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Logic and Argumentation

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Introduction

It is now about twenty years since pleasant contacts started, over a Chinese dinner table, between a small community of philosophical logicians and some incipient argumentation theorists in The Netherlands. At that fabled time of the early seventies, we were looking for common intellectual ground. In the intervening years, however, the two groups have largely gone their own way (and not unsuccesfully). The purpose of this invited lecture is to re-assess the situation, twenty years later. Much has changed, at least, in modern conceptions of logic, and it may be of interest to compare the agendas of both fields in their current state. In what follows, I will look at some broad features of human reasoning, viewed through the eyes of a contemporary logician.

The Texture of Argument

The early leaders of argumentation theory often operated in conscious opposition to what they considered the tradition of 'formal logic'. For instance, Perelman & Olbrechts-Tyteca 1958 claimed that the traditional logical metaphor for human argument is fundamentally mistaken. It views arguments as mathematical proofs, viz. on the analogy of a 'chain', which becomes worthless once a single link has been broken. This rigid foundationalist view could lead, e.g., Gottlob Frege to think that the discovery of one single contradiction would bring all of mathematics down 'like a house of cards'. Real argument, however, is more like a piece of cloth: it still functions when a few strands have broken and become ragged. Its strength rather lies in a web of interconnections. Thus, in contemporary jargon: real argument admits of 'graceful degradation'. This may seem a mere play with images, but e.g., Lakoff & Johnson 1980 have shown convincingly how deep metaphors determine both our ordinary and scientific thinking in many hidden ways, sometimes beneficial, sometimes quite insidious.

Of course, less chain-ful types of argument abound, even inside the exact sciences. For instance, Lakatos 1976 has shown convincingly how real-life mathematical argument is a complex mixture of proofs, refutations and redefinitions of concepts. And more globally, even mathematicians engage in cloth-like common sense argument when 'negotiating' the importance of results and creating common perspectives and research agendas – in what Withaar 1983 has called the 'context of persuasion' in science. But also, it seems fair to say that, even at a more standard formal level, current logical conceptions of reasoning have become broader. This is caused to a large extent by influences from Artificial Intelligence, where the analysis of so-called 'common sense reasoning' has become an urgent and respected task (Hayes 1979, Davis 1990). The subsequent repercussions for our understanding of Logic are slowly making their way into some of the more enlightened text books, but have not yet changed the 'standard image' of the discipline.

Incidentally, the chain metaphor is not all bad, and conservative. When we view reasoning from a Popperian point of view of refutation, rather than justification, having a chain-like system of reasoning which is easily attacked – without a refuge of vague forms of cloth-like 'half-functioning' – may be the preferable strategy for achieving critical progress.

<u>The Toulmin Schema</u>

To demonstrate the new thinking at work, let us consider the famous 'Toulmin Schema', which has served as a rallying point for informal argumentation studies in the early seventies. In fact, Toulmin voiced three influential general criticisms of formal logic. First, reasoning is not uniform, but task-dependent: the appropriate inference mechanism may depend on the subject matter. Second, reasoning is more richly structured than the standard 'premise-conclusion' schema would have us believe. And third, what is crucial in reasoning is not the static 'form', but the dynamic 'formalities' of inferential procedure. Behind this lies a proposed paradigm shift for logic from 'mathematics' to 'law'.

Let us give away our game straightaway. By current logical lights, all three tenets in Toulmin's critical position make good sense. For instance, the dependence of human reasoning behaviour on its subject matter has been demonstrated convincingly by cognitive psychologists (cf. Wason and Johnson-Laird 1972). But there are also more internal logical reasons for appreciating the above points. Let us make this more precise, using the actual 'schema' as a convenient setting. One replaces the traditional binary view of

P --------------------------------------->	C
premises	conclusion

by the following richer structure, whose various components probably speak for themselves, to a first approximation:

```
D        ---------------------------------------->        C
data                                                      claim
                 |                        |
                 W  warrant               Q  qualifier
                 |                        |
                 B  backing               U  rebuttal
```

Typology of Inference

Let us first start with the role of the qualifier Q. This is the expression giving the force of the inferential transition from data to conclusion, sometimes linguistically encoded (say, by a modal adverb like "certainly" or "probably"), sometimes merely understood in context. Qualifiers can be deductive or inductive (probabilistic), or yet otherwise. This way of viewing inference is quite congenial to what has been happening in the literature on reasoning in AI. Especially, Shoham 1988 has pointed out how, in addition to classical reasoning, whose qualifier ("absolutely") says that the conclusion must hold in *all* models of the premises, there are pervasive 'preferential styles' of default reasoning. In the latter styles, the qualifier is something like "presumably", whose claim is that the conclusion holds in *all most preferred* models of the premises. Another way of describing this feature is that we are engaged in the art of reasoning 'under normal circumstances', being the most preferred cases for us to take into account. (Incidentally, this is also the art of scientific reasoning in the natural sciences!) Examples would be situations where we reason about train travel in Holland, using a mixture of logical laws in figuring out our itineray plus default assumptions about this country, such as the absence of strikes, or the continued validity of the laws of physics. (And of course, there is always the over-riding 'mother of all defaults' in The Netherlands, prefixing every practical undertaking by the rider "assuming the dikes don't break".) Note, incidentally, that preferential reasoning is not necessarily statistical in nature: the 'most preferred' cases need not be the most frequent ones (although the two will often coincide.)

Preferential reasoning differs from classical reasoning, even in its most simple domestic properties. These lie encoded in so-called 'structural rules', stateable without any reference to special logical constants. One famous structural rule which may fail now is *Monotonicity*: unlike in classical logic, preferential conclusions which follow from some set of premises need no longer follow from any extension of these premises. (Just suppose that the extension contains facts which tell us that we are in non-normal circumstances after all.) In fact, more general logics in AI are often called 'non-monotonic', a somewhat unfortunate term which emphasizes their iconoclastic character, rather than any positive virtue. (One is reminded of the now-defunct Dutch calvinist "anti-revolutionary party", which existed for one and a half century, starting from an initial program of merely opposing the principles of the French Revolution.) Another conspicuous failure of a classical structural rule is so-called non-*Transitivity*: proposition B may follow preferentially from A, and C again from B, without C thereby being true in all most preferred models for A. (Well-known examples of transitivity failures occur in inductive logic: where exceptions may overflow any pre-set threshold in a number of steps.) As it turns out, though, preferential and classical reasoning still do agree on some familiar structural rules, such as *Permutation* of premises (their order is irrelevant to conclusions drawn) or *Contraction* (the multiplicity of occurrences of premises is irrelevant, too).

For the sake of concreteness, we list some well-known classical structural rules in their most general sequent forms:

Monotonicity

$$\frac{X, Y \Rightarrow A}{X, B, Y \Rightarrow A}$$

Transitivity

$$\frac{X \Rightarrow A \qquad\qquad Y, A, Z \Rightarrow B}{Y, X, Z \Rightarrow B}$$

Permutation

$$\frac{X, A, B, Y \Rightarrow C}{X, B, A, Y \Rightarrow C}$$

Contraction

$$\frac{X, A, Y, A, Z \Rightarrow B}{X, A, Y, Z \Rightarrow B} \qquad \frac{X, A, Y, A, Z \Rightarrow B}{X, Y, A, Z \Rightarrow B}$$

Nevertheless, there is also a basis here for a more refined positive typology of inference (cf. Makinson 1988), starting from the observation that some variants of classical structural rules do remain valid in the new setting. (Non-believers are not necessarily total rejecters.) For instance, preferential reasoning does satisfy 'Cautious Monotonicity', saying that adding already derived conclusions will not disturb inferences:

$$\frac{X \Rightarrow C \qquad\qquad X \Rightarrow B}{X, C \Rightarrow B}$$

Moreover, there is also a converse principle of 'Cautious Transitivity', telling us when indeed we can 'chain inferences':

$$\frac{X \Rightarrow C \qquad\qquad X, C \Rightarrow B}{X \Rightarrow B}$$

An aside. Here is a, perhaps perverse, logician's question. Can there also be structural rules that are valid for preferential reasoning, but not for classical reasoning? The answer is negative. Among all preference relations, there is the universal indifference relation, which makes all models of the premises 'most preferred'. Therefore, classical consequence amounts to preferential inference over a restricted universe of preference relations. And then, each structural rule for preferential reasoning (being a universal statement) will carry over to this subdomain, and thereby hold for classical consequence.

Another aside. A further source of refinement in the above typology is the following. Some classical structural rules may even continue to hold in their unrestricted original format, but then only for special linguistic forms of statement. For instance, in Circumscription (a popular specific system of preferential reasoning in AI; cf. McCarthy 1980), so-called 'purely universal' statements can always be added to the premises without endangering earlier conclusions.

So far, we have considered only the logical role of the qualifier Q . But there is also a modern counterpart to the rebuttal element R in Toulmin's schema. The latter is the 'rider' of the form "unless ..." which states when the qualifier admits exceptions. Similar elements have appeared in the computational literature, witness the 'abnormality predicates' in the logical formalization of circumscriptive arguments (cf. Sandewall 1992), which regulate the domain of exceptional cases.

The more general situation here suggests an agenda that can already be found, in fact, in an earlier phase of modern logic. In what may be called 'Bolzano's Program' (cf. Bolzano 1837), the aim was precisely to develop a rich typology of hman styles of reasoning. Bolzano distinguished deductive and inductive varieties, as well as an especially 'strict' professional philosophical style of reasoning. Moreover, he made a sustained effort to chart the structural behaviour of these styles, including their interaction with changing vocabularies of 'fixed' and 'variable' terms – a level of refinement yet to be attained in much of the contemporary literature. Another famous logician pursuing a similar program (around 1890) is C. S. Peirce, who emphasized that humans display a variety of inferential skills, which logic should analyze and bring out (cf. the collection Peirce 1960). In particular, he distinguished both 'forward' and 'backward' styles of reasoning, which were then classified under such headings as deduction, induction and abduction. The latter is a backward process of inferring the most plausible explanation for observed facts. Another important backward reasoning process is presupposition, well-known from the linguistic and philosophical literature, which provides necessary 'preconditions' for our understanding of a sentence – whereas the usual forward reasoning rather provides 'postconditions'.

Repercussions and Elaborations

The preceding general point of view has many interesting consequences. For a start, on the practical side, it will affect traditional empirical topics. Notably, it is no longer so clear what are argumentative *fallacies*. Observed inferential patterns which seem 'wrong' according to one notion of inference might just as well signal that the speaker is engaged in correct execution of another style of reasoning. E.g., take the concrete fallacy of 'affirming the consequent' (cf. Hamblin 1970). What we observe somewhere, say, is an instance of the propositional fallacy:

$A \rightarrow B$, B "and therefore" A

But note that this pattern would be valid as an instance of abduction (since A is certainly the only available explanation here for B). This abductive use of 'the only available source' is also what drives logic programming in the Prolog-style (an extremely useful computational mechanism, which tends to strengthen implications to equivalences; cf. Kowalski 1979). Of course, this is not the end of the matter. The above analysis also suggests that, when confronted with 'fallacies', we extend our field of vision from observing single inferences to sequences of inferences. If the speaker is engaged in abduction, then the structural rules should not be the same as for classical logic. In particular, in this case, we do not have Monotonicity. In particular, what should not be valid, even as a specimen of abduction, is the transition:

$C \rightarrow B$, $A \rightarrow B$, B "and therefore" A.

For now, there are two possible explanations for B , and the 'best' one is rather the disjunction C-or-A . Thus, we also learn that fallacies should not be studied in isolation. Similar observations can be made about juridical reasoning (cf. Prakken 1993, Feteris 1994). For instance, there is a legal argument pattern called "a contrario", where one reasons as follows. "The law only explicitly states a penalty for male offenders. This person is a woman. Therefore, she should not be punished for this offense." Formally, we have an 'invalid' transition here ' from $A \rightarrow B$ and not-A to not-B ' , to which all the previous points apply.

Next, the preceding perspective also has technical consequences in logic. It is not enough to say that there exists a multitude of inferential styles in reasoning, and then rejoice. For now, the logician has acquired the task of explaining how all these styles manage to co-exist, and indeed cooperate. Thus, one needs mechanisms for combining logics (cf. Gabbay 1994), as well as 'triggers' that tell us when we are switching from one reasoning style to another. (Here the earlier qualifiers may play a systematic role – whence we would need a more systematic logic of modal adverbs from this inferential point of view.) Here, let us just show what combination of inferential styles might involve. Assume that we have two meta-arrows fi (for classical reasoning) and --> (for preferential reasoning). Then we must at least enquire into their combinations, such as:

does A --> B, B ⇒ C imply A --> C ?
(the answer is *yes*)
does A ⇒ B, B --> C imply A --> C ?
(the answer is *no*)
does A --> B, B ⇒ C imply A ⇒ C ?
(the answer is *no*)
does A ⇒ B, B --> C imply A ⇒ C ?
(the answer is *no*)

Thus, logics must now be able to manipulate and combine diverse forms of inferential information.

Parameters of Inference

Another attractive feature of the Toulmin Schema is its richer structuring of the material from which conclusions are supposed to follow. This is in line with most accounts of reasoning from theories in the philosophy of science, as well as computational theories of data bases. From the binary 'premise-conclusion' pattern, one moves to a *ternary* view, where basic 'data' are distinguished from background theory:

P --------- ---------> C
T

There are many examples where the third parameter T emerges naturally. For instance, in the above notion of abduction, T is indispensable for providing the available 'explanations'. This is also true more generally for scientific explanation in the Hempel-Oppenheim style, which even distinguishes further levels: 'facts', 'theoretical laws' and 'auxiliary hypotheses' (essentially, the relevant default assumptions). And the point also emerges in the linguistic study of conditionals, where the basic 'Ramsey Test' presupposes revision of some explicit 'stock of beliefs', so as to accommodate recalcitrant antecedents (Sosa 1975 collects various papers on these matters). The general situation is even more diverse, in that the third 'theory' parameter itself has inner hierarchical structure. Not all theoretical principles are equally general and important. "Structured theories" accounting for this behaviour are coming up in contemporary computer science (cf. Ryan), and we may also think of the much richer structuring found in the computational literature on abstract data types (Meseguer 1989) or module algebras (Bergstra, Heering & Klint 1986). As a final thrust towards more hierarchical views of theory structure, allowing shifts in perspective, we mention Blackburn & de Rijke 1994.

Logical Levels of Aggregation: From Propositions to Proofs

The traditional field for logical analysis lies at the sentence level, where propositions are expressed. This follows standard grammatical practice in linguistics. But reasoning also involves higher levels of aggregation. Evidently, real arguments are *texts*, i.e., configurations of sentences, which shows clearly in argumentation studies (cf. the various contributions in Van Eemeren & Grotendorst 1994, which mostly propose text structures). And of course, the above 'third parameter' T hints at still higher levels of organization, with configurations of texts into theories. Logic as it is does not have a well-developed theory of text structure for argumentation. Nevertheless, there is much implicit material here, once we turn to systems of logical proof and the subdiscipline of proof theory (cf. Sundholm 1986, Troelstra 1994). Let us illustrate this potential by means of a little example.

Here is a simple 'natural deduction tree' for the inference from the two premises not (A&B) and (B or C) to the conclusion (if A, then C) :

```
A              not (A&B)
--------------------------
        not B              B or C
        ------------------------------
                    C
                -------------- withdraw A
                if A, then C
```

The following view of argumentative texts lies behind this example. First, the structure is 'chain-like': the smallest error anywhere would invalidate the deduction. Also, explicit rule annotation is needed: we need to justify each basic step across a bar by reference to some pre-given repertoire of admissible basic steps. And finally, and very importantly, there is a dynamic pattern of changing dependencies. For instance, the intermediate conclusion C inherits the assumptions from both its ancestors 'not B' and 'B or C' , three in all, but the final conclusion has lost one of these.

What of this is relevant in 'real life argument'? This is not the place to perform a detailed comparison with empirical argumentation studies, but a few things may be observed, showing the interest of such an endeavour. First, in reality, there may be a more 'cloth-like' structure, whereby one intermediate conclusion is supported by several bunches of premises. Formally, this requires AND/OR trees, rather than just AND-trees in natural deduction. Thus, we obtain 'forests', rather than trees, where conclusions can have multiple support. Such a logical system would incorporate the natural distinction between 'subordinate' (i.e., sequential) and 'coordinate' (parallel) structures in argumentation discussed in Snoeck Henkemans 1994, with patterns like

$$\frac{P1 \ \& \ P2 \qquad || \qquad Q1 \ \& \ Q2}{C}$$

This coordinated structure has the virtue of explaining something about our actual argumentation, namely its 'robustness'. We are seldom willing to give up a conclusion on the basis of one single problem. This need not be logical immorality or blatant self-interest. A more rational reason is again the cloth picture: that conclusion may be tied to many things supporting it. (As observed earlier on, though, a more refutation-oriented logical strategy might sometimes be preferable from a cognitive point of view – for instance, when engaging in physically dangerous endeavours.)

Next, what seems utterly lacking in reality is explicit rule annotation. The standard argumentative pattern is rather one of 'bare dependency": certain statements stand in certain 'support relations', which are seldom explicitly tagged. Thus, practical argumentative analysis uncovers a 'pre-structure' of dependencies (somewhat like 'argument structures' found in AI), operating at a level somewhat like pure grammatical constituent trees, which are still to be decorated with an appeal to specific derivation rules. (From a mathematical-logical point of view, we still have a 'type-assignment problem' ahead: cf. van Benthem 1991, Barendregt 1992.) Finally, natural deduction also makes one telling empirical point. The delicate dynamics of changing assumptions is a well-attested feature of actual human argumentation and debate. In particular, when viewed in isolation, one cannot tell what an assertion in an argument 'means': since that depends on its 'contextual burden' at the relevant stage of the argumentation. Even the same assertion may occur with different loads of assumptions in the course of one and the same argument.

Here is one more example. Consider the well-known elegant natural deduction for the propositional law $(A \leftrightarrow (A \rightarrow B)) \rightarrow A$, expressing a form of 'Löb's Paradox'. Dependencies on previous assertions are explicitly indicated at the inference bars:

```
        (1)
(A ↔ (A → B))
-------------------- (1)                    (2)
(A → (A → B))                                A
------------------------------------------------- (1), (2)   (2)
                  (A → B)                                      A
                  ---------------------------------------- (1), (2)
(A ↔ (A → B))                                B
------------------- (1)                 ----------- (1) !
((A → B) → A)                           (A → B)
-------------------------------------------------------- (1)
                    A
```

Note the variable burdens for the occurrences of A and $(A \rightarrow B)$. Incidentally, with two more steps, this tree becomes a natural deduction for the proposition B, from just the single assumption (1). (This is the core of the mentioned 'paradox': cf. Boolos 1979.)

Discourse Grammar

The preceding view of proofs as texts suggests that there is a higher level of linguistic discourse structure that may be quite relevant to logic. (Cf. Polanyi & Scha 1988, as well as the more general computational tradition of Grosz & Sidner 1986.) In particular, logical particles such as "so", "then", "unless", "although" specify various of the above-mentioned argumentative connections in texts. Moreover, there are various discourse uses of "and", signalling the earlier parallel and sequential structures. These particles will exhibit linguistic behaviour that is very similar to what happens at the sentence level. For instance, "so" is a scope-bearing operator, looking backwards from a conclusion to bring a number of previous assertions within its inferential ambit. This is why texts of the form "P_1 ... P_k. Therefore C", as found in the usual discussions of argument patterns, are often ambiguous. Which of the initial assertions are in the backward scope of the operator "therefore"? Hence, one cannot draw far-reaching conclusions from untutored intuitions about such flat patterns. (This linguistic point is even relevant to discussions of potential failures of monotonicity: perhaps, in actual examples, the additional premises do not make it into the scope of the conclusion particle. See Kameyama 1993 on the topic of 'linguistic surplus information' in the analysis of puzzle solving in AI.) Similar scope behaviour is exhibited by other discourse particles, such as the 'assumer' "if", whose companion particle "then" rather functions as an anaphoric pronoun.

A more systematic study of this linguistic fine-structure may serve various purposes. For instance, one would also hope to discover explicit cues as to the 'current inferential style' being performed. Some of these cues lie in the earlier modal adverbs, but the situation can be more subtle. For instance, question-answering is often 'exhaustive' (in a Gricean sense: cf. Groenendijk & Stokhof 1984). An answer "John and Mary" to the question "Who are dancing?" suggests that John and Mary are the only dancers. This means that we are making a preferential inference to the smallest models – in terms of individual facts– satisfying these data (cf. van Benthem 1989 on this connection with preferential reasoning). Not surprisingly again, this inference is defeasible by further premises: "And Claudia". Note that this exhaustive mode is the default, which does not need any explicit syntactic triggering. But it does seem that it can be switched off explicitly through certain linguistic (re-)formulations of our answers. For instance, the hedged reply "*at least* John and Mary", although semantically having exactly the same minimal models as the previous one, does not allow any inferences beyond the classical ones. What we learn from the latter is merely that John is dancing and Mary is – but Heaven knows who else besides.

Mechanisms of Reasoning

There is another source of 'plurality' in current logical theorizing. Inference is just one of many general cognitive procedures, such as learning, updating or revising (Gärdenfors 1988). Indeed, one can discern a kind of general 'procedural turn' in recent work in artificial intelligence and linguistic semantics, emphasizing the undeniable and crucial imperative *procedural* aspects of our cognitive behaviour. And also with our present concerns, after all, much of the art in actual argumentation is sequential 'timing' and playing one's cards correctly. Now, standard logic is largely declarative, focussed on static truth conditions. Thus, the new task becomes to bring these dynamic procedures within the scope of logical investigation too: focussing rather on update conditions (Groenendijk & Stokhof, 1991, Kamp 1984, Stalnaker 1972, Veltman 1991, van Benthem 1991, 1994).

There are various broad technical paradigms for bringing out this dynamic structure. Traditionally, there has been the approach via games (Lorenzen & Lorenz 1979, Hintikka 1973), which continues to exist as an undercurrent in contemporary logic. It has also been the main formal face of dynamics in argumentation theory so far (cf. Barth & Krabbe 1982). But the dominant paradigm in the current logical literature comes from computer science: 'texts are programs' denoting cognitive processes that change human information states. One immediate appeal of this view to many people lies in its concrete mentalist interpretation (although its protagonists tend to be non-committal on this score.) Another attractive feature is that we can now avail ourselves of the acquired expertise in computer science concerning the logical properties of procedures.

The dynamic view considerably enriches the earlier landscape of styles of inference. For instance, here is a strong contender for a notion of valid dynamic inference. 'Processing the successive premises always brings us to an information state where the conclusion should hold.' (On this view, a discourse particle "so" keys us for a change in pace from premises to conclusion: from recording to testing.) Here is a picture for this view:

Dynamic inference

• ---> • ---> ... • ---> • C

premises conclusion

The loop at the end expresses that processing the conclusion will not change the information state already attained: that is, it already 'holds' there in some dynamic sense. This view of inference is quite congenial to the world of computational data base updates – which again may not be such a bad model for human reasoning either.

Like the preferential style of inference, the dynamic one loses central classical structural rules such as Monotonicity and Transitivity. This may be seen somewhat domestically by viewing the above notion as follows: the premises form a 'recipe' for achieving the conclusion. Monotonicity then says that inserting arbitrary instructions into the recipe would not change the effects previously obtained: and this is obviously implausible. But this time, there are even more dramatic divergences from classical reasoning, expressing the sequential character of imperative procedures. Permutation fails: changing the order of instructions in a recipe may produce dramatically different outcomes. And also Contraction fails. Evidently, the amount of times the same instruction is performed may matter vitally to what is produced by a recipe. Nevertheless, as before, there rmains a positive typology too: dynamic inference satisfies some well-defined variants of classical Monotonicity and Transitivity, which turn out to completely determine its inferential behaviour. (There is a lot of recent work on complete proof theories for dynamic inference. Cf. Blackburn & Venema 1993, Groeneveld 1994, Kanazawa 1993.)

Again, there are many further logical repercussions of this viewpoint, which we cannot begin to enumerate here. For instance, dynamically, one has to redefine the role of the traditional 'logical constants'. These now become more like programming constructions, and can be studied using algebraic techniques from computer science, as well as from modal and so-called 'dynamic logic' (cf. van Benthem 1991, 1994). Sometimes, this makes them, say "and", "or" and "not", behave more like the above discourse particles than as the original sentence operators – but that, of course, is all to the good in a dynamic perspective on argument.

Conclusion

This brief essay by no means exhausts the potential interfaces between current developments in logic and argumentation theory. For instance, it would be of great interest to also compare actual argumentation patterns with other logical paradigms – such as the partly dynamic, partly declarative styles of reasoning formalized in logic programming (Kowalski 1979, 1989). Moreover, it might be a good idea to bring the disciplines together, not by comparing their consolidated assets, but rather by undertaking some new and challenging joint task, say the detailed exploration of juridical argumentation and procedure, using insights from both disciplines in tandem.

It seems fair to say that contemporary Logic and Argumentation Theory share a common concern with the variety and fine-structure of reasoning. Therefore, the initial tension found with Perelman and Toulmin seems unproductive by now: logical tools and attitudes have matured. Of course, such an optimistic message brings to mind commercials for detergents. The old product has totally changed, according to a 'new formula', and it is being recommended by prominent scientists and other authorities. Why should argumentation theorists buy modern logic? What is the pay-off of the new subtleties and (if the truth be told, sometimes) new complexities? I would recommend that the two communities pull their research agendas and at least begin to find out.

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