind. With typical seventeenth-century confidence in the powers of human reason and craftsmanship he believed that a language at once constructed according to rules of art would be a much more convenient means of communication than the anomalous and irregular languages already in use, which were the products of a long process of uncontrolled change. The use of real characters provided the key to an easy method for overcoming language barriers, and it seemed a realistic and attractive perspective to suppose that the long time now wasted in learning instituted languages could be put to a more profitable use, such as the study of nature.

When Wilkins set to work to carry out his programmatic proposals many years afterwards, his main objectives were still fundamentally the same. The advantages to be expected from universal acceptance of his language were primarily connected with communicational purposes, and even the assumption that the use of real characters entails the universality of these characters remained intact. He refined his thoughts on the subject, and envisaged additional pedagogical and therapeutic advantages, but he himself thought of the project of the *Essay* as putting the proposal of the *Mercury* into practice, though using a better method. To disregard this continuity would be to misunderstand the nature of the project. Nonetheless, the drawing up of elaborate classificatory tables which was begun with a view to constructing a practicable language undoubtedly became an endeavour of independent interest. This is what led Dalgarno to criticize Wilkins for trying to force two irreconcilable objectives into a single design. By the time he finished the *Essay* Wilkins had moreover lost much of his optimism as regards the practical advantages of his scheme. In view of his being an advocate of experimental science, an important motive for pursuing the project seems to have been the wish to demonstrate its feasibility rather than the expectation that it would ever be of practical use.

The Tables

The tables forming the 'scientific part' of the *Essay* were regarded by Wilkins as constituting the most important achievement of the work, and historians have rightly agreed with him in this. Unlike Wilkins himself however, modern writers have tended to describe these tables as though they were intended to reflect the true order of the universe. Wilkins's own claims are much more moderate, and this is undoubtedly because he knew from experience how much 'straining and force' was needed to comply with the antagonistic requirements of descriptive accuracy and representational facility. Rather than pretending to present an accurate schema of the basic categories of reality, his classification is aimed at providing a convenient arrangement of things and

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notions that is based upon ‘properties and circumstances’. In many cases this gives rise, as Wilkins admits, to various, equally arbitrary distinctions. Besides this, the number and the nature of the categories of his scheme are as much determined by convenience with respect to the symbolism to be derived from the scheme as by similarities between the things categorized. Further, the order between items belonging to the same class is admittedly arbitrary to a large extent, following a numerical arrangement. Moreover, almost half of the items occurring in the scheme are defined not solely on the basis of their own properties, but on account of being similar or opposed to another item, and this he acknowledges to be often less proper. Finally, the tables only remotely resemble a taxonomic structure in that the scheme contains many instances of cross-classification, often explicitly noted.

Apart from the need to compromise between scientific and linguistic purposes, Wilkins had a further reason to disclaim that the tables were ‘exactly suited to the nature of the things’ enumerated. This was that the ‘common theory already received’ was plainly defective. By this he meant the Aristotelian theory of categories as elaborated by ‘the schoolmen’. In spite of its defects, Wilkins modelled his tables on this theory, as he apparently saw no suitable alternative. However, his use of the predicaments and the predicables (genus, difference, species) was unconnected with adherence to essentialism. In the tables he retains the basic distinction between substance and accident, and of the nine predicaments falling under accident he uses the three traditionally regarded as most important, as well as the minor one called ‘action’. The tables of substance are structured according to the traditional categories of the Porphyrian tree, but these are filled with an unprecedented number of more specific distinctions. Yet admittedly a large number of species has been omitted, especially of plants, of which only the principal ones are listed. The tables of accident comprise a broad range of terms, including terms related to measurement as well as terms pertaining to ethical, social and political matters. Further, a very large class of ‘transcendentals’ is distinguished, including not only the terms traditionally identified as being above or outside of the predicamental series, but also relative terms, as well as very general predicamental terms.

Although the tables are purportedly the result of an a priori consideration of things and notions to which names are to be assigned, there are very few items listed that cannot be designated by a single English word. In a sense the tables thus provide a thematically arranged dictionary of part of the English lexicon. Furthermore, in joining a number of synonyms and related words to most of the radicals, the tables, in conjunction with the dictionary, reflect a careful analysis of the meaning of an impressive number of English words. In addition to this, the tables contain a wealth of descriptive information which is not expressed by the words of the philosophical language. However, a very large number of things which may be denoted by a single English word are not enumerated in the tables. All words designating things which are too local or too changeable to belong to the common vocabulary of various nations are omitted. A much larger group of words is also excluded, namely all words

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whose meaning may be expressed by means of a compound consisting of a radical and a transcendental particle.

Wilkins's criticism of existing languages notwithstanding, and despite his characterizing the tables as the scientific part of the scheme, the inclusion of items in the tables is ultimately determined by vocabularies of existing languages rather than scientific theory. Precisely when insights resulting from advanced scientific theory tend to diverge from common sense as embedded in ordinary language, Wilkins explicitly uses the latter as a guideline for the philosophical language, dismissing the former as irrelevant. As will be emphasized once more below, this point is clearly crucial for a correct interpretation of his project.

The Lexicon

The lexicon of the philosophical language consists of radical words and compound words. Radical words are formed by expressions which encode a place on the tables by designating a genus, and in most cases the number of a certain difference, as well as the number of some species. What exactly is entailed in the meaning of such expressions is unclear since the language has no users. What is stipulated to belong to the meaning of radical words is in any case that which is meant by their English equivalents, and at least part of the classificatory information is added to this. Thus 'zibi' is supposed to mean 'the whole-footed beast called elephant' rather than 'beast, first difference, fourth species' which latter is what is strictly speaking defined as its meaning. Wilkins claimed that the words of his language are not completely arbitrary on account of their descriptive content. He did not claim that the words embody complete definitions of their referents.

All words other than the slightly more than 4,000 radical words listed in the tables are compounds, consisting of a radical word and a transcendental particle. Just as in Dalgarno's language, the meaning of these compounds is often vague without further stipulation. Furthermore, in violation of Wilkins's principles, more than one compound word may be used to designate a single kind of thing.

The Grammar

The grammar of the philosophical language is claimed to be based upon an abstract theory called 'natural grammar', which contains criteria that a language constructed on rational principles should meet. The philosophical language contains all the traditional word classes minus the verb, which is replaced by the copula joined to an adjective. A novel word class is distinguished as well, the transcendental particles, which are however modelled for the most part on Latin affixes, and function in the same way. The primary word class is the substantive, and all radical words are supposed to be of this kind. Adjectives and adverbs are formed by adding affixes to substantives. The grammar further provides an elaborate apparatus for

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deriving active and passive forms for words belonging to each of these three classes, as well as abstract forms. In principle, a single radical substantive is capable of eighteen different derived forms. In some cases the semantic modifications of radical words introduced by the grammar overlap with lexical meaning, which renders the status of the grammatical markers unclear. The grammar further defines the meaning of a limited number of grammatical particles, which include not only traditional word classes but also particles indicating modes and tenses.

Wilkins's natural grammar is very much focused on word meanings. Apart from phonetics, the grammar is almost exclusively concerned with the definition of word classes, the selection of a limited number of words within each class, and with derivations and particles modifying the lexical meaning of radical words. Analysis of word classes in terms of their contribution to the meaning of the sentence as a whole is largely neglected, with the exception of the analysis of the verb, which however is of little logical consequence. Whereas the definition of word meanings in the tables draws extensively on the logical tradition, the grammar almost entirely disregards what logic had to say about the proposition. Wilkins viewed language primarily as a huge collection of names, and he had little attention for the composition of meaning into more complex structures. Accordingly, his attempt to banish ambiguity is confined to the lexical level, and ambiguity that may arise from forming more complex structures does not even come into the picture. Apart from a few minor deviations, the structure of sentences of his language closely resembles English surface structure.

Science

Considering the wider context of Wilkins's project, it appears that its link with what is usually called 'the new science' is less obvious than has often been assumed. Numerous writers have followed Couturat (1901:55-56) and Jones (1951[1932]:156-157) in taking for granted that the philosophical language was meant to provide the means to express new scientific knowledge. In the words of Shapiro: "The Royal Society was founded to rationalize and coordinate scientific research. The universal language was to rationalize and coordinate the result of that research" (1969:223). Similarly, Subbiondo writes: "Many 17th-century British scholars believed that an ideal artificial language was necessary to communicate their new philosophical and scientific knowledge because natural languages had hopelessly fallen into confusion" (1992[1977]:291-292). Given Wilkins's biography these statements seem plausible enough, but it does not require meticulous scrutiny of his work to perceive that they are untenable. His very explicit use of a model derived from Aristotelian logic is evidently hard to combine with an explanation of his work in terms of "the ascendancy of experimental science which outmoded traditional methods of studying, storing, and communicating information about the physical world" (Clauss 1992[1982]:46). A somewhat closer inspection of the 'scientific part' of the work reveals that the results

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of scientific research carried out by the Royal Society could only rarely be incorporated in the tables. Sometimes items such as the 'toadstone' (cf. 4.3.10) could be given a more appropriate place in a botanical or zoological classification, but when it comes to fundamentally new theories, Wilkins, as noted, dismisses these as extraneous to his design. Whatever new causal explanations may be found, he states, ordinary things will be described as they have always been. Rather than claiming his language to be suitable for the expression of scientific knowledge, he declares this knowledge to be irrelevant for his language.

Perceiving quite rightly that to assume a direct connection between Wilkins's project and the 'new science' is much too simple in view of the unmistakable Aristotelianism of the former, Slaughter has argued that his work was the culmination of a short-lived 'taxonomic episteme', which combined Aristotelian essentialism with scientific method. This episteme was necessitated by the information explosion taking place at the beginning of the seventeenth century and formed a transition "between the ordinary world of knowledge and experience, and the new, inscrutable mechanistic world" (1982:218). It is a merit of this explanation that it takes the complexity of the intellectual climate in which Wilkins was operating into account, but it erroneously ascribes essentialism to him. Further, classification as a method of coping with the multiplicity of phenomena had existed for many centuries, and did not cease when mechanistic philosophy started dominating the scientific scene. Moreover, Wilkins's taxonomy is consciously restricted to a very limited number of things, most of which are objects and concepts any ordinary language user has always been familiar with. It seems odd, then, to assume that the classification resulted from an attempt to cope with an information explosion. Since furthermore Wilkins was about the only representative (for Dalgarno was a severe critic), the 'episteme' described by Slaughter is too much ad hoc to be acceptable as an explanatory concept.

It appears, then, that there is no straightforward way of linking Wilkins's scheme with contemporary developments in natural science. If it can be sensibly associated with any 'episteme' at all, it is a specifically linguistic one, constituted by long-standing logical and grammatical traditions. But although Wilkins drew on these traditions, he was dissatisfied with many of their tenets. Far from being the naive pursuit of a happy but impossible dream, his project was characterized by profound tensions and uncertainties.

Mysticism

Some modern writers have likewise argued that Wilkins's project should not be considered as closely associated with scientific interests, but for quite different reasons. According to these writers, Wilkins was deeply influenced by the mystical tradition in that he, even as the mystics, tried to establish a natural connection between words and things. Since this view has gained some currency it will be worth explaining why it is essentially misguided. The arguments put forward for the mystical connection are of two types: external

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ones that rely on showing that writers of a mystical bent decisively influenced Wilkins's scheme, and internal ones that point at systematic similarities between his scheme and a mystical view on language. The malign genius figuring prominently in the external arguments is Comenius, whose affinities with mystical trends are uncontroversial. DeMott (1955, 1958) has argued that a Comenian manuscript circulating in circles of English language planners in the 1640s caused them to alter their plans in a fundamental way. On the basis of this purported influence, Rossi (1960:215) states that Wilkins's language (as well as Dalgarno's) was intended, among other things, to be a means 'for deciphering the divine alphabet'. DeMott's arguments have been conclusively refuted by Salmon (1988[1966]:129-156)¹ and need not be repeated here; Rossi's claim has no basis whatsoever in Wilkins's or Dalgarno's work.

Relying on both external and systematical considerations, Knowlson takes a middle position between scholars who have concentrated on the Baconian origins of the universal language movement on the one hand, and those who have focused upon links with an occult tradition on the other hand. He defends the view that "the idea of a set of symbols standing in a direct relationship with reality ... [has] been taken over from more occult works and *transformed* into something different" (1975:87). He goes on to explain that both Ward and Wilkins envisaged a language the words of which would convey something of the nature of the things they refer to. This resembles occult ideas, though Ward and Wilkins meant something 'more rational'. Ward's allusions to mystical writers indicate that "although one should distinguish one use of the term *nature of things* from another, the two cannot be entirely divorced" (1975:88). Knowlson's argument is unconvincing as regards both the systematical and the external grounds. As for the latter, it should be noted that Ward's allusions to occultism in the *Vindiciae Academicarum* are extremely unfavourable, and he takes quite some space in ridiculing the mystical belief in a language of nature (Ward 1654:22-23). Ward did compare his own programmatic proposal for a logical language modeled on algebraic notation with the kind of language that mystically inclined writers such as Jacob Boehme were wont to talk about. But in the first place, this remark was obviously occasioned by Webster's references to Boehme's ideas in the *Academicarum Examen* (Webster 1653:26-32). Ward's tract was designed to refute Webster's allegations in that treatise. Further, it is abundantly clear that Ward considered his own proposal as completely different from and unrelated to 'language of nature' mysticism. This is what he said:

¹ To Salmon's quite convincing arguments it could be added that one of DeMott's main premisses is unsound: he erroneously assumes that a sudden fundamental change of objectives took place in the 1640s. In fact, as has been argued, no such change occurred. Cf. also Funke 1959. For discussion of connections between Comenius and Dalgarno, cf. Cram 1989, who argues that the English language planners rather exerted some influence on Comenius. Cf. also Cram & Maat 1996.

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Such a Language as this (where every word were a definition and contain'd the nature of the thing) might not unjustly be termed a naturall Language, and would afford that which the *Cabalists* and *Rosycrucians* have vainely sought for in the Hebrew, And in the names of things assigned by *Adam*, which M. *Webster*, passing the bounds of sence and reason, would bring under the Laws and regulation of *Donatus* (Ward 1654:22)

Ward thus recognized that the language he himself envisaged would have advantages similar to the ones the mystics supposed to be present in Hebrew or the Adamic language. But he emphasized that the endeavours of the mystics were unsound, irrational, and ridiculous. It would therefore be quite distortive to construe Ward's position, which was explicitly and consciously opposed to mysticism, as proceeding from it, albeit with modifications¹. Nonetheless, commentators have frequently referred to this passage in order to suggest connections between English language planners and mysticism².

Knowlson's systematic consideration boils down to drawing attention to the similarity Ward himself noted: both Ward's projected language and mystical language consist of words 'containing' the 'nature of the thing'. On analysis this similarity proves to be completely superficial, in that the attitude towards language as well as the assumptions regarding goal and method in studying it are completely different in both cases³. Whereas in the mystical view language is regarded as of divine origin, to be approached with reverence, Ward, and certainly Wilkins, regarded language as a tool, which may be adjusted at will towards the purposes it is to serve. Furthermore, whereas for the mystics the naturalness of language entailed that it was untouchable for humans, who had to adapt their minds to the wisdom contained in it, the language planners claimed that a conventional language constructed following rules of human art is the best possible one. Consequently, both groups pursued goals that are diametrically opposed, the mystics searching hidden knowledge of nature by studying a given sacred language, the language planners encoding given, public knowledge in a

¹ Knowlson's account is further based on contemporary reports of alleged sympathies for Lullism on Ward's part. This does however not warrant the conclusion that he was influenced by occultism. Further, although an examination of Ward's ideas in the *Vindiciae* is certainly relevant for Wilkins, who was closely associated with Ward, and who wrote a preface to the *Vindiciae*, it is clear that if it could be established that Ward was significantly influenced by mysticism (which is unlikely), this would not imply that Wilkins also was.

² E.g. Aarsleff 1992[1976]:26. Coudert 1978:104 stresses Ward's opposition to mysticism as well as the difference between his views and those of the mystics, but maintains that 'the concept of a real character' emerged from 'mystical and magical ideas'.

³ At the risk of gross over-simplification, I treat in the present context such divers trends as Cabbalism, 'language of nature' mysticism, Rosicrucianism, Hermeticism as though these could all be associated with a single consistent view on language. By the 'language planners' I mean the English ones.

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language of their own device so as to serve pedagogical purposes. Moreover, the methods used are contrary, the mystics surrounding their procedures with secrecy and believing their results to be inexplicable, the language planners using a transparent method, yielding results the merits of which may be tested and judged by everyone. Most importantly, while the mystic quest is chimerical, involving serious confusion about how language relates to the world, the language planners had a sound view on this, and their designs are feasible in principle. Wilkins and Ward were well aware of the wide gap separating their own views from those of the occultists, and especially Wilkins detested their ‘pretended, mysterious, profound notions, expressed in great swelling words’. It seems almost perverse therefore to claim, as Aarsleff does, that Wilkins in producing the *Essay* was merging rationalism and mysticism and that he thus “straddled two traditions that to the minds of most observers could not be brought together” (1992[1976]:26)¹. It is certain that they could not be brought together to Wilkins’s mind either.

A recent attempt to associate Wilkins with a mystical view on language has been made by Isermann (1996), who concentrates on systematical similarities while recognizing that these are in contrast with attitudes and views that Wilkins overtly articulated. According to Isermann, an essential characteristic of the mystical view is that both sign and signified are assigned to the same semiotic level: the essence of things is hidden in signs because signs are really things. Now Wilkins’s project is “just another variation on a Platonic theme, as was the ‘language of nature’ mysticism” (1996:65). This is because Wilkins likewise - silently, it must be admitted - equated things and signs, albeit that in this case they are both thought of as signs: the ‘hidden premises’ of his scheme entail that the essence of signs is hidden in things because things are really signs. No arguments other than the theoretical possibility to plot both Wilkins and the mystics on symmetrical positions in a schema of relations between sign and signified are offered for this extravagant allegation. Obviously, there is so much hidden material involved in all this that Isermann feels he should explain why neither Wilkins himself nor anyone but Isermann recognized the mystic principle underlying the scheme. As could be expected, most of this explanation remains an inscrutable secret as well. We are to believe that Wilkins “reduced the world to a sign-system” and that without himself or anybody else noticing he made the signs of his philosophical language ‘the true signifieds’ (1996:68). Further, the signs of Wilkins’s language are not conventional, but “invisible, immaterial, secret”, as they are “nothing apart from the order they present” (1996:69). Isermann consistently concludes that “strictly speaking, language can’t be used any longer”, because “words and signs have ceased to refer to anything but themselves” (1996:72).

As we are thus finally presented with a verifiable statement, it is one which is obviously false as far as Wilkins’s words are concerned. Though

¹ In the same article, Aarsleff complains about “the low conceptual level of much recent secondary writing” on seventeenth-century language schemes (1992[1976]:38).

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much of Isermann's argument can hardly be taken seriously, his mistakes may be instructive in that they enable one to pin-point the systematic difference between Wilkins's project and that of the mystics once more. Wilkins's method of making words signify the nature of the thing they designate consists solely in using partial descriptions rather than simple names. Descriptions reveal something of the nature of the thing they refer to by virtue of being composed of smaller meaningful units, the meaning of which has been independently established. There is nothing mysterious about that, and it is to fall victim to mystical confusion to believe that if some expression discloses something of the nature of the thing signified, then some magical trick has been pulled and the distinction between sign and signified has ceased to exist. As has been noted (4.4.2), Wilkins had a clear and sound view on the semantics of his radical words¹. What separates him from the mystics is not just that he superficially condemned their approach, or that a sociological borderline divided his camp from that of the mystics, but he differs just as much from them in systematical respects. The proposal to use descriptive expressions rather than simple names is rational and feasible; Wilkins's language may be used in practice. What the mystics were trying to do: find knowledge of nature by doing hocus pocus with language is utterly chimerical. If modern historians think their impartiality prescribes them to loose sight of this elementary point, they are precisely in danger of misunderstanding what was at stake in the controversy between mystical and rational views on language.

Aftermath

The question how the *Essay* was received has been answered in very divergent ways by modern commentators. On the one hand, there are those who emphasize its fame and influence in subsequent years and centuries². On the other hand, a number of writers maintain that the *Essay* was largely ignored or quietly forgotten soon after its appearance³. It seems that both ways of interpreting the relevant facts have some justification. From a longer-term perspective it is clear that the *Essay* was never entirely forgotten, and was favourably mentioned by some influential writers in subsequent centuries. However, Wilkins's linguistic views were also ridiculed by various authors, the most famous instance of which is Swift's satire, depicting the members of the Royal Society as people carrying about large bundles of things. These things rather than words were to be used for conversation, since these people believed it to be more convenient to express themselves in this way, and also because this method could serve as a universal language⁴. In general, it would

¹ Isermann erroneously assumes that 'signs' must be either natural or conventional: "We cannot have it both ways" (1996:69). Wilkins rightly perceived that we certainly can. Cf. also 3.4.6 and 5.4.2.

² E.g. Shapiro 1969:221-223; Firth 1964[1937]:65.

³ E.g. Andrade 1992[1936]:258; Aarsleff 1992[1976]:27.

⁴ Swift 1983[1726]:230-231 (*Gulliver's Travels*, III.5).

4.6 CONCLUDING REMARKS

be exaggerated to state that the *Essay* exerted a profound influence on linguistic theory in any of the following periods.

If one focusses on the events that took place in the decades immediately following on publication of the *Essay* the picture is equally indistinct¹. Wilkins with the help of Ray and others continued working on the project, but no results had been achieved when Wilkins died four years afterwards, feeling that he would have to leave ‘his darling’ uncompleted. The committee for revision was set up, but was never heard of since. Yet another, unofficial group of scholars continued to take interest in the project and tried to improve the *Essay*, without however accomplishing anything concrete. Ray completed a Latin translation of the entire work, which never reached the press and has later been lost. A small group of men, including Aubrey, Hooke, Lodwick, and Wallis sometimes used the real character in their correspondence, and Hooke used it for a fragment on pocket-watches in one of his publications². Although in the 1670s the subject of a philosophical language was still much debated in some circles, notably by Hooke and Leibniz, it seems that the general atmosphere of expectation clearly present in the 1650s had evaporated. Dalgarno in his autobiographic tract written in the 1680s acknowledged that both his own and Wilkins’s endeavours had been quite unsuccessful. Locke’s rather disdainful remark that no one can “attempt the perfect reforming the languages of the world ... without rendring himself ridiculous”³ is assumed by most scholars to be an expression of the attitude of most members of the Royal Society in the last decades of the century. This is confirmed by the sceptical reaction that Leibniz apparently met with when he communicated his plans for a philosophical language to Oldenburg and Boyle.

If a profound change in attitude towards projects of the kind that Wilkins undertook took place in the smaller Royal Society circle at all, this may be connected with far-reaching changes in scientific outlook that occurred in the years after publication of the *Essay*, as has been suggested by various authors. However, it should not be forgotten that the intellectual scene was quite diverse, and that both sceptics and believers had been around all along, and continued to be so for quite some time. One explanation for a possible change in attitude is so obvious that it may be easily overlooked: this is the simple fact that once the *Essay* had appeared, it was easier to judge of the merits and defects of the philosophical language that had so much been debated. After Dalgarno’s *Ars Signorum* was published, one could still expect that Wilkins’s language was to provide an improvement. When the *Essay* finally appeared, all fantasy had definitively been turned into fact. For all the admirable features of the work, the shortcomings were obvious. And even if the defects were regarded to be inessential, the type of enthusiasm for a project that has been

¹ The classic treatment of this subject is Salmon 1988[1974]:191-206. Further, Knowlson 1975:102-107, Slaughter 1982:174-184, and Cram 1994 provide useful discussion.

² See Andrade 1992[1936] for discussion and a translation.

³ Locke 1689, III.XI.2.

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carried out is necessarily different from that for a project which has the advantage of being as yet merely promising. Perhaps significant in this respect is Plot's account of the matter. After describing both Dalgarno's and Wilkins's languages, he concludes "that an *Universal Character* and *Philosophical Language* can be no more reckoned amongst the *Desiderata* of Learning, and that the Defect was supply'd here at *Oxford*"¹. Thus part of the explanation of why the experimentalists of the Royal Society lost their interest in the pursuit of a philosophical language as a research program may be simply that the work of Dalgarno and Wilkins had already turned this desideratum into an achievement. This may also help explain why Oldenburg and Boyle in the early 1670s showed little enthusiasm when a young German scholar named Leibniz tried to convince them of his view that a philosophical language was to constitute the most useful invention for the advancement of learning ever to be created. Oldenburg and Boyle must have felt they knew better from experience, and they apparently told Leibniz so. For Leibniz in his turn emphasized time and again that his own project was completely different from that of Dalgarno and Wilkins. Whether he was right in this will be a question to be examined in the next chapter.

¹ Plot 1705[1677]:290.

CHAPTER 5

LEIBNIZ: THE ART OF THINKING

5.1 INTRODUCTION

In 1666, five years after Dalgarno published the *Ars Signorum*, and in the year that the first version of Wilkins's *Essay* was destroyed by the fire, a short treatise entitled *The Art of Combinations* was published in Leipzig. It was written by a nineteen-year-old student of philosophy and law, whose name was Gottfried Wilhelm Leibniz. At first glance, this treatise on combinations seems to have little in common with the linguistic projects described in the previous chapters. But in fact it contained, in seminal form, all the ingredients as well as a first sketch of the most ambitious project for a philosophical language to be conceived in the seventeenth century, and probably ever. Unlike Dalgarno and Wilkins, Leibniz never reached definitive results in this regard, but he worked on the project throughout his life.

Leibniz (1646-1716) was a man of rare genius. His interests and writings cover the entire range of contemporary learning, and he made substantial contributions to various fields. He achieved major results in mathematics, and his metaphysics has earned him a place in the gallery of great philosophers. Although he has thus been known to many as the originator of an abstruse metaphysical system, he was most of the time occupied by practical affairs. After renouncing an academic career at the age of twenty, he served at various courts as a lawyer, diplomat, librarian, adviser, and historian for the rest of his life. Especially during the first period that he was at Hanover (1676-1687), he devoted much of his time on technical projects aimed at draining water from the silver mines in the Harz, and on proposals concerning issues such as tax reform and monetary policy¹. Of all his many schemes for the benefit of human kind, he himself considered the creation of the philosophical language as the most momentous one.

Leibniz spent large portions of his time writing, and he produced an extremely large number of manuscripts. Most of these were never published during his lifetime, and most of the unpublished writings were never intended for publication. Nevertheless, he himself acknowledged that his unpublished work was essential for understanding his ideas, as he wrote: "Anyone who

¹ MacDonald Ross 1984:15-17. Müller-Krönert 1969:47ff.

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knows me only by my publications does not know me at all”¹. Many of his ideas are described in letters, of which approximately 15,000 have been preserved. Apart from the articles and books he did publish, his vast *Nachlass* includes, besides drafts of published work, a multitude of notes, drafts and essays of extremely diverse sorts. Some of these are fairly lengthy essays, sometimes half finished, sometimes almost completed, others are isolated notes or remarks jotted on scraps of paper.

In subsequent centuries, various editors have published selections of Leibniz’s work. In the eighteenth century, Dutens gave his edition the quite exaggerated title *Opera Omnia* (Complete Works). In the nineteenth century, Erdmann published two volumes of philosophical works, and Gerhardt worked for more than thirty years on his editions of the mathematical and the philosophical works. Although these editions contain a wealth of material, Louis Couturat could justifiably claim in the beginning of the twentieth century that some of Leibniz’s most original and important works, especially on logic and language, had been overlooked by previous editors. Couturat’s own edition of short works and fragments, as well as his classical account of Leibniz’s logic (Couturat 1901), had a forceful impact on scholarship. Yet this edition is as eclectic and in some respects haphazard as the previous ones were. In the 1920s, the Preussische (now: Deutsche) Akademie der Wissenschaften embarked on the enterprise of a complete edition of Leibniz’s work. The first volume of this Academy edition was published in 1923, but although dozens of volumes followed, the edition is as yet incomplete. From 1982 until 1991, a large number of the manuscripts which are primarily important for the subject of the present chapter were published in the so-called *Vorausedition* to the sixth series of the Academy edition. Of many of these manuscripts only fragments had been printed previously, while others had never appeared in print at all. Although the bulk of Leibniz’s writings is now available in a critical edition, a considerable portion of his work still awaits publication. Leibniz once compared the accessibility of existing knowledge with that of a library without catalogue, and he made continuous efforts to assemble and orderly arrange useful knowledge from the scattered books and articles in which it is contained. Ironically, it has occupied teams of scholars for centuries to make the disordered mass of documents he himself produced accessible.

The Leibnizian corpus presents at least four types of difficulties to the historian of ideas. The first of these is the sheer multitude of texts. This is perhaps the least serious problem, for although Leibniz’s fertile mind produced an impressive wealth of ideas, many of them novel and stimulating, his ideas are greatly outnumbered by his writings. In several instances, there are literally dozens of places where the same view is expressed, often in virtually the same terms. On the other hand, the very diversity of the ways in which he expresses his views sometimes causes additional problems of interpretation.

¹ MacDonald Ross 1984:9.

The second type of problem is caused by the complicated nature of the texts. Leibniz's erudition encompassed an extremely wide range of subjects, and his insights sometimes entail the combination of viewpoints that have seemed incompatible to many of his critics. His writings exemplify one of his basic beliefs: that great complexity may arise from the combination of a few simple notions. Further, since much of what he had to say on crucial points never reached a definitive and satisfactory formulation, an account of his views necessarily involves thinking the arguments through on the part of the expositor, and this has led to very diverse, and indeed diametrically opposed interpretations of central aspects of his thought.

The third kind of difficulty concerns the chaotic nature of the corpus. Leibniz's views must often be reconstructed from remarks scattered over diverse texts, written in different periods and for different purposes. This sometimes leads to real or seeming contradictions between several of his statements, and commentators have often resorted to the expedient of postulating a development in Leibniz's thought in order to explain such contradictions. Others however have observed a remarkable constancy in his thought (e.g. Mates 1986:7-8), and the present account likewise assumes that Leibniz never changed his mind on the topic of a philosophical language, as far as fundamental points are concerned.

The final kind of problem to be mentioned here is one that has received less attention than it deserves, probably for its triviality. This problem concerns the status of the Leibnizian manuscripts, which is sometimes quite different from what an uninformed reader might suppose. For it is certain that not everything that can be found among the vast number of Leibniz's papers, even if written in his own hand, can be considered as a straightforward expression of his own views. Leibniz often made extensive excerpts of works by others, possibly for the use of his encyclopedic project (cf. 5.3.6), and these papers should obviously be interpreted accordingly. The neglect of this point has sometimes led scholars to gravely misinterpret texts found among Leibniz's papers. Thus Erdmann erroneously claimed that Leibniz completely adopted Descartes's ethics, on the basis of the mistaken assumption that a piece called *De vita beata* expresses Leibniz's own views, whereas it in fact consists largely of excerpts from some of Descartes's writings¹.

Now that again a large number of Leibnizian manuscripts have recently been published for the first time, modern scholarship should be on its guard against similar misinterpretations. Quite a few of the texts printed in the Vo-rausedition are marked, either by the alertness of the editors, or by explicit clues by Leibniz, as being different from a record of what he himself thought. However, the research on which the present chapter is based, has revealed that some other texts, which have not been flagged as commentary or excerpt and which superficially contain no clues as to their origin, are in fact excerpts, at various points interspersed with commentary, of parts of Dalgarno's and Wilkins's work, respectively. The uncritical assumption that everything con-

¹ Couturat 1901:169; Erdmann's mistake was first pointed out by Trendelenburg.

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tained in these texts may be taken as evidence for Leibniz's views has already caused various misunderstandings to arise in the literature.

The present chapter is limited in scope and aim. Focusing on Leibniz's scheme for a philosophical language, many topics related to this had to be either treated very briefly or completely disregarded. Leibniz maintained that everything is connected with everything, and this certainly holds for his own views. An account of his linguistic ideas necessarily involves some of his metaphysical tenets, and especially his scheme of a philosophical language has direct links with his epistemology, his logic, and many other areas. Two fields of investigation particularly connected with his linguistic views had to be left aside. This concerns in the first place Leibniz's extensive work as a historical and comparative linguist¹, and in the second place the details of his logical calculi².

In what follows, a sketch of the origin, the groundwork and the basic ingredients of Leibniz's scheme is presented. Furthermore, some relevant aspects of his philosophy of language are discussed. In addition, some examples of the work he carried out in order to realize his plans will be examined. Finally, his study of the works of Dalgarno and Wilkins, his attitude towards their achievements, as well as the use he made of their work in carrying out his own plans will be considered.

Notes

1.

In this chapter, I refer to Leibniz's project as that of creating a 'philosophical language' throughout, unless the context requires otherwise. Leibniz himself used a great variety of terms, which are largely equivalent. Cf. 5.3.7 for discussion.

2.

Most of Leibniz's manuscripts are written in Latin, many are in French, and some are in German. Some excellent translations of his basic works are available (major collections of English translations are Loemker (L), Parkinson (P), Parkinson-Morris (PM), Ariew and Garber (AG); a small collection is in Dascal 1987 (D); German translations are provided by Schmidt (S)). I have used these translations wherever possible. If quotations from Leibniz are referred to editions rather than translations, the translations are my own.

¹ Cf. Aarsleff 1969, 1975.

² Couturat 1901:323-388; Rescher 1954; Kauppi 1960:129-243; Burkhardt 1980 provide admirable treatments of this subject.

5.2 THE ART OF COMBINATIONS

The treatise called *Dissertatio de Arte Combinatoria* (1666, further: *DAC*) which Leibniz published at the age of nineteen is an enlarged version of a dissertation he submitted to qualify for a position at the University of Leipzig¹. The dissertation is mainly concerned with some problems in what today is called the theory of permutations and combinations. Considered as such, the treatise is not particularly brilliant. A better, more general treatment of the subject was available in the work of Pascal, which was unknown to Leibniz when he wrote *DAC*. However, for the history of logic and philosophy, and especially for the subject of the present chapter, the importance of *DAC* can hardly be overestimated. On the title-page Leibniz claims that he is 'sowing new seeds of the art of thinking or the logic of invention' (G IV 27²) and it is a seminal work indeed. It contains most or all basic concepts on which Leibniz was to build his logic, and which directed his endeavours to construct a philosophical language.

5.2.1 Combinatorics and its applications

The subject matter of *DAC* is divided into three types: problems, theorems and uses. Leibniz poses himself, and solves, twelve problems in all, and he derives a number of theorems from the solutions. Problems and theorems are of a mathematical character. The most interesting part for present purposes is formed by the third type of subject: the uses or applications. The longest list of uses is connected with the solutions to problems I and II. Leibniz discusses twelve of such uses, of which number X and XI are of central importance in the present context: use X proposes to thoroughly revise the theory of 'predicaments' or categories using combinatorial principles, and use XI presents a 'corollary' of this, which is the construction of a universal writing claimed to be superior to the ones devised thus far. To get an impression of the framework in which this first expression of Leibniz's ideas concerning an artificial language occurs, it will be useful to briefly consider problems I and II.

Problem I, in Leibniz's words, reads as follows: 'to discover the complexions for a given number and exponent'. In modern terminology, this is equivalent to 'to find the number of combinations of k elements out of a total of n elements', written

Error!).

¹ As it turned out, Leibniz never obtained a position at Leipzig, or at any university whatsoever (cf. 5.3.1).

² The Latin text has been printed by Gerhardt 1880, and in the Academy edition (A 6 1, 165ff.). English translations of portions of the text are L 73-84 and P 1-11. A German translation is S 29-59.

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The solution for $k=2$, Leibniz tells us, is common knowledge, but he claims to have found the solution for the general case ($k = 1, \dots, n$) himself. It reads:

$$\text{Error!}) = \text{Error!}) + \text{Error!}).$$

Although this is correct, it is not as general a solution as possible, for Leibniz's solution presupposes for all n and for all k that

$$\text{Error!}) \text{ and Error!})$$

are already known. Leibniz was well aware of this limitation. He even considers a possible way of removing it, but sees that it fails. Therefore he resorts to a tabular method, offering a table which lists for $n = 1, \dots, 12$ and $k = 1, \dots, 12$ the number of combinations.

Problem II is to find the number of what Leibniz calls 'the complexions taken simply', that is, the total number of possible combinations of n things. Leibniz finds the correct solution $2^n - 1$ (subtracting 1 as a combination of 0 elements is not counted in) by reading it off from the table. He cannot prove or explain why this should be so, but he thinks it has something to do with the fact that each number which is equal to 2^n can be written as the sum of a series of $n-1$ numbers of which the first is equal to the last, the second to the second last and so on.

Leibniz was convinced that these and similar results in the theory of combinations, which were hardly satisfactory by contemporary standards, provide the key to a better understanding of any thinkable subject. This is because he believed that "all things which exist or can be thought of are in the main composed of parts, either real or at any rate conceptual" (P 3). Differences between things result either from the fact that they consist of different parts, or from a different arrangement of the parts. In the first case, combinations are essential, in the second, permutations (the latter are treated in a later section of *DAC*, as problem IV (G IV 83-90)). This atomistic starting-point pertains to the whole range of human knowledge. Leibniz defines metaphysics as 'the science of whole and parts' (L 77), and he states that our knowledge of a thing is more perfect, the more we perceive its parts and the parts of these parts (G IV 56-57). Thus he regarded the theory of combinations and permutations as extremely valuable for all sciences (title page, G IV 27). He further states that combinatorics forms the basis of 'almost the whole of the inventive part of logic' (P 3), by which he understands both the theory of terms and the theory of propositions. Leibniz followed a long-standing tradition in regarding logic as a fundamentally important discipline, which cannot be sharply distinguished from metaphysics and ontology. However, in merging the mathematical study of combinations with logic he was breaking new ground, although many of the ideas propounded in *DAC* are clearly inspired by writers such as Bisterfeld and Alsted, who exploited the Lullian idea that combinatorics can direct the discovery of truth. The link between Lullism and Leibniz should however not be overestimated. Already

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in *DAC*, Leibniz criticizes the Lullian art for being ill-conceived (G IV 63-64), and in later writings he often refers rather disdainfully to the Lullists¹.

The series of twelve uses that Leibniz provides as applications of the solution to the first two problems may be summarized as follows:

- I All types of juridical mandate are found by considering the possible combinations of persons (mandator, mandatory, third person) in whose favour the mandate is contracted
- II The four elements (water, earth, air, fire) result from combining cold, humidity, heat, dryness two by two
- III All types of numbers are found by making all combinations of 'number', 'fraction', 'square root' and 'power'
- IV The possible sound effects made by a wind organ result from combining various registers
- V Hobbes' categorization of named things into bodies, accidents, phantasms and names yields ten types of possible propositions
- VI The number of syllogistic moods ($512 = 4^3 \cdot 2^3$) is determined by computing the possible combinations of 4 quantities and the 2 qualities of the 3 propositions occurring in the syllogism
- VII Geometric figures can be combined to form complex ones
- VIII Cases formed by lawyers result from the combination of various types of persons, things, acts and rights
- IX Given the species of a division, the possible genera subalterna can be found by combining the species in various ways
- X If all concepts are arranged into classes according their complexity, the predicates of a given subject, and the subjects of a given predicate can be found, and
- XI A universal writing can be constructed
- XII De Breissac's invention: nine classes of questions, considerations, acts, goals etcetera, which are involved in an emperor's decision concerning warfare, are inscribed on concentric circles that can be moved independently, so that all possible combinations can be produced. Similar wheels are used by Harsdörffer, Lullus, Alsted for various purposes, and also in locks which can be opened without key, by choosing the right combination of letters inscribed on revolving rings.

(G IV 45-75)

This list amply illustrates the broad range of applications that the combinatorial approach to the 'logic of invention' may have. As Leibniz explains, the first nine of these uses pertain to 'division', that is, the theory of simple terms; the remaining three pertain to complex terms, that is, to propositions. It is not immediately clear how the procedure traditionally known as division can be made compatible with combinatorics. As Leibniz's attempt to merge the two lies at the heart of his project for a philosophical language, it will be worth while to pursue this point a little further.

¹ For instance, in a letter to Conring (1671) he refers to the 'absurdities of the Lullists' (A 2 1 81), and in a letter to Hesenthaler of the same year he says that the Lullists have corrupted and discredited the art of combinations (A 2 1 200).

5.2.3 Combinatorics vs. division: ‘use IX’

Division as treated in logic textbooks was concerned with explaining how the concepts related to some subject matter could be arranged and defined¹. The predicables, especially genus, species and difference, played a central part in this. The subdivision of a general concept into more specific ones was often compared with the division of a physical object into its constituent parts. Thus the concept ‘living being’ can be divided into ‘animal’ and ‘plant’ just as the human body can be divided into head, limbs and trunk. Although writers on the subject usually emphasized the distinction between physical partition and conceptual division, a close analogy was obviously assumed (cf. Dalgarno’s analogy between a completely analyzed concept and a dissected body (3.4.3 above); cf. 5.6.2 for Leibniz’s comment on this passage). Thus Leibniz was echoing a familiar element of logical doctrine in stating that almost everything consists of parts, ‘either real or at any rate conceptual’ (P 3). For present purposes, it is important to note two characteristics of the theory of division. First, division is an analytic procedure, concerned with breaking down some whole into its parts; a genus was usually identified with a whole, its species with the parts. Secondly, a commonly assumed requirement for a good division was that the parts should be mutually exclusive and jointly exhaustive of the whole.

In contrast with this, the art of combination is concerned with a synthetic procedure which takes the parts as given, and considers which wholes can be formed out of them. The combinatorial viewpoint as such does not restrict this procedure in any way. For example, the solution to problem II mentioned above yields, in modern terms, all possible subsets of a given set, whereas the theory of division requires that the given set is partitioned into mutually exclusive subsets. In *DAC*, Leibniz seems to take an unrestricted combinatorial standpoint throughout. In the introduction he illustrates the general applicability of combinations to whole-part relations as follows: “for example, let the whole be ABC; then AB, BC, and AC will be smaller wholes, its parts” (L 77). From the perspective of the theory of divisions, the parts AB, BC, AC cannot occur together in a proper division of the whole ABC, as they contain common elements. In order to examine how Leibniz resolves this apparent opposition between combinatorics and division it will be illuminating to consider ‘Use IX’.

Use IX is an example of how the problem ‘given the species, to discover the subaltern genera’ can be solved (L 81). In this case, the things that are combined are species forming larger wholes, the subaltern genera. If a genus is divided into three species a, b, c, Leibniz explains, there will be three intermediate genera, consisting of ‘com2nations’ (combinations of two things), viz. ‘the abstract or genus proximum of a.b, of b.c, of a.c.’, while the

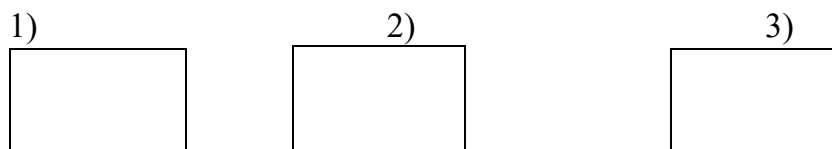
¹ Cf. e.g. Jungius 1957[1638/1681]:211[298]. Leibniz often expressed his great admiration for Jungius.

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genus abc is the one ‘con3nation’ (G IV 60). Apparently, Leibniz proposes a division which results from applying the combinatorial viewpoint without constraint and which consequently does not meet the requirement that the parts should not overlap. But on closer inspection it turns out that this is not what he proposes. Rather, he is concerned with pointing out that the art of combinations may serve to find all possible divisions of a given genus. This point is illustrated by dividing the genus ‘republic’ in various ways into subaltern genera¹, which consist of the combinations of the three species monarchy (a), oligarchy/polyarchy (b) and panarchy (c). There are three ways of doing this:

- 1) either all govern (c), or not all; in the latter case, either one governs (a), or more (b);
- 2) either one governs (a), or more; in the latter case, either all govern (c) or not all (b);
- 3) either the case is extreme: one governs (a) or all govern (c), or not: more than one but not all govern (b).

Schematically the three divisions of the genus look like this:



Interestingly, Leibniz adds the following remark:

Our mind is so fertile in abstracting, that it can discover of any given number of things their genus, that is the concept that is common to them all and to none outside them. And if our mind does not discover it, God will know, and the angels will discover it. Therefore the foundation of all abstractions of this kind pre-exist (G IV 61)

Thus Leibniz draws attention to the relative value of particular divisions, which basically result from an arbitrary choice out of a number of possible ones. He refers in this context to Scholastic authors treating subjects such as the number of predicaments, who draw up their tables in various ways, while all end up with the same lowest species. Clearly, the implication is that combinatorics enables a more fundamental view on such matters as it reveals which particular divisions are at all possible.

This example also illustrates a related point which Leibniz does not mention in *DAC*, but which he was to emphasize repeatedly in later writings², namely that there is no real distinction between a difference and a subaltern

¹ Jungius 1957[1638/1681]:215[306] also uses the example of a threefold division of ‘republic’, but in a different context from the one in which Leibniz treats it.

² E.g. L 229(=G VII 292), L 470 (=G VII 526), NE III 3 §10.

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genus. A given concept may be a genus or a specific difference depending on the order in which it appears in a division, e.g. ‘not all govern’ is the specific difference distinguishing oligarchy/polyarchy from panarchy within the subaltern genus ‘more than one govern’ (case 2), whereas it is a genus in case 1, comprising the two species ‘monarchy’ and ‘oligarchy/polyarchy’.

In spite of these qualifications, the practice of drawing up tables in which concepts are arranged according to genus and species was defended by Leibniz in his later work, notably against Locke’s attacks¹. In a letter to Wagner written in 1696 he relates that when he began to learn logic as a boy of thirteen, he at once noticed that “there must be something great in it”, and that his “greatest pleasure lay in the categories, which seemed to me to be a standard roll of everything in the world, and I examined many logics to see where the best and most exhaustive lists could be found” (L 463-464).

In conclusion, it appears that in the context of ‘use IX’ combinatorics is quite compatible with division. Combinatorics is the more fundamental discipline in that it enables one to compute all possible divisions of a genus of which the species are known. With respect to ‘Use X’ however, things are quite different. As noted, the idea underlying ‘Use X’ is of central importance to Leibniz’s concept of a philosophical language. It entails a thorough revision of the traditional theory of categories based upon combinatorial principles. In ‘Use X’ Leibniz attempts to show that given such a theory, all true propositions in which a given term may occur can be computed. The attempt fails, although Leibniz does not seem to be aware of that. One of the causes of this failure is that the revised theory of categories results from an unconstrained application of combinatorics on its simple elements, whereas the computation of true propositions tacitly assumes that these elements are arranged according to some specific division. ‘Use X’ further illustrates some basic principles of Leibniz’s approach to logic.

5.2.4 Combinatorics vs. division: ‘use X’

Leibniz indicates that in proceeding to the discussion of Use X he is leaving divisions, and comes to propositions. Since all propositions are combinations, namely of a subject and a predicate, the problem is twofold: first, to find the predicates of a given subject and second, to find the subjects of a given predicate, both in affirmative and negative propositions. In order to make this problem a solvable one, Leibniz assumes that he disposes of a complete analysis of any given term. Such an analysis consists of a definition showing of which parts the analysed term is composed. These parts can in their turn be analysed, so that a definition of the terms of the definition is given. This goes on until ‘simple parts, i.e. indefinable terms’ are reached (P 4). When these indefinable terms, which Leibniz calls ‘first terms’, are found, they are placed together in one class. In a second class all terms which are composed of two first terms

¹ NE III.3.9, III.6.42.

are brought together. The third class contains all terms consisting of three first terms, and so on.

It thus appears that the theory of propositions depends on the theory of divisions in that it presupposes a complete analysis of all terms. In this respect, Leibniz is in accordance with a view widespread in the seventeenth century, according to which syllogistic reasoning is idle if the soundness of the terms occurring in the syllogism has not been guaranteed beforehand¹. Leibniz believed that if the analysis of terms were completed, and all concepts were arranged according to their complexity in the way just sketched, this would amount to an extremely valuable inventory of all human knowledge. As seen, Leibniz was familiar with the tradition in which the theory of categories was regarded as providing such an inventory. Accordingly, he explicitly connects the arrangement of terms he envisages with the doctrine of categories: “in order to establish what everything is made of, we must provide an analysis to fix the categories and as it were the matter of this art” (P 4). Rather than awaiting the realization of this ambitious project, he merely sketches the structure of the envisaged theory in *DAC*. As will be discussed below, he also provides a provisional specimen, applied to the restricted field of geometry. He was never to give up his concern with the construction of a new theory of categories, based upon combinatorial principles. In this he was driven by the conviction that if this theory were established, all truths could be found by calculation. In *DAC*, the solution to the problem about subjects and predicates is a first attempt to perform something of this kind. In later periods, Leibniz devised various logical calculi with a view to the same goal.

In order to explain how Leibniz calculates the number of predicates and subjects of a given term it will be convenient to simplify the matter in two respects: firstly, rather than an abstract calculation of the number of predicates and subjects, a concrete example will be considered; secondly, the number of ways in which a single term can be written will be disregarded. For the sake of exposition, then, it is assumed that there are four simple terms in all, the combinations of which are ordered in the way just sketched. The simple terms are designated by letters, a procedure Leibniz often uses both in *DAC* and elsewhere. This simplified theory of categories contains the following classes:

Class I: a b c d

Class II: ab ac ad bc bd cd

Class III: abc abd acd bcd

Class IV: abcd

¹ Cf. e.g. Bacon, *Novum Organon*, Aphorism XIV: “The syllogism consists of propositions, propositions consist of words, words are symbols of notions. Therefore if the notions themselves (which is the root of the matter) are confused and over-hastily abstracted from the facts, there can be no firmness in the superstructure” (Works I:158, IV:49).

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First, Leibniz calculates the predicates of a given term in a universal affirmative (UA) proposition. Although he does not explicitly say so, what he intends is clearly to compute the number of predicates which together with the given term may form a true UA proposition. These are as many as there are combinations of the simple terms of which the given term is composed. Thus if the given term is *ab*, there are $2^2 - 1 = 3$ predicates (according to problem II), namely *a*, *b*, and *ab*. It appears from this that Leibniz assumes that for a UA proposition to be true the predicate must consist exclusively of one or more of the terms that compose the subject.

The subjects of a given term in a UA proposition are as many as there are terms of which the given term is a part. This means that the subjects are as many as there are combinations of simple terms which do not occur in the given term, plus the number of definitions, that is, identical statements. For example, if *ab* is the given term again, there are two terms which do not occur in the given term: *c* and *d*, which together have 3 combinations: *c*, *d*, and *cd*. Combining these with the given term yields the subjects sought: *abc*, *abd*, and *abcd*. To these are added the definitions, of which there is only 1, namely *ab*.

The number of predicates in a particular affirmative (PA) proposition is found by adding the number of subjects and the number of predicates in the corresponding universal proposition. Thus the predicates which may be substituted in the open place in ‘some *ab* are _’ making this a true statement are *a*, *b*, *ab* (predicates UA) and *abc*, *abd*, *abcd*, *ab* (subjects UA). This is based on the assumption that all true PA propositions can be derived from a UA proposition either by subalternation or by partial conversion. In other words, it is assumed that ‘some *A* are *B*’ follows either from ‘all *A* are *B*’ (subalternation) or from ‘all *B* are *A*’ (partial conversion). In the example, the predicates UA *a*, *b*, *ab* are included on account of subalternation, the subjects UA *abc*, *abd*, *abcd*, *ab* on account of partial conversion. The identical predication ‘some *ab* are *ab*’ follows on account of both modes of inference, so that Leibniz should have subtracted 1 from his total number, which he fails to do¹.

The number of subjects in a PA proposition is equal to the number of predicates in such a proposition. Obviously, this is because simple conversion is valid for such propositions (if ‘some *A* is *B*’ then ‘some *B* is *A*’).

Leibniz’s treatment of negative propositions is very brief and rather vague. He does state that negative predicates and subjects are found as follows: the number of all possible terms that can be made from a number of simple terms is calculated, in the example used this is 15. If the number of predicates and the number of subjects in a UA proposition are subtracted from this number, the result is the number of negative predicates (in universal propositions, apparently). The number of negative subjects is probably equal

¹Couturat 1901:46 has criticised Leibniz’s calculation for overlooking PA propositions that are not derived from UA ones by subalternation or conversion. Dürr 1949:24ff. points out against Couturat that Leibniz explicitly limits his discussion to ‘eternal truths’.

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to this; Leibniz just says: 'about the subjects the reverse' (G IV 68: 'de subjectis contra'). About particular negative subjects and predicates he informs us in no more detail than that these are derived from universal ones, just as PA subjects and predicates are derived from universal ones. Applied to the example, these indications lead to the following negative predicates for the given term ab: c, d, ac, ad, bc, bd, cd, acd, bcd, that is, all 15 possible terms minus the 6 which together with ab make up a true PA proposition.

In summary, the various subjects and predicates which together with the term ab form a true proposition, given that there are four terms a b c d, are the following:

subjects of ab	predicates of ab
UA ab abc abd abcd	a b ab
PA ab abc abd abcd a b	ab abc abd abcd a b
UN c d ac ad bc bd cd acd bcd	c d ac ad bc bd cd acd bcd
PN c d ac ad bc bd cd acd bcd	c d ac ad bc bd cd acd bcd

This result is quite unsatisfactory, as the truth conditions on the basis of which it has been established are inconsistent¹. For instance, 'no ab is cd' is true, and 'all abcd are ab' is true. It follows, according to a syllogism of the first figure known as Celarent, that 'no abcd is cd'. But according to the truth conditions presupposed by Leibniz the conclusion is false, since its contrary 'all abcd are cd' is true (because the predicate forms part of the subject). Further, it appears that universal and particular negative propositions have exactly the same truth conditions. In other words, it is supposed that whenever some A is not B, then no A is B. The latter point can be easily explained on account of the way in which Leibniz defines the truth of PN propositions².

It is noteworthy, that the classification of terms on the basis of combinatorial complexity that is presupposed by the calculations in use X differs drastically from the divisions discussed in Use IX. In the context of Use IX, Leibniz says that a requirement for a concept to be a genus is that it should both coincide with the singular things falling under it and be convertible with

¹ Cf. Kauppi 1960:143-144.

² Leibniz supposes that PN propositions are deducible from UN ones just as PA are deduced from UA, that is, either by subalternation (no A is B -> some A is not B) or by partial conversion (no A is B -> some B is not A). Since simple conversion is valid for UN propositions (no A is B -> no B is A), inference by partial conversion leads to exactly the same result as simple conversion plus subalternation. This is in contrast with what is the case with affirmative propositions, because simple conversion is not valid for UA propositions (not: all A are B -> all B are A). This is why the truth conditions for UA and PA propositions, which likewise depend on subalternation and partial conversion, are nevertheless different from each other. Since Leibniz assumes that partial conversion and subalternation exhaust the possible cases in which particular propositions are true, he cannot account for cases in which some PN is true and the corresponding UN is false.

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all of these, taken disjunctively (G VII 60). Thus a genus is thought of as resulting from the combination of several species and as being equivalent with the disjunction of these species. Applied to the example discussed there this means that the term 'republic' is equivalent to 'monarchy or oligarchy/polyarchy or panarchy'. The combinatorial theory of categories sketched in Use X differs in two ways from this. In the first place, in Use IX the genera result from combinations of species, whereas in Use X the species result from combinations of genera. Leibniz confirms this by saying that terms in a lower class, that is, a class of concepts consisting of fewer 'first terms', are the subaltern genera, (although he adds: 'as it were' ('quasi')), of some of the terms in the following class (G VII 65). In the second place, in Use X the genera are combined to form species by conjunction rather than by disjunction, for otherwise it would be hard to see why e.g. the proposition 'all ab are a' should be true. Obviously, what Leibniz had in mind here are concepts like 'rational animal', in which both 'rational' *and* 'animal' are contained as parts, whereas in Use IX he discussed 'abstractions' resulting from 'our fertile mind' that puts quite distinct things together in the same class.

From this it appears that in discussing Use X Leibniz takes what subsequently has been called the intensional view on the proposition. According to this view, to assert that some predicate applies to a subject means that the concept of the subject contains the concept of the predicate. By contrast, on the extensional view the same assertion means that the class referred to by the predicate includes the class referred to by the subject. For example, to say that 'man is a rational animal' means, on the intensional view, that the concept 'animal' is included in the concept 'man'. On the extensional view the same statement means that the class of animals includes the class of human beings. Thus the intensional viewpoint is concerned with the relation of containment between concepts, and the extensional viewpoint with the relation of class inclusion. Consequently, a UA proposition 'all A are B' is true, on the intensional view, if what is denoted by B forms part of what is denoted by A, whereas on the extensional view the proposition is true if what is denoted by A forms part of what is denoted by B. Leibniz does not explicitly address the issue of intension and extension in *DAC*, but the truth condition he presupposes for UA propositions clearly shows that in the context of Use X he treats the proposition intensionally. For he assumes that 'all A is B' is true iff B is identical to some part (or the whole) of A.

Leibniz explicitly limits the scope of his calculations to what he calls 'eternal truths'. His truth condition for PA propositions entails that a sentence of the form 'some A are B' is true if and only if either 'all A are B' or 'all B are A' expresses a true proposition. Leibniz makes this restriction deliberately. He explains that his combinatorial art can only account for 'eternal truths, i.e. which exist, not by the will of God, but by their own nature'. Particular propositions which do not follow from universal ones by subalternation (i.e. 'all A are B' therefore 'some A are B') or conversion (i.e. 'all A are B' therefore 'some B are A') are what he calls 'observations', that is, propositions the

truth of which is based on existence, not on essences. Such propositions cannot be proved by definitions, and are therefore excluded from the present investigation (P 5-6). About the status of other kinds of true propositions Leibniz merely indicates that these are true ‘as if by chance, i.e. by the will of God’, and that their truth can only be established by induction. In developing his philosophical system, the problem how to distinguish between necessary and contingent truth was one of the most important ones Leibniz had to solve.

In the current context it is interesting to note that the restriction implied by the truth condition Leibniz uses for PA propositions precisely matches the restriction which holds for a classical division by genus and species. For a proper division of a genus into species, on the extensional interpretation, partitions the class called genus into mutually exclusive classes called species so that each member of the genus is a member of precisely one of the species. Accordingly, if something belongs to both classes A and B, and thus if ‘some A is B’ is true about the members of these classes, it follows that A and B are related as a class and a subclass. The other possible case in which ‘some A is B’ is true, namely if A and B have common members *and* both have members which are not members of the other, is precisely what is supposed to be excluded by a good division. Thus Leibniz’s truth condition for eternally true PA propositions presupposes the intensional counterpart of a partition, that is, a systematical arrangement of concepts which somehow mirrors the division of a class into subclasses. It is quite understandable why Leibniz presupposed this. As he set out to reorganize the theory of categories and the related theory of division, it is probable that he had a hierarchical arrangement of concepts in mind, such as the ones that were widely used in logic textbooks to exemplify these theories. But he apparently did not realize that such an arrangement is incompatible with his unrestricted combinatorial starting-point in the classification of concepts. For his arrangement of concepts on combinatorial principles only takes the number of parts a concept contains into account, but does not entail any constraints on the formation of complex concepts out of simple ones. And such constraints are precisely what is presupposed by the truth condition for PA propositions.

The same point is even clearer with respect to negative propositions. Their truth conditions likewise presuppose an ordering which restricts the number of possible concepts, while at the same time it is assumed that simple terms may be combined without constraints to form complex ones. To clarify this, one may consider the example used above once again. In class IV, there is the term *abcd*. As this term contains all first terms, each of the terms in the other classes forms a true universal affirmative proposition if predicated of *abcd*. This fact precludes the truth of all universal negative propositions in which any pair of terms occurs as subject and predicate: since ‘all *abcd* are X’ is true for all substitutions of X, at least *abcd* will be a counterexample to all propositions of the form ‘no X is Y’. Thus if it is assumed, as Leibniz does, that all combinations of simple terms are possible, there can be no true universal negative propositions. Yet Leibniz asserts that ‘no A is B’ is true iff

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'some A is B' is false, and this, given his truth condition for PA propositions, leads to inconsistencies.

In the context of Use X, then, division and combinatorics do not fit properly together. Leibniz's calculations of the number of subjects and predicates are based on assumptions which imply a specific ordering of terms. This ordering is very similar to the structures treated in the traditional theory of division. The same assumptions are however incompatible with the arrangement of terms on combinatorial principles to which Leibniz in fact applies his calculations. Use X is however based upon a number of central ideas that Leibniz was to develop in later years. He produced a series of far more satisfactory logical calculi. The intensional view on the proposition remained his starting-point in most cases. In metaphysics, the issue of 'compossibility' became a pivotal one, and this is clearly connected with the question of constraints on possible combinations. None of these matters can be pursued in the present context. What is most important here, is a principle which was to guide all Leibniz's endeavours to construct a philosophical language: the idea that all concepts are ultimately composed of a limited number of simple ones. Definitions, on this view, provide an analysis of a given concept into less complex ones. By successive substitutions of definitions one may finally reach the primitive, unanalyzable notions composing a concept. The set of all of these primitive notions is called 'the alphabet of human thought'. This idea is first explained by Leibniz in connection with 'Use XI': the creation of a universal writing. How this was conceived becomes clear from what Leibniz calls an 'extemporary essay'.

5.2.5 The extemporary essay

Apart from a theoretical sketch of how the new theory of categories should be structured, Leibniz provides an 'extemporary essay' exemplifying the general idea by an application in the field of geometry. From the start, he makes it clear that this application is just meant as an illustration, and does not meet the requirements that would hold for a definitive version. Besides being limited to mathematical terms, the extemporary essay analyses only a selection of these: there was no time to cover all the definitions from Euclid's Elements. Further, as the essay has not started from real first terms, but from those that are first in mathematics, it has been necessary to use signs for 'the cases of words and other things which are necessary for the completion of discourse' (P 6). Leibniz uses the Greek articles for this, but he asserts that he could have used terms instead of these, if he had begun from first terms 'simpliciter'. The extemporary essay consists of 24 classes, which together contain 79 terms. Of these, 27 are in class I. These are the ones that are taken as first terms which are not defined. The 52 other terms in the remaining classes are defined by means of the first terms. The number of first terms occurring in the definition determines the number of the class to which the defined term belongs. Many

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of the classes with a number higher than I contain just one term, and at most they contain 5 terms.

Leibniz also devises a notation for the terms that are arranged in this way. The first terms are designated by numbers. Terms in one of the other classes are designated by a fraction symbol, of which the numerator indicates the place in the class, and the denominator signifies the number of the class. Thus, e.g., $\frac{2}{3}$ signifies the second term in the third class. Terms in the third class or higher can be written in several ways: either by writing all the first terms of which they are composed, or by writing the symbols of less complex yet compound terms they contain. The former way of writing a term is tantamount to giving a full definition of it, whereas the latter represents a partial analysis.

By way of illustration, the first 4 classes are cited below (this is reproduced from the full translation of the ‘extemporary essay’ in P 6 - 10):

“Let there be, therefore, a class I in which the first terms are:

1. Point. 2. Space. 3. Between. 4. Adjacent, or contiguous. 5. Disjoined, or, distant. 6. Extremity, or, what are distant. 7. Contained [*insitum*] 8. Included [*inclusum*]. E.g. (...) 9. Part. 10. Whole. 11. Same. 12. Different. 13. One. 14. Number. 15. Several, e.g. 2, 3, 4, 5 &c. 16. Distance. 17. Possible. 18. Every. 19. Given. 20. Becomes. 21. Direction. 22. Dimension. 23. Long. 24. Extended. 25. Deep. 26. Common. 27. Progression, or, continued.

Class II.

1. ‘Quantity’ is 14. of the 9 (15).
2. ‘Outline’ is 6.10.

Class III.

1. ‘Interval’ is 2.3.10.
2. ‘Equal’, A of the $11.\frac{1}{2}$
3. A is ‘continuous’ with B if the 9. of A is 4. and 7. in B.

Class IV.

1. A is ‘greater’ if it has the $9.\frac{2}{3}$ to B.
2. B is ‘less’ if it is $\frac{2}{3}$ to the 9. of A.
3. A ‘line’ is $\frac{1}{3}$ of 1 (2).
4. ‘Parallel’ is $\frac{2}{3}$ in 16.
5. A ‘figure’ is 24.8 in 18.21.”

These expressions are to be read as follows. For example, ‘ $\frac{1}{3}$ ’ means the first term in class 3, i.e. ‘interval’. This is defined as ‘2.3.10’, that is, ‘whole space

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between'. The number (15) in parentheses means 'plural number', so that '9 (15)' means 'parts'. Other digits within parentheses refer to numbers, e.g. '1 (2)' means 'two points'. An example of a partial analysis is the definition of 'parallel': ' $\frac{2}{3}$ in 16', that is 'equal ($\frac{2}{3}$) in distance (16)'. 'Equal' in turn, is 'A of the $11\frac{1}{2}$ '¹, that is, of the same ('11') quantity ($\frac{1}{2}$). 'Quantity', in turn, is '14. of the 9(15)', that is 'the number of the parts'. The complete definition of 'parallel' in terms of primitives reads: 'of the 11.14.of the 9(15).in 16'.

This extemporary essay illustrates that the implementation of Leibniz's programme faces a number of problems. To begin with, it appears that the first terms listed in class I cannot be combined at random with other first terms. Of the 351 possible combinations of two first terms only two are actually used. This is of course due to the fact that Leibniz started from the other end. Beginning with some definitions from Euclid he substituted those terms he thought could be further analyzed by other terms; the avowedly incomplete series of definitions thus determined which terms are listed as primitives. But it is clear that most combinations of first terms will be nonsensical expressions. It appears, then, that combinatorics alone yields far too many possible terms. Some criterion by means of which the useful combinations can be sorted out is required.

Furthermore, one of the reasons why many of the first terms cannot be combined with other first terms is that these terms are natural language expressions of divers types, which are both semantically and syntactically constrained with respect to the combinations into which they may enter. Among the first terms are not only nouns substantive such as 'point', but also adjectives such as 'possible', verbs ('becomes'), prepositions ('between') as well as various quantifiers ('several', 'every'). Accordingly, the composition of meaning expressed by those combinations of first terms that are possible differs drastically from one case to the other. For instance, the structure of the expression 'every part', semantically speaking, is quite different from that of the expression 'adjacent part', although both result from juxtaposing two first terms.

This point is acknowledged by Leibniz in that he states that "among the first terms [are] not only things, but also modes or relations" (P 4). He further explains:

as we have not started from first terms *simpliciter*, it has therefore been necessary to use signs by which the cases of words and other things which are necessary for the completion of discourse may be understood. If we had begun from first terms *simpliciter* we could have put terms for the variation of the cases themselves, whose origin from relations and from metaphysics Julius Caesar Scaliger has explained in his book, *De causis linguae Latinae*. We however, have used the Greek articles (P 6)

¹ The 'A' in this expression is probably inserted because what is here rendered as 'of the' is expressed in the original by the Greek article $\tau\eta$, which Leibniz probably regarded as requiring a syntactic antecedent.

Apparently, in Leibniz's view the diversity of types of terms and the variety of types of combinations are merely a consequence of the fact that the first terms in the extemporary essay are not really first terms. He believed that if the analysis of terms were to be pursued until the real primitive notions are reached, it would be possible to express all complex notions by means of simple combinations of primitives.

The remark just quoted is fundamentally important for understanding the kind of enquiry Leibniz was to conduct intermittently but unremittingly during a long period afterwards, which he called 'rational grammar'. This enquiry was concerned with an analysis of 'the cases of words and other things which are necessary for the completion of discourse', which was required in order to remove an obstacle to Leibniz's project. For without a proper analysis of modes, relations, cases and syncategorematic terms Leibniz's characterization of what it is for a proposition to be true does not work for many of the definitions in the extemporary essay. For example, 'parallel' is defined as 'equal in distance'. According to the truth conditions for universal affirmative propositions 'all parallel is distance' is true, since the definition states that 'distance' is one of the elements out of which the concept 'parallel' is composed. Further, as 'equal' is equivalent to 'of the same quantity', it follows that 'all parallel is quantity' is also true. These consequences are clearly undesirable. Leibniz was to explain this later by saying that the terms 'distance' and 'quantity' enter *obliquely* into the proposition. This means that these terms cannot be regarded as composing the defined concept 'parallel' in the same way as substitutable definitions do. This is indicated by the preposition 'in' and by the Greek article 'thi', respectively.

Another problem connected with the extemporary essay is that some of the definitions seem themselves to be of a type which makes them unfit to be used as a substitute of the term they define. Class IV, 1 provides a clear example of this. Rather than stating to which expression the term 'greater' is equivalent and by which it may consequently be replaced, the definition states a condition which is to be fulfilled for the term 'greater' to be applicable. Leibniz possibly believed that a proper analysis of the term 'if' could solve this problem as well. He later devoted special attention to comparative expressions such as 'greater'.

The definition of 'greater' also shows that sometimes a first term may occur several times in a single definition: if the constituent terms of this definition are step by step replaced by their definitions, this results in the following sequence:

A is greater than B if it has a part equal to B

A is greater than B if it has a part of the same quantity to B

A is greater than B if it has a part of the same number of the parts to B

Thus the first term 'part' occurs twice. This shows that the analogy between the analysis of a concept on the one hand and the division of a whole into con-

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stituent parts on the other hand is not without flaws¹. It may be recalled in this context that one of the reasons why Dalgarno refrained from pursuing the analytical approach to the end was that for an analysis of a complex notion into simple elements to be complete it will be necessary “to assume and re-assume these *simple* elements, in order to represent the various relations within the *composite*’ (*Ars Signorum*:32). Further, Dalgarno’s objection that a concept becomes unrecognizable after analysis is also exemplified by Leibniz’s definitions in the extemporary essay in that these definitions become increasingly more obscure when terms are progressively replaced by further definitions.

It seems, then, that the extemporary essay shows how problematic the basic idea it is designed to illustrate in fact is. Leibniz’s own examples contradict the assumption that the only kind of complexity to be taken account of in conceptual analysis consists in conjunction of simples, and they contradict the supposition that a definition of a concept consists of nothing more than a list of more simple concepts composing it. Characteristically, Leibniz ascribed the problematical aspects exclusively to the tentative stage of the project, and he did not doubt that its execution is feasible in principle.

5.2.6 Use XI: a universal writing

As noted, the art of combinations as sketched in Use X provides the framework for Leibniz’s first proposal to construct a philosophical language. Having presented the ‘extemporary essay’ he goes on as follows:

We have spoken of the art of complication of the sciences, i.e. of inventive logic, whose categories, as it were, would be formed by a table of terms of this sort. From what we have said there flows a corollary [porisma], or
Use XI: a universal writing, i.e. one which is intelligible to anyone who reads it, whatever language he knows (P 10).

Next he mentions three universal writing systems he was aware of when he wrote *DAC*, viz., the work of ‘a certain Spaniard’ (1653), Kircher’s *Polygraphia nova et universalis* (1663), and Becher’s universal character (1661) (cf. 2.3.2). Leibniz was only indirectly familiar with these works, through the *Technica curiosa, sive mirabilia artis* (1664) by Gaspar Schott. In this work, the systems of ‘the Spaniard’ and Becher are described in some detail, whereas only the title-page of Kircher’s work is printed. This explains why Leibniz limits his discussion to ‘the Spaniard’ and Becher, briefly summarizing their works and adding some critical comments. Nevertheless, the title-page of Kircher’s book must have appealed to Leibniz, as Kircher’s new ‘polygraphy’ is said to be derived from the ‘art of combinations’. Conspicuously, when Leibniz describes his own proposal further on in the

¹ Cf. Mates 1986:62 for a lucid account of this general point.

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same passage of *DAC*, he designates it by Kircher's term 'universal polygraphy'.

In Schott's opinion, Becher's universal character is 'far more ingenious, easier and more universal' than that of the Spaniard (Schott 1664:527). Leibniz clearly did not endorse this judgement. On the contrary, in his summary of the Spaniard's scheme, Leibniz praises its ingenuity, and he notes that not words, but the 'nature of things' forms its starting-point:

He [i.e. Schott] lists a certain Spaniard, (...) who was at Rome in the year 1653. His method was sought, ingeniously enough, from the very nature of things. He divided things into various classes, and in any class there was a certain number of things. So he wrote by numbers alone, citing the number of the class and of the thing in the class; though he added certain marks for grammatical and orthographical inflexions. (P 10)

Leibniz acknowledges that there is a superficial similarity between the Spaniard's scheme and his own extemporary essay described in the preceding section of *DAC*. The similarity consists in that both schemes arrange concepts into classes. Further, in both schemes these classes are designated by Latin numerals and their members by Arabic ones. As Leibniz emphasizes however, the principle of arrangement differs widely:

The same would be done by the classes which we have described above, but in a more fundamental way, since in them the arrangement is more fundamental. (A.6.1.201, P. 10)

As far as Becher's scheme is concerned, Leibniz seems to have cast only a quick glance at Schott's description of it. In his summary of Becher's work Leibniz simply states that "what will be written will be numbers". Curiously, Leibniz thinks that the use of Becher's character requires more skills and efforts from the writer than from the reader:

The writer (unless he has another alphabetical dictionary of his own language, referring to numbers) must know both his native tongue and Latin, and refer to the dictionary of each (P 11)

An alphabetical dictionary for all languages referring to numbers is precisely what Becher proposes. Apart from this, if a writer knows Latin, all he needs is an alphabetical Latin dictionary providing the supposedly universal numerical code. In writing this code there is no need to refer to any other dictionary.

Next Leibniz criticizes both Becher's and the Spaniard's scheme, dismissing them both as 'obvious and impracticable'. This is

because of synonyms, of the ambiguity of words, of the constant tedium of reference to a dictionary (as no one will ever commit numbers to memory), and because of the difference of phrases in different languages (P 11)

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In spite of Leibniz's fairly low opinion of the universal writing systems he was acquainted with when he wrote *DAC*, it is clear that these systems provided the impulse to pursue the matter in a more advanced way. As he explains,

when the tables or predicaments of our art of combination have been formed, something greater will emerge. For let the first terms, of the combination of which all others consist, be designated by signs; these signs will be a kind of alphabet. It will be convenient for the signs to be as natural as possible - e.g. for one, a point; for numbers, points; for the relations of one entity to another, lines; for the variation of relations or of terms, kinds of angles in the lines¹. If these are correctly and ingeniously established, this universal writing will be as easy as it is common, and will be capable of being read without any dictionary; at the same time, a fundamental knowledge of all things will be obtained. The whole of such a writing will be made of geometrical figures, as it were, and of a kind of pictures - just as the ancient Egyptians did, and the Chinese do today. Their pictures, however, are not reduced to a fixed alphabet, i.e. to letters, with the result that a tremendous strain on the memory is necessary, which is the contrary of what we propose (P 11 with revision)

In this first programmatic description of the project for a philosophical language Leibniz thus borrows the terminology of the schemes he was familiar with in characterizing the proposed symbolism as a 'universal writing', and as a 'universal polygraphy' (P 11). And from the indications he gives it is clear that he was thinking, probably under the influence of these schemes, of a written symbolism as opposed to a spoken language. At the same time, he envisages not only practical advantages that the other schemes lacked (no dictionary is needed), but adds a feature that sets his own proposal apart from the 'obvious and impracticable' schemes proposed by others, as he claims that 'a fundamental knowledge of all things will be obtained'. At the heart of this proposal lies the idea of what he was often to characterize as 'the alphabet of human thought'. In this context, the alphabet is said to consist of signs, as

¹ Parkinson translates: "for the variation of angles or of extremities in lines, kinds of relations". This is a correct rendering of the original, which reads: "pro variatione angulorum aut Terminorum in lineis genera relationum" (G IV 73). The problem is that this does not make any sense: that 'kinds of relations' are supposed to represent 'variation of angles' is incomprehensible by itself, and from the context it can be inferred that something like the reverse is intended. It seems plausible, therefore, to assume that the original text contains an error in that the words 'relationum' and 'angulorum' have changed places. Parkinson's rendering 'Terminorum' by 'extremities' is clearly occasioned by the context, but is at variance with Leibniz's use of 'Terminus' in the sense of 'term' in the same passage. Schmidt 1960:59 renders 'Terminorum' by 'Ausdrücken' as is very probably correct, but provides an even less understandable translation: "für die Variation von Winkeln oder von Ausdrücken in Linien die Arten der Relationen".

seems most sensible, but in other contexts Leibniz seems to suppose that the alphabet consists of notions.

In later years, Leibniz repeatedly stated that he considered the expression of the idea of an alphabet of primitive notions as the most important feature of his *Dissertatio de Arte Combinatoria*. Although he admitted that it was a typically juvenile work full of errors, he emphasized that the idea of the alphabet was a considerable merit. Thus, in a text written about 1679 (G VII 186, L 222-3), he says that one of the reasons why he does not regret to have published *DAC* is that it proves that he had conceived the idea of an alphabet of human thoughts at an early age. In 1690, *DAC* was reprinted without Leibniz's permission. To dissociate himself from the reprint, he published a note in the *Acta Eruditorum* saying that the tract was not in accord with his thought at that time in many respects. Thus he dismisses the 'scheme of elements and qualities', i.e. use II mentioned above (5.2.1), as 'an intellectual game which is elegant rather than true', and he points out some errors in the calculations concerning the syllogistic moods (use VI above 5.2.1). Further, he acknowledges that his treatment of arithmetical problems is defective, and that these had been treated much better by others. Yet he states about *DAC*:

it contains some new considerations sowing the seeds of the art of invention, which are not to be regretted, and, among other things, that masterpiece on the analysis of human thoughts into a sort of alphabet of primitive notions."¹

Clearly, Leibniz considered the idea of establishing such an alphabet as extremely important, and he was eager to emphasize that he arrived at the idea by himself. At the same time, he admitted that its discovery had been straightforward, and he expressed his amazement that no one before him had made any efforts towards its realization:

For to anyone who proceeds according to an order in thinking, these considerations should have occurred from the very first, just as they occurred to me as a boy interested in logic (L 223).

It is significant that Leibniz thought this, for it shows that the idea of constructing the alphabet originated from the logical tradition. It also shows that Leibniz believed that logic incorporated a view on cognition from which the alphabet of human thought followed as a natural consequence. The following section explores this topic a little further.

¹ *Acta Eruditorum Lipsiae* 1691, 63; G IV 103. Cf. C 175: "Il y a plus de 20 ans (...) que je m'avisa d'une methode qui nous mène infalliblement à l'analyse generale des connoissances humaines (...) comme on peut juger par un petit traité que je fis imprimer à lors, où il y a quelques choses qui sentent le jeune homme et l'apprentif, mais le fonds est bon, et j'y basti depuis la dessus".

5.2.7 The alphabet of human thoughts

In a number of texts¹, Leibniz describes how the study of logic first suggested the idea of the alphabet to him. Before he was twelve years old, he started reading Scholastic logic texts (G VII 126). He was impressed by logic, because of the order he perceived in its principles. It has been noted that he later recalled that his greatest pleasure “lay in the categories, which seemed to me to be a standard roll of everything in the world” (L 464). Thus Leibniz appeared to be sensitive to the encyclopedic function the doctrine of categories had acquired in scholastic logic: the classification of terms provided by the categories simultaneously served as an inventory of the kinds of things to be found in the world. Reflection on the categories made Leibniz wonder why propositions were not classified in a similar way as terms are. Just as we have categories of terms or simple concepts, we ought to have categories arranging propositions, that is, complex concepts, in order. When Leibniz asked his teachers why such categories did not exist, they could not give a satisfactory answer. Later, he found out that what he was looking for in fact had already existed for a long time, for in demonstrations like the ones that are given in geometry propositions are arranged in an order such that one follows from another. As it turned out, this ignorance proved profitable, for Leibniz pursued these ideas, ‘for the sake of their novelty’ (G VII 185, L 222), and attempting to establish such categories for complex terms

I necessarily arrived at this remarkable thought, namely that a kind of alphabet of human thoughts can be worked out and that everything can be discovered and judged by a combination of the letters of this alphabet and an analysis of the words made from them²

In another passage (C 345-346) Leibniz tells the same story, but he provides some more details which explain why he should, as he says, *necessarily* arrive at his remarkable thought:

when I learned logic and the predicaments ... it occurred to me that new predicaments should be thought out by logicians, of complex terms; in which propositions would be arranged to constitute syllogisms just as non-complex terms in ordinary predicaments are arranged to constitute propositions (C 346)

Thus it appears that Leibniz assumed that syllogisms result in the same way from the combination of propositions, as propositions result from the combi-

¹ G VII 126, 185, 292, C 346, Guhrauer II, Anhang 55.

² Loemker’s usually excellent translation contains an error here, mistranslating ‘combinatio’ as ‘comparison’. This is unfortunate, as it obscures the fact that Leibniz is here alluding to combination or synthesis, as opposed to analysis. The philosophical language supports both methodical procedures, and hence “includes both the arts of discovery and judgment”. Cf. 5.3.5.

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nation of concepts. Terms, propositions and syllogisms represent three levels of complexity, such that the more complex structures are composed of the less complex ones. Accordingly, as concepts are identified with simple terms, propositions are regarded as complex terms. Syllogisms, in turn, can be seen as propositions containing complex terms as elements. As Leibniz tried to work out the idea of new categories for propositions, he noticed that the ordinary categories should be revised. For he saw that combination of simple terms did not bring about that truths and syllogisms could be found as he expected:

I soon realized that in order to correctly establish a series of propositions, the notions themselves or the non-complex terms should be better arranged. For I saw that from the correct arrangement of the non-complex terms of a syllogism the syllogism itself did by no means have to emerge; thus as the received predicaments would not give me this facility of discovering all kinds of syllogisms by a mere combination of them, and of finding beautiful truths as I wished, it was easy to judge that a wholly different arrangement of notions was needed (C 346)

Rather than giving up the combinatorial view on the relation between concepts, propositions and syllogisms, Leibniz decided to reform the traditional theory of categories on the basis of this view. The existing theory of categories was to be replaced by the alphabet of human thought so as to capture the compositional nature of human thinking. At the same time, a systematical representation of knowledge of all things could be achieved. Clearly, in referring to ‘the received predicaments’ Leibniz is not talking about Aristotle’s list of ten categories, but about the far more extensive lists of concepts to be found in logic textbooks, which were arranged by genus and species. Thus in the paper *On universal synthesis and analysis* he says: “Since our common genera do not reveal the species in their combination, I concluded that they were not correctly formed” (L 229). The reform of the ‘received predicaments’, then, entailed the analysis of terms, that is, those associated with the lowest level of complexity in the ‘terms - propositions - syllogisms’ sequence, into even less complex ones. At the end of the analytical chain of ever more simple terms stand the primitives which resist further analysis. These primitives form the alphabet of human thought; they replace the highest genera of the old theory of categories. As Leibniz explains in the same paper:

this [i.e. categories for complex terms] could be achieved universally if we first had the true categories for simple terms and if, to obtain these, we set up something new in the nature of an alphabet of thoughts, or a catalogue of the highest genera or of those we assume to be highest (L 229).

He goes on to resume the programme described in *DAC* of rewriting terms as a combination of simpler terms. If this is carried out correctly, the goal will be

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achieved: “if some particular species is proposed, the propositions which are demonstrable about it could be enumerated in order, or all its predicates could be listed” (L 229).

There can be little doubt, then, that the idea of the alphabet of human thoughts originated in the context of Leibniz’s study of logic. We have his own repeatedly stated testimony showing this unambiguously. And if there would be reason to cast doubt on his autobiographical accounts at all, the fact that they are based on written notes enhances their credibility¹. Apart from this, the logical ancestry of the alphabet is apparent from the way it is described. Leibniz identifies the alphabet with ‘a catalogue of the highest genera’ (L 229), and in a draft on ‘the art of invention’ (C 165) Leibniz lists as one of the topics to be treated: ‘On the predicaments of the universal art of combination, or on the dictionary formed out of the alphabet of human thoughts’. As seen, it is precisely because the alphabet derived directly from logic that Leibniz wondered why no one before him had tried to implement the idea². As he saw it, the view that all knowledge consists of a combination of atomic concepts must have suggested itself to anyone who studied logic.

Numerous later writings show that Leibniz’s plans for a philosophical language remained intimately connected with the alphabet of human thoughts. As his views on the matter developed, an additional element was introduced, which came from mathematics rather than logic. This is the belief that well-chosen symbols are capable of greatly enhancing the thought process. In *DAC*, Leibniz suggested the use of a kind of pictograms for the purpose of a universal writing. In the immediately following period, he wrote a note addressed to his patron³, in which he explained this idea by examples (C 29-30). He shows how characters may be assigned to titles (in the legal sense), supposing that signs for other things may be derived from these. Thus ‘riches’ may be symbolized by a little square: , and its ‘privative’, that is, ‘poverty’, by a shaded square: . This is probably the kind of thing Leibniz had in mind when he said in *DAC* that the signs expressing primitive notions should be ‘as natural as possible’. Leibniz further articulates the basic idea underlying the proposals for a universal writing such as those made by Lodwick and by Wilkins in the *Mercury*, saying that “all nations could by some agreement designate all things by the same characters”, and that they already agree in dividing the Zodiac into twelve signs (C 29). Although the pictorial nature of

¹ “I read much later what I had written when I was fourteen, and it pleased me very much”. One of the things he had written at that age, was his idea concerning the categories of propositions. Guhrauer II, Anhang 55.

² It has been seen however (2.2.4) that Ward 1654:21 sketched a similar programme.

³ Couturat assumes on internal grounds that this patron was Boineburg. Couturat states: “Cette lettre doit dater de la première jeunesse de Leibniz (1666-1672)” (C 30), which seems quite plausible. However, the terminology used in the opening sentence of the letter suggests that Leibniz must have at least heard of Wilkins’s *Essay*, as it begins thus: “Since your Excellency takes delight in thoughts about a philosophical language, which others also call a universal characteristic”. Leibniz first heard of the *Essay* in 1668 (cf. 5.3.1).

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the sign always continued to fascinate Leibniz, his thoughts on the matter soon acquired greater sophistication. At the same time, his claims on the advantages of the philosophical language became even more extravagant. Both topics will be the subject of the following section.

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square: □. This is probably the kind of thing Leibniz had in mind when he said in *DAC* that the signs expressing primitive notions should be ‘as natural as possible’. Leibniz further articulates the basic idea underlying the proposals for a universal writing such as those made by Lodwick and by Wilkins in the *Mercury*, saying that “all nations could by some agreement designate all things by the same characters”, and that they already agree in dividing the Zodiac into twelve signs (C 29). Although the pictorial nature of the sign always continued to fascinate Leibniz, his thoughts on the matter soon acquired greater sophistication. At the same time, his claims on the advantages of the philosophical language became even more extravagant. Both topics will be the subject of the following section.

5.3 PLAN AND PURPOSE OF THE PHILOSOPHICAL LANGUAGE

5.3.1 The English connection

By the time that his dissertation on the art of combination was published, Leibniz was also engaged in the study of law. As a doctor’s degree in law was refused to him at Leipzig, he left his native city and went to Altdorf, where he obtained his degree in February 1667. He was offered a professorship, which he refused. Instead of pursuing an academic career, he entered the service of Boineburg, and through him he was employed by Johann Philipp von Schönborn, the Elector of Mainz. In the following years, Leibniz produced, under the guidance of Boineburg, several books concerning juridical and political matters. One of these purportedly proved, in mathematical fashion, that the candidate for the Polish throne favoured by Boineburg was the best one. Leibniz also produced a lengthy manuscript which was meant to dissuade Louis XIV of France from invading Holland, and to attack Egypt instead. Politically speaking, these writings were of no avail, but the introduction of mathematical reasoning into political science was a novelty admired by specialists in the field¹.

When writing *DAC*, Leibniz was unaware of the debate concerning universal language carried on in England. Although Dalgarno’s *Ars Signorum* had appeared five years previously, he did not learn about this work until 1673. In view of the much greater prestige surrounding Wilkins’s *Essay*, it is not surprising that Leibniz first heard about it in 1668, the year of publication. In a letter to Thomasius², his former teacher, Leibniz enthusiastically tells him that he has seen letters by the secretary of the Royal Society to a countryman living in Germany. In these letters reference is made to a number of admirable recent inventions made in England, one of which is what Leibniz calls ‘Polygraphia Wilkenii universalis’, misspelling Wilkins’s name and again, as in *DAC*, using Kircher’s term ‘polygraphia’, this time to refer to the *Essay*. In

¹ Mates 1986:20.

² 26 september / 6 October 1668, G VII 9, A 2 1 10-11.

5.3 PLAN AND PURPOSE

1670, Leibniz started corresponding directly with the secretary of the Royal Society, Henry Oldenburg, who shared this task with Wilkins. Writing to Oldenburg in July of that year¹, Leibniz states that he has learned that “Wilkins has considered the founding of a perfect language for the use of philosophy”. He did not obtain a copy of the *Essay* until October, through William Curtius², who presumably is Oldenburg’s countryman referred to above. The first record of Leibniz’s judgement of the *Essay* after this date is the following comment in a letter³ written three months afterwards:

Some people think the means are greater than the end, that is, the many very learned things that have been brought together in that place by the author, rather than the language with its character itself (A.2.1.77-78)

In spite of the cautious formulation, this judgement is clearly Leibniz’s own, as is confirmed by later records⁴. He admires Wilkins’s philosophical tables, but attaches little value to the character and the language. Leibniz communicated the positive part of this judgement to Oldenburg:

I have recently read the universal character of the very learned Wilkins through the kindness of the distinguished William Curtius; the tables please greatly: I would have liked him to exhibit the things that can only be described by pictures, such as various kinds of animals, plants, instruments, by adding figures. I wish it were translated into Latin, which no one could do better than the author (29 April / 9 May 1671, A 2 1 104)

As noted, Leibniz had been convinced from the start that a universal writing should consist of symbols reflecting a theory of categories. For this reason, Wilkins’s impressive tables must have seemed to be of great value to Leibniz, especially in comparison with the work of the ‘unknown Spaniard’, or with Kircher’s work, which had disappointed him greatly when he became acquainted with its contents⁵. Although Wilkins’s tables are not organized in the way Leibniz thought they should be, he certainly regarded them as a useful starting-point for his own project. Shortly after Wilkins’s book had come into his possession, he began working on a list of definitions based on the philosophical tables. Beginning with the first genus of Wilkins’s scheme, he provided the radical words with a definition, as well as the words with a related

¹ G VII 5, A 2 1 59-60.

² Letter from William Curtius to Leibniz, 13/23 October 1670, A 2 1 67.

³ To Martin Fogel, a professor of logic and metaphysics in Hamburg (14/24 January 1671.

⁴ G VII 16, G III 216.

⁵ *On universal synthesis and analysis, or the art of discovery and judgment*, L 229-234, G VII 292-298 (presumably about 1679). On Kircher’s *Ars magna sciendi sive combinatoria* Leibniz says: “I hoped to find similar matters discussed in it, but when it did appear later, I found that it had merely revived the Lullian art or something similar to it but that the other had not even dreamed of the true analysis of human thoughts” (L 230).

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sense that are enumerated, but not defined, by Wilkins (cf. 4.3.5). This list, and the numerous other collections of definitions Leibniz was to produce in later years, will be discussed in more detail below (cf. 5.5.2). Leibniz had not advanced until halfway the second genus when he broke off the work, possibly because of the preparations for his journey to Paris (A 6 2 487).

In the letters just quoted, Leibniz does not explain why he considered Wilkins's character and language to be of little use, but this was no doubt because he had developed a highly ambitious view on the purpose and use of a philosophical language. This appears from various later sources to be discussed below. Here it may be noted that since Leibniz had become acquainted with the *Essay*, he described his own plan no longer as that of producing solely a 'polygraphy' or 'universal writing', but as a 'writing, or language'. The idea of creating also a spoken language was probably inspired by Wilkins's example (more on this topic below, 5.3.8).

In March of 1672, Leibniz arrived in Paris with the purpose of explaining his Egyptian plan in person, but as the political situation had rapidly changed, he never got down to this. However, Leibniz enjoyed the intellectually stimulating atmosphere he found in Paris, and he started to seriously study mathematics. In January, 1673, he participated in a diplomatic mission to London, where Oldenburg introduced him to leading members of the Royal Society. Since Wilkins had died on 19 November 1672, Leibniz was only a few months late for a personal meeting with Wilkins. At one of the meetings of the Royal Society, Leibniz showed his calculating machine, which he had good reason to be rather proud of¹. Before he had to leave in March, he bought all the books he could afford, and among these was Dalgarno's *Ars Signorum*. It appears from the annotations Leibniz made in the book, that he read it very attentively. His comments are particularly interesting for a comparison of his views with those of Dalgarno, a topic which will be discussed more fully below (5.6.2). Here it will suffice to mention a note he pasted at the front of his copy of *Ars Signorum*. In this note he expresses his opinion on both Wilkins's and Dalgarno's philosophical languages, contrasting them with the project he envisages himself. After stating that Dalgarno's language is a first sketch of an invention which was later perfected by Wilkins, Leibniz says:

But as I have indicated personally to Robert Boyle and Henry Oldenburg, it seems that these excellent men [i.e. Dalgarno and Wilkins] have not completely understood the magnitude or the true use of the project. For their language, or writing, only accomplishes that people who speak different languages can easily communicate: but the true Real Characteristic, as I conceive it, must be reckoned among the most effective instruments of the human mind, as it will have the greatest power for invention, retention and judgment. For it will achieve in every subject matter, what arithmetical and algebraical characters do in

¹ Hofmann 1974:24-25. On January 22nd 1673, Hooke noted in his diary: "Libnitius shewd Arithmetical engine" (Robinson and Adams (eds.) 1935:23).

mathematics. And the experts know how great their power is and how admirable their use (A 6 3 170)

Leibniz never changed this opinion on Dalgarno and Wilkins (cf. 5.6). For present purposes, the most important thing is what Leibniz says about his own conception of what he now calls, possibly prompted by Wilkins's use of the term 'real character', a 'Characteristica Realis'. He indicates that his own primary concern is the creation of a symbolism which will improve the functioning of the mind. It appears from the same note that when Leibniz discussed his plans with Oldenburg and Boyle in person, these men apparently thought that the plans needed some clarification, for Leibniz adds that he started working on a tract exclusively devoted to this subject, "at the request of the most distinguished men of the Royal Society". A tract of this kind has not been preserved, but what was probably to be its substance is contained in a letter to Oldenburg which Leibniz wrote when he was back in Paris. It is doubtful whether it was ever sent¹. In this letter he dwells upon the prodigious advantages that he is convinced will flow from the philosophical language that he envisages.

5.3.2 An amazing invention

Writing to Oldenburg, Leibniz first sets his own plan apart from anything that has been tried or accomplished in this area by others. He emphasizes:

I have a notion of this which widely differs from that of those who wanted to institute some universal writing following the example of the Chinese, which everyone would understand in his own language, or also from those who have strived for a philosophical language that would lack ambiguities and anomalies. And yet what I desire will also have to manifest these characteristics, but it has to contain something greater too and it will surpass the simple uses of a language or a writing in infinite ways; indeed I think that if it will once be possible for men to have the benefit of the thing we wish, everyone will consent that it belongs to the principal benefits that may befall human kind. For nothing greater can happen to men than the perfection of their mental functions (A 2 1 239)

Thus Leibniz carefully distinguishes between universal writing systems on the one hand, and the more ambitious project of a philosophical language as conceived by Wilkins and Dalgarno on the other hand. But he is convinced that a sharp borderline separates both types of projects from his own plan. Nonetheless, he claims that the language he himself is aiming to construct will also have the advantages both of a universally legible writing and of a language free from ambiguities and anomalies. This is however a minor advantage com-

¹ When exactly the letter was written is also uncertain, but this was presumably some time in 1673 (A 2 1 xxix).

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pared to the principal use of what he calls on this occasion his ‘rational writing’, ‘this characteristic’, and the ‘lingua realis’¹. This principal use is that it will be ‘the chief instrument of reason’.

This instrument will provide a ‘thread of thinking’ (*meditandi filum*), that is, the symbols used will be a sensible and as it were mechanical guide for the mind, both preventing it from going astray and leading it toward new insights. Examples of such excellent symbols are those used in arithmetic and algebra. If similar symbols will be invented which are applicable outside mathematics, covering the whole range of human knowledge, this will result in a writing or language² having sensational features. Though difficult to create, this language will be very easy to learn. Once it has been learned, it will be almost impossible to forget it, and if this should nevertheless happen, the knowledge of this language will be easily retrieved. Speakers of this language will at the same time have an encyclopedia ready at their disposal, which furnishes them with arguments on any subject they want to speak or write about. For the name of each thing will be the key to everything that reasonably might be said about it, thought about it, or done with it. At this point, Leibniz admits that such names must necessarily reflect the limited scope of human knowledge:

It is evident that we cannot now deduce from the name we assign to gold, for example, certain chemical properties that are concealed by time and accident, until we have found enough properties to determine the remaining ones. Only God can assign names to things by a primary intuition of this kind. But the name that will be assigned to gold in this language, will be the key to all those things that can humanly be known about gold, that is, by reason and order, while it will also be apparent from this name, which experiments should be undertaken with reason (A 2 1 240)

He further states that a single thing will have various names. The same thing will often be called by one name by the common public, and by another by the learned, “whithout the genius of this universal language being affected”, and both expressing the nature of that thing. The existence of synonyms of this kind is advantageous, because the more names of a thing one has memorized, the more one will be able to say about it.

Another remarkable characteristic of this language concerns its structure. Avoiding syntactic errors will be a sufficient guarantee that mistakes in judgment are avoided as well. Thus the less talented will be able to compensate a natural defect by means of this art. Anyone following the grammatical precepts of this language will be able to recognize mistaken judgments with ease, for these will reveal themselves as syntactic errors. As a consequence, nobody will be able to write in this language about things one does not understand. If

¹ On terminology, see 5.3.7 below.

² It does not matter, says Leibniz, whether we want to establish a universal writing or a language, for it is easy to produce either one of them by the same efforts (A 2 1 240).

one tries to do this, it will be either apparent both to the reader and the writer that the result is nonsense, or one will learn while writing, as writing and thinking will go hand in hand. If this language will be in use, reasoning will be as easy as speaking, and it will often happen that speakers are surprised and delighted by what they find themselves saying, as “by the very power of the phrases the tongue runs ahead of the mind” (A 2 1 241). “I seem to be speaking of an astonishing grammar”, Leibniz adds, but it is to be noted that this grammar “is truly philosophical, and not to be separated from logic” (A 2 1 241).

These amazing features may be viewed as a specification of how the philosophical language assists the mind in performing the three tasks mentioned in the note pasted in the copy of *Ars Signorum*: invention, retention, and judgment. ‘Retention’ traditionally belonged to rhetoric, and Leibniz in his *Nova Methodus* (1667) added the art of memory to the traditional logical subjects of invention and judgment, so as to enumerate “the three disciplines concerned with typically human ‘habits’” (Dascal 1987:36). As to invention, the language will help in finding arguments and discovering new truths. Retention, or memory, is facilitated as the language is easy to learn and difficult to forget. And judgment is made reliable and certain so that even the most ignorant will be able to detect fallacies without effort. Given these wonderful qualities, Leibniz asserts, it is clear that this language will immensely enlarge the capacities of the human mind. Using a simile he was to invoke very frequently in this context, he claims that the language will assist the mind even more effectively than the eye is helped by the microscope or the telescope. For this reason, the use of this language will have tremendous effects on learning. The sciences will grow so rapidly, that “years will be like centuries” (A 2 1 241).

In the letter to Oldenburg, Leibniz, as noted, calls his philosophical language a ‘thread of thinking’ because of its capacity to direct judgment and to enhance invention. In other writings he frequently uses the same metaphor, sometimes using the phrase ‘a thread of Ariadne’ to illustrate his belief that the philosophical language will offer a mechanical guide in treating any subject matter. Rather than having to rely on vague methodological precepts, the mind will be conducted by a palpable thread, so that it becomes infallible¹. The quest for truth, which is hazardous and laborious without such assistance, will be replaced by regulated manipulations of symbols which provide certainty in an effortless way: whether a proposition is true will be decidable on account of the form its expression in the philosophical language takes. At various points², Leibniz mentions a consequence of this which he obviously found very important: the philosophical language might be a judge in

¹ E.g. A 2 1 271: “L’esprit humain ne sçauroit aller fort avant en raisonnant, sans se servir des caracteres: et les caracteres bien choisis ont cela de merveilleux, qu’ils laissent pour ainsi dire les marques des pensées sur le papier; et nous donnent le moyen d’estre infallibles”.

² G VII 57, G VII 64, G VII 125, G VII 168, C 285 = VE 929; VE 144.

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controversies. As this language will reduce everything to a calculus, and fallacies will be easily detectable errors in calculation, all disagreement can be settled “so that it will no longer be necessary to deal with the matter by screaming, but one can say to the other: let’s calculate” (G VII 125). It will suffice to express both antagonistic opinions in this language to see which (if any) is true. For lack of sufficient data, it might happen that no definite solution arises, but in that case at least the probability of each can be weighed. And it will become clear which data must be provided to obtain certainty.

However, in one fragment Leibniz states that there is one particular type of controversy which cannot be settled by means of the philosophical language, namely those which concern theology. The terms used to describe religious mysteries, he explains, although belonging to ordinary language, acquire a more eminent sense if used in that context, and cannot be analyzed in the usual way. Only the church can decide how to properly combine them (C 284 = VE 929). This remark occurs in an unpublished manuscript that was probably written between 1685 and 1687¹, and is in contrast with a self-confident statement Leibniz made in a letter written in 1679, in which he says that wherever his new ‘characteristic or language’ will be received “there will be no difficulty in establishing the true religion”. He also adds that he cannot submit to the church of Rome, “since I should otherwise be obliged to admit things which my demonstrations, and especially this characteristic, would refute” (L 262). At that time, he was clearly convinced that the philosophical language could profitably be applied to religious controversies as well.

It seems that Leibniz’s far-reaching claims concerning the use of his philosophical language strain credibility, but he was convinced that his proposals were wholly realistic. He based this conviction on the observation that in some limited fields his ideal was already realized, at least to a certain degree. As has been indicated, he believed that the symbols used in arithmetic and algebra have the properties required to improve the operations of the mind. It is precisely in this respect that they differ from Egyptian hieroglyphics, Chinese characters and chemical symbols, which had become standard examples of ‘real characters’ (cf. 2.3.1).

Illustrating the excellence of one kind of symbolic representation as compared to another, Leibniz mentions the following examples in his letter to Oldenburg:

there is as much difference between this [characteristic] and other ones, as there is between (for example) the mathematical notation of Vieta and Herigon, or between Q. and a^2 , or between $\frac{y^2+y}{2}$ and $\square$, both of which can represent a triangular number, or finally between the characters of the Arithmeticians and those of the astrologers (A 2 1 239)

¹ VE 926.

The mathematical notation introduced by Viète (1540-1603), who like Leibniz was a lawyer and a courtier¹, was regarded as a major invention by many 17th-century scholars. Viète's use of letters to designate both known and unknown quantities marked the beginning of algebra, which had a massive impact on the development of mathematics. Descartes once said that he began where Viète had left off². A concomitant result was an awareness of the great importance that the choice of a notational system may have for science and thought in general. For Leibniz, this awareness was central to his views on language, but the insight by itself is by no means idiosyncratic. It is significant that Leibniz thought it was sufficient just to mention Viète's notation as opposed to that of Herigon in order to explain his intentions to Oldenburg. Pierre Hérigone was the author of a *Cursus mathematicus* in which he presented a notation purported to be 'real and universal', using rebus-like symbols such as '5<' for 'pentagon'³.

Leibniz's second example is an instance of Viète's notation, who replaced the common way of designating a square number 'A²' by 'Q', the first letter of 'Quadratum'⁴. The third example includes reference to 'a triangular number'. By this he means a number which is equal to the sum of a number of consecutive positive integers, beginning with 1. Thus 10 is a triangular number as it is equal to 1 + 2 + 3 + 4. Such numbers are called 'triangular' because these sums form a triangle when written like this:

1
1 + 2
1 + 2 + 3
1 + 2 + 3 + 4

The expression $\frac{y^2+y}{2}$ shows, as Leibniz already knew when he wrote *DAC*, an alternative way of calculating 1 + 2 + y-1 + y. Obviously, the triangular symbol $\triangle$ reveals nothing of this sort.

Leibniz explains the difference between the two kinds of symbols he opposes to each other by saying that the latter characters have been invented for abbreviation or communication, or even for secrecy, whereas the former "augment invention and direct judgment" (A 2 1 239). That is, they make the reasoning process more secure and lead to the discovery of new truths.

In numerous other writings, Leibniz restated and elaborated this point. Almost as often as he has occasion to talk about his ideal of a philosophical

¹ Kline 1972:261

² Kline 1972:280

³ Couturat 1901:82.

⁴ Struik 1967:94. It is unclear to me why Leibniz chose this particular instance, as I cannot see why this should be an improvement. Perhaps the replacement of numerical symbols by letters was considered to be so valuable that it was seen as an improvement wherever it was done. Struik 1967:103 notes that Descartes wrote *aa* for *a*², "though he has *a*³ for *aaa*".

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language, he adds that its realization amounts to finding symbols of the kind used in arithmetic and algebra for all fields of learning¹. It should be noted however, that although Leibniz considered algebraical symbols as a good specimen of what his general characteristic could accomplish, this only concerned the limited field of numbers. He often stated that the algebraical approach to geometry as developed by Viète and Descartes was infelicitous².

Arithmetical and algebraical symbols derive their potential for both invention and judgment from various characteristics. In Leibniz's view, none of these are restricted to mathematical symbols; other kinds of symbols may display them as well, be it usually to a smaller degree. First, signs in general have the capacity to fix the objects of our thought. This function is all-important, as the human mind is so weak that without the use of signs it is unable to carry out a prolonged reasoning of any kind. Our thoughts are often so vague and volatile that they must be made material and sensible:

the human mind could not advance in reasoning, without making use of characters (A 2 1 271)
characters will fix are thoughts, which are too vague and too volatile (...)
otherwise our mind could not get very far without getting lost (A 2 1 380-381)

Secondly, and related to this, a sensible mark may abbreviate thinking (as opposed to signs invented for abbreviating writing, mentioned above). It brings about that the mind does not need to distinctly conceive all aspects of a thing, as it can confine itself to considering the symbol referring to it. Further, the use of a formula may encompass all the intricacies involved in a problem, which may even be infinite, and so replace the effort of going through them all:

all theorems are nothing but 'tachygraphies' or abbreviations of thinking, and all the utility of words and characters consists in this, that the mind is exempted from distinctly thinking of things, and yet everything comes out correctly (C 256-257)

A third characteristic of symbolic systems is that they make the objects of our thought more manageable: the symbols designating them can be orderly displayed, so that is easy to survey all relevant aspects at a glance, 'uno obtutu'³. Leibniz summarizes the advantages of a well-chosen system of symbols as follows:

all our thoughts can be pictured, and as it were, fixed, abridged, and ordered; pictured to *others* in teaching them, *fixed* for ourselves in order to

¹ E.g. L 166, G VII 184, L 261, L 670, A 2 1 384.

² Cf. A 2 1 384-385; D 168; C 152; L 249-250.

³ Dascal 1987:44 lists a series of places where Leibniz uses this expression.

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remember them; *abridged* so that they may be reduced to a few; *ordered* so that all of them can be present in our thinking (L 193)

As mathematical symbols perform these functions in an excellent way, they enable what Leibniz calls ‘blind thought’. Already in *DAC*, he refers to this phenomenon:

we often grasp a number, however large, all at once in a kind of blind thought, namely, when we read figures on paper which not even the age of Methuselah would suffice to count explicitly (L 76)

A ‘blind thought’ thus appears to be a single intellectual act which might replace an effort of the imagination that would require an extremely long time. The thought is called ‘blind’ as it relieves the mind from having to look at the content of the thought. It suffices to consider the numerical symbol instead. Elsewhere, Leibniz explains this point as follows:

In order to examine a calculation with numbers, for example if 1677 times 365 [makes] 612.105, one would never be done if one would have to make 365 little heaps, put 1677 little stones on each of them, and count them all in order to know if the said number is found. Therefore one contents oneself by doing it with the characters on paper by means of the theorem of casting off nines, or some other proof (C 154-155)

The ‘theorem of casting off nines’ tells us that a number is divisible by nine if the sum of the numbers denoted by the individual digits occurring in its numerical expression can be divided by nine (thus we know that 2,457 is divisible by 9 as $2 + 4 + 5 + 7 = 18$). This rule is often invoked by Leibniz (e.g. L 231) to illustrate the great advantage of mathematical symbols over signs which merely picture their referents. For it shows that a well-chosen system of symbols ensures that one may reach reliable conclusions about things merely by considering symbols representing them, without having recourse to these represented things.

Leibniz does not assume a sharp dichotomy of good and bad symbolic systems. Even in the area of arithmetic there are various degrees of perfection. On the hand, Arabic numerals are much better than Roman ones, as the former “better express the genesis of numbers”. Consequently, “we calculate much more easily than the Romans did either with pens or in their heads” (L 193). On the other hand, the decimal system is inferior to the binary one. Leibniz asserts that the latter, unlike the former, enables us to prove everything that can be said about numbers on the basis of the characters used to represent them. For example, that 3 times 3 makes 9 is a fact which does not follow from the symbols 3 and 9. But using the binary system, this fact can be read off from the expressions 11 (three) and 1001 (nine), if the multiplication is executed step by step. For this reason, the binary system approaches the ideal sign system closely. It exemplifies the rule that “characters are more perfect,

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as they are more self-sufficient (autarkeis), so that all consequences can be drawn from them” (C 284-285).

Leibniz’s ideas on the importance of a proper notation were extremely fruitful. It inspired him to make a large number of mathematical innovations, many of which are now historical curiosities. But the development of the infinitesimal calculus belongs here too, and this is still regarded as a major event in the history of mathematics. This invention reinforced Leibniz’s conviction that solving complex mathematical problems is greatly facilitated if the proper symbolic notation to handle them can be found.

In summary, Leibniz claims that his philosophical language will provide all the benefits that earlier proponents of artificial language schemes had claimed for their projects: the language will be easy to learn, and it will be a convenient international auxiliary language. In various other writings he claims an additional advantage: just like other language planners, he assures that the philosophical language will be an excellent instrument for the spreading of the true religion¹. But all this, Leibniz asserts, is of minor importance compared to the principal use of his language, which renders it far superior to all the schemes that have been proposed previously, namely that it will be the most powerful instrument for thinking available to mankind. This instrument is conceived as a completely formalized language. Leibniz’s optimism led him to believe that one could create a language with enough expressive power to encompass the whole of human knowledge, while every well-formed expression would be either provable or provide clues concerning the probability of the statement expressed by it.

5.3.3 The calculus and the primitives

On the face of it, Leibniz’s plans as described in the previous section differ drastically from the project described in *DAC*. In the latter tract, a universal writing was proposed, which could be used as an international medium of communication. At the same time it would provide ‘a fundamental knowledge of all things’, being a corollary of a revised theory of categories, in which all concepts are ordered according to the number of primitive notions they contain. Further, this writing was to consist of picture-like symbols, resembling Egyptian hieroglyphics and Chinese characters. By contrast, in the letter to Oldenburg and the other letters and fragments quoted in 5.3.2 above, all the emphasis is on the function of the philosophical language as an instrument for thinking. The point is to find symbols which will accomplish in everything what the symbols of arithmetic and algebra do in mathematics, that is, according to Leibniz, to render all statements susceptible of formal proof, at least as far as this is possible on the basis of what is given. And the symbols bringing about this principal benefit are expressly opposed to hieroglyphics and Chinese characters. In other words, the plan as expounded in *DAC* is

¹ L 225, L 262.

mainly concerned with the material, semantic side of the project, whereas the texts quoted above emphasize the formal, syntactic side.

To Leibniz's mind however there is no contrast between the plan of *DAC* and that explained in later writings. As regards hieroglyphics and Chinese characters, he had already indicated in *DAC* that his own symbols, were going to be superior to characters of that type, since they would be reduced to an alphabet. More importantly, he always remained convinced that the great power of the symbolic system he wanted to create depends on the fact that it accurately reflects the structure of our thoughts. And this implies that it is based on an analysis of thoughts into its simple elements, according to the project outlined in *DAC*. For this reason, Leibniz himself regarded his plans as described in the letter to Oldenburg as a direct development of his early views:

I have been engaged upon this matter from the age of eighteen onward and I have been confirmed in the undertaking by daily experiments, however crude the first thoughts were (A 2 1 240)

Thus in the statements expressing the more mature views one may discern at most a change of emphasis with respect to the plan in *DAC*: the grandiose advantages of a well-designed symbolic system are stressed, and the idea that the basic symbols should be a kind of pictures is abandoned. In a number of tentative sketches, numeric symbols are used instead, but this is only pending a definitive decision (cf. 5.5.1). However, the actual shape of the individual symbols is of relatively little importance. In Leibniz's view, the power of a symbolism does not reside in the individual symbols, but in the systematical relations the symbols have to each other and to the things they designate. Hence, Leibniz's central concern in his efforts to construct a philosophical language is to establish a perfect conformity between its semantic and syntactic aspects.

One of the texts in which Leibniz makes this very clear was written some time between 1678 and 1682, and was published for the first time in 1982 in the *Vorausedition*, the editors of which have given it the title *De Characteristica* (VE 193-196)¹. Starting out with a characterization of what a primitive notion is, Leibniz explains that the notion of a thing that is known without other intermediate notions can be considered to be primitive. For example, the notion 'gold-colour' can be held to be primitive, for there is no other reason why something is distinguished as being gold-coloured than that the thing is simply glanced at by the eye. By contrast, the notion of gold is not primitive, for gold is recognized by colour, weight and other qualities. Next Leibniz states: "The alphabet of human thoughts is a catalogue of primitive notions, or of those we cannot render clearer by any definitions" (VE 193). The formulation suggests that the alphabet consists of notions rather than of sym-

¹ Couturat 1903:435 prints one sentence. The close link between the alphabet of human thoughts and the formal language is also clearly stated in G VII 204-207 (D 181-184).

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bols designating them. However, this is probably a consequence of a careless manner of expression which is typical of many of Leibniz's writings, especially his unpublished notes. For in the following sentence he refers to notions which are expressed rather than contained in the alphabet. On the basis of the definition of a primitive notion Leibniz uses in this particular context¹ (cf. 5.3.4), he infers that primitive notions are infinite, because sensible qualities such as colours also are. This does not present a problem for the alphabet, since only a selection of primitives needs to be represented, while the others may be expressed 'by some relation' to the selected ones. Further, only those primitive notions which are connected with sensible qualities are numerous; but "in qualities perceived by the inner sense so to speak, or which are common to various senses, primitive notions are few". This shows that Leibniz likewise does not bother to express the distinction between qualities in things on the one hand, and notions of these qualities on the other hand.

The great use of the alphabet is explained by means of an example with strong Platonic overtones. Since an intelligent schoolboy, Leibniz says, is able to understand everything his teacher tells him about various disciplines without his teacher having recourse to new empirical evidence the boy does not yet know, it follows that "the seeds of all those notions are already in him, and that out of those few notions that the boy already has, those infinite ones which the teacher explains are necessarily composed" (VE 194). Now if one brings together in a catalogue the primitive notions that this boy has, and assigns to each of these a character of some kind, then all the notions that are composed of these can be designated by words composed of these characters. As most sciences can be explained to the boy, "it follows that the ideas contained in most sciences can be designated by this kind of language or character" (VE 194). An excellent quality of this symbolism is that "the mutual relations among the characters will be the same as those among the notions". Kneale 1966 has argued that what he assumes that Leibniz means by a statement similar to this one² cannot be right, as the relations between the symbols (e.g. being left to another symbol) are of an essentially different type from the relations between the things signified. It seems that Leibniz's statements on this matter should not be taken too literally, and that all he means by saying that the symbols have the same relations among each other as the ideas signified³, is that each of the ingredients of the ideas should be

¹ In the *Nova Methodus* (1667) he likewise equates 'simple terms' with 'sensible qualities' (L 89).

² Kneale quotes the following passage: "The art of symbolism (*ars characteristica*) is the art of so forming and ordering symbols that they reproduce (*referant*) thoughts, or have the same relations among themselves that thoughts have among themselves" (1966:207).

³ That Leibniz refers to relations between ideas rather than relations between things is possibly relevant in this context. This point has been disregarded by Kneale, who treats Leibniz's argument as though it unambiguously concerned correspondences between language and the world.

represented by an element of the symbol designating the idea, without considering specific relations among the symbols. This is confirmed by the example by means of which Leibniz illustrates his intention. In ordinary languages, he says, the symbols do not have the desired quality:

for although for example the name of goldsmith is composed of the name of gold and of smith, because the notion of him is composed of these two as well, yet the name of gold is not composed of letters designating metallity, gold-colouredness and weight, of which the notion of gold consists, nor is the name of smith composed of letters signifying forming artisan (VE 194)

If Leibniz in fact thought that simple concatenation of the symbols representing the ingredients of an idea would result in a complex symbol representing the whole idea, this very example seems to show that this is erroneous. For an unordered list of symbols representing ‘metal’, ‘gold-colour’ etc., does not yield a complex symbol whose meaning can without further definition be determined to be ‘goldsmith’. Many of Dalgarno’s artificial words provide clear examples of the same kind of indeterminacy (cf. 3.4.7).

Leibniz goes on to argue that everything that is true about the things that are expressible in the language obtained by assigning characters to the primitive notions “can be demonstrated by a calculus alone, or by merely manipulating the characters according to a certain form, without any effort of the imagination or the mind, in a word just as it is done in arithmetic and algebra” (VE 195). This shows that Leibniz saw the analysis of knowledge resulting in a catalogue of simple notions on the one hand, and the possibility of giving formal proof of statements by manipulating symbols as in mathematics on the other hand, as intimately connected. He further explains this connection as follows:

Suppose the characters of arbitrary primitive notions are *a*, *b*, *c*, *d* etc. And suppose some proposition is to be proved of which the subject and the predicate are resolved into some notions consisting of these primitive ones. I assert that this proposition can be demonstrated without using any other notions than these: *a*, *b*, *c*, *d* etc. and those that are composed of these, and I say that the proposition can be proved by a mere calculus. The character of the subject is namely resolved until the primitive characters are reached, and the character of the predicate likewise; it is necessary if the proposition is universal that all the characters of the predicate are contained in the characters of the subject. For if the predicate inheres in the subject (for example if uniformity inheres in every circle), it is necessary that whatever is conceived in the predicate can also be conceived in the subject: for everything which is conceived in the predicate will be contained by the primitive notions which are conceived in it, therefore all these primitive notions can also be conceived in the subject, or are contained among the primitive notions of the subject ...

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Therefore if someone is sure to have encompassed most of the more customary primitive notions by the Alphabet, it is therefore certain that most of the truths one may need can be proved by a mere calculus (VE 195-196).

Clearly, what Leibniz understands by a ‘calculus’ in this context has a more general application than an arithmetical or algebraical algorithm has. It closely resembles what today is called a decision procedure, that is, a mechanical means by which the truth or falsity of any given statement can be established. In Leibniz’s view, the existence of such a calculus depends essentially on the alphabet of human thoughts, which is, or represents, a catalogue of simple notions. The ideal of a formal language is thus inextricably linked with the analysis and representation of knowledge. In other words, the syntactic and semantic aspects of the project are two sides of the same coin. The two following sections explore some of the many problems and doctrines connected to each of these aspects.

5.3.4 The elusive nature of the primitives

Leibniz’s conviction that all our knowledge is ultimately built up out of a set of primitive notions, as noted (5.2.6), originated from his study of the logical tradition. In later work, he sought to justify this conceptual atomism on independent grounds. He characterizes the primitive notions in various ways, which he apparently assumed to be equivalent. First, a primitive notion is simple, that is, it cannot be resolved into constituent parts. For this reason, a primitive notion cannot be defined. Alternatively, a primitive notion is said to be conceived through itself. That such notions must exist, seemed inevitable in view of the nature of definitions. To analyze a concept, in Leibniz’s view, is to show, by means of a definition, of what other concepts it consists. These concepts can in turn be analyzed or defined in terms of still other concepts and so on. But in the end, Leibniz felt, we must necessarily reach the point where analysis is no longer possible. Otherwise, he apparently assumed, the whole edifice of knowledge would collapse for want of a foundation. According to Leibniz’s objectivist approach in epistemology, there is no distinction between having a distinct concept of a thing and being able to produce a definition of that thing. Accordingly, non-primitive concepts are interchangeable with the ingredients into which they can be decomposed. Further, if a concept contains or involves¹ another concept, the former is conceived through the latter. Thus, the concept *man* is not conceived through itself, but through the concepts it involves, such as *animal* and *rational*. Hence Leibniz’s equation of an indefinable concept with a concept which is conceived through itself. Now if all concepts would be conceived through others, nothing would be conceived at all:

¹ For the distinction between ‘contain’ and ‘involve’ cf. D 183: a character is contained in another if it is clearly a part of it; it is involved in another if it can be shown through the substitution of equipollents to be contained therein.

For what is conceived only through others will be conceived in so far as those others are conceived, and so on; so that we only may be said to conceive something in actuality when we arrive at those things which are conceived through themselves. I will illustrate this by a simile. I give you a hundred crowns, to be received from Titus; Titus will send you to Caius, Caius to Maevius; but if you are perpetually sent on in this way you will never be said to have received anything (C 430, PM 1-2)

Leibniz recognized various problems concerning the primitives. One of these problems concerned the internal consistency of the very concept ‘primitive notion’. In a paper called *De iis quae per se concipiuntur* obviously a personal note which shows him grappling unsuccessfully with the problem, Leibniz doubts whether we can be consistently said to conceive something through itself at all. He first notes that a pure difference between two distinct real things is inconceivable, because the notion of this difference cannot contain ‘reality’, for both things do not differ in that respect, both being real. But ‘reality’ is a part of everything that is thought: “since everything which is conceived by us are thinkable real things [realia cogitabilia] (for reality is nothing but thinkability), we must not postulate some ultimate difference, in which there is no reality or thinkability: for we suppose that it is in all things” (G I 272). The text continues:

But from this it will further follow, that nothing which is most simple is thought by us: for it has in any case two things: thinkability and the species of thinkability, namely something common, and something specific of its own [proprium]. But in this proprium is again thinkability: otherwise it is not thought. Therefore it will follow from this that these two are not to be separated, and that they are only thought by us in one act (G I 272)

Leibniz’s point seems to be that all concepts must contain thinkability, otherwise they could not be thought. From this it follows that each concept can either be further analyzed, namely into thinkability and some other content, or cease to be thinkable. Therefore, an unanalyzable, primitive concept cannot be thought. If this is really Leibniz’s point, the problem is obviously caused by his supposing that anything that can be predicated of a concept is contained in that concept. This supposition has rightly been criticized by modern scholars¹. Perhaps it came as a natural consequence of Leibniz’s belief that each composite concept coincides with, and can be replaced by, its component parts without affecting truth. (this is the famous substitutivity principle (cf. 5.3.5)). This may have led him into thinking that anything that may enter into the definition of a concept is contained in that concept. Thus, just as for example the concepts *man* and *ape* have in common that both contain the concept *animal*, they also agree in containing the concept *possible*, since both

¹ Kauppi 1960:110.

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are possible concepts. That a consideration of this kind may have been at the background emerges from another passage, in which Leibniz explains his problem concerning the primitive notions once again:

I have often thought about *protonoemata simpliciter* or those that are conceived through themselves (...) where it can be asked, first, whether there really are any *protonoemata*, or whether there will be a subdivision in *infinitem*, as in other divisions, next, when it is posited that some exist (for it seems that nothing is conceived at all if nothing is conceived through itself) the question is whether there is one or several. If there is just one, how can there be so many notions composed out of it? If there are several, they will have necessarily something in common such as possibility; there will also be certain relations among them, otherwise they cannot come together to form composite notions. How then are these notions simple? Thus wherever we turn we run into difficulties (To *Vagetius*, December 1679, A 2 1 497)

It may well be that Leibniz later resolved this particular puzzle about the primitive concepts. As indicated, the only thing he needs is a distinction between what is true about a concept and what is contained in a concept. And his identification of a class of what he calls ‘reflexive’ propositions seems to provide him with just this. Clearly drawing on the medieval distinction between ‘formal’ and ‘material supposition’ (e.g. PM 94-95), Leibniz distinguishes direct contexts from reflexive ones. In the latter, the very manner of conceiving a thing is the object of our thought, just as words can be the subject matter of discourse. As Leibniz points out on various occasions, in such cases the substitutivity principle is not applicable¹. Now propositions stating that a concept is, e.g., thinkable, or simple, or possible, seem to belong fairly obviously to the class of reflexive propositions. Once this has been acknowledged, it is easy to give up any reason one might have for supposing that every concept that is thinkable must itself contain the concept of thinkability. One vague indication that Leibniz eventually took this step is an obscure note saying that “simple notions cannot be understood without additional propositions, that is, such as are called reflexive”².

A second problem concerns the compatibility of the primitive notions. In accordance with a long-standing metaphysical tradition, Leibniz connected existence, or being, with positiveness, and negation with limitation or privation, the absence of being. Within this framework, it was natural to suppose that on the level of primitive notions there could be no negation, since negation necessarily entails reference to something positive and hence can only occur on the level of composite notions. In 1676, Leibniz used the thesis that all

¹ For a clear exposition of this point, see Mates 1986:130-132. Some relevant texts: VE 185 (S 475); C 402-403 (PM 94-95); C 261; C 367 (P 56-57); A6.6.287.

² Grua 537. However, this text was written in April 1679, whereas the letter quoted in the text (A 2 1 497), in which the problems concerning the primitives are summarized, dates from December of that year.

simple qualities are compatible with each other as the basis of his proof for the consistency of the concept of God¹. This consistency he maintained to be both a necessary and sufficient condition for God's existence. A complication in trying to make sense of this kind of metaphysical speculation is that Leibniz in these contexts hardly seems to distinguish between a concept of a thing and the thing itself. In any case, it appears that Leibniz assumes a structural correspondence between thought and reality in that he considers them both to result from simples and their combination. In a letter written in 1678, he says:

The foundation of my characteristic is also that of the proof of the existence of God. For the simple thoughts are the elements of the characteristic, and the simple forms are the sources of things. I maintain, then, that all simple forms are compatible with each other (A 2 1 437-438)

A problem with the compatibility of simples, whether forms or concepts, is that it is hard to explain how any combination of simples could be impossible. And as all concepts ultimately originate from such combinations, the existence of inconsistent concepts, as well as the truth of negative propositions, remained inexplicable. It is not quite clear whether and how Leibniz solved this problem. In a notoriously puzzling text he speculates that there might be only one simple concept, namely God or pure being, and that besides this there is 'nothing, or privation'. Just as in the binary system all numbers are written by means of 1 and 0, so "everything comes from pure being and from nothing" (PM 3), although we do not know in what way. The simile with binary arithmetic thus provided Leibniz with a solution to the problem he mentioned in the letter quoted above (To Vaquetius, A 2 1 497): how can so many notions arise from just one simple notion? But if he considered this solution to be satisfactory at all, it is quite incompatible with the way in which he usually views the composition of concepts. The binary notation makes essential use of the position of individual digits within a larger expression, and tokens of the same symbol occur more than once in most cases. If concepts are composed in a similar way out of 'being' and 'nothing', this entails that the one simple concept 'being' is usually contained more than once in a composite concept, and that the order in which these occurrences are mixed with 'nothing' is essential. This clashes with the assumption Leibniz made in his logical calculi that idempotency and commutativity hold for composite concepts (that is, that, e.g., AA is equivalent to A, and AB is equivalent to BA²). Further, it is clear that in spite of the metaphysical considerations suggesting the contrary, the binary model in fact amounts to using two primitives rather than one. Leibniz not surprisingly adds that all this is beyond the scope of human understanding (PM 3).

¹ G VII 261; Couturat 1901:194-195.

² E.g. P 90 = C 235 (1690)

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A remark in the *New Essays*¹ may be taken to show that Leibniz eventually abandoned the view that negation could be no primitive notion. Against Locke's observation that 'negative or privative words', such as 'nothing' and 'ignorance', do not signify an idea, but the absence of a positive idea, he holds that there are privative ideas, as well as negative truths, because "the act of negating is positive"². However, if Leibniz regarded negation as a genuine concept at all, it had a very special status. In his logical calculi, negation naturally played a central part, although it took him some time to realize that it should: his early sketches significantly have difficulties in accounting for the truth of negative statements³. From 1679 onward, his many logical studies assign an all-important role to the distinction between positive and negative terms, and to negation in general. And of course, the principle Leibniz often states to be basic for all reasoning, the principle of contradiction⁴, depends essentially on the notion of negation. But negation is obviously not an ordinary concept; in the logical calculi it functions as a constant. Its combination with some concept ('non-A') is, understandably, treated quite differently from the way a combination of two ordinary concepts ('AB') is. For instance, idempotency does not hold: 'non-non-A' is not equivalent to 'non-A'⁵. Negation, then, is rather an operation on concepts than an independent concept in its own right. Although this seems to be perfectly sound and straightforward, the recognition that such operators exist amounts to a modification of the view, to which Leibniz initially adhered, that all knowledge ultimately consists of the unqualified combination of primitive concepts.

The way Leibniz dealt with the problem of the primitives is typical of his approach to many other topics as well. Starting from a few basic assumptions he is quick in perceiving what is problematical about them. Rather than giving up the assumptions, he explores any pathway that might lead to a solution. This often occasions him to articulate views that are irreconcilable with beliefs he expresses elsewhere, in different contexts. In many cases, no definitive solutions are reached, but the initial assumptions are seldom totally given up, although they are often mitigated or otherwise modified. Concerning the primitives, Leibniz's initial optimism displayed in *DAC*, where he suggests that it is only for lack of time that his extemporaneous essay does not list the 'first terms simpliciter' (cf. 5.2.5), soon disappeared. In a text which was presumably written in 1679 he says: "An analysis of concepts by which we are enabled to arrive at primitive notions, i.e. at those which are conceived through themselves, does not seem to be enough in the power of man"⁶.

¹ *Nouveaux essais sur l'entendement humain (NE)*, written 1703-1704, contains a detailed discussion of Locke's *An essay concerning human understanding* (1689). Cf. 5.4.3.

² *NE* III I 4.

³ Kauppi 1960:175 ff.

⁴ L 646. Cf. Couturat 1901:214ff.; Parkinson 1966:xxxiii; Mates 1986:152ff.

⁵ E.g. P 86 = C 397 (1686).

⁶ C 514, PM 8. I have added 'enough' so as to render 'satis' which Parkinson leaves untranslated. The original reads: "Non videtur satis in potestate humana esse

However, in later writings he does not altogether exclude the possibility that we may at times arrive at the primitives¹. In an article published in 1684² he says he is not sure that an example of a completely analyzed concept can be given by man, although “our concept of numbers approaches it closely” (L 292)³. And the *Discourse on Metaphysics* (1686) contains the remark that intuitive knowledge, i.e. “when my mind understands distinctly and at the same time all the primitive ingredients of a notion”, is ‘very rare’⁴. Apart from the question to what extent the primitives may be known, Leibniz never gave up his conviction that these notions must exist. In the *Monadology* of 1714 he simply declares that there are ‘simple ideas which cannot be defined’ (L 646).

It seems that the difficulties the human mind usually, or always, encounters in carrying the analysis of concepts far enough to reach the primitives threatens the quality of all our knowledge, since this ultimately derives from the primitives. Leibniz endorses this conclusion to some extent, in that he often emphasizes that only God has a complete and perfect knowledge of everything, whereas we humans for the most part know things confusedly and incompletely⁵. However, the elusive nature of the primitives does not imply that there is nothing we know for certain. This is because it is not always necessary to carry the analysis of concepts through until the primitives are reached. We are often capable of analyzing the subject and the predicate of a proposition sufficiently far to be able to establish its truth. For this reason, after observing that a complete analysis of concepts is ‘not enough in human power’, Leibniz adds: “But the analysis of truths is more in human

Analysis conceptuum, ut scilicet possimus pervenire ad notiones primitivas, seu ad ea quae per se concipiuntur”.

¹ Burkhardt’s claim to the contrary (1980:171, 263) is based, among other things, on what Leibniz says in a letter to Foucher (1687, G I 392). But he says there that we must not assume that analysis down to the primitives is always possible, which is obviously not equivalent to saying that we must assume that such an analysis is never possible.

² *Meditationes de Cognitione, Veritate et Ideis*, L 291-295. Cf. 5.4.4.

³ Cf. C 187: we only have a negative, and provisional criterion for deciding whether a given notion is primitive or not, for we know when a notion is not primitive, namely when it occurs in a proposition which is necessarily true but not proved. In such cases we are certain that the notion can be defined, i.e. resolved into simpler ones. If the process of definition is continued, we arrive at the most simple ideas. Leibniz adds that he does not believe that this process might go on infinitely. Cf. also G II 227 (L 525), written 1701: “It will be difficult to give examples of a concept from which no representative mark can be removed. Primitive concepts lie concealed in derivative ones but are hard to distinguish in them”.

⁴ *Discourse on Metaphysics* § 24, PM 33, L 319. Parkinson (1966:xxxv) says it is surprising that “as late as the early months of 1686” Leibniz should think that this is possible, since “he had decided that human beings cannot reduce derivative concepts to those that are absolutely primary”. Perhaps this decision was not as final as Parkinson apparently assumes, if it was unambiguously made at all.

⁵ E.g. P 65, 77.

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power, for we can demonstrate many truths absolutely and reduce them to primitive indemonstrable truths” (C 514; PM 8). To explain why he believed this it is necessary to say a few words about his theory of truth.

5.3.5 The analytical theory of truth

Leibniz’s well-known theory of truth is central to many of his philosophical doctrines. It is also closely linked with his belief that the philosophical language would be a ‘calculus’ by means of which the truth or falsity of propositions could be tested. For present purposes, three main elements of this theory should be mentioned. In the first place, in Leibniz’s view a proposition is true if and only if the concept of the predicate is contained in that of the subject. As seen, this criterion was presupposed by the calculation of subjects and predicates in *DAC* (‘Use X’), and Leibniz later articulated this ‘predicate-in-subject principle’ quite explicitly in a large number of writings. One way in which he put it runs as follows:

An affirmation is true if its predicate is in its subject; thus, in every true affirmative proposition, necessary or contingent, universal or singular, the concept of the predicate is somehow contained in the concept of the subject, in such a way that anyone who understood the two concepts as God understands them would *eo ipso* perceive that the predicate is in the subject (C 16-17; translation Mates 1986:84)

As Mates notes, this assertion only concerns simple propositions such as ‘A is B’ or ‘All A are B’, excluding complex propositions such as conjunctions and conditionals. Further, according to Mates, particular affirmative propositions (‘some A is B’) are excluded, as well as negative propositions (1986:84-85). Parkinson, however, suggests that Leibniz might include negative propositions, since he possibly considers them as stating that a negative predicate is included in the subject (1965:23-24,56). As for particular affirmative ones, Leibniz somewhere says that for these to be true, “the predicate should be contained in some species of the subject” (P 23). Leibniz apparently continued to believe, as he did when writing *DAC*, that the truth of negative and particular affirmative propositions could be derived, by means of additions or modifications of some kind, from the truth of universal affirmative ones.

The most revolutionary aspect of this definition of truth is that it explicitly covers both singular and contingent propositions. According to Burkhardt, the existence of analytical truth consisting in a relation of containment between concepts had been generally acknowledged by scholastic writers. But these analytical truths were regarded to be restricted to ‘eternal truths’, which are disconnected from any specific state of affairs in the actual world (1980:244). Leibniz’s characterization of truth, by contrast, also applies to propositions which have a proper name in subject position, and an expression denoting some contingent property in predicate position. Leibniz in fact believed it to be a logical consequence of the predicate-in-subject principle that

“the individual notion of each person includes once for all everything that will ever happen to him” (PM 52). He admits that this consequence may seem paradoxical, but “that is the fault of the philosophers, who do not follow up sufficiently the clearest notions” (PM 57). Thus typically, rather than shrinking back from apparently bizarre conclusions, Leibniz applies himself to showing that they do follow from sound premisses and hence must be accepted. His unconditional adherence to the predicate-in-subject principle brought him into a tangle of logical problems, many of which he dealt with in an ingenious manner. In the present context, this subject cannot be treated in any detail.

A second point that is important in the present context is the central role played by definitions in demonstrating the truth of a proposition. In order to show that a proposition is true, it will usually be necessary to analyze either its subject or its predicate or both so as to establish that the predicate is contained in the subject. The result of the analysis of a concept into less complex components is what is expressed by a definition. To provide a demonstration of a proposition thus boils down to replacing the concepts occurring in it by definitions, that is, by equivalent, but analytically more explicit expressions. Leibniz held this view already when he wrote *DAC*, and it has been seen that it was relevant for the ‘extemporary essay’ (cf. 5.2.5). This idea remained of central importance to Leibniz’s epistemology as well as his views on scientific method. As he explained in later writings, the ‘scientia generalis’, a general method applicable to all sciences, consisted of two basic procedures: analysis and synthesis. Analysis consists in the decomposition of concepts, synthesis in their combination.

The third point, finally, is the so-called ‘principle of identity’. In his earlier writings, Leibniz said that definition is the principle of all demonstration¹. Rendering his position on the subject more precise, he added identity as a second principle, and in various places he says that definition and identity are the two sole principles of his logic². The addition of identity followed from consistently maintaining that the predicate-in-subject principle is the basis of truth, and that definition is the principle of demonstration. For there is a class of propositions for which this characterization of truth and demonstration does not seem to be valid: axioms are assumed to be incapable of demonstration, and their truth is assumed to be self-evident. In Leibniz’s view however, axioms are capable of proof just as every other proposition is. Leibniz demonstrated this by producing a formal proof of the statement that ‘the whole *cde* is greater than the part *de*’ (D 150-151). There is one type of axiom that cannot be proved, namely statements of identity. The prototypical form of such statements is ‘A is A’, but Leibniz also included statements of the form ‘AB is A’ as expressions of indemonstrable truths. The principle of identity, according to Leibniz, may also be called the principle of contradiction, which says that statements of the form ‘A is non-A’ are just as indemonstrably and

¹ E.g. *DAC*, P 6

² E.g. C 187.

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self-evidently false as statements of the form 'A is A' are true. Leibniz usually mentions the principle of identity together with that of contradiction. His many formulations of the latter principle are diverse, and he seems to have believed that his principle implied or entailed not only non-contradiction but also bivalence¹. The principle of 'identity or contradiction' are together with the 'principle of reason' the two 'great principles' on which our reasoning is based.

It is on the basis of this account of truth that Leibniz states that it is not always necessary to carry analysis of concepts through until the primitives are reached. For it is sufficient to show that the predicate is identical with some part of the subject to prove the truth of a proposition. For example, the truth of the statement 'man is rational' can be simply established by replacing the word 'man' by its definition: 'rational animal' so that the statement 'rational animal is rational' results, which is true because the predicate is identical with a part of the subject. It is now easy to see why Leibniz believed that a language which systematically designates the primitive notions to which the knowledge of some subject can be reduced, provides the means to establish the truth or falsity of statements expressed in it by a 'mere calculus'. The calculus consists in replacing terms by definitions, and in checking after each substitution whether or not the expression in predicate position is identical with some string of symbols occurring in the subject position.

In a paper called *On universal analysis and synthesis*, written at least fifteen years after *DAC*², Leibniz refers back to this 'little treatise', and to his proposal to organize the categories on combinatorial principles. He recapitulates the procedure of placing all simple terms in one class, combinations of two simple terms in a second class, and so on. He then gives the following example:

Suppose, for example, that there is a species y , whose concept is $abcd$, and suppose that for ab there is substituted l ; for ac , m ; for ad , n ; for bc , p ; for bd , q ; and for cd , r , all of which are groups of two; and suppose that for abc there is substituted s ; for abd , v ; for acd , w ; and for bcd , x , which are groups of three. All of these will be predicates of y , but the convertible predicates of y will be the following only: ax , bw , cv , ds , lr , mq , np (PM:11)

Thus a dispute on the question whether or not 'v is q' can be settled by writing 'abd' for 'v' and 'bd' for 'q', so that its truth becomes evident: 'abd is bd'. Leibniz was certainly aware that the analysis of knowledge is beset with difficulties and complications which this simple model does not account for. Nevertheless, it clearly was this model that lay at the basis of all his plans and efforts related to the construction of a philosophical language.

¹ Cf. Mates 1986:153 for a list of different expressions of the principle.

² Around 1683; see PM:241.

5.3.6 Method

Although Leibniz's project depends crucially on a catalogue of simple notions, and although he acknowledged that it is very difficult indeed if not impossible to draw up such a catalogue, his optimism concerning the feasibility of his project never disappeared. For just as certainty does not necessarily presuppose perfect knowledge, so will many of the benefits of the philosophical language be available if the knowledge we possess, rather than the ultimate result of a complete analysis of it, is taken as its basis. It will be remembered that Descartes in his famous letter to Mersenne had stated that a philosophical language should be based on a systematical enumeration of human thoughts, and that the invention of such a language was feasible in principle, but was dependent on 'the true philosophy' (cf. 2.4). Among Leibniz's manuscripts is a copy of this letter, with the following note in Leibniz's hand:

Although this language depends on the true philosophy, it does not depend on its perfection. This means that this language may be established, although the philosophy is not perfect: and to the extent that the science of man will grow, this language will grow as well. In the meantime it will be a wonderful aid both for making use of what we know, and for seeing what we lack, and for inventing the means of acquiring that, but first of all for eliminating controversies on matters that depend on reasoning. For then reasoning and calculating will be the same thing (C 28)

Two points emerge from these statements. In the first place, the use of the philosophical language is restricted to the improvement of deductive reasoning, as Leibniz repeatedly emphasizes. Thus in a manuscript in which he once again explains the possibility to resolve disagreements by saying 'let's calculate', he says: "I always add: *in as far as this can be done by reasoning, ex datis* [from the given]" (C 156). In empirical sciences, the data will always be incomplete, and so will our knowledge be. The philosophical language ensures however that inferences drawn from the data are objective and sound. It also provides a clearer view on what data are missing, so that even political science and medicine, where certainty is often unattainable, may profit tremendously from the philosophical language.

Secondly, the way Leibniz viewed the implementation of his project does not straightforwardly follow from the manner in which he usually describes the structure of the philosophical language. For whereas in the latter context the language is said to be based on primitive notions, this does not imply that the alphabet must be complete and definitive before the language can be created. The implementation rather consists in finding a proper way of expressing a preliminary analysis of existing knowledge. For this reason, Leibniz often refers to the alphabet of human thought as consisting of, or representing, a catalogue of notions that are 'primitive for us', "although they

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are perhaps not absolutely primitive” (C 220-221)¹. He thus lays some emphasis on the fact that it is the alphabet of *human* thoughts that forms the basis of his philosophical language. Accordingly, in the *De Characteristica* quoted above (5.3.3), he includes the notions of sensible qualities among the primitives, although he assumed that these qualities can be reduced to underlying causes. He also says that those notions are simple which we cannot render any clearer by definitions. Such notions may be assumed as primitives for the time being, even when we know that if science advances they will be capable of further analysis.

Clearly, even such a provisional catalogue of tentatively assumed primitives is as yet not available. For this reason, the first step to be taken towards the creation of the philosophical language is to assemble, analyze and arrange the basic components of what is hitherto known about every thinkable subject. The implementation of Leibniz’s scheme thus involves the production of a universal encyclopedia, from which a catalogue of notions which are primitive for us humans can be extracted². A large number of plans and sketches related to the production of such an encyclopedia are among his manuscripts. Some of these contain enumerations of subjects and divisions of sciences, others add lists of authors and works to be excerpted³.

Just as Wilkins had observed that his own project required the work ‘of a college and an age’ (cf. 4.1), so Leibniz realized from a very early stage onward that the completion of the encyclopedia surpasses the capacities of a single man. In the letter to Oldenburg of 1673 he says that a group of ten may suffice to obtain sensational results⁴, but elsewhere he says that the inventory of knowledge he envisages is “not the undertaking of a single man, nor even of few persons” (C 229). As Couturat relates⁵, Leibniz’s various attempts to interest the Royal Society and the French Academy for his plans failed, and thereafter he decided to address princes and kings in order to obtain support for his encyclopedic project. For this purpose, he wrote a number of pieces designed to show that great progress in science is possible if a ‘demonstrative encyclopedia’⁶ will be produced, containing a general inventory of

¹ Other places are L 229, C 176.

² Cf. VE 799: “La Caractéristique que je me propose ne demande qu’une espece d’Encyclopedie nouvelle. L’Encyclopedie est un corps, où les connaissances humaines les plus importantes sont rangées par ordre. Cette Encyclopedie estant faite selon l’ordre que je me propose, la caracteristique seroit quasi toute faite, cependant ceux qui y travailleront n’en sçauroient pas le dessein: croyant de travailler seulement à une Encyclopedie” (1678-1681).

³ Some of the relevant texts are G VII 43-45, 49-53, 54-56; 57-63; 64-65; 66-77; C 30-41; C 217; C 218-222; C222-224. Couturat 1901:119-175 provides an excellent and detailed account of this subject.

⁴ A 2 1 242. Couturat 1901:142 remarks that this constitutes a hardly implicit invitation to start a collaborative project.

⁵ Couturat 1901:142ff.

⁶ G VII 168.

knowledge¹. In this way, the many valuable insights and useful observations that at present are scattered without order can be made far better use of². The encyclopedia comprises all sciences, deductive ones as well as experimental ones, and in addition incorporates the many useful insights to be found in the practical arts.

As it happened, Leibniz did not succeed in organizing an encyclopedic effort jointly undertaken by a group of scholars along the lines he proposed. He did however put himself a lot of work into the project. He made notes and excerpts of a large number of works he considered important. It is understandable that this work occasioned him more than once to write down statements and observations he did not consider to be completely true or valid. As noted, commentators have sometimes overlooked this evident point (cf. 5.1).

The creation of the encyclopedia which summarizes existing knowledge is closely connected with linguistic analysis. This is because in Leibniz's view human knowledge is virtually inseparable from its expression in language. Much of the work he carried out as preliminary studies for the encyclopedia and thus for the philosophical language to be based upon it is accordingly linguistic in nature. These studies can be divided into two classes: firstly, lists of definitions, of which Leibniz drew up a large number, and secondly, studies concerned with so-called 'rational grammar'. Both types of work will be discussed below (5.5.2, 5.5.3). In the present context, it is important to note that Leibniz's project consists in creating a new and wonderful philosophical language on the basis of the analysis of existing languages. Rather than starting from scratch, replacing the languages presently used by a newly invented one in one go, Leibniz's project proceeds by extracting an ideal language from existing ones. Given his theoretical starting-points there is no other option available. In describing the philosophical language as a symbolism built on the alphabet of human thoughts, Leibniz merely sketches the structure of an as yet unrealized ideal. From the perspective of the method to be used in achieving this ideal, the primitives constituting the alphabet are not the starting-point, but the end towards which progressive analysis of knowledge as well as of language is directed.

Couturat's authoritative account of Leibniz's views on the subject has quite justifiably acquired a monumental status. Nevertheless, his chapter on the 'universal language' contains a couple of flaws that have caused some confusion in the literature. Two points in particular are unfortunate in this respect. Firstly, Couturat claims that Leibniz at first took an 'a priori' approach, attempting to create a 'completely conventional' language built on primitive notions. However, he "soon realized that the problem is less simple and less easy than he at first believed", and he adopted an 'a posteriori' method, which is 'less arbitrary and less bold' (1901:63-64). The a posteriori method takes existing languages as a starting-point in order to extract by logical analysis, firstly, simple ideas, and secondly, a rational grammar. If we

¹ G VII 157-173; G VII 174-183.

² G VII 178; similar remarks are at C 30 and C 228.

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are to believe Couturat, Leibniz was still working on a priori lines in February, 1678 (1901:62), while the a posteriori approach was begun in April, 1678 (1901:64). This alleged sudden change has no basis other than Couturat's unwarranted assumption that a text entitled *Lingua generalis*, written in February 1678 should be interpreted as representing a quite different approach from the one followed in a text entitled *De grammatica rationali*, written in April of the same year.

In fact, the two fragments merely treat two different aspects of the very same project, and it is clear that Leibniz saw both aspects as belonging to it. In the *Lingua generalis* he assumes provisionally that the primitive notions are known and then proceeds to devise a means of calculating the truth of statements made about them; he also considers a method of pronouncing numerals (cf. 5.5.1). This text is thus closely related with the logical papers of April, 1679 (C 42-92), written a year after the supposed change in outlook. The *De grammatica rationali* sketches very briefly some elements of the programme for a rational grammar (cf. 5.5.3). This programme, as noted, was part of the analysis of knowledge which is required in order to identify the primitives. The April 1678 paper, then, concerns an aspect of the preliminary work, whereas the February 1678 paper shows that Leibniz typically was not discouraged by the fact that this work was as yet not completed; he merely explores some methods of shaping his language on the assumption that the work had been completed. That grammatical analysis of the type described in the April 1678 fragment (and many others) was a necessary preliminary for the creation of the philosophical language had been clearly assumed from the very start: in *DAC*, as seen, Leibniz explicitly states that the identification of primitive notions depends, among other things, upon grammatical analysis of cases. There is no basis whatsoever, then, for Couturat's obviously ad hoc assumption that Leibniz abruptly adopted a new approach. Pombo (1987:124) rightly criticizes Couturat for postulating a temporal development which in fact did not take place, but makes essential use in her own account of a distinction between a posteriori projects concerned with grammar, and a priori projects based on primitive notions.

A second unfortunate flaw in Couturat's chapter on the 'universal language' concerns his distinction between on the one hand a universal language, capable of being written and spoken, and on the other hand a universal characteristic, consisting of a calculus resembling algebraical ones. Again, Couturat resorts to assuming a development in Leibniz's thought in order to account for what would otherwise be all too obvious counter-evidence. Thus he says that "In May 1676, he [Leibniz] still identified the universal language with the Characteristic, and dreamt of a language which would be a calculus at the same time, a sort of algebra of thought" (1901:61). When Leibniz started working out the details, his idea of a universal language developed and became more complicated: in 1680, he still considers the universal language as a logical and rational language, "which serves as an aid and instrument for thinking; but it is no longer a logical Algebra, and the proof of this is that the

Calculus ratiocinator thenceforth is developed in a parallel, but absolutely independent manner” (1901:79).

Couturat bases this claim on a short fragment written in January 1680, in which Leibniz discusses the possibility of providing a specimen of the philosophical language applied to geometry, and in this context he says: “I shall not however mix a calculus with this” (C 152). This remark clearly does not have the broad implications Couturat ascribes to it. For Leibniz goes on to explain that for this specimen, which he explicitly limits to those matters which are easy and certain, “so that I don’t seem to promise incredible things”, he will disregard magnitudes, sums, differences “and other things which are common to arithmetic and geometry”. Thus what he means by saying that he will not mix a calculus with this is simply that quantitative concepts will be disregarded for the purpose of providing a specimen of the philosophical language applied to a limited field. This has no bearing on the more general resemblance between the philosophical language and a calculus in the sense of a formal system. Couturat’s misinterpretation is the more curious as he devotes an entire chapter to Leibniz’s attempts to work out an alternative method of doing geometry, different from the algebraical approach (1901:388-430). Further, there is abundant evidence in Leibniz’s later writings of the very same kind as that which led Couturat to state that he in 1676 still identified the language with the calculus. One clear example of this is what Leibniz wrote as late as 1709, when he was in his sixties, in a letter to Bourguet:

The analysis of notions in an alphabet, as I call it, of human thoughts depends on quite different devices and must rather be illustrated by some similarity to Algebra. This will at the same time provide the basis [rationem] of a universal language or writing, much firmer than that of any Chinese one. This will not only be very easy to learn and to remember, but it will also contain a sort of calculus, so that to reason in this language or writing will be to calculate, and errors of the person who reasons will be nothing but errors in calculation, which neither the Chinese nor Wilkins and others who have made a universal character have aimed at (G III 545)

In Leibniz’s view, then, the ‘language or writing’ and the calculus, as well as the alphabet of human thoughts were inextricably connected elements of one and the same scheme, and this view remained constant throughout his career. Couturat’s mistakes at this point were probably occasioned by his failure to incorporate the manuscripts concerned with rational grammar into his pre-existing interpretation of the Leibnizian project. These manuscripts had been discovered by himself among Leibniz’s papers when his book was almost completed, and they made it necessary to completely rewrite the chapter on universal language, as he relates in the introduction (1901:x). It seems that to Couturat’s mind, the creation of an algebra of thought is incompatible with linguistic analysis of the type Leibniz proved to have devoted himself to. To resolve the seeming contradiction, he resorted to associating the relevant

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documents with various stages of development and to different though related kinds of objectives. None of this however is warranted by anything Leibniz himself said. Nevertheless, commentators have often followed Couturat in assuming that the project of a ‘lingua rationalis’ differs in some significant way from that of a ‘characteristica universalis’¹. In the following section, the terminology Leibniz uses in designating the various aspects of his scheme will be briefly examined.

5.3.7 A note on terminology

It has been mentioned that Leibniz in his early writings uses various terms to designate his project of a philosophical language, and that his terminology reflects that of other projects he was acquainted with at some point in time. He thus at first characterized his project as that of a ‘polygraphia’ or a universal writing, using Kircher’s term, and as soon as he became aware of Wilkins’s philosophical language, he referred to his own project as that of a philosophical language as well, adding that such schemes are also often called a ‘characteristica universalis’. The latter term apparently resulted from Latinizing the term ‘universal character’, which was a familiar term in English. Likewise, in the note pasted in his copy of *Ars Signorum*, he refers to his own project as that of the true ‘Characteristica Realis’, which probably translates Wilkins’s term ‘real character’. In the letter to Oldenburg of 1673 he characterizes his own scheme successively as a ‘rational writing’ (*scriptura rationalis*, A 2 1 239), ‘this characteristic’ (*characteristica illa*, A 2 1 239), ‘this language or writing’ (*lingua haec sive scriptura*, A 2 1 240), and as a ‘real language’ (*lingua realis*, A 2 1 241). Obviously, Leibniz used whichever term entered his mind as most suitable on a particular occasion.

In later writings he continued to use a variety of terms, and in many cases the choice of a particular term is clearly motivated by the context. If his numerous references to the project are collated, it appears that the terms ‘characteristica’ or ‘caractéristique’ (sometimes: ‘characterismus’ A 2 1 228; C 73) and ‘language’ (*lingua*), often with the addition: ‘or writing’ (*sive scriptura*), both occur in combination with each of the adjectives ‘universal’, ‘philosophical’, ‘general’, ‘rational’, ‘real’, among others. Further, emphasizing that his goal consists in an extension of mathematics, Leibniz characterizes it as a ‘specieuse générale’, in analogy with Viète’s ‘specieuse’, i.e. algebra, or he designates it by the term ‘algèbre universelle’. In another context, stressing his view that combinatorics is more general than algebra, he refers to a ‘combinatorial characteristic’. Although Leibniz thus clearly adapted his terminology to the purposes of the occasion, he seems to have considered all terms used in describing his scheme as roughly equivalent. A tendency among commentators to connect systematic distinctions with the use of certain terms seems to have little basis in Leibniz’s own usage.

¹ E.g. Heinekamp 1972:462; Kauppi 1960:25.

It is true that the terms ‘characteristica’ and ‘lingua’, as used by Leibniz, are not completely synonymous. The former term is used in a wider sense in some contexts, namely when it is used to refer to the general art of symbolization rather than to any of its results (C 98-99). Further, the term ‘characteristica’ may also have a more specific sense than ‘lingua’, namely in contexts where it is used to designate some systematical aspect of a symbolism. For instance, the binary number system is called the ‘binary characteristic’, and in a draft of a logical calculus Leibniz says that it depends on the ‘characteristic’ whether or not, as it would be called today, idempotency and commutativity hold (C 267, 366). At many other places, however, Leibniz uses the terms ‘characteristica’ and ‘lingua’ as roughly synonymous expressions.

5.3.8 A language and a writing system

As has been seen, the relationship between written and spoken language played an important part in the ideas underpinning seventeenth century universal language schemes. For Leibniz however, the issue was of minor importance. Although he at first, in *DAC*, modelled his own proposal on the universal writing systems he was familiar with at that time, he modified his proposal so as to include a spoken language as well, as soon as he had heard of Wilkins’s work. In his letter to Oldenburg of 1673, written shortly after he had become acquainted with Dalgarno’s work, and not long after he had first seen Wilkins’s, he points out that “it does not matter whether we want to establish a universal writing or also a language, for it is easy to produce both of them by the same efforts” (A 2 1 240), thus dismissing the issue as irrelevant for his own project. In accordance with this, he usually refers indiscriminately to ‘a language, or writing’ in his later discussions of the subject, and he continues to do so towards the end of his life. Thus in a letter written in the fall of 1679, he mentions his ‘new writing or characteristic, or, if you prefer, language’ (L 261). And in another letter, written in 1714, he says that his ‘spécieuse générale’ could at the same time be ‘a kind of universal language or writing’ (L 654).

There are however two places where Leibniz seems to express deviant views. In one text (written between 1685-1687) he says that when he was trying to invent symbols of some sort, he found that it was easier to contrive written symbols than ones that can be pronounced, because as to the former

it was possible to connect the parts of the characters by various lines, which were simultaneously visible on paper, whereas sounds vanish, and therefore a preceding sound could not refer to a later one, unless it had something in it corresponding to what was in the preceding one. Therefore Dalgarno is wrong in believing that it is equally easy to contrive a language and a mute character. Therefore I do not shrink back from first trying a character. When this has been done it will perhaps be easier to proceed to the language (VE 929)

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This seems to show that Leibniz, on the basis of his own experience, abandoned his initial belief that the distinction between a written symbolism and a spoken language was inessential. The view that there are some relevant differences also tallies very well with his observation that symbols which are especially suitable for thinking provide the possibility to survey many aspect at a glance ('*uno obtutu*'; cf. 5.3.2). It has been seen that Dalgarno's point was different from what Leibniz takes it to be, as he was in fact concerned to refute the myth of a real character rather than to point out that a language and a character could equally easily be invented (cf. 3.2.4). This passage does suggest however that Leibniz's earlier remark to this effect in the letter to Oldenburg was made to endorse what he believed to be Dalgarno's opinion (and which, in fact, may well have been Dalgarno's opinion).

The other text in which Leibniz addresses the issue was probably written after 1689, and contains the following remark:

I prefer the language to the character, the language can be written by common characters. If the Europeans will have readily accepted it, others will also accept and learn it. Therefore Wilkins could have omitted his characters, which are more discouraging (VE 376)

This may seem to contradict what was said in the other text just quoted, but as will be explained below (5.6.1), this is a specific comment on Wilkins's language and character rather than an expression of a preference for a language as opposed to a written character in general.

It appears, then, that Leibniz generally considered both a language and a writing as belonging to his grand project. In one text, he acknowledges that a written symbolism has certain advantages which are hard to realize in a spoken language because of the transient nature of the latter¹.

¹ Frege was to make a similar point concerning his '*Begriffsschrift*' (1986[1882]:95.)

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Leibniz's strong belief in the tremendous advantages to be expected from a philosophical language was shared by few of his contemporaries. Most philosophers, including Descartes, Spinoza, and Locke, were sceptical about such projects or completely disinterested in the idea. Part of the explanation of Leibniz's deviant position in this regard is to be found in his views on the significance of language for thought, which differed drastically from the opinions of most of the other philosophers. The present section deals with Leibniz's philosophy of language, in particular with his views on the relations between language, thought and reality. This is a large subject, which connects with many other aspects of his thought. Far from constituting a comprehensive treatment, the following discussion consists of some excursions into this fascinating field.

5.4.1 The difficulty posed by Hobbes

As has been noted above (2.3.1), much of seventeenth-century thinking about language was deeply influenced by the framework concisely expressed by the opening paragraph of Aristotle's *De Interpretatione* :

Now spoken sounds are symbols of affections in the soul, and written marks symbols of spoken sounds. And just as written marks are not the same for all men, neither are spoken sounds. But what these are in the first place signs of - affections of the soul - are the same for all; and what these affections are likenesses of - actual things - are also the same (1, 16a 4-7; transl. Ackrill 1963:43)

¹ Frege was to make a similar point concerning his 'Begriffsschrift' (1986[1882]:95.)

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If one disregards the distinction between spoken and written words for the moment, it appears that the framework has three elements, namely linguistic signs, mental experiences, and actual things. In the seventeenth century it was common to refer to these three elements as words, notions (or ideas), and things respectively. This three-element framework lay at the basis of the views of the most influential thinkers of the period, among whom were Bacon and Descartes. They both assumed, firstly, that the three elements are clearly distinct, and secondly, that the nature of truth and the foundation of knowledge ought to be exclusively considered in terms of the relationship between things and notions; words were thought to have no part in this. The function of language, on this view, is to communicate the thoughts which are formed independently of their expression. In accordance with this, words are primarily signs of mental experiences, and only indirectly signs of things in the extralinguistic world. Although Descartes acknowledged the practical advantage of a well-chosen notation in mathematics, he emphasized that the clear and distinct notions which form the criterion of truth are in principle completely disconnected from any symbol or auxiliary image we may use in conceiving them¹. And while Bacon recognized that words may interfere with thinking, he regarded this as an obnoxious consequence of the regrettable fact that words sometimes fail to stay within the confines of the communicative function they were designed to fulfil.

Given this generally accepted framework, the theory put forward by Thomas Hobbes was markedly dissident. Hobbes propounded the thesis that 'to reason is to calculate', and that these calculations consist of 'an assemblage and linking together of names'. Therefore, he argued, truth depends essentially on names, and as these are assigned to things by arbitrary convention, truth itself is completely arbitrary. The reaction to Hobbes's view was mostly one of astonishment. A passage which was surely known to most of the learned of Leibniz's day, occurs in Hobbes's objections to Descartes's *Meditations*, which were published together with Descartes's answers. In the fourth objection, Hobbes raises the following question:

now what shall we say, if perhaps reasoning is nothing but an assemblage and linking together of names by this word *est*? From which it would follow, that, by reason, we conclude nothing concerning the nature of things, but only concerning their appellations, that is to say that by reason we simply see whether we assemble the names of the things well or badly, following the conventions that we have made with our fantasy concerning their significations (Descartes 1967:608)

Descartes's brief answer shows that he considered this view to be evidently absurd:

¹ This shows that Descartes certainly did not in all respects subscribe to the Aristotelian schema quoted. In particular, he sharply distinguished between images and ideas.

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the assemblage which is made in reasoning is not that of names, but of the things signified by the names; and I am surprised that the opposite might enter anybody's mind. For who doubts that a Frenchman and a German could have the same thoughts or reasonings concerning the same things, while they nevertheless conceive completely different words? (Descartes 1967:608-609)

Descartes adds that Hobbes implicitly indicates the falsity of his thesis, as he himself mentions the conventions we have made concerning the signification of words: since he admits that words signify something, it is wholly unclear why reasonings should not concern these significations rather than merely the words. Thus, to Descartes's mind, the distinction between language and thought is so clear-cut, and it is so obvious that it is the function of words to refer to language-independent thoughts, that a view which identifies thinking with manipulating names cannot even be consistently held.

A similar reaction to the Hobbesian thesis is given by Arnauld and Nicole in the *Logic of Port Royal*. Citing the passage quoted above, they display the same disbelief as Descartes, stating that the author could not have seriously meant what he says. Next they restate Descartes's arguments against the propounded view: Hobbes (whom they do not mention by name, designating him as 'an Englishman') talks about conventions himself. Now it is clear that these conventions concern the relationship between words and the ideas in our mind, for without these ideas the conventions would have been impossible. Further,

as divers nations have given divers names to the things, and even to the most clear and most simple, as those which are the object of geometry, they would not have the same reasonings concerning the same truths, if reasoning were nothing but an assemblage of names by the word *est* (Arnauld & Nicole 1970[1662]:68 (I, 1))

Finally, Arnauld & Nicole add an argument not explicitly mentioned by Descartes: although the connection between ideas and sounds is purely arbitrary in that other sounds could have been chosen equally well, the ideas themselves are not arbitrary at all. Ideas do not depend on our fantasy, but they are grounded in reality.

Thus Descartes and the logicians of Port Royal were ready to locate the source of the apparent absurdity of the Hobbesian thesis that truth is arbitrary. In their view, the thesis confuses concepts with the words designating them. The falsehood of this, they maintained, is evident from the fact that diversity of linguistic expressions does not lead to differences in concepts. As a consequence, the thesis erroneously transfers the admitted arbitrariness of the relationship between the first pair of the triad word - notion - thing to the relation between the latter pair, which in fact is not arbitrary at all, since the correspondence between notions and things has nothing to do with linguistic conventions. All that is needed to refute the thesis, Descartes and his followers

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believed, is to restore the distinctness of the three elements of the schema, and to point out the difference between the relations obtaining between them.

5.4.2 Leibniz's solution in the *Dialogue*

Leibniz studied Hobbes's work at an early age, and there are some references to it in *DAC*¹. In 1670, he wrote a letter to Hobbes, in which he expressed his admiration for the latter's work on physics and politics². As appears from the *Preface to Nizolius* which he wrote in the same year, Leibniz thought it important to refute Hobbes's thesis on the arbitrariness of truth³. In fact, what he sometimes refers to as the 'difficulty posed by Hobbes', is a recurrent theme in his later writings⁴. In 1677, Leibniz wrote a dialogue which is entirely devoted to the problem.

After some discussion, the participants in the dialogue, who are simply called A and B, first reach the conclusion that both truth and falsity are properties of thoughts or propositions, not of things. This point needs argumentation, as at first sight truth seems to reside in things, because it exists independently of human thinking. For this reason, the Port Royal logic investigates the question whether there is falsity in complex terms rather than whether there is truth in them. For falsity, unlike truth, can only exist in a fallible mind⁵. A and B conclude that, more precisely, both truth and falsity are properties of possible thoughts, which may never be actualized: that some truths are never grasped does not prevent them from being true. Further, truth arises from the nature of things; our nature is such that when we proceed by a valid method we shall necessarily find out whether or not some proposition is true.

At this point, the difficulty posed by Hobbes is introduced. It has been argued, says A, that truth arises from the human will and from names or characters. This thesis is supported by observing that first, all our thinking depends on the use of symbols of some kind, and secondly, that the meaning of these symbols is established by arbitrary definition. In view of the usual

¹ G IV 46, 52, 64, 78. Couturat (1901:457-472) has convincingly argued that these references should not be taken to show that Leibniz was in any way indebted to Hobbes for his logical insights.

² A 2 1 56-59, L 105-107. Hobbes, who was in his eighties, never bothered to answer. Some four years later, Leibniz wrote a second, more critical letter on political philosophy, which likewise remained unanswered (A 2 1 244-245).

³ L 128.

⁴ Cf. C 220, 516; L 231.

⁵ Arnauld & Nicole 1970[1662]:170 (II, 7). As Loemker notes (L 185), and as is confirmed by the passage mentioning geometry (see below), the Port Royal logic probably influenced Leibniz's argumentation in this text. It should be noted, however, that Leibniz reaches opposite conclusions: both truth and falsity, he concludes, are properties of thoughts. Burkhardt (1980:252), ignoring the dialogue form of the text, misinterprets B's hesitation to accept this conclusion as expressing Leibniz's own view.

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reaction to these arguments, the dialogue takes an unexpected turn here. Rather than conceding the second premiss while denying the first, both premisses are taken for granted. A and B need no extensive argumentation to reach agreement on the second: definitions depend on the human will at least insofar as e.g. the word 'ellipse' rather than some other arbitrary sequence of speech sounds has been chosen to signify the figure now known under that name. But the first premiss comes as a surprise to B, who is forced to admit that thinking is impossible without words or other symbols of some kind:

B. What of it? [that the meaning of words is arbitrary.] Thoughts can occur without words.

A. But not without some other signs. Try, I pray, whether you can begin any arithmetical calculation without numerical signs.

B. You disturb me very much, for I did not think that characters or signs are so necessary for ratiocination (L 183).

Thus, significantly, Leibniz does not choose the easy way out, as Descartes and his followers had done, but sets out to solve the problem posed by Hobbes, while accepting the arguments on which it is based. This makes the problem more pressing than it seemed to the logicians of Port Royal, who claim that it can be easily solved. For in taking sides with Hobbes so far, Leibniz cannot use the fact that truth does not vary with languages as an argument against the arbitrariness thesis any longer. On the contrary, it needs to be explained:

B. But can anyone depart so far from a sound mind as to persuade himself that truth is arbitrary and depends on names, though he knows that the geometry of the Greeks, Latins, and Germans is the same?

A. You are right; yet the difficulty needs to be resolved (L 183)

The reference to geometry makes it plausible that Leibniz had the Port Royal reaction in mind when he wrote this. The solution is reached as follows: A and B first come to agree that there need not be any similarity between the basic symbols of a sign system and the things they designate. It is noted by the way, that such a similarity may be very useful, but generally it does not exist. For example, there is no similarity between numeric symbols and numbers, nor between simple words such as 'lux' (light) and 'ferens' (bringing) and their respective referents. However, the compound 'lucifer' (light-bringing) does have a relation to the words 'lux' and 'ferens' which corresponds to the relation between the thing signified by 'lucifer' and the things signified by 'lux' and 'ferens'. In the same way, the Greek word 'phosphoros' is built up out of the roots 'phos' (light) and 'phero' (to bring). Thus, the Latin and the Greek names for Venus, the morning star, are composed in an analogous way, so that both names contain the same descriptive content¹. Although Leibniz

¹ Cf. Ishiguro 1990:28 for a similar interpretation. By contrast, Kauppi (1960:39) interprets the 'phosphorus' example as being aimed at showing that similar means of

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always took great interest in etymological considerations of this kind, he was well aware that they do not suffice to completely determine the meaning of compound words. The ‘phosphorus’ example is a clear case in point, as this word, apparently on account of the same descriptive content, was also used for a newly discovered, light-bringing material, on which Leibniz published an article in the very same month in which he wrote the *Dialogue*¹. Consequently, he notes that the Greeks might have used another word than this. Nevertheless, there is a structural correspondence between language and things, and between languages among each other:

if characters can be used for ratiocination, there is in them a kind of complex mutual relation [situs] or order which fits the things; if not in the single words at least in their combination and inflection, although it is even better if found in the single words themselves. Though it varies, this order somehow corresponds in all languages (L 184).

It is noteworthy, that not all characters fit things equally well: only if they can be used for ratiocination, their order corresponds to that of things. In this context, Leibniz clearly includes natural language expressions in this category. Given the correspondence between these characters and the things they signify, the difficulty posed by Hobbes’s argument can be resolved:

although characters are arbitrary, their use and connection have something which is not arbitrary, namely a definite analogy between characters and things, and the relations which different characters expressing the same thing have to each other. This analogy or relation is the basis of truth. For the result is that whether we apply one set of characters or another, the products will be the same or equivalent or correspond analogously (L 184).

Thus, rather than granting that the relationship between symbols and things is arbitrary, as the gentlemen of Port Royal had done, Leibniz restricts the arbitrariness in such a way that it does not affect truth any more. To admit that characters are arbitrary only pertains to the ‘initial baptism act’, that is, to the establishing of a connection between some symbol and a certain kind of thing. But once the connection has been established, we are no longer free to alter it

expression may express *different* things, overlooking the fact that ‘lucifer’ and ‘phosphorus’ are names of the same thing, though both words also have other meanings. Possibly Kauppi was led astray by the word ‘but’ introducing B’s remark: “But the Greek ‘phosphorus’ has the same relation to ‘phos’ and ‘phero’”. This ‘but’ (Latin ‘at’) is puzzling, as it suggests an opposition to the preceding sentence about the Latin ‘lux’ and ‘fero’. However, Leibniz’s using ‘but’ here might be explained by taking into account that B at this point is trying to cast doubt on the view that there is no similarity between characters and things.

¹ ‘Le phosphore de M. Krafft, ou liqueur de terre seiche de sa composition qui jettent continuellement de grands éclats de lumière’, *Journal des savants*, August 2, 1677 (L 176).

at will. In this sense, the *use* of characters is not arbitrary. Further, as the relationship between the characters and the things remains constant, the relation between the characters has its basis in the relationship between the things they designate. Therefore, the *connection* between the characters is not arbitrary either. This also explains why different sign systems may express the same truth: they differ in the basic symbols that have been chosen to designate things, but they are analogous in the use and connection of these symbols.

Leibniz offers two mathematical examples to illustrate this point: whether we use the decimal or the duodecimal system makes no difference for the outcome of calculations. Likewise, we may use 'a' or 'd - e' to designate some quantity. The square will be written 'a²' or 'd² + e² - 2de', respectively. Now the latter expression can be reduced to 'a²' by appropriate substitutions of 'a + e' for 'd'. "You see then", Leibniz concludes, "that however arbitrarily the characters may be chosen, if you observe a certain order and rule in their use, they always agree". Although truths necessarily presuppose some characters, "yet they consist not in the arbitrary element in their characters but in the permanent element in them, namely, in their relation to things" (L 185).

Thus, compared to the Cartesian reaction, Leibniz takes Hobbes's thesis far more seriously. Rather than readily dismissing it as evidently false, Leibniz endorses its premisses to a certain extent. The solution consists basically in showing that the conclusions Hobbes thought followed from conventionalism do not follow at all. Further, as Leibniz grants that thought cannot be separated from the use of symbols, this result is reached by taking the relationship between symbols and things directly into account, rather than having recourse to a level of concepts in between.

It will be clear that Leibniz's views at this point bear some resemblance to those of Dalgarno and Wilkins. For all three of them, the distinction between on the one hand primitive symbols, arbitrarily assigned to kinds of things, and on the other hand composite symbols, which are capable of expressing the 'nature of things' on account of their being composed of primitive ones, is essential. Any attempt to describe their views in terms of the unspecified question whether they believed that 'the' linguistic sign is either 'natural' or conventional and hence arbitrary must lead to misrepresentations.

The solution to the difficulty posed by Hobbes that Leibniz offers in the *Dialogue* has an obvious weakness. If it is true that we cannot conceive anything distinctly without the use of signs, it is hard to see how we could ever know that there is an analogy between the sign system and the structure of things. For the ability to check whether this analogy exists presupposes the possibility to inspect the structure of things in a manner independent of the sign system, and this is assumed to be beyond our power. Although this objection probably never bothered Leibniz (after all, most of his metaphysics consists of statements which are in principle unverifiable), there are good reasons to assume that his qualified acceptance of the premisses of Hobbes's argument in the *Dialogue* is not his definitive view. For instance, in a letter to Gallois (A 3 1 1-20, end of 1672) Leibniz follows the same strategy against Hobbes's thesis as Descartes and others had done, that is, as Dascal puts it, "to

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admit the arbitrariness of signs, and then to rescue truth from the danger of arbitrariness by placing it at the level of pure, non-symbolized ‘ideas’¹. It will be seen below (5.4.3) that in the *New Essays*, a much later work, Leibniz returns to this line of argumentation.

Apparently because of the difficulties involved in reconciling the position Leibniz takes in the *Dialogue* with some of his other statements, Burkhardt (1980) gives a curious interpretation of this text. The *Dialogue*, on this interpretation, shows that Leibniz adheres to ‘the theory of a three-place semantics’, which has signs, concepts and things as its basic elements. On the basis of this theory, Burkhardt claims, Leibniz holds that a language does not express things directly, but through more or less analyzed concepts. To complete this picture, Burkhardt presents a schema, in which each of a series of sign systems consists of signs numbered 1 ... n. These signs correspond to concepts 1 ... n, which in their turn correspond to things 1 ... n². Evidently, this systematization does not account for the problem Leibniz was trying to solve in the *Dialogue*, let alone that it does justice to the specificity of his solution, as contrasted with the Cartesian one. Conspicuously, Burkhardt makes no mention whatsoever of the central starting-point of the discussion between A and B, namely that thought cannot occur without signs³. Furthermore, if Burkhardt’s interpretation were correct, Leibniz should have at least mentioned concepts when explaining the foundation of truth; but he says that this is to be found in the relation between characters and things⁴. If Leibniz’s view as presented in the *Dialogue* can be correctly rendered in terms of a three-place semantics at all, it would be more appropriate to put signs between concepts and things than to place concepts in the middle position. This point will be reconsidered below (5.4.5). It will suffice to note here that the very feature which distinguishes the theory Leibniz puts forward in this text from the view held by most of his contemporaries, is that the standard ‘words - notions - things’ schema does not straightforwardly apply.

5.4.3 Leibniz and Locke

¹ Dascal 1987:73. Although I disagree with some of Dascal’s conclusions, this article has been very useful for the present discussion.

² Burkhardt 1980:251-252.

³ This is not to say that Leibniz’s thesis on the importance of signs for thinking has escaped Burkhardt’s thoroughness. On the contrary, Burkhardt gives due recognition to this thesis (1980:178), but unfortunately not in the context where it is essential to do so.

⁴ In his zeal to force the *Dialogue* into the three-place pattern, Burkhardt goes so far as to say that Leibniz in this text also makes mention of a level of concepts between signs and things: this is because he refers to general or rational grammar, which is the same for all languages. But in fact the only thing Leibniz says about this in the text is that all languages somehow correspond in that they have the same relation to *things*. Again, no mention of concepts, which is quite understandable given the structure of the argument.

A passage in the *Nouveaux essais sur l'entendement humain* (further: *New Essays* or *NE*)¹, suggests that Leibniz eventually abandoned his views as put forward in the *Dialogue* and that he returned to a more conventional theory. Leibniz reacts to a definition of 'truth in general' put forward by Locke. Leibniz dismisses this definition as defective and he adds:

what is least to my liking in your definition of truth, is that one looks for truth in words. Thus the same sense, expressed in Latin, German, English, French, will not be the same truth, and one will have to say with M. Hobbes that truth depends on the will (*plaisir*) of people, which is to speak in a very strange manner (*NE* IV V 1)

Leibniz further argues that God knows the truth without the use of signs. Therefore, it will be better to locate truth in the relation between the objects of the ideas, which makes that one idea is contained in the other or not. "This does not depend on languages, and in this we agree with God and the angels". Thus, "we can distinguish between truths, which are independent of our will (*plaisir*), and expressions, which we invent as it seems good to us". It seems that in this passage, which was written some 25 years after the *Dialogue*, Leibniz has returned to the Cartesian point of view. The very same arguments as Descartes and the Port Royal logic had used against Hobbes emerge again: first, truth does not depend on words, as otherwise it would vary from language to language. In fact, it consists in a correspondence between language-independent ideas and the things these ideas are about. Second, the relation between words and ideas is arbitrary, whereas the relation between ideas and things is not. The contrast between the standpoint of the *Dialogue* and that of the *New Essays* is a good illustration of the difficulties facing attempts to provide a consistent picture of Leibniz's views.

A possible strategy to explain the contrast between these texts is to take into account that Leibniz's arguments in both texts, as often, are directly occasioned by those of the authors he is reacting to. Thus, his remarks in the *New Essays* are directed against Locke's peculiar notion of verbal truth', which is distinguished from 'mental truth'. In short, Locke's theory is the following: truth in general consists in the conjunction or separation of signs, which corresponds to the agreement or disagreement of the things designated by the signs. Locke uses the term 'sign' in a very broad sense here: it covers both ideas and words. Signs are either words, referring to ideas, or they are ideas, which refer to things. Hence truth comes in two types: it is either verbal, in which case words are joined or separated in agreement with ideas, or it is mental, namely when ideas are joined or separated in accordance with the agreement or disagreement between things.

Leibniz's objections to this theory are twofold: first, he disagrees that joining and separating of signs is a good definition of what a proposition is,

¹ The *New Essays* consists of a very detailed commentary on Locke's *Essay* (1689). The *NE* was written in 1703-1704, but not published until 1765.

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and he observes that agreement or disagreement between things is not what is generally expressed by a proposition. Secondly, and this is what concerns us here, he objects to Locke's division of truth into two types. At this point, Leibniz builds an additional piece of dialogue into his text¹. He makes Théophile, the character who puts forward his own views, fail to grasp that Philalèthe, i.e. Locke, takes the word 'sign' in the wide sense that he does. Thus Théophile's remark that the other is mistakenly looking for truth in words is somewhat misguided in that the other does not maintain, with Hobbes, that truth is solely to be found in words. Of course, Leibniz's move of making Théophile suppose this is a subtle way of criticising Locke's manner of speaking. Next Leibniz makes Philalèthe correct Théophile's misunderstanding by pointing out that 'sign' may also mean 'idea', and that truth is therefore either verbal or mental. This double character of truth is certainly unacceptable to Leibniz. Ridiculing the distinction between mental and verbal truth, he proposes to make further distinctions, such as paper truth versus parchment truth, and truth in normal ink versus printing ink. He concludes: "let us content ourselves with looking for the truth in the correspondence of the propositions which are in the mind with the things they are about".

Now the result of scrutinizing the context in which Leibniz uses the arguments of the Cartesian type - truth does not vary with languages and words, unlike ideas, are arbitrarily related to their referents - is that these arguments are not precisely directed against Locke's position, and that they are neither directly aimed at refuting Hobbes's thesis. Rather, they are aimed at showing that if Locke would take the position one might incorrectly ascribe to him on account of his odd use of the word 'sign', Locke would be running into the difficulties obviously connected with the Hobbesian thesis. But this result does not detract from the fact that Leibniz clearly considers the arguments against Hobbes to be valid, and that his emphasis on the correspondence between language-independent ideas and the things they are about amounts to a decisive departure from the position advocated in the *Dialogue*. However, it will be worth while to pursue his reaction to Locke's theory a little further, as this will reveal that in a number of other respects his views were quite constant.

The issue between Leibniz and Locke at this point does not concern the locus of truth. Both agree that ultimately truth must be located in the relation between, roughly speaking, our thoughts and the world. Nor is there much controversy on the observation that we often put words in the place of ideas while thinking. Locke, in the chapter just discussed, as in many other passages of his *Essay*, elaborates the theme that in fact much of our thinking is purely

¹ In the Introduction to the *New Essays*, Leibniz remarks: "It is true that the necessity of having to follow the thread of another person's argument in making my remarks has meant that I have been unable to think of achieving the graces of which the dialogue form is capable". Apparently, Leibniz has occasionally tried to achieve some of these graces after all.

verbal. Especially when our ideas are very complex, it is easier to reflect on the names of ideas than on the ideas themselves¹. Leibniz likewise often draws attention to this phenomenon: references to his notion of ‘blind thought’ pervade his writings, including the *New Essays*. However, as far as the implications of the phenomenon for epistemology are concerned, the two philosophers are diametrically opposed. According to Locke, the fact that much of our thinking is dependent on words is a ‘great obstacle to our clear and distinct Knowledge’². One of the often committed errors that words lure us into, is that we make them stand for things, while in fact the only legitimate way of using them is to make them signs of ideas. Otherwise we make them signs of things we do not know, and this is ‘a perverting the use of Words, and brings unavoidable Obscurity and Confusion into their Signification’³. Clearly, Locke was an ardent advocate of what has been seen to be the standard scheme: words signify ideas, and ideas represent things. Accordingly, the connection between language and the world is indirect, through an intermediate level of mental representations. However, for Locke this scheme acquires a normative rather than a descriptive status. Throughout the *Essay* he shows himself puzzled and annoyed that in fact the scheme is often distorted. Many of our ideas, especially so-called ‘mixed modes’, are inextricably interwoven with words. Besides, as said, words are often abused in that they are made to signify other things than our ideas. Of course, this is not how things ought to be: many of the errors we make in reasoning, and most of the fruitless disputes that people engage in could be avoided if words were kept distinct from ideas and if they were not made to signify anything but ideas.

By contrast, Leibniz denies that our knowledge suffers from the fact that we often have words rather than things in mind while thinking. In such cases “the mind merely marks the truth without understanding it for the moment, persuaded as it is that it has the power to understand it whenever it wants to”⁴. This capacity of temporarily suspending our understanding of the truth by replacing it with words even has its advantages. As will be shown below, Leibniz did recognize that this procedure might also be deceptive. But against Locke he points out that we use language not only for communication but for reasoning as well, as words help us remembering abstracts thoughts, and because of “the utility one finds while reasoning in making use of symbols and silent thoughts [*pensées sourdes*]”⁵. Rather than being a continuous threat to clear thinking, the use of language enhances our intellectual abilities. Leibniz is in a position to hold this view, as he is in no way committed to the claim that words can only refer to things via an intermediate level of ideas. On the contrary, in his view words may refer to anything in the world, whether

¹ Locke 1689 (further: *Essay*), Book IV, ch. V, § 4.

² *Essay* IV IV 17.

³ *Essay* III II 5.

⁴ *NE* IV V 3.

⁵ *NE* III I 2.

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ideas, or things, or even words. Leibniz is quite explicit about this when Locke claims that words signifying simple ideas and modes are often ‘secretly referred’ to other people’s ideas, whereas words signifying substances are usually, but erroneously, supposed to refer to the reality of things. Leibniz answers that he sees no such difference between these various kinds of words: “substances and modes are equally represented by ideas; and things, just as well as ideas, are in both cases marked by words”. Furthermore, one may use words to refer to words themselves¹.

That Leibniz opposes the view that words can only refer to things through our mental representations of them emerges clearly from the extensive debate with Locke on essences. According to Locke, the meaning of a term like ‘gold’ consists of a list of properties, such as a certain colour, weight, fusibility, fixedness, etc. These properties together determine what is to count as gold: anything that has these properties has ‘a right to the name’ of gold². Accordingly, what is called the ‘essence’ of a thing like gold is nothing but an aggregate of descriptive features, assembled by human intellect, and kept together by a name. Locke dwells upon the point that essences are thus purely *nominal*, ‘the Workmanship of the Understanding’, in order to refute what he thinks is a misguided belief, namely that general terms refer to the ‘internal constitution of things’. Granting that in the case of substances such an internal constitution, or *real* essence, must exist, he emphasizes that we can never use these real essences as a standard for classification and naming, as it is beyond our faculties to know them³. Again, it becomes clear that according to Locke there is no direct connection between words and things. In his view, the reference of words is determined by the ideas in the mind of an individual speaker. For this reason, the meaning of a term may vary with different speakers, to the extent that they connect a different ‘collection of simple ideas’ with the same word⁴.

Leibniz rejects this picture completely. There is no ground for a distinction between nominal and real essences, just as there is no basis for the distinction between verbal and mental truth. Although we do not always know the real essence of a thing, this does not preclude that general terms do refer to the internal constitution of things. The word ‘gold’ refers to a certain substance, irrespective of whether our knowledge of gold is complete and perfect: ‘our ignorance does not change anything in the nature of things’⁵. If our knowledge were perfect, we could explain all the properties of gold from its internal constitution, but as it is, we must be content with a list of descriptive features we may use to identify something as gold. The important thing is, that this list is by nature provisional. As our knowledge increases, it may be necessary to add properties to the list, or to delete some of them.

¹ *NE* III II 5,6.

² *Essay* III III 12 and III III 19.

³ *Essay* III VI 9.

⁴ *Essay* III III 14.

⁵ *NE* III X 21.

5.4 WORDS, IDEAS, THINGS

Therefore, the descriptions we use to identify a thing as being of a certain kind neither form a set of necessary conditions nor a set of sufficient ones for determining whether they really are of that kind. On the one hand, it may happen that such a description turns out to be incorrect. Leibniz's example is 'the heaviest body' - a property of gold which may in fact belong to a hitherto unknown material¹. On the other hand, all the properties of gold we presently know, taken together, may be insufficient to characterize gold in a manner which is specific enough. One day some material might be produced which satisfies all the criteria we presently use to recognize gold². But this does not compel us to say that this new material is the same stuff as that what we have been calling gold all the time. On the contrary, as we know how to distinguish this counterfeit gold from real gold, we have made a discovery which changes the way in which we recognize something as gold. But when talking about gold we have been referring to the same thing all along. The discovery helps to refine our concepts, but does not change anything in the real constitution of things. Thus, according to Leibniz, our concepts are not by themselves capable of completely determining the reference of words.

It has been mentioned that Locke, by contrast, went so far as to claim that the meaning of a word is determined by the peculiar collection of simple ideas which an *individual* speaker connects with that word. Leibniz, in opposition to this, observes the following:

the name of gold for example signifies not only what the one who pronounces it knows about it; for example, something yellow and very heavy, but also what he does not know, and what somebody else may know, that is, a body endowed with an internal constitution, from which its colour and weight flow, and from which originate still other properties, which he acknowledges to be better known by the experts (NE III XI 24).

Leibniz's views are strikingly similar to the theory which has been recently developed by Kripke and Putnam, commonly described as the theory of direct reference. Two major ingredients of this theory, namely what Putnam calls 'the division of linguistic labor' and 'the contribution of the environment to the fixing of reference'³ are central to Leibniz's objections against Locke's theory of language. Putnam seems to be unaware that he was anticipated by Leibniz. Presenting his own views and those of Kripke as consisting in 'an attack on conceptions which had been central to realism from the seventeenth century on' he points out the following:

Few speakers today can be certain that an object is gold without taking the object to a jeweler or other expert. The reference of our words is often determined by other members of the linguistic community to whom

¹ NE III IV 16.

² NE IV VI 4.

³ Putnam 1990:110.

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we are willing to defer. There is a *linguistic division of labor* which the traditional picture entirely ignores (1990:108)

Obviously, Putnam's picture of the tradition entirely ignores Leibniz.

Needless to say, Leibniz's position differs from that of Kripke and Putnam in a number of respects as well. A point that is important for the interpretation of Leibniz's views, is that Leibniz, in contrast with Kripke and Putnam, adheres to a form of classical realism. Against Locke's insisting that 'essences' are nothing but abstract ideas produced by the human mind, Leibniz holds that the only abstract ideas the human mind is capable of forming are those which are already moulded by nature¹. Likewise, the descriptive features we use in recognizing things as belonging to a certain kind, which Leibniz usually calls 'requisites' or 'marks', answer to real properties of those things. Although in most cases the requisites taken together form an essentially provisional characterization of kinds of things, this means for Leibniz in the first place that completing and perfecting knowledge involves addition to and refinement of the requisites we presently know, rather than a total deletion of some of them. It is significant in this connection, that his example of a 'requisite' possibly turning out to be false (gold is the heaviest body), is a relative property whose hypothesized falsity is a consequence of an addition to our general knowledge. It is doubtful whether Leibniz would allow for the possibility that, say, gold may prove to be blue, or that it would turn out to be the lightest material.

5.4.4 Language and thought

If we compare the position Leibniz defends in the *Dialogue* with the views put forward in the *New Essays*, we find that there is a perfect conformity as to some major issues. In both texts, Leibniz opposes the traditional framework, according to which the meaning of words consists primarily in the ideas of the speaker, which mediate between language and the world. Further, both in the *Dialogue* and the *New Essays* Leibniz maintains that truth must reside in the correspondence of thought with things. However, the question opened up by the next step in the argument of the earlier text, namely that thought cannot occur without words, is avoided in the later one. Here, as has been noted, the conformity breaks down. Although there is no doubt that Leibniz always attributed great importance to the use of signs or characters for thought, his statements on this matter are not wholly consistent. In the *Dialogue*, the possibility of thinking without symbols is denied, while in the *New Essays* not only the possibility but the outstanding importance of such thinking is emphasized.

¹ This is not to say that Leibniz was a 'conceptual realist', i.e. that he held that concepts have an independent ontological status. On the contrary, in his view only individual substances exist.

There is other textual evidence supporting both positions. Thus a fragment starts out as follows: “all our reasoning is nothing but the connection and substitution of characters, whether these characters are words or marks or finally images”¹. Another opens thus: “All human reasoning is performed by certain signs or characters”². Strictly speaking, these statements are about reasoning, which perhaps may not be equated with thinking in general, so that we might assume that they still allow for other, non-symbolic types of thinking. But this assumption is contradicted by Leibniz's claim in the *Dialogue*: “if there were no characters, we could neither think of anything distinctly nor reason about it”³. And: “no truth is ever known, discovered, or proved by me except by the use of words and other signs presented to the mind”⁴. These statements suggest that Leibniz believed that ‘blind thought’ is not just a convenient means employed for efficient calculating, but that it is in fact the only way of thinking performed by us.

On the other hand, a great number of texts make it very clear that Leibniz adhered to the opposite view, that is, that thinking without symbols is very well possible. In the first place, in several other passages in the *New Essays* than the one quoted above Leibniz is quite explicit about this point. For instance, Locke claims that it is only with reference to names that we can say of ideas that they are confused, e.g. our idea of a leopard is confused if we are unable to tell whether we should apply the name ‘leopard’ to a certain animal rather than ‘lynx’ or ‘panther’. Against this, Leibniz argues that such an idea is defective because of our inability to distinguish among various kinds of animals, quite irrespective of their names. Even if they had no names at all, we could have more or less perfect ideas of them⁵. Thus ideas are sharply distinguished from their linguistic expression, and may exist without them.

This kind of observation is by no means peculiar to Leibniz's arguments against Locke in the *New Essays*. Similar considerations can be found in writings produced at about the same time as the *Dialogue*. For instance, in a letter to Tschirnhaus of May 1678, which is largely devoted to the great value of symbols for thought, Leibniz defines calculating as ‘operation through characters’. This takes place “not only in matters of quantity but in all other reasoning as well”. After admitting that in very complex matters a calculus is necessary, he goes on to say:

Meanwhile I have a very high regard for such problems as can be solved by mental powers alone insofar as this is possible, without a prolonged calculation, that is, without paper and pen (...) we ought to practice both in calculating and in meditating, and when we have reached certain results by calculation, we ought to try afterward to demonstrate them by

¹ G VII 31.

² G VII 204; D 181.

³ L 184.

⁴ L 183.

⁵ NE II XXIX 5,6,7.

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meditation alone, which has in my experience often been successful (L 194)

These inconsistencies have interested some modern commentators. According to Dascal, who has devoted a series of essays¹ to this theme, Leibniz was always intrigued by the question which function signs perform in thinking. Dascal argues that Leibniz hesitated on the choice between two different conceptions of the cognitive role of signs, without ever making a final decision: he oscillated between the view that signs are “constitutive of thought in its higher forms, and, therefore, essential to it”, on the one hand, and the view that they ultimately have an auxiliary function on the other hand. However, Dascal believes that ‘the inner and deeper tendency’ (p. x) of Leibniz’s thought was towards the thesis that human thought is essentially symbolic; that language and signs are not merely instruments for thinking, but its ‘constitutive elements’ (1987:x). Searching an explanation for the fact that Leibniz never wholly adopted this view, and simultaneously kept clinging to the thesis that the function of signs in thinking is essentially subsidiary, Dascal suggests, seemingly with some regret, that Leibniz was held back by ‘constraints inherent to the *epistémé* of his time’ (1987:48).

Pombo (1987) has tried to show that ‘ambiguities and oscillations’ of the kind signaled by Dascal are sometimes manifested by a single text. She analyzes the fragment with the opening sentence just quoted (G 7 204) to establish this result, which may indeed illustrate that Leibniz’s assertions are not always completely unambiguous. As has been seen, Leibniz begins with the categorical statement that “all human reasoning is performed by means of certain signs or characters”. However, the sentence immediately following this apparently clear-cut assertion shows that it does not preclude the existence of mental acts in which things or ideas are grasped rather than symbols: “Indeed, it is neither possible nor desirable that the things themselves or even the ideas of them be always distinctly observed by the mind². So, for the sake of abbreviation, signs are used for them”. The latter sentence even suggests that signs are essentially derivative of a previous direct consideration of the things or ideas they stand for.

¹ Dascal, 1975, 1976, 1977, 1980. I have used the English versions of these articles in Dascal 1987. References are to page numbers in Dascal 1987.

² Pombo (1987:110) takes this very sentence to express a reaffirmation of what was said in the first, but I think that Pombo is wrong here, and that she apparently overlooks the word ‘always’, without which the sentence would indeed mean what she says it does. Adding emphasis on ‘It is neither possible nor desirable’, as she does, cannot change the fact that the sentence as it stands merely denies the possibility of *always* distinctly observing things or ideas, and hence carries the implication I draw attention to, and which is clearly confirmed by the sequel, as Pombo is likewise concerned to show. Moreover, it is remarkable that Pombo suppresses the phrase immediately following the one she emphasizes, namely: “itaque compendii causa signa pro ipsis adhibentur”. If signs constituted thinking, what could they be an abbreviation of?

This suggestion is clearly confirmed by the examples Leibniz offers: if a geometrician, each time that he mentions a hyperbola, would be compelled to recall its definition or mode of construction, this would retard the attainment of new discoveries. Likewise, an arithmetician could never complete large calculations if he were to think continuously of the values of the marks he uses, just as when he would want to use as many little stones as there are units involved¹. Again, a jurist cannot always make a thorough mental examination of everything that is involved in the actions, exceptions and benefits of a law. The implication seems to be that although the use of signs enables us to reach conclusions we could not reach without them, this is mainly due to their potentiality for accelerating and facilitating the reasoning process. In principle, each step could be performed and verified by independent means. It is only because it would be too laborious and too time-consuming to do so that we have recourse to signs. Thus Leibniz seems to contradict himself within the space of a single paragraph: setting out by declaring that all reasoning is performed by means of signs, he goes on to show that this is because signs are such a convenient means for abbreviating the non-symbolic mental operations on which they ultimately depend.

Now this particular inconsistency might be easily resolved by arguing that the opening sentence should not be taken too literally, and be read in the light of what follows². One could further point to the fact that we are dealing with an unpublished, and obviously unfinished draft of a paper of obscure status which is likely to contain some imprecise or over-simplified expressions. But probably this kind of textual analysis will not suffice for showing that the corpus of Leibniz's writings does after all provide a single unambiguous answer to the question that puzzles Dascal, and Pombo in his wake.

However, a picture which represents ambiguities of this kind as essential to Leibniz's views, exaggerates both the extent and the importance of the purported 'oscillations', and tends to lose sight of some crucial points. In the first place, in the text just discussed, and elsewhere, Leibniz is concerned to distinguish a variety of signs, ranging from characters which are of no use for reasoning, such as the characters of chemists and astronomers, to the symbols of arithmetic and algebra, the use of which virtually coincides with reasoning. A middle position is taken by the words of natural languages, which are helpful but deficient³. Conspicuously, the criterion for the division of signs into types is precisely the extent to which the signs can be used for reasoning. It is clear therefore, that the function of signs in thinking varies with the type of sign used. Secondly, it is a fundamental characteristic of Leibniz's

¹ Leibniz uses the same example elsewhere, e.g. C 154.

² An even shorter way of removing this difficulty is to translate 'perficitur' as 'is perfected' instead of 'is performed', as the following translation does: "All human reasoning is perfected through the use of signs or characters." (Rutherford 1995:260). But this is almost certainly a mistranslation, not only because it involves deviating from the standard meaning of 'perficere', but also as it renders the use of the universal quantifier 'omnis' stylistically awkward.

³ G VII 204-205.

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epistemology that two distinct perspectives on knowledge are taken: God's mind knows everything intuitively, simultaneously and perfectly (e.g. *NE* IV XVII 14), whereas we humans have only an inadequate knowledge of most things, although some of the perfections of divine knowledge are sometimes achieved. It makes little sense therefore, to demand a straightforward answer to the question what cognitive role Leibniz attributes to signs in thinking, as long as it is left unspecified what kind of signs, and what kind of thinking one is talking about.

Further, the importance the question had for Leibniz should not be overestimated. The very ambiguities observed above may indicate that he perhaps did not care so much about the matter. Anyway, in most of the relevant texts, Leibniz is not in the first place concerned to establish, as a matter of psychological fact, to what extent our thinking depends on symbols. Rather, he is searching a proper foundation for knowledge. And his answer to *this* question is characterized by a tendency to minimize the role of what goes on in individual minds in favour of logical considerations.

This tendency is clearly expressed in the important paper *Meditations on Knowledge, Truth and Ideas* (*MCVI*) of 1684. The fact that it was published in the Leipzig journal *Acta Eruditorum* indicates that, unlike some of the other texts mentioned above, this paper contains a balanced expression of Leibniz's views. Besides this, frequent references to it in later writings (e.g. *NE*) show that he regarded these views as fairly definitive. Moreover, the main points of the paper are repeated or anticipated in a large number of other texts. For these reasons the paper has rightly become a classical text.

In the *MCVI* the distinction between symbolic and intuitive thinking is explained as follows:

for the most part, especially in a longer analysis, we do not intuit the entire nature of the subject matter at once but make use of signs instead of things, though we usually omit the explanation of these signs in any actually present thought for the sake of brevity, knowing or believing that we have the power to do it (...) Such thinking I usually call *blind* or *symbolic*; we use it in algebra and in arithmetic, and indeed almost everywhere. When a concept is very complex, we certainly cannot think simultaneously of all the concepts which compose it. But when this is possible, or at least insofar as it is possible, I call the knowledge *intuitive* (L 292).

This leaves little doubt about Leibniz's belief that *most* of our thinking is carried out by means of signs. At the same time it is clear that he acknowledges the existence of non-symbolic, intuitive thinking. And although the actual part played by this latter type of thinking is very modest, it is of crucial importance from a systematical viewpoint. For the very definition of what 'blind thinking' is depends essentially on a contrast with intuitive thinking. Blind or symbolic thinking is clearly conceived as a derivative substitute for intuitive thought: in principle the use of signs can be reduced to the intuitive knowledge which it replaces. However, in practice this reduction usually does not take place. And

worse, in complicated matters symbolic thinking is the only possibility open to us humans, as an intuitive grasp of a very complex concept is beyond our limited cognitive powers. Here the importance of the two different perspectives just mentioned becomes clear. Viewed from an absolute standpoint, intuitive thinking provides the model for real knowledge, while symbolic thinking is just a subsidiary alternative. From the perspective of human knowledge however, things are not quite as clear: most of our thinking is symbolic, and we are usually not in a position to judge whether our thoughts in fact amount to real knowledge.

Given this state of affairs, Leibniz is concerned to show, the mental states we perceive in ourselves cannot serve as a foundation for knowledge. This is because

we often mistakenly believe that we have *ideas* of things in mind when we mistakenly suppose that we have already explained some of the terms we use (...) for, often, we do understand in one way or another the words in question individually or remember that we understood them previously. But since we are content with this blind thinking and don't pursue the resolution of notions far enough, it happens that a contradiction that might be included in a very complex notion is concealed from us (AG 25)

Thus it appears that thinking is not the same thing as 'having an idea', the latter being equivalent to having true knowledge of something. Because most of our thinking is symbolic, there is no guarantee that what we conceive are genuine ideas. It may happen that we perfectly understand what we say, and yet talk nonsense. As an example, Leibniz offers the concept 'the most rapid motion', which at first sight seems to be quite in order, for "we certainly understand what we say". After some reflection, however, it turns out that the most rapid motion cannot exist, and that we therefore do not have an idea of it, as "we have no idea of impossible things" (AG 25). Thus there is an incongruity between what goes on in our mind and the realm of objective ideas.

Leibniz uses these observations to show that a proof of the existence of God given by Descartes is not sound, and more generally, to attack the Cartesian criterion of truth, according to which whatever is conceived distinctly and clearly about a thing is true of that thing. This maxim is useless, Leibniz claims, as often what seems to be clear and distinct to people who are careless in judgment is in fact obscure and confused. Therefore, the Cartesian criterion is too individualist and too subjectivist to provide a reliable foundation for knowledge. Instead, Leibniz argues, objective, logical criteria should be used.

In this connection he introduces the distinction between nominal and real definitions, which also appears in numerous other writings, forming a central topic in his theory of knowledge. A *real* definition ascertains the possibility of the thing defined, whereas a *nominal* definition merely contains marks for discerning the thing from others. Nominal definitions do not suffice for perfect knowledge, as they contain no guarantee that the thing defined is possible, although it often happens that the possibility of a thing is proved

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simply by the fact that it exists. Thus the crucial question on which the reliability of our knowledge depends, is whether it consists of 'true ideas', that is, whether the concepts we use represent possibilities. A false idea, by contrast, is one which implies a contradiction. As Leibniz explains in *NE*, to speak of 'true' and 'false' ideas is in fact an abbreviation of saying that the proposition stating the possibility of an idea is true or false.

The distinction between real and nominal definition provides Leibniz with a new way of refuting Hobbes's thesis that truth is arbitrary. As he points out, Hobbes "held truths to be arbitrary because they depend on nominal definitions, not considering that the reality of the definition does not depend upon our free choice and that not all concepts can be combined with each other" (L 293). This argument is not quite the same as the solution proposed in the *Dialogue*, for there the basis of truth is said to consist in a correspondence of symbols with things, whereas in the present text, as in a number of others in which the point is repeated, the emphasis is on the consistency of concepts. But in spite of this difference in orientation, which may appear more fundamental than it really is, there is a constant element underlying both ways of rejecting Hobbes's thesis, namely the decisive role of combinations. In the *Dialogue*, the admitted arbitrariness of definitions was confined to the moment at which a connection between basic symbols, such as words, and their referents is first established. Once the connection exists, combinations of symbols into larger wholes are constrained in that they must correspond to the reality of things. In *MCVI*, the arbitrariness of definitions is denied because their soundness depends on whether the concepts that are combined are compatible. This shows that the roots of Leibnizian doctrines in combinatorics remained unaltered. The corresponding conceptual atomism continued to guide his thought.

An important view connected with this basic attitude is clearly expressed in the *MCVI* as well. Leibniz maintains that knowledge is perfect if we have a complete analysis of a concept down to the primitives of which it is ultimately composed. It has just been mentioned that a real definition, as opposed to a nominal one, explains the possibility of the thing defined. In Leibniz's view, this possibility is known a priori when we have resolved a notion into other notions known to be possible. An example of this is provided by causal definitions, which show how a thing can be produced. In general, "whenever we have adequate knowledge, we also have a priori knowledge of possibility, for having carried an analysis to completion, if no contradiction appears, then certainly the notion is as least possible" (AG 26). The inadequacy of human knowledge is explained in a parallel fashion. That our thinking may be unreliable is due to the fact that we are often unable to tell whether a combination of concepts into more complex ones is consistent or not. As we are usually not capable of grasping intuitively and simultaneously all the ingredients that make up a complex concept, it not seldom occurs that the concept contains a contradiction and hence is impossible without us noticing.

In conclusion, for an account of the relationship between language and thought as conceived by Leibniz, it will be useful to distinguish three aspects

of the problem. First, one may view the matter as a problem of empirical psychology, and ask to what extent symbols are involved in the cognitive processes going on in the human mind. As has been seen, Leibniz's various answers to this question range from a complete equation of thinking with symbol manipulation to the claim that the larger part of our thinking depends on the use of symbols. It is clear however that in his view very complex concepts cannot be grasped without the use of symbols. Further, our ability to think without symbols is limited in that we can only direct our attention to a few things at the same time. In an early fragment (1671-1672, A 6 2 479-486, D 148-154) Leibniz states that very few people distinctly imagine all the units of the number nine when talking about it. The suggestion seems to be that if we try hard, we could succeed in doing this without using a symbol, but that if the number is only slightly larger we will fail. In any case, for calculating with very large numbers the use of symbols is indispensable. This is because our intellectual abilities are not only limited in that they require too much time for dealing with large numbers, but also in that they cannot contain sufficient distinct imaginations at the same time:

Who, indeed, could imagine distinctly the units contained in 1.000.000.000.000 in a time shorter than the age of Methuselah? And even if he could, he would forget the first units as he progressed towards the end (D 149)¹

This explains why Leibniz attached so much value to the capacity of well-chosen symbols to present a complicated matter in such a way that it can be viewed at a single glance ('*uno obtutu*'; cf. 5.3.2).

A second aspect concerns not the recognition, but the evaluation of the fact that our thought is in such a large measure dependent on the use of symbols. Again, Leibniz does not provide a straightforward answer. On the one hand, our dependence on symbols illustrates the weakness of our intellect. Compared to the perfect knowledge that God possesses, symbolic thinking is certainly inferior. It has been noted that precisely because of the fact that most of our thinking is symbolic, we cannot use 'clear and distinct ideas' as a criterion for reliable knowledge. This negative evaluation also appears in the following way. Many seventeenth-century writers point out the unique character of human speech by contrasting it with the sounds uttered by parrots. Human speech sounds, so the story goes, are accompanied by ideas, and this is what renders them far superior to the prattling of parrots. And if people utter words without having ideas, as sometimes happens, they degrade themselves to the state of parrots. Leibniz does not hesitate, in accordance with this picture, to describe the exertion of blind thought as '*psittacisme*', i.e. 'parrotism'². From

¹ This remark is very similar to one occurring in *DAC*, G IV 35: "we often grasp a number, however large, all at once in a kind of blind thought, namely, when we read figures on paper which not even the age of Methusalem would suffice to count explicitly" (L 76).

² *NE* II XIX 35.

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the context it is clear that he does intend this term to have the negative connotation it suggests. At the same time however, Leibniz evaluates the use of symbols in quite the opposite way. For if we take our limited capacities for granted, the utility of symbols cannot be overestimated. It then appears that all kinds of benefits flow from them: the capacity of the memory is greatly enlarged, volatile thoughts become fixed, and the reasoning process is facilitated, accelerated and secured. As before, it appears that Leibniz's views defy the demand for an unambiguous position, not because he undecidedly oscillates between several alternatives, but because he integrates various perspectives on the same thing.

The third aspect regards the implications of the points just mentioned, which have a direct bearing on the plan and purpose of the philosophical language. Since much of human thinking necessarily consists of mechanical operations on symbols, the quality of the language used is crucial for the quality of thinking. For in so far as our thought is blind, the symbol system takes the lead, bringing us to conclusions we could hardly reach on our own. But this presupposes that the symbol system is impeccable, as otherwise there is no guarantee that it brings us to the right conclusions, namely those we would reach if we had the capacity and the time to perform each step of the argument by 'meditation alone', that is, by a full consideration of everything that is involved in the concepts we are dealing with. It will be remembered that according to Leibniz the only symbols we can effectively and reliably use in a mechanical way, are those of arithmetic and algebra. Other symbol systems are classified according to the degree in which they approach the ideal. As has been mentioned, Leibniz points out that some types of symbols are completely unfit to be used in reasoning; they can only do service in representation. As examples he mentions 'the characters of Chemists and Astronomers' (cf. 5.3.2). Apparently, such symbols are worthless for reasoning because they merely indicate their referents, without being capable of being operated upon in a meaningful way: they cannot be transformed or combined with other symbols to form another meaningful expression. Obviously, the notation used in modern chemistry would have been quite contrarily judged by Leibniz. Between the ideal, mathematical symbols and the purely representational ones used in chemistry and astronomy, stand ordinary languages. About these Leibniz says the following:

Ordinary languages, although considerably helpful for reasoning, are guilty of countless equivocations and cannot be used to perform the task of a calculus, namely, to allow the detection of errors of reasoning through the formation and construction of words themselves, as in the case of solecisms and barbarisms (D 182)

The main defect of natural languages, then, is that we cannot infer the truth of an expression from its form. In other words, the criteria for formal, or syntactic correctness of expressions are not sufficient to establish semantic correctness. Although Leibniz does not expressly say so in the fragment just

quoted, this explains why it may be hazardous to rely on blind thought while using ordinary language. The example of ‘the most rapid motion’ given in the *MCVI* illustrates this. Unlike solecisms and barbarisms, this expression does not offend any well-formedness rule. Yet there is no genuine idea answering to it. In the philosophical language, this would be immediately clear from the form of the expression:

In this system of characters, sophisms and paralogisms would be nothing more than what errors of calculation are in Arithmetic, or solecisms and barbarisms in language (D 182)

The philosophical language, therefore, is one which brings about that symbol manipulation and reasoning coincide. As Leibniz says in an earlier fragment: “blind thoughts alone would be sufficient for distinct reasoning” (D 149; cf. e.g. C 50-51, P 18: “what others could hardly do with the greatest mental labour and good fortune, we can provide with the guidance of symbols alone”). Thus Leibniz’s conception of a philosophical language may be viewed as the final consequence of a tendency prevailing in his age: the mechanization of the world picture culminated in the ideal of mechanizing thought.

5.4.5 Language and things

So far, only a negative conclusion concerning Leibniz’s conception of the relationship between language and the extralinguistic world has been reached: the schema according to which words primarily signify ideas, and connect with things indirectly through an intermediate level of ideas, proved to be a bad model for Leibniz’s views. To begin with, words and ideas cannot always be easily separated, as most of our thinking is symbolic. Further, symbolic or blind thought may either lead to reliable knowledge about things or be totally disconnected from the way things are, depending on the language we use. Moreover, Leibniz rejects Locke’s view that it is the abstract idea in the mind of an individual which determines whether a thing ‘has a right’ to a certain name. It is tempting therefore, to reconstruct Leibniz’s philosophy of language in such a way, that a direct connection between words and things is assumed. On such a picture, the meaning of a word, e.g. a common noun, is simply the class of individual objects denoted by that noun, regardless of the ideas various speakers may have of these objects. In order to schematize this picture, it would be appropriate to position the elements of the words - ideas - things schema at the angles of a triangle, rather than on a straight line. A triangular arrangement expresses the fact that no element is intermediate between the other two, and that each has a direct connection with both of the others. Accordingly, both words and ideas constitute an independent way of representing reality.

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There is quite a lot of evidence one could adduce in support of this interpretation. It has been seen that in the *Dialogue* the basis of truth is said to lie in the relation between characters and things. And the debate with Locke on essences shows that Leibniz assumes a connection between words and things which remains unaffected by changes in our ideas about these things¹. Further, one will recall that Leibniz expressly states that “things, just as well as ideas (...) are marked by words”. To this one might add other texts supporting the assumption of a direct relation between symbols and things. In some cases, the connection is only implicit, e.g. when it is said that signs are used for things when we are thinking (G VII 204) or that “we use signs in the place of things” (MCVI). But in a tract devoted to the question how to improve the German language, the *Unvorgreifliche Gedanken*, Leibniz explicitly says that “words are not only signs of thoughts, but also of things”(BC II:520), and that this explains why words can be used for quickly reaching reliable conclusions about things.

Although Leibniz apparently assumed that in a sense words directly refer to things, it is not very clear what part this assumption plays in his philosophy of language. First it should be pointed out that textual evidence, as usual, is not wholly unambiguous. Some of Leibniz’s statements may be taken to show that he advocated the contrary position after all. For instance, a text called *Characteristica Verbalis* begins as follows: “Words are signs either of concepts, as in the case of nouns, or of modes of conceiving, as in the case of the other parts of speech” (D 175). And in a table of definitions, borrowing its entries from Dalgarno’s lexicon (cf. 5.5.2), ‘nomen’ (name) is defined as ‘the sign of a concept’ (C 497). This does not seem sufficient however to show that Leibniz denied the possibility of a direct connection between words and things. Burkhardt, who takes these statements to prove precisely this (1980:183-184), points to a number of other passages which are even less conclusive (1980:88, 180²). Thus he quotes the following statement, which according to Burkhardt shows that Leibniz accurately distinguishes three things, namely names of individuals, individual concepts and individuals themselves:

Si A sit B et B sit *terminus completus* erit A *substantia singularis*, seu subjectum certum quam vulgo individuum vocant. Sola enim substantia singularis *completum* habet *conceptum* (Burkhardt 1980:105, 169)³

¹ It must be noted however that e.g. the discovery of counterfeit gold may induce adaptation of nomenclature, for instance coining a new term for counterfeit gold while retaining ‘gold’ for real gold, or coining new terms for both materials, while retaining ‘gold’ for the species to which they both belong. NE IV VI 4.

² As has been noted above (5.4.2), Burkhardt surprisingly includes the *Dialogue* among the texts allegedly supporting this point.

³ LH IV 7 B 4, 13-14 (printed in S 479, German translation S 465). In English, this reads approximately: “If A is B and B is a complete term then A will be a singular substance, or some subject which is usually called an individual. For only a singular substance has a complete concept”.

But this is only correct if the Leibnizian term ‘terminus’ is rendered as ‘name’, and contrasted with the term ‘conceptus’, which occurs only once in this context. In fact, it seems inappropriate to do so, as the context strongly supports that ‘terminus’ is roughly equivalent to ‘concept’¹. For instance, Leibniz says that a substantival term contains a complete term, which would make little sense if Leibniz meant ‘name’ by ‘term’. Even if one concedes that Leibniz does distinguish here between the three elements mentioned by Burkhardt, nothing is clear about their interrelations. Worse, if ‘terminus’ is to be taken to refer to linguistic expressions, a remark by Leibniz a few lines earlier suggests that such expressions refer directly to things: “terminus completus est (...) qui totam subjecti naturam exprimit”. Furthermore, in another manuscript written in the same period (around 1695), Leibniz is making a similar point as in the sentence quoted by Burkhardt, and there he says

substantiae singularis conceptus est terminus completus omnia continens
quae de illa dici possunt (S 475)

which means “the concept of a singular substance is a complete term containing everything that can be said about that substance”. In this case Leibniz thus explicitly identifies ‘term’ and ‘concept’. Moreover, in some of the other texts adduced by Burkhardt it is the word ‘terminus’ which designates the place of concepts in the alleged three-place semantics². In general, Leibniz’s use of the term ‘terminus’ is notoriously vague and indeterminate. Partly due to this, there is an ongoing debate between present-day commentators on the question whether Leibniz can be justifiably accused of use - mention confusion³. Similar remarks could be made with respect to the other texts Burkhardt quotes: they show at most that Leibniz did recognize the evident fact that words, ideas, and things are to be distinguished, but contain few clues as to their mutual relations, let alone that they warrant the conclusion that Leibniz’s semantics is in essence similar to that of the speculative grammarians of the 13th and 14th centuries (Burkhardt 1980:88). The upshot of this is that the texts are not at all as clear as Burkhardt takes them to be, and that it seems little promising to settle the matter by trying to distil Leibniz’s position from isolated statements.

However, there is no need to do this, as a consideration of some points Leibniz explicitly makes concerning the meaning of terms is more compelling. Especially relevant for the issue is what he says about proper

¹ It should be noted that Arnauld and Nicole explicitly state that the word ‘term’ applies to both words and concepts: “tant les idées universelles que les noms communs se peuvent appeller termes généraux”. Nicole & Arnauld 1970[1662]:86 (I, 6).

² Cf. Burkhardt 1980:88, 105, 231.

³ Cf. Mates 1988:124ff., Ishiguro 1990:17ff. Burkhardt 1980:94-96 gives a useful survey of the different meanings of ‘terminus’ as used by Leibniz.

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names, which certainly are among the most obvious candidates if one is looking for a type of linguistic expressions which directly refer to elements of reality. In the *New Essays* Leibniz points out that “it is certain that all proper or individual names have originally been appellative or general” (III I 3). Thus “the first Brutus was given this name because of his apparent stupidity” and “Caesar was the name of a child delivered through an incision in his mother's abdomen”. These and similar examples show that

almost all our words were originally general terms, since it will very rarely happen that a name will be invented just for one given individual without any reason for it. So we can say that individual names used to be names of species that were given to some individual either as a prime example of the species or for some other reason, as the name 'Bighead' was given to the person who had the biggest of the whole town or who was the most considerable of the big heads one was familiar with (III 3 5)

These observations may be taken to show that Leibniz thinks of proper names as expressions which are semantically equivalent to descriptions and that he therefore opposes the view which assumes a direct connection between a proper name and its referent. Rutherford rightly points out that the claim that proper names were originally general terms is inconsequential for semantics, since even if it is correct, proper names could have subsequently acquired an independent status as singular referring expressions. He goes on: “However, this is not a development that Leibniz foresees. Within his scheme no provision is made for a primitive relation of reference, whereby a proper name directly “designates” or “stands for” its bearer. Instead, all terms immediately signify concepts which, in turn, pick out certain individuals” (1995 : 246). At first sight, this interpretation seems very plausible. In view of modern literature on the subject, it is natural to divide theories about proper names into two categories, namely Fregean type, descriptivist theories on the one hand, according to which proper names have a definite sense determining their reference, and Kripkean type theories on the other, which characterize proper names as rigid designators, terms that serve to pick out an individual, no matter what properties the individual has in the actual or some other possible world. It is hard for us not to ascribe the descriptivist type of theory to Leibniz after reading the passage quoted above.

Nevertheless, it would be a mistake to do so, at least if we assume that the descriptive view precludes the possibility of direct reference. In the first place, it would entail charging Leibniz with confusing etymology and semantics, which seems unwarranted. In a fragment containing some brief remarks on proper names, Leibniz explicitly denies that the characteristic that originally played a part in assigning a name to an individual has a bearing on its actual meaning: “etyma pertain to the history rather than the philosophy of speech” (S 479). Secondly, if it were correct that terms refer to things solely through concepts it would follow that, on Leibniz's view, we could seldom if ever succeed in referring to an individual. For according to one of his most cherished doctrines, the concept of an individual is infinitely complex,

involving everything that is true about that individual. We humans are not capable of possessing such complete concepts. Consequently, if names are connected to their bearers via such concepts, they hardly seem to be connected at all. But in fact, there is no indication that Leibniz wishes to deny that we often manage to refer to individuals by using proper names. We should not, therefore, jump to the conclusion that Leibniz's scheme has no provision for a primitive relation of reference. On closer analysis, his discussion of Locke's views on the matter makes it pretty clear that he does recognize the existence of such a relation.

Locke, at the outset of his chapter on words, remarks that it would be inconvenient to have a distinct word for each particular thing, as we would be perplexed by the abundance of words. Therefore, the existence of general terms, signifying ideas which comprehend several particular things, greatly enhances the usefulness of language. Leibniz comments that general terms do not merely serve to improve languages, but are essential for their constitution. If we had only words for individuals, we could not speak, as new individuals, and new properties and actions appear at every moment. The main point of this observation is to turn the Lockean picture, which is rooted in his epistemology, upside down. Locke's conviction that our knowledge starts from particulars and then by abstraction proceeds to general ideas is reflected in his tendency to regard the assignment of a name to a particular thing (strictly speaking: to the idea of a particular thing (*Essay* III 1 3)) as primary, and to think of names of general ideas as especially useful for capturing a number of particulars at once. By contrast, according to Leibniz's deductive model of knowledge, general ideas are logically prior to more specific ones, so that ideas of particular things occupy the last place in the order of priority; at the same time, they are the most difficult to grasp¹. Hence his insistence on the primary importance of general terms as opposed to proper names. The most general terms, he says, are both the easiest ones to master and the most useful in practice:

the most general [i.e. terms], which are less charged with respect to the ideas or essences they include [renferment], though they are more comprehensive with respect to the individuals to which they apply [conviennent], were often the easiest to form, and are the most useful. You also see that children and those who know only little of the language they want to speak, or of the matter of which they speak, utilize general terms like thing, plant, animal, in stead of using the appropriate terms that lack them. And it is certain that all proper or individual names have originally been appellative or general (*NE* III 1 3).

¹ Cf. e.g. C 159: "Methodus scientifica maxime perfecta incipiet non à posterioribus natura atque compositis et specialibus, quae in sensus incurrunt, sed à notionibus et veritatibus maximè simplicibus ac generalibus, quae primum intellectui observantur, unde paulatim ad notiones speciales et compositas descendit".

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Thus when Leibniz, as has been seen, in a later section elaborates on the etymology of proper names, his purpose is not to equate their meaning with the descriptive expression explaining their origin, but to corroborate his claim that general ideas, far from being abstracted from the ideas of particular things, are more easily known and more often talked about than the latter. At the same time, he indicates that the use of a general term to designate an individual is just a special case of a general principle of language use: we often designate things of some specific kind by using words whose sense is too wide to determine that kind. Leibniz's recognition of this fact shows that he had an open eye for the workings of natural language. It also shows that it is to misinterpret Leibniz to ascribe to him the view that words can only refer to things through the concepts they immediately signify. On the contrary, he emphasizes that although we often do not possess the concepts of the things we are talking about, we do manage to refer to these things. In the case of individuals, the concepts associated with them are even principally beyond our reach.

The passage just quoted contains another important clue in this connection: in a relative clause Leibniz informs us that 'terms', which clearly is equivalent to 'words' in this context, are related both to concepts and to individual things. A term both includes a number of concepts and applies to a certain number of individuals. These relations are interdependent: the more individuals a term applies to, the fewer concepts are associated with it, and conversely¹. Elsewhere in the *New Essays* Leibniz explains this point more fully:

when I say "every man is an animal" I want to say that all men are comprised in all the animals, but I understand at the same time that the idea of animal is comprised in the idea of man. Animal comprises more individuals than man, but man comprises more ideas or more formalities; the one has more examples, the other has more degrees of reality; the one has more extension, the other more intension (*NE IV 17 8*)².

This shows rather clearly that in Leibniz's scheme words are equally directly connected with things as they are with ideas, and that neither of these relations is primary with respect to the other. Both the things designated and the ideas signified are aspects of the meaning of words, and these aspects are inter-related.

¹ This interdependence has later been termed 'the law of reciprocity' (Kauppi 1960:8).

² A distinction similar to the one Leibniz draws here was proposed in the logic of Port Royal, but in this work it is made with regard to ideas: each idea includes (enferme) attributes making up its 'compréhension', and applies to (convient à) subjects constituting its 'étendue': "J'appelle compréhension de l'idée, les attributs qu'elle enferme en soi, & qu'on ne lui peut ôter sans la détruire (...); J'appelle étendue de l'idée, les sujets à qui cette idée convient" (Arnauld & Nicole 1970[1662]:87 (I, 6)). Although Leibniz does not explicitly say so, the context makes it fairly obvious that his distinction between extension and intension applies to words.

Leibniz supposes that this scheme is indiscriminately valid for general and for singular terms. The fact that the latter designate only one individual does not single them out as a separate type of expression. In a text entitled *Characteristica verbalis* he says that the distinction between proper names and appellatives can be dispensed with “as it is of no consequence whether we say that the thing of which we speak is alone in the nature of things or whether there elsewhere exists something similar to it” (C 433; translation Rutherford 1995:264). He proposes to introduce another distinction, namely between words which mark qualities of the things named on the one hand, and words which are attributed to things as an arbitrary sign on the other hand. This distinction cuts across the usual distinction between proper names and common nouns. As he explains elsewhere (S 479), according to this criterion, proper names such as ‘Petrus’ and ‘Johannes’ are in the same category with terms like ‘man’ and ‘horse’, while a term like ‘four-sided’ is in the other. Note that this distinction is defined solely in terms of the relation between words and things, without recourse to concepts of any kind. Words that are in the category of ‘appellative’ ones according to the newly proposed distinction display ‘the reason why they are attributed to things’ as Leibniz puts it at S 479. He further says that these appellatives are ‘to be proved’, as they designate attributes. This is revealing, for it indicates that Leibniz thought that even the denotation of ‘appellative’ terms is not determined by the attributes mentioned. Leibniz undoubtedly preferred ‘appellative’ expressions over terms without descriptive content. In fact, his ideal of a philosophical language entailed, as has been mentioned, that each word provides a clue to everything that can be said and thought about the thing denoted by that word. Although Leibniz attached little value to the extensional criterion for distinguishing proper names from common nouns, the corresponding intensional aspect does have some importance. As seen, proper names as well as general terms both designate a number of individuals (in the case of proper names the number is one) and signify an idea. As in the case of proper names the number of individuals designated is the smallest possible (if we set the problem of non-referring expressions aside), the ‘law of reciprocity’ predicts that the corresponding idea is of the largest possible complexity. And this does set proper names apart from common nouns, as it is not given to finite minds to grasp the idea associated with a proper name.

In conclusion, it appears that Leibniz’s writings supply little support for the widespread belief among commentators that his philosophy of language is ‘conceptualistic’ that is, that he believed that words immediately signify concepts, and only indirectly denote things. By contrast, there is clear evidence for the thesis that his scheme contains direct connections between each of the elements of the ‘words - ideas - things’ framework.

For the creation of the philosophical language however this result is of little consequence. Leibniz consistently asserts that the foundation of the language is to be formed by the alphabet of human thoughts, representing, or consisting of a catalogue of simple notions. Thus the elements of thought, rather than the constituents of reality are the basis of the philosophical lan-

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guage. Given Leibniz's methodological starting-point this is quite understandable. To build the language on the elements of reality would be to start from the wrong end. These elements are individual things, whose concepts are infinitely complex, since complete knowledge of an individual involves knowledge of the whole possible world in which it exists. Such knowledge is not accessible to the limited capacity of the human mind. As seen, in the letter to Oldenburg written in 1673 he was already quite clear about this in pointing out that only God could assign names to things on the basis of perfect knowledge (cf. 5.3.2). Instead, the philosophical language must be based upon the analysis of human knowledge. And Leibniz was convinced that a language built on the sound elements in this would both improve thinking and accurately reflect the structure of reality.

5.5 PRELIMINARY STUDIES

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5.5 PRELIMINARY STUDIES

As has often been noted by commentators, Leibniz's ambitious plans never came to fruition. He did however put a great deal of work into sketches and preliminary studies directed towards the realization of his project. Much of this work has been somewhat neglected in the literature, with the exception of his many logical studies, which can quite justifiably be considered as part of the work that he believed to be a prerequisite for the creation of the philosophical language. In the present section, three types of further work he apparently did in order to get closer to the accomplishment of his goal will be discussed: firstly, a few short texts in which Leibniz considers a method of coining words for the philosophical language; secondly, some of the numerous lists of definitions he produced; thirdly, his sketches of a 'rational grammar'.

5.5.1 A method for coining words

In December 1676, Leibniz left Paris for Hanover, to enter the service of Duke Johann Friedrich of Brünswick-Lüneburg. On his way there he made a detour via London, Amsterdam and The Hague, where he paid a visit to Spinoza. Sailing from London to Holland, he was stuck in the Thames for a while because of adverse wind. In the fall of 1677, he wrote to Gallois, the secretary of the French Academy:

at that time, not knowing what to do and having nobody on the boat but sailors I thought of such things [namely his request to Gallois to have definitions excerpted from the dictionary of the French Academy] and above all I dreamt of my old plan of a rational language or writing (A 2 1 380)

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The plan of the philosophical language had been on his mind in Paris as well, witness his request concerning the definitions he had made at that time. Further, he wrote a document in May 1676, in which he states that a rational language is a prerequisite for the advancement of science (C 94). During the following years, especially 1678 and 1679, Leibniz worked hard on improving his logical calculi. He also produced some manuscripts in which he makes some proposals concerning a ‘general’ or ‘universal’ language.

A manuscript dated February 1678 bears the title *Lingua generalis* (C 277-279), in which Leibniz sets out to explain the problems that were to face all proponents of universal language schemes through the ages: although the utility of a universal language is obvious, it is not to be expected that people will consent on the choice of some existing language for that purpose, and neither are they prepared to accept an artificial one. He goes on to state that for this reason, something must be thought out that will entice people by its ‘wonderful facility’. It will be remembered that facility was also Wilkins’s only hope for the general acceptance of his language (cf. 4.2.3). Unlike the latter’s pessimism concerning the slow spreading of useful inventions, Leibniz adds that sometimes such inventions are taken over from one nation by another, ‘such as music’, by which he probably means musical notation. This opening is remarkable in that Leibniz seems to be concerned in the first place with a language meant for international communication, rather than with an instrument for thinking. However, when he goes on to explain the details of his proposal it turns out that this is closely related to his usual scheme after all. First, he mentions a problem that must be solved:

Because everything must consist of few elements, the compounds will become too long unless some method is found for abbreviating expressions, as is done in numbers by means of the decimal progression (C 277)

It is not unlikely that this remark was made in order to answer Dalgarno’s objection to the ‘analytical’ method (cf. 3.4.3). In his copy of *Ars Signorum* Leibniz wrote a marginal note on page 33, where Dalgarno says that since every element of a complex notion must be designated by at least one letter, the words thus formed might fill an entire page. Leibniz underscored ‘one letter’, and commented on this: “that is not necessary, just as there are not as many characters for numbers as there are units” (A 6 3 175). Dalgarno valued this latter fact as much as Leibniz did, stating in his autobiographical manuscript that “ten numerical figures can perform the whole business of numeration” (f.78r.), but Dalgarno did not see how he could use a similar method for the designation of all concepts in general. Descartes, it will be recalled, had likewise said that if, but only if, an order among the elements of thought could be established similar to that between numbers, a philosophical language could be created (cf. 2.4). Leibniz’s remark in the *Lingua generalis* just quoted shows that he took Dalgarno’s problem seriously (that the words would become far too long), but he did have a solution:

the best method of abbreviation will be that the matter will be reduced to numbers which are multiplied by each other, laying down that the elements of some character are all its possible divisors. This system is very admirable and reasonings of this kind can be proved by the theorem of casting off nines. Simple elements can be prime or indivisible numbers (C 277)

He adds that speaking this language will be nothing but uttering numerical propositions such as: “6 x 8 is 48; or 48 is ‘6^{nary}’”. Although these statements are too brief to be clear by themselves, Couturat (1901:62) has shown that Leibniz’s idea can be explained by taking other related texts into account. The idea is as follows. Assuming an analogy between the analysis of concepts and the resolving of products into factors, prime numbers are considered as genera with respect to their products (cf. PM 11: “a derived number can be expressed through the primes as its genera”). Thus ‘48’ could for example be used to represent ‘man’, and the proposition ‘48 is 6^{nary}’ could mean ‘man is rational’¹. In April 1679, Leibniz produced a number of documents in which he drafts various versions of a logical calculus which is based on a similar idea². The calculus is based on the assignment of numbers to the terms of categorical propositions, and makes it possible to test the validity of inferences using the propositions so interpreted. Although the calculus works fine for valid syllogistic inferences, it also does for some invalid ones. Leibniz later developed various alternative calculi along similar lines, until he eventually gave up the arithmetical method completely.

The rest of the *Lingua generalis* is almost entirely devoted to a method by which numerical expressions can be pronounced. Rather than saying “48 is 6^{nary}”, users of the language are supposed to utter ordinary speech sounds, which represent numbers. This is done by having a series of nine consonants represent numbers 1 to 9, and by assigning vowels to the numbers 1, 10, 100, 1000, 10000, so that for example the number 81374 can be written and pronounced as ‘bodifalemu’. Equivalently, it can be represented by ‘mubodilefa’, because the syllables each designate a fixed number, of which the whole word represents the sum. Thus ‘bo’ represents ‘1000’ regardless of its position in the word. Couturat (1901:62, and C 278, note 2) has pointed at the similarity between this method and that used by Dalgarno (cf. 3.4.5). An important difference is however that in Dalgarno’s words for numbers the position of a letter in the word is essential for its reference, just as in Arabic numerals. As Salmon (1972:133) has pointed out, Leibniz’s method is in fact the very same as that proposed by Lodwick in *The Groundwork* (1652:12).

¹ It is unclear whether or not Leibniz deliberately used 8 in this example, since 8 can only be factorized into primes as 2x2x2, whereas Leibniz probably supposed that only products of different prime numbers (concepts composed of different primitives) would be used.

² C 42-92. Cf. Couturat 1901:326-335, Lukasiewicz 1951:126ff, Kauppi 1960:145-153, Parkinson 1966:xxi-xxii for discussion.

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Leibniz notes that the large number of equivalent words resulting from the commutativity of the syllables is a great advantage, for it makes the language very suitable for poetry (C 278). He further mentions the possibility of marking word endings by a final consonant, and of adding special marks for emotional and other connotations. Furthermore, he notes that this language could be used by the deaf, and that it will be excellent for missionaries (C 279).

In an even shorter text, entitled *Lingua universalis*, Leibniz considers another method of making the language ‘agreeable for the people’ (C 279). After considering a similar, though different method for coining words designating numbers, he proposes a musical language: just as in the binary system all numbers are expressed by 1, 0, and their position, so does music consist of notes and intervals. For this reason, a language could be created in which numbers are expressed by means of singing an ordinary language. Leibniz probably means that certain intervals would be indicative of the position of digits, so that musical phrases express numbers. Unfortunately, he does not work this out in any detail; the text is clearly a tentative note. He asserts that songs in this language will be ‘certain proofs, because everything is fixed’. “In any case”, he adds, “this language which is to be expressed by music must be further thought about”, as it will enable one to compose beautiful songs (C 280). The idea of a musical language had been put forward earlier in the seventeenth century. Wilkins, in the *Mercury* (1641:75) discusses ‘a Language that may consist only of Tunes and Musical Notes’, referring to Godwin’s *A Man in the Moone* (1629).

From the overall perspective of Leibniz’s philosophical language, the *Lingua generalis* and the *Lingua universalis* are clearly concerned with relatively marginal aspects. It has been seen that Leibniz’s primary concern was always with an instrument for thinking, although he believed that this instrument could at the same time be a universal means of communication. In the *Lingua generalis* he elaborated the more practical aspects related to the latter goal, considering methods for making the language attractive, for abbreviating too long words, and for enabling elegance of expression. As has been argued (5.3.6), there is no justification for the assumption that the *Lingua generalis* is specifically related to an ‘a priori’ approach as opposed to an ‘a posteriori’ one. The fragment merely shows that Leibniz considered aspects of the implementation of his plan at a stage in which a great deal of preliminary work was still to be done.

The *Lingua generalis* has often been picked by authors sketching an outline of Leibniz’s plans for a universal language, and this has given the text more prominence than it deserves. Its importance is further diminished by the existence of another text, which shows that Leibniz later rejected his own proposal. This short fragment was printed by Couturat (C 280), but incompletely, precisely omitting the passages which could have shown that the proposal made in the *Lingua generalis* was just one in a series of tentative explorations of the subject, which is not very central in itself. The text has been printed in

complete form for the first time in the *Vorausedition* (VE:143-144), and contains the following remark:

If we want to express composite notions by multiplication of numbers by each other we will be in some trouble when joining notions together which involve the same thing twice, as when you say an equilateral triangle, it is manifest that the notion of the angle already implies the notion of the sides and conversely (VE 143)

There is thus a difficulty with the programme presupposed in the *Lingua generalis*: if each element of a concept is represented by a number, the product representing a composite concept will be too high a number if the same element is part of more than one concept that make up the composite one. Leibniz apparently assumed in this connection that a composite concept cannot contain the same element twice, which agrees with his usual approach (cf. 5.2.5 and 5.3.4). In a text written not earlier than 1686 (for he says that it is more than 20 years ago that he wrote *DAC*), he indicates that the arithmetical method of representing concepts is just a provisional one:

If the words were made according to an expedient which I think possible, but which those who have made universal languages have not considered, one could arrive at this effect [that disputes could be settled by computation] by the words themselves, which would be incredibly useful for human life; But in the meantime there is another, less beautiful, way, which is however already open, whereas the other should be entirely newly made. This is to use characters following the example of the mathematicians, which are suited to fix our mind, and to add a proof of numbers (C 176)

In the text in which the problem with the arithmetical method is noticed, Leibniz also recognizes a practical problem with the very feature he had considered as an advantage in the *Lingua generalis*, namely the possibility of unlimited permutations of syllables in words like ‘bodifalemu’:

It is to be seen whether the characters can be so instituted, that they can be transposed at will without loss of the present signification; but after considering the matter better I am of the opinion that it must be done otherwise, for besides as thus there would be far too many synonyms that would disturb the memory (namely so many as there are permutations), I think this cannot be done, because not every arbitrary letter can stand absolutely on its own (VE 144)

The final remark suggests that Leibniz at this stage was considering a method of forming words in which the position of individual letters in the word is significant.

Thus several notes and fragments show that Leibniz considered various methods of forming words of the philosophical language. Most of this was clearly tentative, and it was done in anticipation of decisions concerning the

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‘material’ side of the project, that is, the selection of primitive notions, or of those provisionally assumed to be primitive, which were to be designated by these words. This more laborious task very probably absorbed much more of Leibniz’s time, as it involved producing lists of definitions as well as analyzing grammatical particles and constructions, and the relevant papers greatly outnumber the ones of the kind just discussed.

5.5.2 Definitions

An essential prerequisite for the realization of Leibniz’s project, as noted (5.3.6), was that sound definitions of word meanings were available. It has been mentioned that Leibniz started drawing up lists of definitions using Wilkins’s tables as a guideline (5.3.1), and that he asked Gallois to have such lists made on the basis of the French dictionary (5.5.1). Over a period of more than thirty years, Leibniz produced dozens of documents, together running to hundreds of pages, containing definitions of word meanings. A large part of this has only recently been published for the first time in the *Voraußedition*, and some of the longest lists have never been printed thus far. Apart from papers that contain nothing but definitions, Leibniz often adds some of them at the end of other texts. Some of the lists are confined to words pertaining to certain semantic fields, such as a list of psychological terms with definitions (VE 936-963), and a short list of geometrical terms (VE 407-409), others comprise a great variety of words.

As a starting-point for his definitions Leibniz used various sources, although it is not in all cases clear where the words defined were taken from, if anywhere at all. The list of psychological terms just mentioned follows a work by Descartes (*De passionibus animae*, VE 936). A relatively large portion of these collections of definitions are modelled on the lexicons of Wilkins’s and Dalgarno’s languages. Apparently, Leibniz considered these lexicons to be a useful starting-point for his own plans. The first of these collections, which Leibniz drew up shortly after he had obtained a copy of Wilkins’s *Essay*, that is, in 1671 or the first months of 1672, contains more than 120 definitions. Starting with Wilkins’s first genus of ‘transcendentals general’, Leibniz provided all Wilkins’s radical words with a definition, and he did the same with some of the words Wilkins enumerated next to radicals as synonyms, near-synonyms, or words to be formed from a radical and a transcendental particle (cf. 4.3.5). Thus the first species of the first difference of Wilkins’s first genus is ‘being’, next to which the words ‘entity, essence, existence, subsist’ and others are listed. Leibniz defines ‘being’ (which he translates as ‘aliquid’ and defines as ‘quicquid cogitari potest’, i.e. ‘whatever can be thought’), but also ‘existentia’ and ‘essentia’ (A 6 2 487).

5.5 PRELIMINARY STUDIES

The correspondence as well as the differences between Wilkins's tables and Leibniz's definitions are illustrated by table 5.1¹, which contains definitions of the first 'difference' of Wilkins's scheme, namely the radical word 'genus' and the word 'species' which is coupled on account of affinity, and of the first five species of this difference with their opposites (or, as in the case of 'person', a word related by affinity). Of Wilkins's definitions, only the descriptions of species are reproduced from the tables (*Essay*:26); further information entailed in the description of differences and in the description and classificatory arrangement of genera is ignored². Words such as 'existence' which are not defined by Wilkins have been omitted.

¹ This table was printed earlier in Maat 1995:176. I also suggested that Leibniz may have borrowed not just the entries, but some parts of the definitions as well, adding however that in most cases the definitions differ completely (1995:175). Nevertheless, Dutz 1996:51-55 has argued at length for the difference between Wilkins's and Leibniz's definitions, on the erroneous assumption that he was refuting my position.

² The editors of the Academy edition suggest that the only thing Wilkins provides in his tables is a 'mere division of concepts' (A 6 2 487).

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Wilkins

I. Genus

That common essence wherein things of different natures do agree

Species

That common nature which is communicable to several individuals

1. Being

The first and most general conception of which the Understanding takes notice, as most known

Nothing

(opposite)

2. Thing

Those beings which are truly such

Apparence

those which our senses mistake for beings

3. Similitudes of Beings, formed in our minds either by apprehension of things that are

Notion

or imagination of things that are not

Fiction

4. Name

The words assigned for the signifying of several things and notions

to which may be annexed, though less properly

Person

that common name for the signifying of particular rational beings

5. Substance

Such things as subsist by themselves

Accident

which (according to the old Logical definition) require a subject of inhesion:

Though they are indeed nothing but the modes of Substance

Leibniz

Generalis notio est quae alterius
(specialis) pars est

I.1. Aliquid

est quicquid cogitari potest

Nihil

est quicquid nominari potest, cogitari non potest, nomen sine re, sine mente sonus

2. Reale

est quicquid non est tantum apparens

Apparens

est cuius sensibilitas non est distincta

3. Notio

est cogitatio quatenus alicuius cogitatio est

Fictio

est cogitatio non existentis

4. Vocabulum

est sonus articulatus nota signumque cogitationis

Persona

est cuius aliqua voluntas intelligitur

5. Substantia

est cuius aliqua actio vel passio est. An potius: quicquid cogitatur absolute sive complete

Accidens

est modus substantiae quo cogitari potest

table 5.1

5.5 PRELIMINARY STUDIES

Having provided definitions of all of Wilkins's radical words and several of the near-synonyms and related words belonging to the first genus of Wilkins's scheme, as well as those belonging to the first two differences of the second genus, Leibniz broke off the work. From other papers it appears that he resumed the work at least six years afterwards. A paper provisionally dated 1678 by the editors (VE 148) contains similar definitions of the radical and other words defined or listed by Wilkins in the third difference of the second genus. Again, a similar list (VE 997-1001) provides definitions of words occurring in Wilkins's fourth difference of the second genus. The latter list was produced some time between 1683-1685, as can be gathered from the watermark. It seems, then, that Leibniz resumed the work several times. As far as Wilkins's tables are concerned, he does not seem to have advanced any further. There is however yet another list, presumably drawn up around 1678 (VE 146-147), which shows that Leibniz restarted with the first genus of Wilkins's tables.

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1671-1672 (A 6 2 487-488)

± 1678 (VE 146)

Aliquid est quicquid cogitari potest

Aliquid est quicquid cogitari potest

Nihil est quicquid nominari potest, cogitari non potest, nomen sine re, sine mente sonus

Nihil est quicquid cogitari non potest

Reale est quicquid non est tantum apparens

Res est quae distincte cogitari potest

Apparens est cuius sensibilitas non est distincta

Existit quicquid distincte percipi potest, alioqui erit apparens tantum

(Existentia) est alicuius sensibilitas distincta

(Existentia) est distincta rei perceptibilitas seu sensibilitas distincta

(Essentia) est alicuius cogitabilitas distincta

(Essentia) est quod in re distincte cogitari potest

Vocabulum est sonus articulatus nota signumque cogitationis

(no matching definitions)

Persona est cuius aliqua voluntas intelligitur

Substantia est cuius aliqua actio vel passio est

Substantia cuius individuum de alio dici non potest

Accidens est modus substantiae quo cogitari potest

Accidens cuius individuum de alio praedicari potest

table 5.2

He possibly had temporarily lost the earlier paper. This time he did not get any further than the first two differences. The existence of two parallel lists enables a comparison between the result of his work carried out at different points of time. Table 5.2 reproduces Leibniz's definitions related to the first five species of the first genus.

In using Dalgarno's lexicon, Leibniz did succeed in completing his work. Among his papers there are at least five manuscripts containing definitions of either Dalgarno's radical words (three manuscripts) or the words included in his alphabetical *Lexicon Latino-Philosophicum* (cf. 3.4.1) (two manuscripts). The definitions of Dalgarno's radical words were produced between 1702-1704, since two of these lists are in Hodann's hand, Leibniz's secretary during that period. The longest of these lists is copied from a manuscript in Leibniz's own hand, and has been printed in C 437-508. It

contains definitions of each of the 1,068 radical words of Dalgarno's *Lexicon Grammatico-Philosophicum*. Of the two manuscripts related to Dalgarno's alphabetical *Lexicon Latino-Philosophicum*, one is very long (89 pages) and was obviously produced during the same period, since it is also in Hodann's hand. This list might have been partly compiled by Hodann, since a note says that some of the definitions were taken from other dictionaries. This paper is as yet unpublished. Figure 5.1 reproduces a fragment.

figure 5.1

The other manuscript related to Dalgarno's alphabetical dictionary was written by Leibniz himself, and takes up only one page, breaking off before words beginning with *b* are reached (VE 586-589). The dating of this manuscript is uncertain. The list very probably follows Dalgarno's dictionary, since it contains definitions of each of the words in Dalgarno's very selective list, as well as a number of additional words which are not in Dalgarno's list and which are precisely the ones that were clearly inserted afterwards. However, from the word 'acquiescere' onward the match is less precise. It may well be that

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Leibniz merged two word lists. Figure 5.2 reproduces a part of this manuscript.

figure 5.2

In table 5.3 a small selection is presented of the compound words in Dalgarno's language translating the Latin entries of the *Lexicon Latino-Philosophicum*, together with Leibniz's definitions in the short paper, and the definitions in the long, unpublished one. The similarity between the latter two is caused by the fact that some of the definitions in the longer list are known to be Leibniz's own: the definitions of the words 'abdicare', 'abdere', 'abire', and 'abhinc' were taken over by Hodann from annotations Leibniz made in his copy of *Ars Signorum* (A 6 3 179).

5.5 PRELIMINARY STUDIES

	Dalgarno	Leibniz (VE 586)	Leibniz/Hodann (LH IV 7 D II 5)
abacus	fran (mensa)	v. mensa	planum horizon- tale non quidem ad cibum capiendum, sed vel ad calculos vario inter se ordine dispo- nendos (...)
abbas	kaf (clericus)	rector monasterii, ad vitam constitu- tus	summus praefec- tus coenobii, viri- lis, solitariorum, seu praefectus monasterii viro- rum. (...)
abdicare	sofkafesu (sine clericus + infi- nitive), trud sof- slem (vituperare sine continuare)	rem, rei cura renuntiare	cura alicuius rei renuntiare
abdere	dit (tegere)	rem imperceptibi- lem facere	facere impercepti- bile
abire	bemphd (distantia ire)	desinere adesse	desinere adesse
abhinc	shub lol dan, bem lol dad (posterius hic tempus, distan- tia hic locus)	fit, quod nunc incipit	immediate post nunc incipiens

table 5.3

It appears from these lists that Leibniz continued his efforts to draw up a catalogue of primitive notions through analysis of word meanings. He seems to have believed that descriptions of lexical meaning of the type that can be found in dictionaries would ultimately lead to a set of basic elements out of which the rest is composed. The possibility that such definitions might prove to be circular never seems to have bothered him.

5.5.3 Rational grammar

Leibniz's strategy in realizing his scheme for a philosophical language, as noted in 5.3.6, consists in the analysis of knowledge, and this implies that existing languages are to be analyzed. Definitions of word meanings are part of this, but they are not sufficient. This is because the structure of existing languages is much more complex than is presupposed in the simple model

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characterized by the conceptual atomism inherent in the idea of an alphabet of human thought on the one hand, and the analytical theory of truth on the other hand (cf. 5.2.7, 5.3.3, 5.3.5). Consequently, a special kind of linguistic investigation is called for, namely, an analysis of languages aimed at revealing the basic operations of human thought (C 36). This analysis is what Leibniz often calls ‘rational grammar’. A number of intriguing texts are devoted to this subject, ranging from extremely short ones (C 283) to longer essays, one of which takes up nineteen folio pages (VE 353-376). All of these papers are tentative notes, and there are various points concerning which Leibniz does not take a single consistent position. Many of these papers have only recently been published in full, in the *Vorausedition*. A smaller number of texts were written after 1700, and hence are yet to be printed for the first time. A full account of these fascinating texts cannot be given here; what follows is a brief outline of some issues often recurring in them¹. Other, equally interesting topics require further research.

Rational grammar faces two specific types of problems. First, most of the sentences of natural languages contain all kinds of elements which cannot be fitted into the simple *A is B* pattern of the categorical proposition which is presupposed in the model defined by conceptual atomism and the analytical theory of truth. For this reason, rational grammar tries to identify those elements of languages which are absolutely necessary for the adequate expression of the structure of thought, and seeks to reduce all other elements to these.

A second problem is that natural languages contain various particles and affixes indicating that concepts are combined in some special way rather than being simply put together to form a complex concept. For example, the phrase *part of an animal* expresses a concept which clearly involves both the concept *part* and the concept *animal*, but these concepts do not merge into a larger whole just like that: whereas anything which is a rational animal is both rational and an animal, it is not the case that anything which is a part of an animal is both a part and an animal. This further appears from the impossibility to reverse the order of the words denoting these concepts: *animal of a part*, if it means anything at all, does not mean the same as *part of an animal*. Leibniz expresses this state of affairs by saying that the concept *animal* is not *directly* contained in the concept *part of an animal*, but enters *obliquely*, or in an indirect way into the more complex concept (VE 315, 379). The term *oblique*, obviously, is used because such combinations of concepts are expressed in Latin by means of oblique cases, that is, cases other than the nominative. The presence of obliquely combined terms blocks the possibility to test the truth of a statement by means of definition substitution. For instance, the phrase *part of an animal* is likely to occur in a definition of the word *tail*, but it cannot be said that the concept *animal* forms part of the concept *tail* in the ordinary

¹ Couturat 1901:63-75, Mugnai 1992:59-83, and Schneider 1994:226-236 provide more elaborate, but equally limited discussion.

sense. Consequently, rational grammar seeks to reduce obliquely combined terms to expressions containing only directly combined terms (VE 350).

The overall aim of rational grammar, then, is to resolve the discrepancy between natural language expressions on the one hand and the schema characterized by conceptual atomism and analytical theory of truth on the other hand. To achieve this goal, Leibniz undertakes a painstaking analysis of the function of various word classes and grammatical categories, and of the meaning of specific particles of natural languages. It has been seen that the necessity of such analysis was already part of the programme for a philosophical language in its earliest stage, as in *DAC* Leibniz referred to the analysis of Latin cases as a prerequisite for the identification of the primitives (cf. 5.2.5, 5.3.6). As a starting-point for his investigations, Leibniz takes Latin, being the international language of the learned. But in principle, he emphasizes, any natural language could be subject of examination (C 352). In practice, Leibniz sometimes uses observations on French, German, and even Georgian in the course of his work.

The results of these investigations may be summarized as follows. To begin with, Leibniz observes in several places that the various parts of speech can be classed under two general heads: first, material words or integral terms, and second, formal words or particles (VE 353, C 357ff.). This division closely resembles the distinction made by scholastic logicians between categorematic terms having a meaning in their own right, and syncategorematic terms, whose function is to modify and connect categorematic terms. The *material* words comprise substantives, adjectives, verbs, and adverbs. According to Leibniz, interjections belong here too, though they are usually treated as particles. Since interjections are abbreviations of whole sentences (e.g. *Ah* means *I have pain*), they can be dispensed with in the philosophical language (VE 353; C 353). Further, the distinction between substantives and adjectives is of little importance, for a substantive is nothing but an adjective added to the very general notion *res* (thing) or *ens* (being). For instance, *man* can be analyzed as *human being*, and *gold* is short for *a thing which is yellow, heavy, malleable etcetera* (VE 356-357).

In a similar way, verbs are reduced to the copula plus an adjective. In accordance with the logical tradition Leibniz maintains, just as Wilkins, that the copula is a necessary part of every proposition. The copula may be explicitly expressed by means of the word *is*, or it may be included in the verb. For instance, the sentence *Petrus scribit* (Peter writes) expresses the same proposition as *Petrus est scribens* (Peter is writing) (VE 921).

As to adverbs, Leibniz observes in several places that they relate to verbs just as adjectives relate to substantives. For example, *amat sincere* (he loves sincerely) is equivalent to *amicus sincerus* ((he is) a sincere friend) (VE 368), *valde potito* (I drink very much) is equivalent to *sum magnus potator* (I am a great drinker) (VE 923). However, this analysis has its problems. Perhaps it is correct to say that *he is a sincere friend* entails *he is sincere* and *he is a friend*, but if I am a great drinker it certainly does not follow that therefore I am a drinker and I am great. In one text Leibniz provides an analysis of adverbs

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which is different from the usual one, and which precisely accounts for this problem. In this text he takes *Peter writes beautifully* as an example. Applying the analysis just mentioned (which is the most frequent) would result in *Peter is a beautiful writer*. But as Leibniz points out, this sentence means in fact: *Peter writes, and what Peter writes is beautiful*. And the similar sentence *Peter stands beautifully* is reduced to *Peter is beautiful in so far as he is standing*¹. Thus in these cases, the sentence containing a modifying adverb turns out to be an abbreviated expression of several propositions.

In summary, the parts of speech belonging to the class of material words are analyzed as follows:

Substantive → *res* + adjective

Verb → *est* + adjective

Adverb → adjective

Accordingly, Leibniz says that everything in discourse can be resolved into adjectives, the single substantive noun *ens* or *res*, the copula and formal particles (C 289).

Rational grammar is not concerned with the meaning of material words taken individually. By contrast, each and every one of the formal words or *particles* requires special analysis. This analysis is of the utmost importance for rational grammar, since it is in the particles that the logical structure of thought mainly resides. The term *particle* covers conjunctions, so-called formal adverbs, prepositions and pronouns. In a number of relatively long texts (VE 353-376, 514-532) Leibniz undertakes the analysis of a large number of particles, trying to establish their exact meaning, apparently for the purpose of determining which ones are semantically irreducible and hence indispensable for the philosophical language.

The analysis of particles is related to the problem of obliquity. Leibniz does not provide a clear and definitive solution to this problem, but in a large number of papers he produces reductions of sentences containing 'oblique' terms to sentences from which these terms have been eliminated. For example, the sentence *The sword is the sword of Evander*, which contains a genitive, is analyzed into two simple categorical propositions containing only 'direct' terms:

The sword is property - Evander is owner.

These two sentences are connected by the particle *quatenus* (in so far as), so that the whole complex sentence reads:

The sword is property insofar as Evander is owner (VE 349).

Thus the obliquity of the term *of Evander* has been transferred to the connecting particle *quatenus*. Leibniz, as he notes himself, uses this particle very often in his analyses. Its meaning, he explains in one text, is: *with respect to the following proposition* (VE 531). It thus appears that *quatenus* is not a truth-functional connective like *and* or *or*, which connect propositions the

¹ "*Petrus scribit pulchre. Id est Petrus scribit aliquid pulchrum seu Petrus scribit, et quod Petrus scribit est pulchrum. Petrus stat pulchre. Id est Petrus est pulcher quatenus est stans*" (VE 102-103).

truth of which can be determined independently, but indicates that one of the propositions connected by it is a so-called ‘reflexive’ proposition.

Although according to Leibniz oblique cases must be eliminated from the philosophical language, he emphasizes that such conjunctions as *quatenus* cannot possibly be dispensed with (VE 350). He thus recognizes that if the philosophical language is to be capable of adequately expressing the logical structure of thought as revealed by rational grammar, special particles are needed in addition to the simple sentence forms which figure in the schema defined by conceptual atomism and analytical theory of truth.

Since Leibniz’s investigations into rational grammar are ultimately aimed at a complete general explication of the semantics of natural languages, it is understandable that he did not achieve many final results. Nevertheless, it seems that his investigations deserve to be further explored.

5.6 LEIBNIZ, WILKINS, DALGARNO

It has been seen that Leibniz became acquainted with both Wilkins’s and Dalgarno’s languages not long after he published his own programmatic proposal in his treatise on combinations. Further, it has been noted that Leibniz emphasized the difference between his own scheme and that of the artificial languages of his predecessors in England. In addition, it has become clear that he made extensive use of both Wilkins’s and Dalgarno’s lexicons while doing some of the large amount of preparatory work directed towards the accomplishment of his goals. Leibniz’s papers contain some further clues that may shed light on how his views are related to those of both Britons. In the present section, some of this material is examined so as to enable a just assessment of this point.

5.6.1 Wilkins

Leibniz clearly considered the *Essay* to be an important work. Two years after the first expression of his wish that it be translated into Latin (in a letter to Oldenburg, May 1671, cf. 5.3.1), he repeated it in a letter written from Paris, saying that he hopes a Latin version of the *Essay* will soon be published, “for it seems to me to be a very useful work” (to Oldenburg, April 1673, G 7 9). After Oldenburg had died in 1677, Leibniz exchanged some letters with Hooke, who was curator of the experiments to the Royal Society, as well as a member both of the official committee for the revision of the *Essay* and of the unofficial group of correspondents who had set themselves that task (cf. 4.6). Just as Leibniz, Hooke had invented a calculating machine, and he remained curious about Leibniz’s work in that area¹. In February 1680, Leibniz wrote to

¹ Cf. A 3 3 235-236: in a letter of July 1680, Hooke inquires whether Leibniz “hath yet perfected his arithmetical Instrument”.

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Haak, a German who had been living in London for decades, asking him to convey his opinion on Wilkins's language to Hooke:

I see that this distinguished man [Hooke] attaches great value to the philosophical character of the Reverend Bishop Wilkins, which I also value duly. But yet I cannot conceal that he could have made something greater and so much more useful, as Algebraical characters are preferable to the characters of the Chemists. For I think that some universal writing can be invented, by means of which we can calculate and find proofs in all kinds of things just as in Algebra and Arithmetic. And I wish that Wilkins at the time when he was still at work, would have known this plan of mine; perhaps we would now have had by the same labour something of which I do not know if anything more useful can be provided to mankind in matters concerning the sciences (A 3 3 83)

Hooke replied to Haak that he was very pleased to hear that Leibniz had the same opinion as he himself had on the use of a philosophical language. He politely refutes Leibniz's assumption that Wilkins's work could have been much improved had he known about Leibniz's ideas, because, Hooke points out, he in fact brought similar ideas of his own to Wilkins's attention while the latter was working on his *Essay*. Hooke did not succeed in convincing Wilkins, although he "had many debates with him of that particular". Hooke adds that he at present is working on improving the *Essay*, so as to make it "applicable and usefull not only for common Discourse and keeping correspondence but for the strict and philosophicall way of Reasoning and Inquiry" (July 1680, A 3 3 234).

In his reply Leibniz subtly expresses some scepticism about Hooke's endeavours to revise the *Essay*. He says he thinks that although Wilkins did not at all have a 'universal calculus' in mind, his attempt is valuable and can be useful for the development of such a 'truly rational language', adding however: "I realize that other, quite different aids are required". Nevertheless, he says, he is curious to know what Hooke thinks should be changed in Wilkins's work (January 1681, A 3 3 314). Hooke's answer contains little information concerning that question, but emphasizes that Leibniz's help is very welcome. He confesses that his own plans met with very little response, and he repeats that he is very glad to find Leibniz having similar ideas, for "the Scarcity of Persons to converse with concerning it does almost Discourage me" (April 1681, A 3 3 392). Although Hooke and Leibniz were clearly kindred spirits, both working on similar projects that were not understood by most of their contemporaries, it never came to any collaboration between them¹.

Leibniz's opinion on Wilkins's *Essay* remained unaltered through the years. In 1697, he wrote in a letter to Burnett that he had attentively considered Wilkins's work, and that he had found 'infinitely many beautiful things'

¹ Hooke wrote a work called *Mathematical Language* around 1686, which was never published (Slaughter 1982:182).

in it. He asserts that “we have never had a more accomplished table of predicators [prédicateurs]”. Nevertheless, he points out, something far superior to Wilkins’s character and language could and should be created, and he refers to the plan put forward in *DAC* to show that he had already conceived such a symbolism before he knew of Wilkins’s work.

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essence can be understood to be distinct from the thing itself, and we will have, if we like to fabricate it like that, a sort of *humanitality*; and this will go on infinitely. Hence the trifles of the scholastics concerning abstracta. *Humanity* will be a *humanitalitous* being, or *having humanitality*. Nonsense. Surely if every being has an essence, and essence is a being, an essence of essence will be given ad infinitum; without any profit and effect. Wilkins makes out of *heat*, which itself is abstract, another abstract *hotness* (VE 357).

This quotation is from a long text on rational grammar, entitled *De lingua philosophica* by the editors, which on close analysis appears to be something between an excerpt of and a detailed commentary on Wilkins's chapter on 'natural grammar'. This text was published for the first time in complete form in the *Vorausedition* (a few short passages were printed earlier in C 288-290), and its nature has not been recognized thus far. This is undoubtedly because it contains no explicit indications that it is partly a summary, partly a commentary, and it reads like an independent treatise (although Wilkins is mentioned twice, VE 357, 376). In addition, it contains various passages which do not seem to be linked with Wilkins's chapter at all. Yet there are so many indications that the text is somehow modelled on Wilkins's, that neglecting this fact may easily lead to misinterpretations. Thus the various subjects treated, as well as the order in which this is done, are too similar to be incidental. Apart from this, there are many passages which are clearly a summary of, or a note concerning what Wilkins says. As it would be cumbersome to produce all the evidence that could be adduced, a few examples may suffice here.

1) Discussing tense, Leibniz notes: "tenses of nouns, just as is said *amatio*, the act of one who loves, so will *amavitio* or *amaturitio* be the act of one who has loved or will love" (VE 358). Wilkins (p. 316) says that tenses should be ascribed to substantives: "As there is *Amatio*, so there should be *Amavitio* and *Amaturitio*, &c".

2) Leibniz provides discussion and definition of a list of prepositions. The order of the prepositions, treated immediately after interjections just as Wilkins does, is virtually the same as in the *Essay*. In the margin of pp. 309-311 of the *Essay*, a Latin equivalent to each of the prepositions is printed in the margin (pp. 309-311). After defining 'secundum', Leibniz says: "instar is not a preposition but a noun", thus correcting the *Essay*, which prints 'inster, secundum' in the margin (p. 309). The next preposition defined by Leibniz is 'pro', which in the *Essay* is also the next one, and in the margin it is coupled with 'vice'. Leibniz goes on to remark: "Vice is not a preposition but a noun, as instar" (VE 362).

3) Discussing the imperative mood immediately after the article, which is precisely the idiosyncratic order followed in the *Essay* (p. 315), Leibniz says that this designates the "declaration of the will, which is done by petition, persuasion, command according to whether we speak to superiors, equals or inferiors" (VE 371). Wilkins's definition says that the imperative is "the

expression of his [the speaker's] will to him that hath the thing in his power, namely to his **Error!** by **Error!**” (p. 315-316).

It is quite clear, then, that Leibniz used Wilkins's 'natural grammar' as a starting-point for the grammatical observations he recorded in this fascinating text. This is not to deny that much of what is contained in it are views genuinely held by Leibniz; it is quite clear that this is the case, and much of it is as interesting and original as what he says in many of his other writings. It is however also clear, once it is realized that much of this is interspersed with either simple renderings of what Wilkins says, or comments directly occasioned by what Wilkins says, that not everything he wrote down should be interpreted as an unambiguous expression of his own views, and that in many cases the precise import of his statements is doubtful. At the same time however, the origin of this text clarifies much of what otherwise might seem puzzling.

Thus there is little doubt that when Leibniz refers to “characters of all letters as they are pronounced by various nations for designating proper names” (VE 376), he is referring to Wilkins's phonetic alphabet. And where he notes: “The philosophical language will be best taught by playing; some ingenious game will be invented, the outcome of which is to be obtained by means of this character or language” (VE 376) he is either merely recording or borrowing Wilkins's suggestion that “the reducing of the Learning of this Character to a Game, may be a special help and furtherance to it” (*Essay*, p.442). For the same reason, it is clear that Leibniz's statement quoted above (cf. 5.3.8) should be translated as is done there, namely using the definite article: “I prefer the language to the character [Malim linguam quam characterem]”, since he is referring specifically to Wilkins's scheme.

Commentators who were unaware of the status of this text, have been exercised by problems that vanish as soon as its status is taken into account. For example, Mugnai (1992:62-69) has been puzzled by the fact that on the one hand Leibniz usually maintains that the philosophical language should not contain oblique cases, while in *De lingua philosophica* he seems to completely accept their presence, considering various methods of marking them. In fact, the relevant passage (VE 366) is a summary of some of Wilkins's statements in the *Essay* (p. 352). Gensini 1996:79 notes that VE 360 is “one of the rare passages in which Leibniz recognises that animals have a form of language”. The explanation is that Wilkins observes that some interjections “are common with us to Brute Creatures” (*Essay*, p. 308), and this is obviously what occasioned Leibniz's similar remark.

In conclusion, Leibniz thoroughly studied Wilkins's work, and he found so many ‘beautiful things’ in it, that he used both the tables and the grammar as a starting-point for further investigations. It must be noted however that Wilkins's work was by no means unique in this respect. One of the many other authors whose works were carefully studied by Leibniz was Dalgarno.

5.6.2 Dalgarno

Leibniz's copy of *Ars Signorum* shows very clearly that he read the book with great attention, witness the many underlinings and marginal notes he inserted¹. The broadsheet that contains the *Lexicon Grammatico-Philosophicum* is filled with annotations, some in Leibniz's hand, others in Hodann's. Some of these annotations are clearly intended to enable easy reference to radical words², others are definitions of radical words, which were entered by Leibniz. Some of these definitions are similar to, others are different from the ones occurring in the long list that was compiled between 1702-1704 (C 437-508). Further, Leibniz summarized Dalgarno's method of forming radical words, and he corrected printing errors and other minor mistakes, which shows that he scrutinized the details of Dalgarno's tables.

It has been mentioned that Leibniz's copy of *Ars Signorum* contains a note in which he explains the great differences between his own scheme and those of Dalgarno and Wilkins (cf. 5.3.1). From this note it also appears that Leibniz, despite his careful reading of *Ars Signorum*, regarded Dalgarno's and Wilkins's languages as being basically of the same type, noting about Dalgarno's language: "This invention has been carried through and brought to its conclusion by John Wilkins" (A 6 3 170), a comment which would have offended Dalgarno if he would have been able to take notice of it. Nevertheless, Leibniz also recognized that Dalgarno's theoretical framework was in some respect similar to his own, as he noted: "Dalgarno saw something through the mist p. 33, but as he was scared off by the difficulty of the matter, and did not sufficiently understand how to deal with it, he went astray in all other respects" (A 6 3 170).

On page 33 of *Ars Signorum* Dalgarno explains why "the constitution of the predicament that in first place puts the *first* and *most simple* notions (...), and next thereafter those that are composed out of these few simple ones, is not an adequate foundation for the art of grammar" (AS:32), although he admits that "it is the highest achievement of philosophy to be able to resolve any notion into its first principles" (AS:33). This 'constitution of the predicament' is obviously what Leibniz regarded as being indistinctly perceived by Dalgarno, and it is precisely what he himself believed to be the proper foundation of a philosophical language. Dalgarno's objection to taking the simple

¹ The high editorial standards of the Academy edition are exemplified by the meticulous records of these notes in A 6 3 169-188.

² The editors of the Academy edition note: "Aus welchem Grunde und in welcher Absicht Hodann am unteren Rand des *Lexicon Grammatico-Philosophicum* das Vorkommen der Vokale und Konsonanten am Silbenanfang in der Reihenfolge der Druckspalten 1-8 registriert hat, ist nicht zu erkennen" (A 6 3 169). It is very probable however, that Hodann, while compiling the list of definitions using Dalgarno's alphabetical *Lexicon Latino-Philosophicum* (cf. 5.5.2), had to consult the lexicon of radical words frequently in order to make sense of Dalgarno's compound words. An index-like survey of the type entered by Hodann facilitates locating radical words on the broadsheet, which otherwise may be cumbersome. I realize that I am one of the very few people who have shared this experience with Hodann.

notions as a basis was that the language would become wholly impracticable and possibly incomprehensible, because complex notions after analysis may become just as unrecognizable as ‘a dead body dissected into the minutest parts’. Leibniz commented in the margin:

It is one thing to dissipate the parts, and another to consider them distinctly, nor is it necessary to direct the attention to all the details at the same time; it suffices when the character is so composed that it can be subdivided as one thinks fit (A 6 3 174-175).

This shows that in Leibniz’s view the symbols that represent complex notions are normally not aggregates of symbols designating primitive notions. Instead, abbreviations will be used which are only spelled out in so far as some particular context requires. Leibniz’s comment on Dalgarno’s other objection has already been mentioned (cf. 5.5.1), and amounts to the same: contrary to what Dalgarno assumes, it is not necessary that all elements composing a concept be designated by a letter, just as “there are not as many characters for numbers as there are units” (A 6 3 175).

Many years afterwards Leibniz repeated his opinion on Dalgarno’s objections in the letter to Burnett referred to above, stating that

the objections of Mr. Dalgarno and Mr. Wilkins against the truly philosophical method are only to excuse the imperfection of their attempts, and only indicate the difficulties that have repelled them (G 3 216)

Some other comments on Dalgarno’s work are to be found in various papers. One of these has been called *De rerum classibus* (VE 394-400), and contains a summary of comprehensive classification schemes as described by various authors, among whom are Dalgarno and Wilkins, who thus figure in a list of thematic dictionaries. Another text, in which Dalgarno’s opinion on the equivalence of a language and a character is criticized (cf. 5.3.8), contains some further remarks that were apparently made in reaction to some statements made by Dalgarno. Thus Leibniz says that it would be useful to have a particle meaning ‘a sort of’ (quasi), which resembles one of Wilkins’s transcendental particles. He explains this by two examples: “spark could be called a point of fire, that is a sort of point. Thus sand a point of stone” (VE 930). Dalgarno suggested precisely these compound words (AS:39; 4.4.7). The same text contains a lucid argument to the effect that ‘homo est non-lapis’ is a logically preferable expression to ‘homo non est lapis’, because the latter unlike the former is ambiguous if combined with ‘every’ and ‘some’ (VE 927-928). Dalgarno, by contrast, had argued that expressions such as non-lapis are ‘absurd’ (AS:65).

Among the papers recently published for the first time in the *Vorausedition*, there is one which parallels the *De lingua philosophica* discussed in 5.6.1. in that Dalgarno’s scheme of radical words has clearly been used as a model, although this is nowhere stated, and this may be easily overlooked. The text is called *De Totae cogitabilium varietatis complexione* (VE 338-346)

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and starts out with the familiar observation that it is important to be able to oversee in one view the things we are thinking about. After some grammatical observations, Leibniz says: "I now come to the enumeration itself, and first of terms, next of particles and affixes" (p. 339). What follows is a systematical enumeration of all kinds of things, which on analysis appears to follow Dalgarno's scheme so closely that there is little doubt that Leibniz must have had it in front of him when he wrote this piece. There are also several points of deviation, but these are insufficient to make the similarity doubtful. Just as in the case of the *De lingua philosophica*, this text illustrates how Leibniz seems to have often worked. Taking some text he considered useful for one purpose or another, he copied parts of it, summarized others while making changes, inserting comments of all kinds, and so on. The result is a hybrid piece, which poses difficulties of interpretation one should be aware of. In the present case, the amount of commentary is relatively small. At the end of the text, Dalgarno's grammatical affixes are enumerated. Schneider 1994:225-226 briefly summarizes this text, stating that Leibniz starts from a basic distinction between concepts of complete and incomplete things. Had Schneider been aware that this distinction is Dalgarno's, even as most of the other ones made in this piece, he would perhaps have interpreted Leibniz's statements differently.

Thus Dalgarno's work as well as Wilkins's was carefully studied by Leibniz, and put to various uses in connection with his wide-ranging schemes.

Conclusion

Leibniz's grandiose schemes were too ambitious to be capable of realization. He himself never lost his optimism regarding their feasibility, although the awareness that he would not live to see anything of it in practice grew as time went by. In 1714, ten years after the lists of definitions using Dalgarno's lexicon were produced, he wrote:

If I had been less distracted, or if I were younger or had talented young men to help me, I should still hope to create a kind of universal symbolistic ... this could be a kind of universal language or writing, though infinitely different from all such languages which have thus far been proposed (L 654).

Two years later he died.

5.6 Leibniz, Wilkins, Dalgarno

It has been seen that Leibniz became acquainted with both Wilkins's and Dalgarno's languages not long after he published his own programmatic proposal in his treatise on combinations. Further, it has been noted that Leibniz emphasized the difference between his own scheme and that of the artificial languages of his predecessors in England. In addition, it has become clear that he made extensive use of both Wilkins's and Dalgarno's lexicons while doing some of the large amount of preparatory work directed towards the accomplishment of his goals. Leibniz's papers contain some further clues that may shed light on how his views are related to those of both Britons. In the present section, some of this material is examined so as to enable a just assessment of this point.

5.6.1 Wilkins

Leibniz clearly considered the *Essay* to be an important work. Two years after the first expression of his wish that it be translated into Latin (in a letter to Oldenburg, May 1671, cf. 5.3.1), he repeated it in a letter written from Paris, saying that he hopes a Latin version of the *Essay* will soon be published, "for it seems to me to be a very useful work" (to Oldenburg, April 1673, G 7 9). After Oldenburg had died in 1677, Leibniz exchanged some letters with Hooke, who was curator of the experiments to the Royal Society, as well as a member both of the official committee for the revision of the *Essay* and of the unofficial group of correspondents who had set themselves that task (cf. 4.6). Just as Leibniz, Hooke had invented a calculating machine, and he remained curious about Leibniz's work in that area¹. In February 1680, Leibniz wrote to Haak, a German who had been living in London for decades, asking him to convey his opinion on Wilkins's language to Hooke:

I see that this distinguished man [Hooke] attaches great value to the philosophical character of the Reverend Bishop Wilkins, which I also value duly. But yet I cannot conceal that he could have made something greater and so much more useful, as Algebraical characters are preferable to the characters of the Chemists. For I think that some universal writing can be invented, by means of which we can calculate and find proofs in all kinds of things just as in Algebra and Arithmetic. And I wish that Wilkins at the time when he was still at work, would have known this plan of mine; perhaps we would now have had by the same labour something of which I do not know if anything more useful can be provided to mankind in matters concerning the sciences (A 3 3 83)

Hooke replied to Haak that he was very pleased to hear that Leibniz had the same opinion as he himself had on the use of a philosophical language.

¹ Cf. A 3 3 235-236: in a letter of July 1680, Hooke inquires whether Leibniz "hath yet perfected his arithmetickall Instrument".

He politely refutes Leibniz's assumption that Wilkins's work could have been much improved had he known about Leibniz's ideas, because, Hooke points out, he in fact brought similar ideas of his own to Wilkins's attention while the latter was working on his *Essay*. Hooke did not succeed in convincing Wilkins, although he "had many debates with him of that particular". Hooke adds that he at present is working on improving the *Essay*, so as to make it "applicable and usefull not only for common Discourse and keeping correspondence but for the strict and philosophicall way of Reasoning and Inquiry" (July 1680, A 3 3 234).

In his reply Leibniz subtly expresses some scepticism about Hooke's endeavours to revise the *Essay*. He says he thinks that although Wilkins did not at all have a 'universal calculus' in mind, his attempt is valuable and can be useful for the development of such a 'truly rational language', adding however: "I realize that other, quite different aids are required". Nevertheless, he says, he is curious to know what Hooke thinks should be changed in Wilkins's work (January 1681, A 3 3 314). Hooke's answer contains little information concerning that question, but emphasizes that Leibniz's help is very welcome. He confesses that his own plans met with very little response, and he repeats that he is very glad to find Leibniz having similar ideas, for "the Scarcity of Persons to converse with concerning it does almost Discourage me" (April 1681, A 3 3 392). Although Hooke and Leibniz were clearly kindred spirits, both working on similar projects that were not understood by most of their contemporaries, it never came to any collaboration between them¹.

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In conclusion, Leibniz thoroughly studied Wilkins's work, and he found so many 'beautiful things' in it, that he used both the tables and the grammar as a starting-point for further investigations. It must be noted however that Wilkins's work was by no means unique in this respect. One of the many other authors whose works were carefully studied by Leibniz was Dalgarno.

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Leibniz's copy of *Ars Signorum* shows very clearly that he read the book with great attention, witness the many underlinings and marginal notes he inserted¹. The broadsheet that contains the *Lexicon Grammatico-Philosophicum* is filled with annotations, some in Leibniz's hand, others in Hodann's. Some of these annotations are clearly intended to enable easy reference to radical words², others are definitions of radical words, which

¹ The high editorial standards of the Academy edition are exemplified by the meticulous records of these notes in A 6 3 169-188.

² The editors of the Academy edition note: "Aus welchem Grunde und in welcher Absicht Hodann am unteren Rand des *Lexicon Grammatico-Philosophicum* das Vorkommen der Vokale und Konsonanten am Silbenanfang in der Reihenfolge der Druckspalten 1-8 registriert hat, ist nicht zu erkennen" (A 6 3 169). It is very probable however, that Hodann, while compiling the list of definitions using Dalgarno's alphabetical *Lexicon Latino-Philosophicum* (cf. 5.5.2), had to consult the lexicon of radical words frequently in

were entered by Leibniz. Some of these definitions are similar to, others are different from the ones occurring in the long list that was compiled between 1702-1704 (C 437-508). Further, Leibniz summarized Dalgarno's method of forming radical words, and he corrected printing errors and other minor mistakes, which shows that he scrutinized the details of Dalgarno's tables.

It has been mentioned that Leibniz's copy of *Ars Signorum* contains a note in which he explains the great differences between his own scheme and those of Dalgarno and Wilkins (cf. 5.3.1). From this note it also appears that Leibniz, despite his careful reading of *Ars Signorum*, regarded Dalgarno's and Wilkins's languages as being basically of the same type, noting about Dalgarno's language: "This invention has been carried through and brought to its conclusion by John Wilkins" (A 6 3 170), a comment which would have offended Dalgarno if he would have been able to take notice of it. Nevertheless, Leibniz also recognized that Dalgarno's theoretical framework was in some respect similar to his own, as he noted: "Dalgarno saw something through the mist p. 33, but as he was scared off by the difficulty of the matter, and did not sufficiently understand how to deal with it, he went astray in all other respects" (A 6 3 170).

On page 33 of *Ars Signorum* Dalgarno explains why "the constitution of the predicament that in first place puts the *first* and *most simple* notions (...), and next thereafter those that are composed out of these few simple ones, is not an adequate foundation for the art of grammar" (AS:32), although he admits that "it is the highest achievement of philosophy to be able to resolve any notion into its first principles" (AS:33). This 'constitution of the predicament' is obviously what Leibniz regarded as being indistinctly perceived by Dalgarno, and it is precisely what he himself believed to be the proper foundation of a philosophical language. Dalgarno's objection to taking the simple notions as a basis was that the language would become wholly impracticable and possibly incomprehensible, because complex notions after analysis may become just as unrecognizable as 'a dead body dissected into the minutest parts'. Leibniz commented in the margin:

It is one thing to dissipate the parts, and another to consider them distinctly, nor is it necessary to direct the attention to all the details at the same time; it suffices when the character is so composed that it can be subdivided as one thinks fit (A 6 3 174-175).

This shows that in Leibniz's view the symbols that represent complex notions are normally not aggregates of symbols designating primitive notions. Instead, abbreviations will be used which are only spelled out in so far as some particular context requires. Leibniz's comment on Dalgarno's other objection has already been mentioned (cf. 5.5.1), and amounts to the

order to make sense of Dalgarno's compound words. An index-like survey of the type entered by Hodann facilitates locating radical words on the broadsheet, which otherwise may be cumbersome. I realize that I am one of the very few people who have shared this experience with Hodann.

same: contrary to what Dalgarno assumes, it is not necessary that all elements composing a concept be designated by a letter, just as “there are not as many characters for numbers as there are units” (A 6 3 175).

Many years afterwards Leibniz repeated his opinion on Dalgarno’s objections in the letter to Burnett referred to above, stating that

the objections of Mr. Dalgarno and Mr. Wilkins against the truly philosophical method are only to excuse the imperfection of their attempts, and only indicate the difficulties that have repelled them (G 3 216)

Some other comments on Dalgarno’s work are to be found in various papers. One of these has been called ‘De rerum classibus’ (VE 394-400), and contains a summary of comprehensive classification schemes as described by various authors, among whom are Dalgarno and Wilkins, who thus figure in a list of thematic dictionaries. Another text, in which Dalgarno’s opinion on the equivalence of a language and a character is criticized (cf. 5.3.8), contains some further remarks that were apparently made in reaction to some statements made by Dalgarno. Thus Leibniz says that it would be useful to have a particle meaning ‘a sort of’ (quasi), which resembles one of Wilkins’s transcendental particles. He explains this by two examples: “spark could be called a point of fire, that is a sort of point. Thus sand a point of stone” (VE 930). Dalgarno suggested precisely these compound words (AS:39; 4.4.7). The same text contains a lucid argument to the effect that ‘homo est non-lapis’ is a logically preferable expression to ‘homo non est lapis’, because the latter unlike the former is ambiguous if combined with ‘every’ and ‘some’ (VE 927-928). Dalgarno, by contrast, had argued that expressions such as non-lapis are ‘absurd’ (AS:65).

Among the papers recently published for the first time in the *Vorausedition*, there is one which parallels the *De lingua philosophica* discussed in 5.6.1. in that Dalgarno’s scheme of radical words has clearly been used as a model, although this is nowhere stated, and this may be easily overlooked. The text is called *De Totae cogitabilium varietatis complexione* (VE 338-346) and starts out with the familiar observation that it is important to be able to oversee in one view the things we are thinking about. After some grammatical observations, Leibniz says: “I now come to the enumeration itself, and first of terms, next of particles and affixes” (p. 339). What follows is a systematical enumeration of all kinds of things, which on analysis appears to follow Dalgarno’s scheme so closely that there is little doubt that Leibniz must have had it in front of him when he wrote this piece. There are also several points of deviation, but these are insufficient to make the similarity doubtful. Just as in the case of the *De lingua philosophica*, this text illustrates how Leibniz seems to have often worked. Taking some text he considered useful for one purpose or another, he copied parts of it, summarized others while making changes, inserting comments of all kinds, and so on. The result is a hybrid piece, which poses difficulties of interpretation one should be aware of. In the present case, the amount of commentary is relatively small. At the end of the text, Dalgarno’s

grammatical affixes are enumerated. Schneider 1994:225-226 briefly summarizes this text, stating that Leibniz starts from a basic distinction between concepts of complete and incomplete things. Had Schneider been aware that this distinction is Dalgarno's, even as most of the other ones made in this piece, he would perhaps have interpreted Leibniz's statements differently.

Thus Dalgarno's work as well as Wilkins's was carefully studied by Leibniz, and put to various uses in connection with his wide-ranging schemes.

Conclusion

Leibniz's grandiose schemes were too ambitious to be capable of realization. He himself never lost his optimism regarding their feasibility, although the awareness that he would not live to see anything of it in practice grew as time went by. In 1714, ten years after the lists of definitions using Dalgarno's lexicon were produced, he wrote: "If I had been less distracted, or if I were younger or had talented young men to help me, I should still hope to create a kind of universal symbolistic ... this could be a kind of universal language or writing, though infinitely different from all such languages which have thus far been proposed" (L 654). Two years later he died.

CONCLUDING REMARKS

Dalgarno and Wilkins

As the only two philosophical languages to be completed in the seventeenth century are the outcome of an initially collaborative project, it is quite understandable that they bear a number of obvious resemblances. As has been argued, an exclusive focus on similarities between the two schemes is however likely to obfuscate a clear picture of the debate on universal language carried on in the period. Now that both languages have been described in some detail, some differences and similarities may be summed up.

As far as objectives are concerned, it is clear that Dalgarno and Wilkins were both concerned to create a language which surpasses instituted ones, in being more rationally organized, and free from irregularities, redundancies, and ambiguities. However, they were also acutely aware that a perfect language is unattainable, and consequently they both set their goals much lower, convinced as they were that a language constructed according to 'rules of art', though necessarily imperfect, is still much to be preferred to existing languages. Further, they were both very much focused on word meaning in assessing defects and merits of languages as well as in constructing their own languages. Furthermore, in accomplishing their goal they both drew extensively on logic, that is, on the segment of the logical tradition that is primarily relevant to lexical meaning.

But in spite of these common characteristics, the general approaches of Dalgarno and Wilkins diverge in opposite directions. Dalgarno's analytical approach is aimed, in principle, at making the structure of speech correspond to what results from conceptual analysis of thought, each simple element of thought being designated by a radical word, and all complex parts being designated by corresponding composite expressions. The foremost objective of Wilkins's encyclopedic approach is to establish a correspondence between language and things, such that the set of words is mapped one-to-one onto the set of kinds of things. The lexicon of radical words, which encode descriptive information on their referents, thus provides an annotated inventory of the most important types of objects to be found in the world. Accordingly, in describing the features of a philosophical language Dalgarno emphasizes logicality and rationality, whereas Wilkins stresses accuracy and

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comprehensiveness. Although both authors state that what is to be primarily designated are things of a 'simple' nature, they understand quite different things by this, Dalgarno meaning unanalyzable, primitive ideas, Wilkins thinking of distinct types of objects (cf. Slaughter 1982:173). The disparity between the two approaches appears quite clearly from the consequent evaluations of compound expressions, which are favoured by Dalgarno as the summit of logicality, but avoided or else regulated as much as possible by Wilkins. Further, whereas the latter regarded the classificatory tables forming the basis of the lexicon of his language as an important achievement in their own right, Dalgarno never gave up his misgivings regarding the classificatory method, stating that it is impossible to establish a universally acceptable arrangement, and emphasizing that the method is unsuitable to provide the foundation for a practicable language.

Neither of the two authors pursued their principles consistently. Both Dalgarno and Wilkins compromised between their own ideal of a philosophical language on the one hand and the requirements of practicability and learnability on the other hand. This caused them both to move toward a common centre, so that the actual differences between their languages are much smaller than they would have been if they each had stuck to their theoretical starting points. Yet the actual differences are still considerable.

Regarding the lexicon, one of the most conspicuous differences concerns the number of radical words, Dalgarno's language containing about 1,000, Wilkins's consisting of more than 4,000. In general, the meanings Dalgarno selected to be expressed by means of radical words, overlap with those picked by Wilkins, though there may be some exceptions to this. Since Dalgarno's radical words are ultimately defined by means of Latin, and those of Wilkins by means of English equivalents, it is strictly speaking impossible to determine whether or not the overlap is complete. For instance, Dalgarno has a radical meaning 'optare - to wish', which in Wilkins's language is to be rendered as 'desire + active', that is, by means of what is considered as a synonym of a radical rather than a radical. Since however 'optare' may well be translated as 'to desire', it can hardly count as an instance in which the radical words of both languages do not cover the same ground.

Obviously, there are thousands of radical words in Wilkins's language which have no corresponding radicals in Dalgarno's language. It is here that the difference in approach becomes manifest. For instance, almost all the words for species of animals, plants and stones which in the previous chapter have been used to illustrate Dalgarno's use of compounds, such as the words meaning marble, gold, gourd, heron, elephant, etc. (cf. 3.4.5), are expressed by radical words in Wilkins's language.

Besides the two categories of words mentioned, that is, firstly, radical words meaning roughly the same in both languages and secondly, radical words in Wilkins's language which are expressed by compound words in Dalgarno's, a very large category consists of words that are compound in both languages. Whereas Dalgarno puts only unspecified semantic constraints on composition of radical words with others, Wilkins relied on a special class of

‘transcendental’ particles for coining compound expressions. The result, as has been argued (cf. 4.4.3), is very much the same in both cases, Dalgarno for example expressing ‘glove’ as ‘garment hand’, Wilkins as ‘hand + vest’.

As far as the grammar is concerned, both languages are very different in that Dalgarno’s borrows a minimal amount of categories from Latin, although his principles prescribe the absence of any category whatsoever, while Wilkins’s language contains an elaborate apparatus of derivations as well as equivalents to all of the traditional word classes.

Wilkins and Dalgarno, and Leibniz

Since Leibniz never succeeded in producing a language, no detailed comparison of a similar type can be made between his scheme and those of the others. It is however clear, that if Leibniz had been able to produce an artificial language, the difference between his language and those of Dalgarno and Wilkins would have been one between different categories rather than one between two things of the same sort.

In stressing the great differences between his own plans and those of his precursors, Leibniz emphasized the communicational purposes of the other schemes. Perhaps he downplayed concomitant motives underpinning Wilkins’s, and especially Dalgarno’s language a little too much in doing so. Nevertheless, it is clear that on the whole he was right in claiming that his aims were completely different from anything that had been tried by either Dalgarno or Wilkins. Leibniz studied their work more carefully than many historians writing after him did. He was thus able to perceive that in spite of claims concerning logicality or descriptive accuracy, both Dalgarno and Wilkins were primarily concerned with the most general aspect of language use, that is, communication. His own preoccupation was with language as an instrument for thinking.

Although the logical tradition was important for all three schemes, it was only Leibniz who perceived that its potential could be profitably used. The categories, for both Dalgarno and Wilkins, formed an almost obsolete theory to which they reluctantly resorted for want of anything better. Leibniz was concerned from the very start to reform the categories, and with their role in more complex expressions.

Finally, whereas both Dalgarno and Wilkins were aware that compromises between conflicting goals were necessary to achieve a practicable language, Leibniz unconditionally believed that a perfect language was possible. Thus the surplus of logical and philosophical acumen that Leibniz possessed was compensated by a certain linguistic naïvety, which helps explain why he never saw practical results. From a long-term perspective however, in the history of ideas the implementation of realistic projects has often proved to be less fruitful than the pursuit of impossible dreams.

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