Unraveling vagueness:
Exploring its puzzles, its nature, and their interplay

MSc Thesis *(Afstudeerscriptie)*

written by

Isa Anne Kooiman
(born 22 July 1998 in Hoorn, The Netherlands)

under the supervision of **Prof. dr. ing. Robert van Rooij**, and submitted to the Examinations Board in partial fulfillment of the requirements for the degree of

MSc in Logic

at the *Universiteit van Amsterdam.*

Date of the public defense:	**Members of the Thesis Committee:**
June 21, 2023	Dr. Maria Aloni (chair)
	Prof. dr. ing. Robert van Rooij (supervisor)
	Dr. Thomas Schindler
	Dr. Jeroen Smid

INSTITUTE FOR LOGIC, LANGUAGE AND COMPUTATION

Abstract

This thesis is an investigation into the nature of vagueness, the problems to which it gives rise, and the interplay between these two issues. The two main problems to which vagueness gives rise are the Problem of the Many and the Sorites paradox. The Problem of the Many is generally considered to be a problem specific to objects, arising from their (apparent) vague spatial boundary. The Sorites paradox, while often presented as a paradox concerning vague concepts, is a puzzle for any phenomenon involving vagueness, thereby including the (apparent) vague spatial boundary of objects. As both, distinct, problems potentially arise from the (apparent) vague boundary of objects, this prompts the question of what the relation is between the two puzzles involving vagueness. Considering the absence of this question in the vast collection of literature on vagueness, providing an answer to this question is one of the main aims of this thesis. Surprisingly, this thesis shows that the Sorites paradox and the Problem of the Many are in fact mutually exclusive. In doing so, this thesis provides a novel suggestion of the essential feature that underlies the Sorites paradox and the Problem of the Many, thereby arguing against the generally accepted understanding of both puzzles. Moreover, this thesis provides new insights into how our adopted ontology, and thereby the nature of vagueness, is intertwined with the two puzzles, thereby clarifying the existing literature on vagueness and the solutions to the two puzzles. Finally, this thesis contributes to the debate on the nature of vagueness by (i) providing new insight into the relation between the different kinds of vagueness, (ii) providing an argument establishing that ordinary objects must be vague objects, (iii) discussing the notion of vague identity, and (iii) providing an argument showing that the existence of vague objects does not have to give rise to the vague existence of objects.

Acknowledgements

First and foremost, I would like to thank my supervisor Robert van Rooij, for your guidance throughout this project. Our shared interest in vagueness, yet from a different perspective, made our conversations animated and interesting. The sessions where you tried to push me to unravel my thoughts have been very insightful and without them, the thesis would not have been where it is now.

I would also like to thank the members of the committee, Maria Aloni, Thomas Schindler and Jeroen Smid, for taking the time to read my thesis in full, and for your insightful questions. I especially want to thank Maria Aloni, as you were not only the chair of my committee, but have also been my academic mentor throughout my master and (unofficially) during my bachelor. Your guidance has been of great value, of which I am immensely grateful.

Moreover, I would like to thank my fellow MoL students, the people at the ILLC in general, and in particular the thesis support group. I have experienced the ILLC as a warm and supportive environment, as there were always people willing to help you and share their wisdom with you, for which I am grateful. The thesis support group made this final year of the MoL way more fun and made the activity of writing the thesis a lot less solitary.

The time with my friends kept me sane and motivated to keep on going. Thank you for cheering me up.

Finally, I would like to thank my family, for their immeasurable support and for being proud of me always.

Contents

1 Introduction

Once noticed, the phenomenon of vagueness is everywhere. It is not only a big topic within philosophy, but it also plays an important role in discussions within society and politics. For instance, at what point does an embryo start to be a human being and start to obtain rights? And the question of at what moment a person is determinately passed away is important for organ donation, as the organs have to be removed as quickly as possible in order to preserve their high functionality. Another case that has become more prominent in recent years concerns people who are neither determinately female nor determinately male. Yet, there does not seem to be much room for this vagueness in sex in our society. For instance, in most countries, it is not possible to officially register as 'X' instead of 'F' or 'M' in your passport. All these cases involve vagueness. This is why it is so difficult to make policy for these cases, as policy often requires strict boundaries, which is per definition absent in the case of vagueness.

Within philosophy, vagueness has given rise to a vast collection of literature. A substantial selection of this literature concerns the two main problems to which vagueness gives rise: the Sorites paradox and the Problem of the Many. The Problem of the Many is generally understood to be a problem specific to objects, as it is considered to be a problem that arises from their apparent vague spatial boundary. A classic example of an object with an apparent vague spatial boundary is the mountain Kilimanjaro, of which it is unclear what rocks on its boundary are part of the mountain and what rocks are not. The Sorites paradox, on the other hand, is often presented as a paradox that is involved with vague concepts, such as 'bald', 'tall', 'red', etc. The Sorites paradox applied to concepts is sometimes, for clarity, called 'the Heap paradox', as 'heap' is such a vague concept that gives rise to the Sorites paradox. Nevertheless, the Sorites paradox is in fact a paradox that arises for any phenomenon of vagueness. It, therefore, also arises from the vague spatial boundary of objects. As the (apparent) vague boundary of objects gives rise to both potentially the Problem of the Many and potentially the Sorites paradox, this prompts the question of what the relation is between the Sorites paradox and the Problem of the Many. Considering the lack of discussion on the exact relation between the Sorites paradox and the Problem of the Many, one of the main aims of this thesis is to contribute to the existing literature by clarifying this relation. Interestingly, this thesis aims to show that the two puzzles are in fact mutually exclusive. In doing so, this thesis argues against the generally accepted characterization of the Sorites paradox and the Problem of the Many in terms of, respectively, concepts and objects, and provides a novel suggestion for the essential feature that underlies the two puzzles and whereby the two puzzles are connected.

Another substantial part of the literature on vagueness concerns its nature. Traditionally, all vagueness was considered to be a purely representational phenomenon. That is, all vagueness was assumed to be semantic in nature. Yet, in more recent years, a minority of philosophers has explored the idea that the world itself might be vague, that is, the idea that there is *metaphysical vagueness*. The Problem of the Many has often been discussed in relation to the question of whether there is metaphysical vagueness. As it is a problem that appears to arise from the apparent vague boundary of objects, the question naturally arises whether such boundaries are genuinely vague, or whether it is merely our representation of these boundaries that is vague. Yet, the discussion on the Sorites paradox and what its solution should be, takes place completely separate from the debate on the nature of vagueness. However, this thesis aims to show that both problems, and their potential solutions, are crucially intertwined with what ontology we adopt, and thereby with the discussion on the nature of vagueness. This is a result of the by this thesis suggested essential element that underlies the two puzzles and whereby the two puzzles are connected. Furthermore, this thesis aims to contribute to the debate on the existence of vague objects, and thereby the debate on metaphysical vagueness. This thesis shall focus on the existence of vague objects in the light of a common sense ontology. In particular, it aims to provide a novel argument showing that ordinary objects must be vague objects. Moreover, this thesis discusses the two most important concerns for the idea that there exist vague objects, namely that their existence seems to give rise to vague identity and vague existence. In particular, it aims to provide a novel argument showing that the existence of vague objects does not have to entail the vague existence of objects, and discusses how the existence of vague objects does not lead to (a problematic notion of) vague identity. The aimed contributions to the literature are further spelled out below.

The **first aim** of this thesis is to provide new insight into the relationship between vagueness of individuation and vagueness of classification, which are the two kinds of vagueness distinguished by Keil (2013). In particular, I shall argue that vagueness of individuation is more fundamental than vagueness of classification. This discussion is relevant in the light of aim three, as the Sorites paradox is often presented as a paradox involving vagueness of classification, and the Problem of the Many is generally understood to be a problem arising from vagueness of individuation.

The **second aim** of this thesis is to provide a novel explanation of the relation between the Sorites paradox and the Problem of the Many. In particular, I aim to show that the feature that relates the Sorites paradox and the Problem of the Many is the notion of a *boundary region*, a concept that I shall further explain in this thesis. Where the Problem of the Many arises for a collection of many distinct, apparent vague, boundary regions, the Sorites paradox concerns one vague boundary region. The Sorites paradox, thus, potentially arises for each of the individual boundary regions that collectively potentially give rise to the Problem of the Many. Moreover, this thesis aims to show that and further clarify how aim four has the surprising consequence that the Sorites paradox and the Problem of the Many are mutually exclusive: if the Problem of the Many arises for a collection of boundary regions, the individual boundary regions do not give rise to a Sorites paradox. And if for a collection of boundary regions the individual boundary regions each gives rise to a Sorites paradox, they do not collectively give rise to the Problem of the Many.

The **third aim** of this thesis is to argue against the generally accepted understanding of the Sorites paradox and the Problem of the Many and to provide a novel suggestion for the essential feature underlying both puzzles: the number of boundary regions. In particular, I shall highlight the fact that the Sorites paradox arises for any phenomena involving vagueness, and thus is not a problem that is fundamentally concerned with concepts, and thereby with vagueness of classification. Moreover, I aim to show that the Problem of the Many is not a problem unique to objects, but also arises for certain vague concepts. It is thereby not a problem that is essentially concerned with vagueness of individuation, but thus can also concern vagueness of classification. This would mean that the Sorites paradox and the Problem of the Many are not essentially involved with a certain kind of phenomenon of vagueness. Rather, I argue, their essential feature is the number of boundary regions.

A **fourth aim** of this thesis is to provide new insights into how our adopted ontology is intertwined with the two puzzles, and thereby to clarify the existing literature on vagueness. In particular, this thesis aims to show that the vagueness of boundary regions depends on our adopted ontology. And as the two puzzles essentially rely on boundary regions, I aim to show that whether the puzzles arise and what their potential solutions are in case they arise, also depends on our adopted ontology, and thereby on the nature of vagueness.

In aiming to show that the puzzles are intertwined with our adopted ontology, the question naturally arises of what ontology we should adopt. This leads to the final and **fifth aim** of the thesis: to show that the existence of vague objects is both intuitive and philosophically not as problematic as it appears to be – or at least that it does not have to be. In particular, this thesis aims to provide novel arguments in favor of vague objects in the light of an ontology based on common sense. First, I argue that ordinary objects must be vague. Second, I shall use existing arguments to show that the defender of vague objects can avoid concerns with respect to its apparent connection to vague identity. Finally, I aim to show that the existence of vague objects does not have to entail the vague existence of objects.

To achieve these aims, the thesis is structured as follows. Chapters 2 and 3 provide background information. Chapter 2 presents general characteristics of vagueness and the discussion on its nature, and explains the Sorites paradox and the Problem of the Many. Chapter 3 provides an overview of the most popular solutions to the two puzzles that have been proposed in the existing literature.

Chapter 4 regards the first, second, and third aim. First, I shall discuss the different phenomena that involve vagueness and how they are related (aim one) (§4.1). This will allow me to show (aim two) how the Sorites paradox and the Problem of the Many are related by the notion of a boundary region (§4.2.2), and (aim three) that the Sorites paradox and the Problem of the Many are not essentially involved with a particular phenomenon of vagueness (§4.2.1, §4.2.3), but rather are essentially involved with a certain number of boundary regions (§4.2.4).

Chapter 5 is concerned with the second and fourth aim. It discusses the two problems with respect to objects (§5.1) and concepts (§5.2), and shows how they are intertwined with our ontology of objects and properties. This will allow me to conclude that, in general, the Sorites paradox and the Problem of the Many are mutually exclusive (aim two).

Finally, chapter 6 regards the fifth aim. It first shows that vague objects are, intuitively, part of a common sense ontology (§6.1.1). Moreover, I shall support this intuitive idea by arguing that if there exist ordinary objects, then these must be vague (§6.1.2). Finally, this chapter discusses the two main concerns for the existence of vague objects, namely that they lead to vague identity and vague existence. I shall argue that the existence of vague objects does not have to lead to vague identity (§6.2), nor to vague existence (§6.3).

2 Vagueness and its puzzles

The phenomenon of vagueness has given rise to several puzzles and paradoxes within logic and philosophy. The two most prominent ones are the Sorites paradox and the Problem of the Many, having led to a vast collection of literature. This chapter first presents general characteristics of vagueness and the debate on its nature. Second, this chapter presents the Sorites paradox and the Problem of the Many. The most popular solutions to the two puzzles shall be discussed in chapter 3.

2.1 The characteristics and nature of vagueness

In characterizing vagueness, I shall start by discussing what vagueness is *not*. First, it is important to distinguish vagueness from context-dependence and ambiguity. Expressions that are context-dependent have different extensions in different contexts. Clear examples of terms that are context-dependent are indexicals, such as 'I', 'you', 'there', etc. Vagueness and context-dependence often co-occur. For instance, 'tall' is both context-dependent and vague. But, fixing the context does not fix its vagueness. Even if we have fixed the context, including a clear comparison class, there are cases such that it is unclear whether they count as tall or not (Keefe, 2000; van Rooij, 2011). Vagueness should also be distinguished from ambiguity. An expression is ambiguous when it has multiple meanings that are semantically unrelated (van Rooij, 2011). This is not the case for expressions that are vague. While there are expressions that are both ambiguous and vague, such as 'bank', many vague expressions, such as 'tall', are not ambiguous (Keefe, 2000).

Furthermore, vagueness is often conflated with indeterminacy. Yet, vagueness is not the same as indeterminacy, but rather is a particular kind of indeterminacy, as Eklund (2013) has shown. While all vagueness is a matter of indeterminacy, not all cases of indeterminacy are cases of vagueness. There are different kinds of semantic indeterminacy and different kinds of metaphysical indeterminacy. An example of cases involving a kind of semantic indeterminacy are cases involving underdetermination of reference, called 'Quinean indeterminacy'. According to Quine, interpreting what someone is referring to by using a certain term is always underdetermined. For instance, when someone uses the term 'rabbit' to refer to an object, the speaker could refer to a rabbit, or the ears of the rabbit, or its tail, or timeslices of rabbits, etc. All these options fit the facts equally well, according to Quine. An example of metaphysical indeterminacy is the indeterminacy to which quantum physics seems to give rise. These cases of indeterminacy are not cases of vagueness.

Yet, what, then, is vagueness? Keefe (2000) identifies three interrelated features of vague predicates, which seem to extend to all phenomena of vagueness. First, vagueness involves *borderline cases*. Borderline cases of predicates are cases of which it is unclear whether the predicate applies or not. Borderline cases with respect to the boundary of an object are particles of which it is unclear whether they are part of the object or not. These borderline cases give rise to the second feature of vagueness: *the lack of a sharp boundary*. As vague concepts have borderline cases, they do not have a determinate extension. They, therefore, have a vague boundary of application. And, as objects seem to have borderline cases with respect to which particles are part of it, they do not, then, have a precise boundary. The final feature Keefe identifies is that vagueness gives rise to the Sorites paradox. The Sorites paradox will be explained more elaborately in section 2.2. To put it briefly, since the concept 'heap' is vague, removing one grain of sand from a heap does not affect the "heapness" of the object. Yet, according to this principle, if you take a heap and remove all of its grains one by one, the final grain of sand should still form a heap – which is clearly false. Therefore, the result is a paradox. This characteristic of vague terms, giving rise to the Sorites paradox, is what Kamp (1981) and Wright (1975) have called *tolerance*: a vague predicate is tolerant if it is "insensitive to very small changes in the object to which it can be meaningfully predicated" (van Rooij, 2011, p. 127). This tolerance highlights to what extent a vague boundary is genuinely vague. Vagueness does not just consist in the fact that there are borderline cases, since this presumes a sharp boundary between the clear cases and the borderline cases. Rather, as Sainsbury (1991) explains, vague predicates are *boundaryless*. A vague predicate draws no boundary between the positive and negative cases of a predicate, between its positive cases and its borderline cases, between its positive cases and the borderline cases of borderline cases, etc. (Sainsbury, 1991, p. 179). This tolerance and boundarylessness seem to generalize to all phenomena of vagueness, as similar considerations also hold, for instance, of the boundary of a mountain.

The predominant view of the nature of vagueness is that it is a purely semantic phenomenon, that is, all vagueness is a product of our language. This view holds that vagueness consists in linguistic expressions not having a precise meaning. Vague sentences, for instance, do not have precise truth conditions, and vague predicates do not have clear conditions of application. On this view, the apparent vague boundary of objects such as mountains is not genuinely vague. Rather, our representation of the world is vague (Dummett, 1975; Lewis, 1986; Russell, 1923). Yet, a minority is pushing against this traditional view of vagueness by claiming that there is (also) vagueness in the world, i.e., the view that there is *metaphysical vagueness*. Defenders of this view include Barnes (2010), Barnes and Williams (2011), Rosen and Smith (2004), and Wilson (2013). They claim that the boundaries of objects themselves, such as mountains and clouds, are vague. Finally, Williamson (1994) has famously introduced the epistemic view of vagueness, which denies both vagueness in the world and vagueness in language. According to *epistemicism*, vagueness is a matter of ignorance. There are no borderline cases, and expressions and objects have a sharp cut-off point. Yet, it is not possible to know these sharp cut-off points, which is why expressions and objects appear to be vague. All three views on the nature of vagueness will be further discussed in this thesis. Yet, as a substantive amount of this thesis concerns the essential element that underlies the Sorites paradox and the Problem of the Many, this thesis treats these problems as genuine, and thus treats vagueness as real (in language and/or the world). This thesis will, therefore, not be concerned much with the epistemic theories of vagueness. It will rather mainly focus on the semantic and metaphysical understandings of vagueness.

2.2 The Sorites Paradox

The Sorites Paradox is an ancient puzzle that is mostly discussed with a focus on vague concepts[1], such as (what is denoted by) 'heap', 'bald', 'old', 'tall', etc. These concepts seem to have an unclear boundary of application (Hyde and Raffman, 2018), which means there seem to be cases such that is unclear whether the concept applies or not. For example, there seems to be no clear dividing line between the number of grains of sand which makes a heap and the number of grains that does not make a heap. It seems false to say that a collection of 999 grains of sand does not make a heap, while a collection of 1.000 grains of sand does. Likewise, the concept 'bald' seems to have an unclear boundary of application, as one single hair does not seem to make a difference between being bald or not. However, together with the fact that someone with no hairs is bald, this tolerant feature of the concept 'bald' gives rise to a paradox:

- A person with 0 hairs is bald.
- If a person with 0 hairs is bald, then a person with 1 hair is bald.
- If a person with 1 hair is bald, then a person with 2 hairs is bald.
- ...
- If a person with 149.999 hairs is bald, then a person with 150.000 hairs is bald.

  Therefore
- A person with 150.000 hairs is bald.

So from the fact that someone with no hairs is bald, and the assumption of tolerance that one single hair does not make a difference to someone's baldness, we reach the false conclusion that someone with 150.000 hairs is bald.[2] Hence, from very plausible assumptions, we reach a false conclusion. Therefore, the argument is a paradox.

The argument can also be run in the opposite direction. Starting from the fact that a person with 150.000 hairs is not bald, and the assumption of tolerance that one hair does not make a difference to someone's baldness, we reach the false conclusion that someone with 0 hairs is not bald. So the result is again a paradox. While these two paradoxes are already problematic in themselves, they together lead to the absurd conclusion that any number of hairs makes a bald person and that no number does. Moreover, it follows that for a single person, any number of hairs does and does not make them a bald person. So the contradictions resulting from vague predicates are all over.

[1]The paradox is most often explained as involving vague predicates rather than concepts. Yet, explaining the paradox as involving predicates assumes that the vagueness involved is semantic. As I want to stay neutral on the nature of the vagueness involved, I explain the paradox as involving concepts, where I take 'concepts' to be a neutral term. That is, when claiming that certain concepts are vague, I do not mean to say anything about whether the relevant predicates or the relevant properties are vague.

[2]The average person has around 100.000 hairs on their head.

Sorites paradoxes arise for any phenomena involving vagueness. For clarity, I shall refer to Sorites paradoxes concerned with vague concepts as ‘the Heap paradox’, as it is often explained using the concept ‘heap’.

Another phenomenon of vagueness is the apparent vague temporal boundary of objects. The temporal boundary of an object consists of two moments: when an object starts to exist and when an object ends to exist. For many objects, this moment seems to be vague. For instance, when assembling a ship from wooden planks, it is vague at what moment the wooden planks start to form a ship. One wooden plank clearly does not form a ship. And adding one wooden plank does not seem to make a difference to whether the object forms a ship or not. Yet, at some point, the wooden planks clearly form a ship. Similarly when deconstructing the ship, removing one wooden plank does not seem to make a difference. Yet, at some point, the ship has clearly ceased to exist. It is, thus, vague at what moment the ship starts and ends to exist. As one wooden plank clearly does not form a ship, and one plank does not seem to make a difference to the existence of the object, this results in a Sorites paradox for the moment at which the object starts to exist. The Sorites paradox results in the clearly false conclusion that the ship never starts to exist. A similar Sorites paradox can be formulated concerning the decay of the ship when deconstructing it, concluding that the ship never stops to exist.

There is a popular puzzle that is structurally very similar to the above instances of the Sorites paradox, yet which is not commonly considered to be an instance of the Sorites paradox: The Ship of Theseus. The puzzle is concerned with Theseus’ ship, whose parts are all gradually replaced. This process finally results in a ship with none of the parts of the original ship of Theseus. The question of the puzzle is: is the final ship Theseus’ ship or not? Replacing one plank from the original ship with a new plank does not seem to result in a new ship. But if replacing one plank does not make a difference, we reach the conclusion that the final ship with all the planks replaced for new ones should also be Theseus’ ship. Yet, it is not clear that it is. It could also be plausibly argued that it is not, since it shares no parts with the original ship. This puzzle can be phrased in a way structurally very similar to Sorites Paradox. Suppose Theseus’ ship has n parts. Then:

- The ship with all original parts is Theseus’ ship.
- If the ship with all the original parts is Theseus’ ship, then the ship with one replaced part is Theseus’ ship.
- If the ship with one replaced part is Theseus’ ship, then the ship with two replaced parts is Theseus’ ship.
- ...
- If the ship with $n - 1$ replaced parts is Theseus’ ship, then the ship with n replaced parts is Theseus’ ship.

  Therefore,

- The ship with n replaced parts is Theseus’ ship.

It is clear that this puzzle is structurally very similar to the Sorites paradox. In both cases, there is the crucial assumption of tolerance that one plank does not make a difference which gives rise to the puzzle.

However, while the Sorites paradox is a genuine paradox, Theseus' ship is not a paradox but rather a puzzle. Unlike the Sorites paradox, its conclusion is not clearly false. In fact, the puzzle is concerned with the question of whether the conclusion is false or not. According to some, the final ship is Theseus' ship, while others claim that it must be a different ship. Proponents of the former view claim that, as long as the change is sufficiently gradual, an object can survive the complete replacement of its parts, provided, at least, that the change is sufficiently gradual. Proponents of the latter view claim that it cannot be the same ship as it is constituted from completely different materials. The puzzle is therefore commonly taken to be a problem concerning constitution and identity across time, similar to other such problems like the Puzzle of the Statue and Clay/ Lumpl and Goliath (Gibbard, 1975), the Stoic puzzle of Deon and Theon (Burke, 1994) and its modern variant of Tibbles and Tib (Wiggins, 1968).

Yet, note that if the conclusion of the puzzle is that the final ship is not Theseus's ship, then the result is a Sorites paradox, concerned with the vague temporal boundary of the ship. Since, if the final ship is not Theseus' ship, at what point does Theseus' ship stop existing and does a new ship come into existence? From the fact that the original ship is Theseus' ship and the plausible assumption of tolerance that one plank does not make a difference, we reach the then false conclusion that the final ship is Theseus' ship.

Another phenomenon of vagueness that gives rise to the Sorites paradox is the vague spatial boundary of individual objects. Yet, the vagueness of the spatial boundary of individual objects is most often discussed, not in relation to the Sorites Paradox, but rather in relation to the Problem of the Many, discussed below.

2.3 The Problem of the Many

Consider Kilimanjaro, a single mountain on an open plain. It is a mountain that is not surrounded by any other mountains nearby, it stands alone. Like any other mountain, it is composed of rocks. For many rocks in the open field, it is clear that they are not part of the mountain. And for many other rocks, it is clear that they are part of Kilimanjaro, such as the ones near the middle of the mountain. Yet, for many rocks on the border of the mountain, it is not clear whether or not they are part of the mountain. It is not clear where Kilimanjaro ends and where the surrounding field begins. Kilimanjaro does not seem to have a sharp boundary. There are many equally good ways of drawing a precise boundary of Kilimanjaro. To each way of drawing a boundary corresponds an aggregate of rocks. These aggregates are all equally good candidates to be Kilimanjaro. Therefore, it is entirely arbitrary to pick one particular aggregate and claim that this one is Kilimanjaro. There is no way to single out one of the aggregates as being the mountain. But if all of the aggregates count as mountains, then we have not one but many mountains on the plain. And if none of them counts as a mountain, then there is no mountain on the plain. So, there are either many mountains on the plain or none, but never just one.

This problem generalizes to other macroscopic physical objects. These are all composed of particles and seem to have imprecise boundaries, with particles being neither clearly nor clearly not part of the object. As a consequence, there are many ways to draw an object's boundary, and many corresponding aggregates of particles, each of which being an equally good candidate to being the object. Not being able to select one, there are either many objects or there is no object. This is the *Problem of the Many*, introduced by Peter Unger (1980). And as David Lewis points out, it is *everywhere*:

> "Once noticed, we can see that [the Problem of the Many] is everywhere, for all things are swarms of particles. There are always outlying particles, questionably part of the thing, not definitely included and not definitely not included. So there are always many aggregates, differing by a little bit here and a little bit there, with equal claim to be the thing. We have many things or we have none, but anyway not the one thing we thought we had. That is absurd." (Lewis, 1993, p. 23)

The Problem of the Many is, thus, a problem that arises from the (apparent) vague boundary of individual, ordinary objects. It makes us doubt whether there are such ordinary objects, and if so, what they are. Note that the Problem of the Many involves a crucial background assumption, namely that constitution is determinate. If constitution is determinate, then the question arises as to which of the many precise aggregates the object is identical.

3 Classic solutions to the puzzles

In this chapter, I shall present the mostly discussed solutions to the Sorites paradox and the Problem of the Many.

3.1 The main solutions to the Sorites paradox

Classical logic and semantics do not allow for vagueness, as the tolerance with which phenomena of vagueness are involved, combined with classical logic and semantics, gives rise to the Sorites paradox. Therefore, the standard thought is that the logic and/or semantics of vague expressions cannot be classical. This has given rise to several non-classical logics and semantics that aim to satisfactorily deal with the logical and semantic behaviour of vagueness and thereby avoid the Sorites paradox. The major logical and semantic responses to the Sorites paradox are many-valued logics, supervaluationism and subvaluationism. Yet, there is also a solution to the Sorites paradox that "simply" denies that vagueness is a real phenomenon. According to the epistemic theory of vagueness, our logic and semantics should be classical, as vagueness is a mere matter of ignorance.

Several *many-valued logics* have been proposed to appropriately model vagueness and resolve the Sorites paradox. On these approaches, borderline statements have truth values that lie between 1 (full truth) and 0 (full falsehood). Three-valued logics divide sentences into the true, the false, and the indeterminate, i, where the connectives are defined truth-functionally.[3] In Weak Kleene, the truth value i is thought of as nonsensical, or as off-topic. In Strong Kleene and Łukasiewicz, i is thought of as neither true nor false. This different interpretation of i gives rise to a difference in their definition of the connectives. This, then, affects what counts as valid or not. Validity in three-valued logics is generally defined as the preservation of designated value D. The designated value is the value a sentence should have in order to hold. While Weak Kleene, Strong Kleene and Łukasiewicz all take the set of designated values D to be true, $D = \{1\}$, the difference in their definitions of the connectives leads to different validities. Nevertheless, by means of the third truth value and their notion of validity, all three logics can avoid that the Sorites sequence has to lead to a paradoxical conclusion by giving up the assumption of the validity of the tolerance principle, according to which a small change cannot change the truth value of a sentence from true to false. Another three-valued logic that is especially interesting in the light of the Sorites paradox is ST logic, as it assumes that the tolerance principle is valid.[4] In preserving the validity of the tolerance principle, this logic was formulated specifically to deal with vagueness (and truth). ST logic adopts the Strong Kleene definitions of the connectives, yet unlike the other three-valued logics, ST logic assigns different designated values to the premises and the conclusion. While the premises have to be strictly true ($D = \{1\}$), the conclusion has to be tolerantly true ($D = \{1, i\}$). This results in a logic that has exactly the same consequence relation as classical logic. Yet, unlike classical logic, ST logic is

[3]First proposals were developed by Halldén (1949) and Körner (1960), which were updated by Tye (1994).

[4]See Cobreros et al. (2012, 2014).

not transitive. By its non-transitivity, ST logic can avoid the paradox of the Sorites sequence while nicely accommodating the characteristic tolerance of vague concepts. Others suggest that we should adopt infinite-valued or fuzzy logics instead of two- or three-valued logics.[5] One motivation for this approach is that as baldness comes in degrees, so does the truth value of sentences predicating the baldness of things. For all many-valued logics, there is a variety of ways to define the connectives and validity, each leading to a different logic, each with their own advantages and problems.

One of the general issues for many-valued logics is that they postulate determinate cut-off points between the different truth values, which is in conflict with the vagueness of the phenomenon at issue.[6] Three-valued logics distinguish between statements that are true, statements that are indeterminate, and statements that are false. Yet, this requires clear cut-off points between the true and the indeterminate and the indeterminate and the false. However, these boundaries also seem to be vague, as vague concepts appear to have no boundaries at all. Infinite-valued logics appear to avoid this problem, as they do not strictly distinguish between the true, the indeterminate, and the false, but rather put forward a degree of truth. However, this does, arguably, not avoid the postulation of cut-off points, but rather results in postulating infinitely many cut-off points, one cut-off point between each degree of truth. Moreover, many people object to infinite-valued logics that it is unclear what establishes which degree of truth a statement takes on. Especially since not all sentences in natural language can be compared to each other with respect to their truth value.

The most popular semantics to deal with vagueness is *supervaluationism*, which is by many considered to be an improvement of the above three-valued logics. According to supervaluationism, sentences concerning borderline cases lack a truth value.[7] Borderline cases are cases where the relevant expression neither definitely applies nor definitely does not apply. An example of such a borderline case is a person who is neither definitely bald nor definitely not bald. On the supervaluationist view, a sentence s is definitely true, or determinately true, iff s is super-true. A sentence s is super-true iff s is true on all ways to precisify the meaning of s, and s is super-false iff s is false on all ways to precisify the meaning of s. A sentence s is neither super-true nor super-false iff s is true on some but not on all precisifications. So borderline cases are cases of semantic imprecision, where the meaning of the expression can be extended, i.e., can be made precise, in such a way that it comes out as true under some precisifications while false on other precisifications. If someone is a borderline case of being bald, then this means that for some ways to make the concept 'bald' precise, the person is considered to be bald, while for others the person is considered to be not bald.

A pleasant feature of supervaluationism is that it preserves all valid consequences of classical logic, and in particular all theorems. This allows us to retain classical logic to some extent, while also being able to accommodate vagueness. One theorem

[5] Goguen (1969), Hyde (2008), Smith (2008), and Zadeh (1975) adopt this approach.

[6] This is a problem concerning higher order vagueness. Yet, this is a notion I am not going to further discuss in this thesis.

[7] Fine (1975) has developed the classic defense of supervaluationism to accommodate vagueness, based on the supervaluation semantics of van Fraassen (1966). Further accounts have been provided by, amongst others, Kamp (1975), Keefe (2000), and Lewis (1986).

that it preserves is the principle of the excluded middle. If someone is a borderline case of being bald, then on each precisification it is true that the person is bald or not bald. So the proposition '$Bx \vee \neg Bx$', where B expresses baldness, is supertrue. Yet, at the same time, bivalence is rejected. 'Bx' and '$\neg Bx$' do not have a determinate truth value. It is not supertrue that the person is bald, nor that the person is not, since there are precisifications where the person is bald and precisifications where the person is not. Likewise, there is not a single pair of people such that one has n hairs and the other $n+1$ hairs of whom it is supertrue that the one is bald and the other not. Nevertheless, it is true on each precisification that there is a pair of people, (x_n) and (x_{n+1}), such that one has n hairs and the other $n+1$ hairs where the one is bald and the other not. More generally, it is supertrue that $\exists n(\phi(x_n) \wedge \neg\phi(x_{n+1}))$, where ϕ is a vague predicate. At the same time, it is not the case that there is an n of which it is supertrue that $(\phi_n \wedge \neg\phi_{n+1})$. So while it is supertrue that there is some cut-off point, there is not a particular point of which it is supertrue that it is the cut-off point. This allows the supervaluationist to block the problematic conclusion of the Sorites paradox. There is not a single conditional premise of the Sorites paradox 'if $\phi(x_n)$, then $\phi(x_{n+1})$' that is superfalse. Yet, it is nevertheless supertrue that some conditional is false.

However, this means that if we would adopt supervaluationism, we are forced to admit that there are existential statements that can be supertrue while not having any supertrue instances. While it is supertrue that $\exists n(\phi_n \wedge \neg\phi_{n+1})$, there is not an n of which it is supertrue that $(\phi_n \wedge \neg\phi_{n+1})$. This expresses one of the prominent concerns for supervaluationism, namely its "ontological honesty" and thereby the adequacy of the logic.[8]

A dual approach from supervaluationism is *subvaluationism*. According to subvaluationists, borderline cases are not propositions that are neither true nor false, but rather are both true and false. Subvaluationism, therefore, is an approach to vagueness that uses paraconsistent logic.[9] This position takes a proposition to be true iff it is true on at least one precisification, and false iff it is false on at least one precisification. So a borderline case, which is true at one precisification and false at another, is thus both true and false. It thereby analyzes the semantic indeterminacy of borderline statements not as semantic underdeterminacy like the supervaluationist, but rather as semantic overdetermination.

Finally, according to the epistemic theory of vagueness, vague terms have a determinate cut-off point, yet we cannot discover what this cut-off point is. Vagueness, on this view, is a form of ignorance.[10] For instance, people are determinately tall or not tall, and objects are determinately heaps or not. However, it is not possible to know where the boundary lies. This immediately blocks the Sorites paradox, as, on this view, one of the conditionals is determinately false. One of the main arguments in favor of epistemicism is that it retains classical logic and semantics.

[8] See Hyde and Raffman (2018) and Sorensen (2022) for an overview of many concerns.

[9] Jaśkowski (1948 [1969]) was the first logician to develop a paraconsistent logic. Interestingly, paraconsistent logics were originally in part intended to deal with vagueness and the Sorites paradox.

[10] Williamson (1994) has famously introduced the epistemic theory of vagueness. Other positions have been offered by, amongst others, Rescher (2009) and Sorensen (1988, 2001). Distinct theories differ in their explanation of how the route to knowledge of the cut-off point is blocked.

3.2 The main solutions to the Problem of the Many

One of the suggested solutions to the Problem of the Many also comes from supervaluationism.[11] This is considered to be a solution "from semantics", as it treats the involved vagueness as a semantic phenomenon. To repeat briefly, the Problem of the Many consists in there being either many or no mountains on the plain, but not the single one we take there to be. On the supervaluationist account, it is vague what the name 'Kilimanjaro' refers to. On each precisification, it refers to a different aggregate of rocks. Let's call the precise aggregates K_i's. There is a K_1, a K_2, a K_3, etc. Each precisification makes each of the sentences 'K_1 is a mountain', 'K_2 is a mountain' and so on either true or false. For different precisifications, it differs which of these sentences are true and which ones are false. Therefore, none of the sentences 'K_1 is a mountain', 'K_2 is a mountain' and so on is supertrue. Nevertheless, the sentence 'There is one mountain in the field' is supertrue. On each precisification, there is exactly one aggregate of rocks which is Kilimanjaro, as only one of the sentences 'K_1 is a mountain', 'K_2 is a mountain' and so on is true on each precisification. It is, thus, not the mountain that is vague, but rather the name we use to refer to the mountain is. It thereby considers the involved vagueness to be semantic in nature. There are, however, many objections to the supervaluationist solution to the Problem of the Many.[12] One prominent concern is again the worry about the ontological honesty of supervaluationism, described in the section above. How should we make sense of the claim that it is supertrue that there is one mountain in the field, while there is not a particular mountain of which it is supertrue that it is Kilimanjaro. It is, on this view, not clear what exists and what does not.[13]

An alternative suggestion comes from Lewis (1993), who suggests that we should distinguish between absolute identity and partial identity. The many different aggregates of rocks are, strictly speaking, not identical. Yet, they are also not completely distinct, as they overlap almost completely. They differ by only a few rocks. The aggregates are partially identical and partially distinct. They are, thus, almost completely identical. They are strictly speaking many, but they are almost one. In some contexts, we maintain strict standards, so that we count many objects. Sometimes we will be ambivalent about our standards. Yet, for most contexts, it is true enough that there is one mountain. The solution to the Problem of the Many, then, is that there is one mountain, Kilimanjaro, and all of the aggregates are almost identical to Kilimanjaro (Lewis, 1993, pp. 36-40). One of the criticisms of this view is provided by Hudson (2001). He concedes that we might understand ordinary counting sentences in this way. Nevertheless, he claims, we do still know how to count by absolute identity, and when we do, it still seems to be the case that there is just one mountain, not millions of them. Even in contexts where we maintain strict standards with respect to identity, there seems to be just one mountain. The Problem of the Many is, thus, not resolved, Hudson claims.

[11] See Lewis (1986) and McGee and McLaughlin (2000) for accounts that aim to solve the Problem of the Many using supervaluationism.

[12] See Weatherson (2016) for an overview of the objections to supervaluationism as a satisfactory solution to the Problem of the Many.

[13] Related to this ontological honesty, I shall argue in section 5.1 that the supervaluationist naturally seems to rely on a particular, non-trivial, ontological assumption, namely that of universalism.

Another option is to embrace the conclusion of the Problem of the Many and defend the position that there are indeed no mountains. This is a consequence of adopting the metaphysical position *nihilism*. There are different kinds of nihilism, yet the most common kind is *mereological nihilism*, also called *compositional nihilism*.[14] According to compositional nihilism, there are no composite material objects. There are only mereological "simples", that is, material objects without parts. These simples can be arranged in a variety of ways and collectively instantiate certain properties. However, these collections of simples never constitute a new object. They deny that there are objects such as mountains, tables, clouds, etc. Our ordinary beliefs about the world are thus radically mistaken. The main defense for nihilism consists in the claim that it dissolves many puzzles in philosophy, such as the Problem of the Many, but also puzzles concerning material constitution and identity across time. By claiming that there are no ordinary objects, the nihilist embraces the conclusion of the Problem of the Many. In the case of Kilimanjaro, it plainly denies that there exists a mountain. However, on its own, this does position not provide an answer to the Problem of the Many. In order to satisfactorily deal with the problem, the nihilist has to provide us with an explanation of why we ordinarily do take there to be ordinary objects, while there are in fact no such objects. Moreover, as this position is extremely counter-intuitive, there are not many people who adopt this position in order to solve the Problem of the Many.

Another way to embrace the conclusion is to defend the position that there are indeed many Kilimanjaros, not just one. This position is put forward by defenders of *universalism*.[15] There are different versions of universalism,[16] of which the mostly discussed version is *mereological universalism*. According to this position, composition is unrestricted. This means that any mereological fusion of objects is itself an object. So if there is a table and a chair, then there also exists an object which is made up of this table and chair. Note that universalism does not require a commitment to objects being of a certain kind. It "merely" entails that if there are particles arranged a certain way, then there is an object that they compose. Another version of universalism is *diachronic universalism*, according to which the material content of any spatiotemporal region composes an object. This region can be completely discontinuous. With respect to the Problem of the Many, universalism entails that each of the many aggregates is indeed an object. It thereby embraces the conclusion of the argument that there are either many or no objects, but not just one. However, like the nihilist, in order to provide a satisfactory answer to the Problem of the Many, the universalist has to provide an explanation to the question of why it is the case that we ordinarily take there to be ordinary objects, as these apparently do not exist.

[14]See Unger (1979) for a classic defense of nihilism. In addition to this defense, he (1980) believed that the Problem of the Many also showed that we should be nihilists. van Inwagen (1990) discusses nihilism and argues that we should be nihilists, but that we should make an exception for organisms, that is, living beings. See Rosen and Dorr (2002) and Sider (2013) for further discussion and defense of nihilism.

[15]The position has been defended by philosophers such as Heller (1990), Hudson (2001), Lewis (1986), Rea (1998), and Sider (1997, 2001).

[16]See Korman (2020) for an overview. It is not relevant for the purposes of this thesis to discuss the different versions of universalism and other views that permit many entities where we ordinarily take there to be one.

Indeed, not many people defend the position that we are wrong in thinking that there are ordinary objects. A more common philosophical position is to argue that where we ordinarily understand there to be one object, there are actually many objects, but that these are represented as one. Pre-theoretically, it is not a very intuitive position to adopt, as it conflict with our everyday judgments of the world. Yet, philosophically, it is a quite popular position to adopt. This is mainly because the position that there exist only ordinary objects is considered to be theoretically problematic, as it seems to give rise to more philosophical problems.[17]

Finally, some philosophers seek to solve the (so-called) Problem of the Many by defending the position that objects genuinely have vague boundaries. As mentioned, the problem crucially relies on the assumption that the boundary of objects is determinate. And if the boundary of an individual object is determinate, the question arises as to which of the many objects with a determinate boundary, i.e., the aggregates, the object is identical. By claiming that the boundary of objects is genuinely vague, this assumption is rejected. On this view, it is genuinely vague whether particles on the boundary of an individual object are part of the object or not. The answer to the Problem of the Many, then, is that there is just one object: the one with the vague boundary. By having a vague boundary, the objects themselves are vague.[18] The vagueness involved is, therefore, not semantic in nature, but rather metaphysical. It is thus not the case, like for supervaluationism, that the term 'Kilimanjaro' is vague because it is vague to which of the many aggregates the term refers. Rather, 'Kilimanjaro' is a precise term that refers to this one, vague object. Traditionally, many philosophers thought that the notion of metaphysical vagueness was simply incoherent. All vagueness had to be purely representational, as the world had to be precise, they thought.[19] Judgments on this point have become less strong in recent decades, yet the proponents of worldly vagueness remain the minority group.

Some philosophers characterize vague objects in terms of vague identity.[20] Garrett (1988, p. 134), for instance, characterizes the claim that there can be vague objects as "the thesis that there can be identity statements which are indeterminate in truth value (i.e. neither true nor false) as a result of vagueness [...], the singular terms of which do not have their reference fixed by linguistic means." The vagueness of such identity statements is, thus, not the result of vagueness in language, but rather of the vagueness of objects.

[17] See Korman (2015) for an overview of the arguments against the position that there exist only ordinary objects, in favor of nihilism and universalism. Arguments against mereological universalism – and against ontologies denying the existence of ordinary objects in general – can be found for instance in Elder (2008), Hirsch (2002), Kelly (2008), Korman (2015), and Kriegel (2011).

[18] Accounts of vague objects have been provided by, amongst others, Rosen and Smith (2004), Sattig (2013, 2015), Tye (1990, 1996), and Wilson (2013). Some also take the vagueness of concepts such as 'bald', 'tall', etc., to be metaphysical in nature. Others assume that the vagueness of concepts is purely semantic, and argue that in addition to this representational vagueness, there is also worldly vagueness since there are vague objects. Barnes and Williams (2011) argue for metaphysical indeterminacy more generally, of which objects with vague boundaries might be an instance.

[19] The most famous defenders of such claims are Dummett (1975), Lewis (1986), and Russell (1923).

[20] See for example Garrett (1988), Garrett (1991), Parsons (2000), and Parsons and Woodruff (1995).

Yet, the idea that the identity relation is vague is considered to be unintelligible by many philosophers. As is often cited from Lewis:

> "Identity is utterly simple and unproblematic. Everything is identical to itself; nothing is ever identical to anything except itself. There is never any problem about what makes something identical to itself; nothing can ever fail to be." Lewis (1986, pp. 192-193)

Many believe that the relation of identity is regularly confounded with other relations, such as persistence (confounded with identity over time), the counterpart relation (confounded with trans-world identity), co-reference of singular terms, or mereological composition. According to them, puzzles in the context of which is often argued for vague identity, such as the Ship of Theseus, Tib and Tibbles, Lumpl and Goliath, are wrongly considered to be identity crises.[21]

Yet, it is a general worry for the position that there exist vague objects that it leads to vague identity, even if the notion of vague objects is not characterized in terms of vague identity. The idea is that, as the boundary of Kilimanjaro is vague, it is indeterminate whether Kilimanjaro is identical to K_1, K_2, K_3, etc. Yet, as the vague identity statement does not involve vague terms, the vagueness of the statements can only be located in the identity relation itself. In addition to being considered to be plainly unintelligible, as described above, Evans (1978) has provided a proof that is considered to establish that it leads to a contradictory conclusion. The proof shows that if the identity between K and K_1 is indeterminate, that is, $\triangledown(K = K_1)$, then it follows that $\neg(K = K_1)$, that is, K and K_1 are determinately not identical. As this is an absurd conclusion, the defender of vague objects has a serious problem. In section 6.2, I shall further discuss the argument, where I shall argue that the defender of vague objects does not have to accept one of the main assumptions of Evans' argument, and where I shall present the solution from Cobreros et al. (2012) where they avoid the conclusion of Evans' argument.

To summarize this chapter, the main solutions to the Sorites paradox come from non-classical logic and/or non-classical semantics. The main solutions to the Problem of the Many, on the other hand, include solutions from metaphysics. This reflects in which settings the two puzzles have been mainly discussed. The Sorites paradox is most often presented as a problem arising from the vagueness of predicates, and thus considered to be a puzzle mainly for classical logic and/or semantics. The Problem of the Many, on the other hand, is considered to be a problem for the existence of ordinary objects, one that makes us doubt whether we should hold on to the idea that there are ordinary objects. It is, therefore, not a surprise that it has been discussed mainly within the realm of metaphysics. Nevertheless, the Sorites paradox also arises from the vague spatial boundary of objects. It should, therefore, also have a connection to debates in metaphysics about the nature of objects. The relation between the two puzzles and their connection to our ontology shall be further discussed in chapters 4 and 5.

[21]See, for instance, Quine (1987).

4 The essential feature of the puzzles

The previous chapters have discussed the Sorites paradox and the Problem of the Many, and their potential solutions that have been mainly discussed in the literature. The Problem of the Many is generally considered to be a problem that is fundamentally concerned with the apparent vague spatial boundary of individual objects. The Sorites paradox is often presented as a paradox that involves vague concepts, i.e., the Heap paradox. Nevertheless, it is clear that the Sorites paradox is a paradox that arises for any phenomenon of vagueness, and thus also potentially arises for the apparent vague spatial boundary of objects. This prompts the question of what the relation is between the Sorites Paradox and the Problem of the Many, and what the relation is between these different phenomena of vagueness with which they are concerned. These are the two questions with which this chapter is concerned. This chapter aims to show (i) how the different phenomena of vagueness are related to each other, (ii) how the Sorites paradox and the Problem of the Many are related to each other, and (iii) that the Sorites paradox and the Problem of the Many are not essentially involved with a particular kind of vagueness, but rather (iv) that they essentially involve a certain number of boundary regions. I thereby aim to argue against the generally accepted understanding of the two puzzles.

4.1 The different phenomena of vagueness and their relation

4.1.1 Individuation and classification

Keil (2013) distinguishes between vagueness of classification and vagueness of individuation. Vagueness of *classification* concerns the vagueness of how a certain object or aggregate of particles should be classified. According to Keil, the Heap paradox is concerned with this vagueness of classification, as it is concerned with whether an object or aggregate of particles should be classified as, for instance, a heap or not, or as tall or not, etc. The Problem of the Many, on the other hand, is concerned with vagueness of *individuation*, according to Keil. It is not concerned with the membership of a class, but rather is concerned with which of the multitude of, for instance, the partially overlapping mountain candidates is identical to this particular mountain, Kilimanjaro. The Problem of the Many, thus, is concerned with how to individuate objects, as the result of their apparent vague spatial boundary. So according to Keil, the Heap paradox is concerned with the vague classification of objects while the Problem of the Many is concerned with the vague individuation of objects.

Indeed, the vagueness of individuation and the vagueness of classification seem to be distinct phenomena. Independent of how we classify an object, its spatial boundary can be vague. Whether a pile of grains of sand on the beach classifies as a heap or not, does not affect its vague spatial boundary. It might be that it is clearly big enough to be considered as a heap, maybe it is clearly too small to be a heap, or maybe it is vague whether it is a heap. Yet, independently of this question, it is vague where the pile of sand begins and where the rest of the beach ends. So individuation can be vague independently of whether the classification is vague or not. Moreover, classification can be vague without vagueness of individuation. Consider, for example, a collection of grains of sand piling on top of a table. There is a clear demarcation between the collection of grains of sand and the table, so that it is clear where the pile starts and where the table ends. In this situation, it is clear how to individuate the object. However, at the same time, it might be that it is unclear for this number of grains of sand whether it is a heap or not. I.e., that the classification of the object is vague. Vagueness of classification and vagueness of individuation are, thus, distinct phenomena. This is supported by considerations provided by Sattig (2013, 2015). He claims that the mereological vagueness of a mountain such as Kilimanjaro is independent of how we classify this object.

> "Notice that a mountain may be mereologically fuzzy even if the sortal *mountain* is perfectly precise; the sortal is not the source of all ordinary mereological indeterminacy." (Sattig, 2013, p. 219)

Yet, while the distinction between vagueness of classification and vagueness of individuation is a good one to make, this distinction does not do justice to all the different phenomena of vagueness, as there are different kinds of individuation and different kinds of classification. Objects seem to have both a vague spatial boundary and a vague temporal boundary. The vague temporal boundary of an object concerns the fact that it is vague when an object starts and ends to exist. For instance, when assembling a ship from wooden planks, it is vague at what moment the wooden planks start to constitute a ship. It is, thus, vague when the ship starts to exist. The vague spatial boundary of an object and its vague temporal boundary are both cases that involve vagueness of individuation. Where the former is concerned with *where* an object starts and ends to exist, the latter is concerned with the question of *when* an object starts and ends to exist. The involved vagueness is concerned with the question of how to individuate a particular object from the multiple spatial and temporal object candidates.

Like there are different kinds of vagueness of individuation, so are there different kinds of vagueness of classification. There are classifications that are involved with the size, shape, color or origin of objects – denoted by adjectives. For instance, an object can be tall, round, red, wooden, etc. There are classifications involved with to what class of objects or kind objects belongs to – denoted by common nouns. For instance, an object can be a mountain, an apple, a police officer, a ship, etc. Moreover, there are classifications that describe how, to what extent, when, where or in what manner something happens or is done – denotes by adverbs. For instance, something can be (done) easily, slowly, underneath, early, always, etc. These different kinds of classifications differ as to what extent they describe the nature of an object. Adverbs provide context to the situation in which the object is located. For example, 'Alice eats slowly this morning' provides us with information about how and when Alice was eating. As they provide context to the situation, they do not inform us about some characteristic of the object itself. Adjectives, on the other hand, do not inform us so much about the situation but rather do inform us about characteristics of the object involved in the situation. For most adjectives, whether they apply to an object can vary in different situations. Consider, for instance, the shape, color and/or size of an object. Yet, some adjectives might be considered to describe an essential feature of the object to which it applies. For instance, some philosophers consider an object's origin as essential to its existence: an object made from wood could not have been made from ice.[22] Finally, while there are common nouns that do not describe the nature of an object, such as being a police officer or a grandmother, other common nouns seem to have the potential to inform us of what kind an object is in a more invariant, natural way, such as being a mountain or a butterfly. So there seem to be different levels as to what extent a certain classification describes part of the nature of an object or not. And as there are such different levels of classification, there are different levels as to what extent the vagueness corresponding to these classifications affects the object that is being classified.

So there are phenomena of vagueness that involve the individuation of an object and there are phenomena of vagueness that involve the classification of an object. Moreover, there are different kinds of vagueness of individuation as well as different kinds of vagueness of classification.

4.1.2 The relation between individuation and classification: Individuation first

The fact that vagueness of individuation and vagueness of classification are independent phenomena, does not directly mean that individuation and classification themselves are not connected to each other. In fact, I will argue that classification depends on individuation, and that therefore vagueness of individuation is of a more fundamental nature than vagueness of classification.

The nature of vagueness of individuation is intimately connected to our ontological account of objects. For instance, if we adopt mereological universalism, i.e., the position that each collection of objects constitutes a new, precise object, then the boundary of objects is not vague. This means that the involved vagueness of individuation is not of a metaphysical nature. Rather, the difficulty of individuating objects stems from some form of ignorance or from vagueness in how the world is represented. If, instead, we adopt nihilism, i.e., the position that there exist no complex objects, possibly only simples, then there are no complex objects to vaguely individuate. This again means that then there is no metaphysical vagueness of individuation. If, on the other hand, we adopt the position that there are vague objects, then it is genuinely vague how to individuate an object, as their boundaries are truly vague. This means that vagueness of individuation is a metaphysical kind of vagueness. Therefore, the question of what objects exist goes together with what kind of phenomenon vagueness of individuation is, namely epistemic, semantic or metaphysical.

Now, we need an account of what objects there are before we can attempt to (vaguely) classify these objects. Since, what are we classifying if it is not clear what it is that is being classified? Once it is clear which objects there are, it is possible to say whether these objects are heaps or not, tall or not, red or not, etc. If there are only ordinary (vague) objects, then we can attempt to classify them as tables, mountains, rocks, etc. If any fusion of objects constitutes a new object, the question arises whether we should classify all objects. For instance, should we classify the

[22] Origin essentialism has been defended by Forbes (1985), Kripke (1980), and Salmon (1981), among others.

fusion of a table and a tree as a tabletree? If instead there are no complex objects, possibly only simples, then there are plainly no complex objects that can be (vaguely) classified.

We thus need to settle on our ontology of objects, and thereby settle on the nature of vagueness of individuation, before it is possible to classify these objects, and thus before the issue of vagueness of classification can even arise. Therefore, vagueness of individuation seems to be of a more fundamental nature than vagueness of classification. See figure 1 for an illustration of the relation between vagueness of individuation and vagueness of classification.

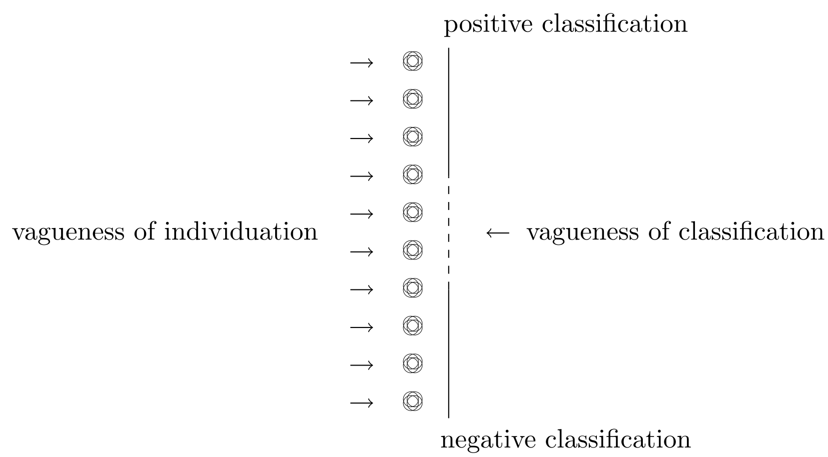

Figure 1: The relationship between vagueness of individuation and vagueness of classification.

4.1.3 Individuation cannot depend on classification: Against a sortal ontology

The above section has shown that it seems to be the case that we need an account of what objects there are – and thereby settle on the nature of vagueness of individuation – before we can attempt to (vaguely) classify these objects. Yet, this assumes that the individuation of objects and the classification of objects are two strictly independent phenomena. This, however, is not clearly the case. In order to defend the position that there are only ordinary objects, it is a popular and intuitive option to individuate ordinary objects, and thereby distinguish them from non-objects, on the basis of them being of a certain invariant kind, or falling under some familiar sortal concept. The idea, on this view, is that the objects in the world are individuated by invariant kinds. The identity of an ordinary object, then, depends on to what kind it belongs. Examples of such ontologies are certain modern versions of hylomorphism.[23] According-

[23]See Koslicki (2008) for an extensive discussion of different versions of hylomorphism. Sattig (2015) provides an interesting 'quasi-hylomorphism', where he tries to find a midway between classical mereology and Aristotelian hylomorphism. Unlike hylomorphism, he admits that there exist material

ing to hylomorphism, particular objects are, in some sense, compounds of matter and form. One way to understand this, following Harte (2002) and Koslicki (2008, 2018), is to think of the form of an object as the “slots” that are to be filled by objects that belong to a certain kind. The form provides a sort of “recipe” for how to build objects of a certain kind. What fills the slots, then, is the matter of the objects. The matter provides the ingredients for the recipe provided by the form, so to say. So the identity of the object, the whole, depends on to what kind, or sortal concept, the object belongs.

Thus, one possibility to individuate ordinary objects is to do so on the basis of sortal concepts or invariant kinds. The sortal concept or kind the object belongs to is, then, part of its identity. This means that the question of what objects there are, depends on what kinds of objects there are. This implies that individuation depends on classification. Specifically, it depends on classification into kinds.

Now note that, as most people would agree, classification into kinds is in fact vague. There are objects of which it is vague whether they are mountains or not. Of other objects, it is vague whether they are a chair or not. And so on. Also, membership of a biological species is vague in certain cases (Simons, 2013). For instance, hybrid offspring of parents belonging to a different species that are sufficiently distinct is not clearly part of either of the parent’s species. Consider, for example, ligers and mules. Another case where the vague boundary between species is evident is in the diachronic dimension (Simons, 2013). Over time, new species can evolve via an evolutionary process, such that the new species is clearly distinct from its ancestor and its sister species. However, there is no sharp cut-off between the old species and the new species. The creation of a new species is, via such an evolutionary process, a gradual process.

Problematically, the combination of the vagueness of sortal concepts or kinds, and an ontology of objects based on these sortal concepts or invariant kinds, entails the vague existence of objects. Suppose that one adopts a sortal ontology. This means that it is part of the identity of an object to what kind it belongs. This means that two things of a different kind cannot be the same object. If it is vague to what kind some piece of matter belongs, this means that it is vague whether there exists an object of a certain kind. Note that it is not just that it is vague as to what kind an existing object belongs. Rather, on this view, it is vague whether a certain object (of a certain kind) exists or not. The piece of matter does not in itself constitute an object, because for there to exist an object, a piece of matter has to be of a certain kind. If the piece of matter is of a certain kind, then an object of that kind exists. If the piece of matter is not of that certain kind, that object does not exist. Thus, if it is vague of the piece of matter whether it is of that kind, it is vague whether a certain object exists or not.

To illustrate, suppose that for some piece of matter, it is vague whether it is a mountain or a hill. On the sortal ontology view, an object that is a mountain cannot be the same object as an object that is a hill, even if their matter is the same. Since it is vague for some piece of matter whether it is a mountain or a hill, it is vague

objects that obey the rules of classical mereology. Yet, unlike classical mereology, ordinary objects are not such material objects but rather are compounds of a material object and a *K-path*, which simply put comes down to the life of a kind.

whether there exists a mountain or whether there exists a hill. Since the possible mountain and the possible hill are different objects, according to sortal ontology, it is vague whether there exists an object that is a mountain or whether there exists a different object that is a hill. So it is not vague, of an existing object, whether it is a mountain or a hill or not. Rather, it is vague whether there exists an object that is a mountain, and it is vague whether there exists a different object that is a hill. Of both potential objects, it is vague whether they exist or not.

Hence, if kinds can be vague on a sortal ontology, there must be vague existence of objects. Yet, the notion of vague existence is generally considered to be highly problematic and plainly unintelligible. How can an object partially exist and partially not exist? As this is so counter-intuitive and problematic, it is something that must clearly be avoided. Yet, classification into kinds clearly seems to be vague. Therefore, as the combination of vagueness of classification into kinds and sortal ontology seems to entail vague existence, the only conclusion can be that we must abandon the idea of sortal ontology.

Generally, this argument shows that if classification has an impact on what exists, then this classification cannot be vague. Note that this again means, as concluded in section 4.1.2, that vagueness of individuation is of a more fundamental nature than vagueness of classification. We need to have determined our ontology before vagueness of classification can arise. That is, it needs to be determined what objects there are, and thereby settle on the nature of vagueness of individuation, before it is possible to vaguely classify them.

4.2 Analysis of the puzzles

Vagueness of individuation and vagueness of classification seem to be intimately tied to the Problem of the Many and the Sorites paradox. The Problem of the Many is generally presented as a problem that is fundamentally concerned with the (apparent) vague spatial boundaries of ordinary objects, and thus a problem that is fundamentally concerned with vagueness of individuation. The Sorites paradox, on the other hand, is usually presented as a paradox concerned with vague concepts, and thus a paradox that arises from vagueness of classification. However, in this section, I shall argue against this generally accepted characterization of the two puzzles and provide a novel suggestion of how the Sorites paradox and the Problem of the Many are related to each other and what their underlying essential feature is.

4.2.1 The Sorites paradox for individuation

The Sorites paradox is often presented as a paradox concerned with vague concepts, i.e., the Heap paradox, and thus as a paradox arising from vagueness of classification. Nevertheless, the Sorites paradox is a general feature of all phenomena that involve vagueness. As we have seen in section 2.2, it is possible to construct a Sorites paradox that is involved with the vague temporal boundary of an object, where is it vague when an object starts to exist or when an object stops to exist. The Sorites paradox can, thus, also concern vagueness of individuation.

Moreover, one can formulate a Sorites paradox that is the result of the vague spatial boundaries of objects. Take, for instance, Kilimanjaro, K. Its spatial boundary does not seem to be sharp: if a particular rock near Kilimanjaro's boundary is part of Kilimanjaro, then also a rock next to it is part of Kilimanjaro. This feature of tolerance combined with the fact that a rock near the middle of Kilimanjaro, s_m, is part of Kilimanjaro, leads to a paradox. Take a number of rocks n such that it is clearly false that the rock n rocks away from the middle of Kilimanjaro, s_{m+n}, is part of Kilimanjaro. Then:

- s_m is part of K.
- If s_m is part of K, then the rock next to it, s_{m+1}, is part of K.
- If s_{m+1} is part of K, then the rock next to it, s_{m+2}, is part of K.
- ...
- If $s_{m+(n-1)}$ is part of K, then the rock next to it, s_{m+n} is part of K.

  Therefore,

- s_{m+n} is part of K.

So from the fact that a rock in the middle of Kilimanjaro is part of Kilimanjaro, and the assumption of tolerance that one rock next to a rock that is part of Kilimanjaro must also be part of Kilimanjaro, we reach the false conclusion that s_{m+n} is part of Kilimanjaro. And like with the Heap paradox, this argument can also be run in the opposite direction. Take a rock that is clearly not part of Kilimanjaro. Together with the assumption of tolerance that one rock does not make a difference – i.e., one rock next to a rock that is not part of Kilimanjaro is also not part of Kilimanjaro – we reach the false conclusion for a rock that is clearly part of Kilimanjaro that it is not part of Kilimanjaro.

The Sorites paradox is, thus, not fundamentally concerned with vagueness of classification. Vague spatial and temporal boundaries also give rise to Sorites paradoxes. Therefore, Sorites paradoxes can also arise from vagueness of individuation.

4.2.2 The relation between the puzzles: boundary regions

The (apparent) vague spatial boundary of ordinary objects, and thus vagueness of individuation, gives rise to both potentially the Problem of the Many and potentially the Sorites paradox. This gives rise to the question of what is it about objects that they potentially give rise to both problems, and how the Problem of the Many and the Sorites paradox are related to each other.

Each Sorites paradox is concerned with one Sorites sequence. Each Sorites sequence consists of two ends, where it is vague at what point the one end turns into the other end. For instance, the Sorites sequence concerning tallness has tallness on the one end and non-tallness on the other end, and it is vague where tallness ends and non-tallness starts. There is no clear cut-off point between the two ends. As there is one vague area[24] between the two ends, I will call the vague area of a Sorites sequence

[24]Potentially with many orders of vagueness.

a vague *boundary region*. A vague boundary region is the collection of borderline cases of one Sorites sequence.[25] Each Sorites sequence, and thus each Sorites paradox, involves one vague boundary region. There can also be precise boundary regions. In that case, the boundary region is a point, namely a precise cut-off point between the positive and negative instances. If the boundary region is a point, it does not involve a Sorites sequence. See figure 2 for an illustration. The Sorites paradox can arise from any kind of phenomenon of vagueness, as any phenomenon of vagueness involves at least one vague boundary region.[26]

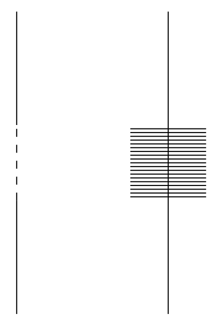

Figure 2: A Sorites sequence with its vague boundary region (left) and a rough representation of the potential precise cut-off points (right).

The spatial boundary of ordinary objects is a collection of many such boundary regions. Each "point" on their boundary is such a boundary region, each with an (apparent) unclear cut-off point. If the spatial boundary is vague, and thus all the boundary regions are vague, then each of these vague boundary regions individually gives rise to a unique Sorites sequence, and so a unique Sorites paradox. If, instead, the spatial boundary is precise, then each of the boundary regions is a precise cut-off point. They, then, do not involve a Sorites sequence, and so do not give rise to a Sorites paradox. So a single ordinary object, having millions of boundary regions, potentially gives rise to millions of Sorites paradoxes, each relative to one of these boundary regions.

The Problem of the Many, on the other hand, does not concern one boundary region, but rather concerns the total boundary of an object, that is, it concerns the millions of different boundary regions combined, which each potentially give rise to their own Sorites sequence. It is not "just" that there are many possible cut-off points like with the Sorites paradox. Rather, the boundary for an ordinary object is a collection of millions of boundary regions, each with many different possible cut-

[25] As it is vague where cases start to be borderline cases, it is vague where the boundary region starts.

[26] Sainsbury (2013) and Tye (1996), and potentially others have argued that it is not possible to define vagueness in terms of borderline cases. As a vague boundary region is the collection of borderline cases of one Sorites sequence, it will likewise not be possible to define vagueness in terms of these boundary regions. Nevertheless, any phenomenon of vagueness does involve borderline cases, and thus at least one vague boundary region.

off points. Each potential precise boundary of an individual object, constituting the *many* in the Problem of the Many, differs on the cut-off points for each of the apparent vague boundary regions. See figure 3 for an illustration.

So, the Sorites paradox and the Problem of the Many are related via boundary regions. The Problem of the Many concerns the complete boundary of ordinary objects, and thus concerns the collection of the millions of boundary regions on the complete boundary. Each single boundary region potentially gives rise to a unique Sorites paradox. See again figure 3 for an illustration between the Sorites paradox and the Problem of the Many.

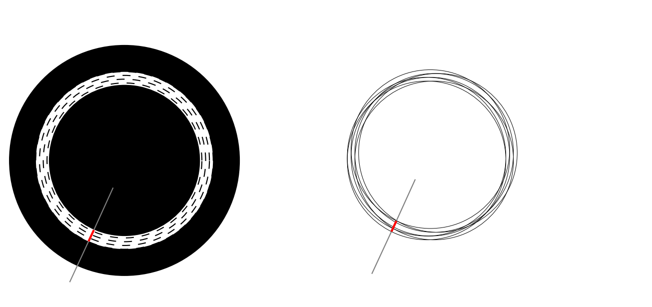

Figure 3: A round object with its vague boundary (left), and a rough representation of the potential precise boundaries (middle) giving rise to the Problem of the Many. Each of the boundary regions (colored red) potentially gives rise to its own Sorites sequence and corresponding Sorites paradox (right).

However, it is not the case that the Problem of the Many is simply a combination of many different Sorites paradoxes. As I will further show in chapter 5, resolving the Problem of the Many does not provide a solution to the Sorites paradox, and *vice versa*. To give one illustration, suppose one adopts the position that the spatial boundary of objects is genuinely vague. This means that the Problem of the Many dissolves, as the crucial assumption that composition is determinate is rejected. There is one object and that object has vague boundaries. It is genuinely vague whether particles on the boundary of an individual object are part of the object or not. Yet, since the boundary is genuinely vague, each of the boundary regions gives rise to a Sorites sequence and corresponding Sorites paradox. Therefore, the Sorites paradox and the Problem of the Many are related via boundary regions, but are nevertheless genuinely different problems. Chapter 5 will further discuss the relation between the Sorites paradox and the Problem of the Many.

4.2.3 The Problem of the Many for classification

As we have seen above, the Sorites paradox is not merely involved with vague concepts, but arises from any phenomenon involving vagueness, including the vague spatial and temporal boundaries of ordinary objects. It can thus arise from both vagueness of classification and vagueness of individuation. The Problem of the Many, on the other hand, is generally understood as being fundamentally concerned with the vague spatial boundary of objects, and thus with vagueness of individuation. Peter Unger, when introducing the Problem of the Many, indeed introduced it as a problem specific to ordinary objects, such as clouds, stones, tables, hands, etc. (1980, p. 412). He claims that while the Sorites paradox is concerned with vague expressions,

> "for our new problem, the leading idea is to focus on physical, spatial situations where no natural boundaries, no natural stopping places, are to be encountered." (Unger, 1980, p. 413)

However, this understanding of the Problem of the Many, as being fundamentally concerned with the vague spatial boundary of ordinary objects, is mistaken. The problem is not unique to ordinary objects. The problem also arises for certain concepts. Consider, for instance, the concept 'chair'. There is not one criterion that decides whether an object is a chair. Rather, a chair has several, different, characteristics, which an object all has to fulfil to some measure in order to be a chair. Namely, in order to be a chair, an object has to have a seating, a back, and legs, all of a certain measure. Consider a basic chair, with 4 legs, a back and a seating. We can increase the height of the legs in such a way that the object is no longer a chair but rather a barstool. Yet, it is vague at what point the object stops being a chair and starts to be a barstool. Or we can decrease the length of the back of the object such that the chair is no longer a chair but rather a stool. Yet, again, this boundary is vague. Another option is to increase the width of the seating such that the object becomes a couch. Yet, it is vague at what point the object stops being a chair and starts to be a couch. It is also possible to increase the length of the seating such that the object becomes a chaise longue. See figure 4 for an illustration of the chair "spectrum".

There is, thus, not one vague boundary between being a chair and not being a chair. Rather, there are several, different, independent, conditions that all have an influence on whether an object counts as a chair or not. Each of these conditions thus appears to be tolerant, and therefore the concept chair seems to be vague. As each condition is tolerant, each of them gives rise to unique Sorites sequences. Each Sorites sequence consists in a gradual alteration in the value of one of the conditions, while the remaining conditions are set to a certain value. Different settings of the remaining conditions give rise to different Sorites sequences for the condition which value is gradually altered. Therefore, the combination of the three different conditions that an object has to satisfy in order to be a chair, gives rise to a large boundary of the concept 'chair' with many different boundary regions.

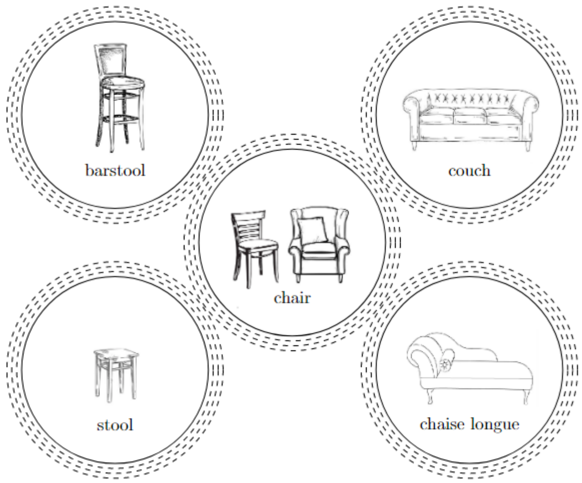

Figure 4: The chair spectrum.

To each way of drawing a boundary of the concept ‘chair’, that is, to each way of determining a cut-off point for all of the boundary regions, seems to correspond a different concept, with a different extension. The question is to which of these concepts the concept ‘chair’ is identical. It would be entirely arbitrary to pick one of them to be the meaning of the concept ‘chair’. As they differ so slightly, there is no way to single out one of them as the meaning of the concept ‘chair’. This means that either there are many concepts of ‘chair’, or none, but never just one. Hence, the Problem of the Many for chairness.

Figure 5: The color spectrum.

Other examples of vague concepts are colors. Colors are not distinguished from each other linearly, but rather are located on a spectrum, as illustrated in figure 5. This spectrum arises from the three different properties of colors: hue, saturation and lightness. To put it simply, the hue describes the wavelength of the color, which you can consider as the 'base color'. The saturation is the intensity and purity of a hue. Lightness concerns how light or dark a color is, as the result of adding more white or black to the hue. Consider, for instance, redness. There are many different shades of redness, all differing in their hue, saturation and lightness. Similarly, there are different shades of orange, pink and purple. We can set the value of the hue and saturation, and alter the lightness in such a way that a shade of red gradually turns into a shade of pink. Yet, it is vague when the color stops being red and starts to be pink. Alternatively, we can set the saturation and lightness in such a way that a certain shade of red turns into a certain shade of orange, or in such a way that a certain shade of red turns into a certain shade of purple. In general, each different setting in the values of the remaining conditions results in a different Sorites sequence for the condition which value we are gradually altering. This gives rise to the many different boundary regions for the color redness, as is reflected in the color spectrum. Each boundary region has many potential cut-off points. To each way of drawing a boundary, that is, to each way of determining a cut-off point for all of the boundary regions, seems to correspond a different concept. Yet, to which of these precise concepts is redness identical? It would be entirely arbitrary to pick one of them as the concept of redness. As they differ so slightly, there is no way to single out one of them as the concept of redness. This means that either there are many concepts of redness, or none, but never just one. Hence, the Problem of the Many for redness.

The concept 'chair' and color concepts concern the classification of an object, that is, they concern whether an object can be classified as being a chair or not, or as having a certain color or not. Therefore, the Problem of the Many can also involve vagueness of classification.

Thus, the Problem of the Many does not only arise as the result of the vague spatial boundary of objects, and thus vagueness of individuation, but also arises in certain cases of vagueness of classification. Keil (2013) is, therefore, wrong in suggesting that the Problem of the Many is fundamentally concerned with vagueness of individuation, as it also arises in cases involving vagueness of classification.[27] Moreover, the generally accepted understanding of the Problem of the Many as a problem specific to objects is, thus, mistaken. But, since the apparent vague boundary of objects is not the essential element underlying the puzzle, what, then, is?

4.2.4 The number of boundary regions as the essential feature of the puzzles

Section 4.2.1 has shown that the Sorites paradox arises not only for vagueness of classification but also for phenomena involving vagueness of individuation. Section

[27]It is, of course, possible to consider the involved vagueness of classification as vagueness of individuation of properties. Yet, there would be no difference between vagueness of classification and vagueness of individuation of properties.

4.2.2 has shown that the Sorites paradox and the Problem of the Many are related via boundary regions, which allowed me to explain why vagueness of individuation potentially gives rise to both instances of the Sorites paradox and the Problem of the Many. In particular, I have shown that a Sorites paradox arises as soon as there is one vague boundary region involved. This is why the (apparent) vague spatial boundary of an object potentially gives rise to instances of the Sorites paradox: the complete boundary of an individual object consists of many single (apparent) vague boundary regions. The Problem of the Many, on the other hand, arises from the complete spatial boundary of an individual object, and thus from all the boundary regions combined.

Furthermore, section 4.2.3 has shown that the Problem of the Many does not only occur for ordinary objects but also for certain vague concepts. There are concepts, such as 'chair' and 'redness' that involve many (apparent) vague conditions of applications, and therefore many (apparent) vague boundary regions, thereby giving rise to instances of the Problem of the Many. Therefore, the generally accepted representation of the Problem of the Many as being concerned with the apparent vague spatial boundary of ordinary objects, and thus vagueness of individuation, fails.

So the Sorites paradox and the Problem of the Many are not essentially involved with a particular kind of phenomenon of vagueness; classification or individuation. Rather, the essential element for both problems consists in the number of boundary regions that are involved. As each single vague boundary region gives rise to its own Sorites sequence, the Sorites paradox is essentially involved with one vague boundary region. The Problem of the Many, on the other hand, is essentially involved with a collection of many apparent vague boundary regions.

Phenomena of vagueness have a certain amount of boundary regions and this number, and whether the boundary regions are genuinely vague or not, determine to what problems they give rise. If a certain phenomenon, be it individuation or classification, involves many (apparent) vague boundary regions, then it both potentially gives rise to the Problem of the Many and potentially to many instances of the Sorites paradox. Each single boundary region potentially gives rise to a Sorites paradox. And all the boundary regions combined, that is, the complete boundary, potentially gives rise to an instance of the Problem of the Many. On the other hand, phenomena of vagueness with one boundary region only potentially give rise to a Sorites paradox, not to an instance of the Problem of the Many. So there are different phenomena involving vagueness and because of a specific characteristic of these phenomena, namely the number of (apparent) vague boundary regions, they potentially give rise to either only the Sorites paradox or both potentially to the Sorites paradox and potentially to the Problem of the Many.

It is, nevertheless, not strange that the Problem of the Many has thus far only been connected to the spatial boundary of ordinary objects. Ordinary objects clearly have a large spatial boundary, and thereby clearly many "points" on their boundary. And as this boundary appears to be vague, each of the "points" is really an apparent vague boundary region, each region with multiple different cut-off points. Therefore, ordinary objects clearly give rise to the Problem of the Many. This boundary with many different boundary regions is less obvious for concepts. This explains why the Problem of the Many is often, wrongly, understood to be a problem unique to ordinary objects. Likewise, as many vague concepts appear to have only one vague boundary region, the Sorites paradox is often represented as a paradox involving vague concepts, i.e., the Heap paradox.

Thus, the Problem of the Many essentially involves a collection of many apparent vague boundary regions. The Sorites paradox, on the other hand, is essentially involved with one vague boundary region. Vagueness of individuation and vagueness of classification can give rise to both problems, depending on the number of boundary regions the phenomena involves.

To summarize this chapter, I have argued against the generally accepted understanding of both the Sorites paradox and the Problem of the Many, and provided a novel suggestion for the essential element underlying the two puzzles. The Sorites paradox is often presented as a paradox that arises for vague concepts, and thereby typically involves vagueness of classification. The Problem of the Many is generally understood to be a problem that arises from the apparent vague spatial boundary of objects, and thus a problem concerning vagueness of individuation (§4.1.1). In this section, I have first clarified the different phenomena involving vagueness and have argued that vagueness of individuation seems to be more fundamental than vagueness of classification (§4.1). Second, as the Sorites paradox is a puzzle that arises for any phenomena involving vagueness, and thus also for vagueness of individuation (§4.2.1), I have argued that the Sorites paradox and the Problem of the Many are related to each other via boundary regions. A collection of many (apparent) vague boundary regions collectively potentially gives rise to the Problem of the Many, and each individually potentially to the Sorites paradox (§4.2.2). Moreover, I have shown that the Problem of the Many arises not only from the (apparent) vague spatial boundary of objects, but also from certain (apparent) vague concepts. Therefore, I have argued that the essential feature underlying both puzzles is not that they involve a certain kind of vagueness, but rather that they involve a certain number of boundary regions. Where the Sorites paradox essentially involves one vague boundary region, the Problem of the Many essentially involves a collection of many apparent vague boundary regions (§4.2.4).

5 The interplay between the puzzles and ontology

The previous chapter has shown that the Sorites paradox and the Problem of the Many are related via boundary regions, and even more, that they essentially depend on the number of boundary regions. If a phenomenon of vagueness involves one (apparent) vague boundary region, it only potentially gives rise to the Sorites paradox. If, on the other hand, it involves many (apparent) vague boundary regions, it potentially gives rise to an instance of the Problem of the Many and potentially many different instances of the Sorites paradox. As there are both phenomena of vagueness of individuation and phenomena of vagueness of classification that involve many boundary regions, the Sorites paradox and the Problem of the Many can arise for both individuation and classification. Therefore, the problems are not specific to a certain phenomena of vagueness.

As already hinted at, while both puzzles essentially depend on the boundary regions involved, and are thereby linked, it is not the case that the Problem of the Many is simply a combination of many different Sorites paradoxes. As already briefly illustrated, providing an answer to the former does not solve the latter. And the same holds *vice versa*.

This chapter further explains why solving one problem does not solve the other, thereby shedding more light on the relation between the Sorites paradox and the Problem of the Many. In fact, I shall show that the two puzzles are mutually exclusive. Doing this is a natural side effect of the main aim of this chapter: to show that the Sorites paradox and the Problem of the Many are intertwined with what ontology we adopt, and thereby with the question of the nature of vagueness. Both whether the problems arise or not, and what appropriate solutions to them are, depend on the adopted ontology. I shall argue that (i) the vagueness of the boundary regions of a phenomenon depends on what ontology one adopts. And as the two puzzles essentially rely on the boundary regions involved, I shall discuss how the adopted ontology affects (ii) whether the two puzzles arise or not, and (iii) what appropriate solutions are. This discussion allows me to show (iv) that the two puzzles are mutually exclusive. As issues on the nature of objects are often distinct from issues on the nature of concepts, I shall first focus on the vagueness of objects, after which I shall focus on the vagueness of concepts.

5.1 The puzzles for objects

Consider the spatial boundary of an individual object. Each "point" on the boundary of the objects is a *boundary region*, that potentially gives rise to a Sorites sequence. One end of such a Sorites sequence consists of particles that are clearly part of the object, the other end consists of particles that are clearly not part of the object. In the middle of the Sorites sequence is a vague boundary such that it is vague what particles are part of the object and what particles are not. The spatial boundary of an individual object consists of many different such boundary regions.

In the debate on objects, there are roughly three positions one can take on: (i) there are only precise complex objects, (ii) there are no complex objects, and (iii) there are vague complex objects. The most popular position defending (i) is universalism, according to which there is an unrestricted composition of objects, as discussed in section 3.2. This means that any fusion of objects is itself a single object. It is, thus, never vague whether composition occurs or not. Any combination of objects determinately forms a new object. As composition is not vague, the boundary of individual objects is precise. This means that each boundary region on the boundary of an object is precise and thus involves a determinate cut-off point. The spatial boundary of objects is, therefore, not tolerant. From this, it follows that there are in fact no Sorites sequences for the boundary regions on the boundary of an individual object. This thereby dissolves the relevant Sorites paradoxes. Yet, while the Sorites paradox dissolves, the Problem of the Many remains a problem. If one adopts a version of universalism, there is not the one ordinary object we ordinarily take there to be, for instance, Kilimanjaro. Rather there are many objects, each with a precise boundary. To provide a solution to the problem, the defender of such a position has to provide an explanation of why we take there to be one object instead of the many that are actually there.

Supervaluationism most naturally has this kind of metaphysics as background ontology. According to supervaluationism, different precisifications make a different sentence of 'K_1 is a mountain', 'K_2 is a mountain', 'K_3 is a mountain', etc., true. On different precisifications, different precise mountain-candidates are represented as Kilimanjaro. There, thus, are various candidate extensions of the name 'Kilimanjaro'. This means that supervaluationism seems to require a background ontology of precise objects which are the various candidate extensions of the name 'Kilimanjaro'. If there are no such objects, then there are no mountain-candidates toward which 'Kilimanjaro' can refer. Supervaluationism, thus, in general, seems to require an ontology that posits many entities for all vaguely referring terms.[28] On each precisification, only one of the sentences 'K_1 is a mountain', 'K_2 is a mountain', 'K_3 is a mountain', etc., is true. Therefore, the sentence 'there is one mountain in the field' is supertrue. The universalist can thus use supervaluation semantics to make the sentence that expresses the intuition that there is only one mountain on the plain supertrue, while there are in fact many mountains. However, it then has to deal with the ontological dishonesty of the supervaluationist position, explained in section 3.1. Especially in the case of objects, this worry seems to be particularly pressing. For, how can it be

[28]See Schaffer (2012) for a related discussion of a specific type of supervaluationism, namely *iterated* supervaluationism. According to iterated supervaluationism, informally sketched, there is not just semantic indecision in the object language, but the metalanguage is itself vague. It takes 'being an admissible precisification' to be a vague phrase, and therefore also notions as super-truth. There are multiple admissible precisifications of 'being an admissible precisification', which also have multiple admissible precisifications, *ad infinitum*. So there are infinite levels of vague languages. Schaffer argues that iterated supervaluationism requires an abundant background ontology of precise objects which can function as the candidate extensions of vague phrases. He explains: "If 't' is a vague phrase of a given n-level language, then 't' will be assigned a plurality of admissible precisifications in the $n+1$-level meta-language, which associate 't' with different extensions over the many precise objects in the background ontology" (p. 80). This is the same for standard supervaluationism, except that only the object-language is vague according to standard supervaluationism, the meta-language is precise. But like iterated supervaluationism, standard supervaluationism requires a background ontology of many precise objects which provide the needed candidate extensions of the vague object-language terms.

supertrue that there is only one mountain on the plain while there are in fact many mountains? This does not seem to make sense at all.

One way to explain this, and an option the universalist can adopt also without embracing supervaluationism, is by adopting the strategy of *compatibilism*.[29] The compatibilist distinguishes between an ordinary point of view and an ontological point of view. From the ordinary point of view, that is, on our ordinary way of looking at the world, there is only one object. Yet, the universalist can maintain that from the ontological point of view, there are really many objects, not one.

However, it is not obvious that the arguments of the compatibilist are successful. Korman (2015, Ch. 5) provides several arguments against the compatibilist strategies. First, he shows that there is no evidence for the claim that we do not take both claims, the claim that there are many objects and the claim that there is one object, at face value, nor that we take these claims to be ambiguous (§5.2). For instance, the compatibilist might suggest that the claim that there is one mountain on the plain is a matter of loose talk. Yet, by contrast, consider the claim 'you are not going to die' in the context of a discussion on, for instance, the risks of skateboarding. This claim is clearly an example of loose talk. Obviously, at some point, you are going to die. Yet, probably not due to skateboarding. Similar considerations do not apply for the claims 'there are many objects' and 'there is one object'. When someone claims 'there is one mountain on the plain', she seems to genuinely mean that there is one mountain on the plain. Korman (2015) further argues that the compatibilist strategy is ad hoc (§5.3) and idle (§5.4). It is idle as there is also an ontological reading of 'there is one object'. The universalist (and nihilist) has to explain why we should reject that reading. The compatibilist strategy itself does not explain this. Rather, it seems to require a stipulation that the reading of 'there is one object' is ordinary and not ontological. Therefore, along with his other arguments in §5.5, §5.6, and §5.7, Korman concludes that the compatibilist strategy is not satisfactory in explaining why we usually take there to be one mountain on the plain instead of the many that are really there, according to the universalist. And thus, the universalist has to seek somewhere else in order to provide a satisfactory solution to the Problem of the Many.

Alternatively, one can adopt the position such that no composition occurs at all. This position is defended by the nihilist. As discussed in section 3.2, nihilists claim that there are no composite material objects. There only exist simples, at most. As there are no complex material objects, there are no objects of which it can be unclear what their particles are and thus have a vague boundary. As there cannot be vague boundary regions, the tolerance principle for the boundary of objects is denied and no Sorites sequences can arise for the individual boundary regions. Therefore, as for the universalist, the Sorites paradox does not arise for the boundary of objects when adopting a nihilist position. Yet, the Problem of the Many remains unresolved. Nihilism embraces the conclusion of the Problem of the Many that there is no object where we ordinarily take there to be one object. But in order to provide a satisfactory solution to the Problem of the Many, the nihilist has to provide an explanation of why we take there to be one object while there is actually no object. The nihilist, like the universalist, can use a compatibilist strategy to resolve this issue. In that case,

[29]See Korman (2015, Ch. 5) for an overview of the different compatibilist positions.

there are no objects from the ontological point of view, while there is one object from the ordinary point of view. Yet, the counterarguments of Korman (2015) also apply to the nihilist adopting a compatibilist strategy.

Another option is to adopt the position that composition can be vague, thereby admitting that there are vague objects. On this view, the boundary of individual objects is genuinely vague. And so, each of the boundary regions on the complete boundary of the object is vague, thereby giving rise to a Sorites sequence. Therefore, each of the boundary regions gives rise to an instance of the Sorites paradox. The Problem of the Many, on the other hand, naturally dissolves by admitting the existence of vague objects, as described in section 3.2. There is just one object where we ordinarily take there to be one and that object has vague boundaries. It is genuinely vague whether particles on the boundary of an individual object are part of the object or not. As there is really just one object where we ordinarily take there to be one, our terms precisely refer to these objects. Our language precisely refers to objects that are vague. The terms cannot be made more precise, as the language already is precise. Since there are no further precisifications of the relevant terms, supervaluationist semantics is not relevant to deal with the involved vagueness. Therefore, it makes the most sense for the defender of vague objects to provide a solution to these Sorites paradoxes by adopting a non-classical logic.

Similar considerations apply to the temporal boundary of individual objects. If one claims that objects have genuinely vague temporal boundaries, then these boundary regions give rise to a Sorites sequence and corresponding Sorites paradox. Yet, as the objects have genuinely vague boundaries, they do not give rise to an instance of the Problem of the Many. Suppose one instead claims that there is not one object but rather there are many objects mainly overlapping in time, yet differing in when the object starts and ends to exist.[30] Then the apparent vagueness is not part of the world but rather part of our language. It is vague which of the multitude of overlapping objects is referred to. As the many objects have precise boundaries, they do not give rise to Sorites sequences and Sorites paradoxes. Now, as the temporal boundary of an individual object only has two vague boundary regions, namely when the object starts to exist and when the object ends to exist, the temporal boundary of the object does not give rise to a Problem of the *Many* like the spatial boundary of individual objects do. Nevertheless, it does give rise to a light version of the Problem of the Many, as it concerns more than one vague boundary region. Finally, if one defends a nihilist position and claims that there are no composite material objects, then there are no such objects that can have a vague temporal boundary. Therefore, there are no relevant Sorites sequences and corresponding paradoxes. Yet, this also gives rise to a light version of the Problem of the Many.

So only after determining our ontology of objects, and thereby establishing whether (i) there are objects, and if so, (ii) whether their boundary is precise or vague, it is clear whether the Sorites paradox and the Problem of the Many arise for the (apparent) vague boundary of objects or not. Moreover, this connection between the puzzles and ontology has an impact on what appropriate solutions are to deal with

[30] According to the perdurantist, there are many precise four-dimensional objects that overlap each other. According to the endurantist, there are many wholly-present objects that overlap each other.

the issues to which the (apparent) vague boundary of objects gives rise. If objects have a genuinely vague boundary, and the involved vagueness is thus metaphysical in nature, then it does not seem sensible to adopt supervaluationism in order to deal with the issues to which the involved vagueness gives rise. If, instead, there are no objects or only precise objects, then the involved vagueness might be semantical in nature. In this case, supervaluationism is an appropriate semantics to adopt. Finally, note that the two problems are mutually exclusive: if the Problem of the Many arises for a collection of boundary regions, then the individual boundary regions do not give rise to a Sorites paradox. And if the individual boundary regions of a collection of boundary regions each give rise to a Sorites paradox, then the relevant Problem of the Many dissolves. This seems to be a consequence of a crucial background assumption of the Problem of the Many for objects, namely that composition is determinate. If composition is determinate, then it is, per definition, not vague. This means that the boundaries of objects are precise. Each of the boundary regions, then, is a point, namely a determinate cut-off point. This background assumption, therefore, entails the rejection of the tolerance principle for the boundary of objects, and thus excludes the possibility of the Sorites paradox for the boundary of objects. If this assumption is rejected, and composition is vague, then this dissolves the Problem of the Many, yet automatically gives rise to the Sorites paradox as there is genuine vagueness involved.

5.2 The puzzles for concepts

Similar considerations apply to vague concepts. As for vague objects, whether the problems arise for vague concepts depends on your adopted ontology of properties. Yet, while all objects have multiple boundary regions, it is important to distinguish between concepts with one vague boundary region and concepts with many vague boundary regions. An example of a concept with one vague boundary region is tallness. An example of a concept with many vague boundary regions is redness. The Sorites paradox can arise for any phenomenon of vagueness, as the paradox is essentially concerned with one vague boundary region. Yet, as the Problem of the Many essentially depends on many different boundary regions, the Problem of the Many can only arise for phenomena involving vagueness that concern many boundary regions. The interaction between the Sorites paradox and the Problem of the Many thus only shows for concepts that have many (apparent) vague boundary regions. Nevertheless, the connection between our adopted ontology and the puzzles, be it both the Sorites paradox and the Problem for the Many or only the Sorites paradox, shows for any concept.

Suppose, first, that one adopts the position that there are properties as ontological entities in the world. Moreover, suppose one adopts the position that properties that appear to be vague are genuinely vague, such as redness and tallness. This means that the conditions that an object has to satisfy in order to obtain the property are vague. This has the effect that the boundary of the set of objects that instantiates the property is vague. Tallness involves one condition that an object has to satisfy: having a certain height. There is, therefore, only one vague boundary area: the boundary between tallness and non-tallness. There are many different potential cut-off points between these two ends. Since, on this view, this boundary is genuinely vague, the property gives rise to an instance of the Sorites paradox. As shown in section 4.2.3, redness, on the other hand, has multiple conditions that an object has to satisfy in order to obtain the property. As, on this view, these conditions are vague for the property redness, the many boundary areas to which these conditions give rise are genuinely vague, and thus each gives rise to an instance of the Sorites paradox. Yet, the Problem of the Many for redness naturally dissolves. There is simply one property with vague conditions of application. Thus, since the many individual boundary regions of redness are genuinely vague, they do each give rise to an instance of the Sorites paradox, but they do not collectively give rise to the Problem of the Many.

As, on this view, there are (vague) properties in the world, it makes sense to consider the meaning of predicates to be these (vague) properties, and thus that predicates refer to these (vague) properties. For instance, the meaning of 'redness' is the property redness, and the meaning of 'tallness' is tallness. This means that there are not multiple precisifications of these predicates, as their meaning is precise, namely a specific, vague, property. Therefore, supervaluationism does not seem to be a useful semantics to adopt in order to solve the Sorites paradox arising from vagueness due to properties. Instead, it makes more sense to adopt some many-valued logic to solve the relevant Sorites paradoxes.

However, most philosophers do not take predicates to refer to (vague) properties. Rather, they take predicates to refer to sets of objects. Of certain predicates, such as 'redness' and 'tallness', it is vague to which precise set of objects they refer. The meaning of 'redness' and 'tallness' is therefore not precise. The relevant vagueness, then, has a semantic source. There are no things in the world that are vague, but rather our language to describe the world is vague. On this view, supervaluationism is an interesting and popular semantics to adopt to deal with the Sorites paradox to which the vague predicate gives rise. There seem to be different ways to precisify the predicates 'redness' and 'tallness', i.e., to precisify their conditions, each precisification selecting a distinct set of objects. Other many-valued logics might also be interesting to consider. Most philosophers who locate the relevant vagueness in semantics, often implicit, are nominalists with respect to properties, i.e., reject the existence of properties as ontological entities. This means that there are no properties in the world that can have vague boundary regions. As there are no properties, there are no properties that can give rise to the Sorites paradox. Yet, as shown in section 4.2.3, the concept 'redness' gives to the Problem of the Many, as the concept has multiple boundary regions. The nominalist embraces the conclusion of the argument of the Problem of the Many, as she claims that there are no properties. Yet, in order for her to satisfactorily solve the Problem of the Many, she has to provide us with an explanation of why we ordinarily take there to be one (apparent vague) property of redness, while there actually is no such property. This is a general problem of the nominalist, as she also has to explain why there is no property of tallness where there does seem to be such a property.

While most philosophers in the debate on vague concepts make the (implicit) assumption that there are no properties that are the meanings of predicates, an analogy with the debate on vague objects shows that there is a third, intuitive, alternative: the existence of only precise properties. As mentioned, a popular option to deal with vague predicates is to adopt supervaluationism, discussed in section 3.1. According to supervaluationism, the predicate has a specific cut-off point at each precisification. That is, at each precisification, the predicate has a precise boundary of application as the conditions of application have been made precise. Therefore, on each precisification, the predicate refers to a specific set of objects. As shown in section 5.1, if we adopt supervaluationism to deal with the apparent vague boundary of objects, the most natural understanding of this position is that it entails that there are many precise objects where we ordinary take there to be one, and that it is vague to which of these many precise objects the relevant name refers. The name refers to a different precise object at each precisification. Similarly, a natural understanding of supervaluationism for vague predicates is that it is vague to which of many precise properties the predicate refers. It seems to be the case that on each precisification, the meaning of a predicate is a specific precise property and thus refers to that precise property. For instance, when considering tallness, the predicate 'tallness' seems to refer to a different determinate height on different precisifications. For instance, 'tallness' can refer to the property of being 1.80m, the property of being 1.81m, the property of being 1.81m, etc. Likewise does 'redness' seem to refer to a precise property on each precisification, each with determinate cut-off points for the several conditions of application for 'redness'.

Each of these properties, in being precise, has a determinate cut-off point. They, therefore, do not give rise to a Sorites sequence and corresponding Sorites paradox. Yet, since the concept 'redness' has multiple conditions of applications, while 'tallness' only has one, the concept 'redness' gives rise to an instance of the Problem of the Many. On this view, where the predicate 'redness' refers to a different precise property on different precisifications, there are many properties where we ordinarily take there to be one. It, therefore, has to be explained why there is not the one property we ordinarily take there to be.

Interesting cases are concepts such as 'heap' and 'bald'. These appear to involve only one boundary region, yet in fact, have multiple. Whether these concepts apply is ordinarily assumed to depend on one factor, namely the number of grains of sand or hairs involved. Yet, whether a number of grains of sand form a heap crucially depends on how the grains of sand are distributed. In the (imaginary) case 1.000 grains of sand are piled directly on top of each other, these grains would not constitute a heap. Nor would they constitute a heap if they were distributed along a certain width and length such that the height is only one grain of sand. Likewise, whether someone counts as bald depends not just on the number of hairs, but also on how the hairs are distributed on a person's head. Perhaps one could make the assumption that the numbers of grains of sand or hairs are 'ordinarily distributed'. Then the concepts would involve only one boundary region: the number of grains of sand or hairs. Yet, when not making an assumption about an ordinary distribution and what an ordinary distribution would consist of, the concepts seem to involve multiple boundary regions, namely the relevant spatial dimensions.

To conclude this section, like for objects, there are broadly three options: (i) there are vague properties, (ii) there are only precise properties, and (iii) there are no properties. In the first case, the source of vagueness lies in the world. In the second and third case, the source of vagueness can lie in language.[31] Whether the Sorites paradox and the Problem of the Many arise for properties or not, depends on the adopted ontology of properties. If there are no vague properties, as for options (ii) and (iii), properties do not give rise to instances of the Sorites paradox, since their boundary regions are not vague. Moreover, for concepts that involve many boundary regions, whether the Problem of the Many arises depends on whether we take there to be properties and whether we take them to be vague or not. In case they are vague, option (i), the Problem of the many dissolves. Yet, if we take there to be no properties or only precise properties, options (ii) and (iii), the Problem of the Many remains an issue. This connection between the puzzles and ontology has an impact on what appropriate solutions are to deal with the issues to which vagueness gives rise. For option (i), where the involved vagueness is metaphysical, it does not seem sensible to select supervaluationism in order to deal with the issues to which vagueness gives rise. For options (ii) and (iii), there are no vague properties but rather potentially vague predicates. As the involved vagueness is then semantic nature, unlike for the Sorites paradoxes to which vague properties give rise, supervaluationism is an appropriate solution for the Sorites paradox arising from vague predicates. Finally, like for objects, the Sorites paradox and the Problem of the Many seem to be mutually exclusive. For each option (i)-(iii) for concepts with multiple boundary regions, in case the Problem of the Many arises for properties, the individual boundary regions do not give rise to a Sorites paradox. And if the individual boundary regions do give rise to a Sorites paradox, then they collectively do not give rise to a Problem of the Many. This, again, seems to be the result of the assumption underlying the Problem of the Many. Where the Problem of the Many for objects assumes determinate constitution, the Problem of the Many for concepts assumes determinate conditions of application of properties. If these conditions are determinate, then there are, per definition, no vague properties. Therefore, if a property has vague conditions of application, then this background assumption is rejected, which thereby dissolves the Problem of the Many. If, on the other hand, there are no properties or only precise properties, then (if there are any) properties have determinate conditions of application, and the background assumption of the Problem of the Many remains intact. Yet this automatically excludes the possibility of the Sorites paradox arising for the individual application conditions as there is no genuine vagueness involved.

To conclude this chapter, whether the Sorites paradox and the Problem of the Many arise and, if so, what their appropriate solutions are, depends on your ontology of objects and properties. This is the result of the fact that the puzzles rely on whether the relevant boundary regions are genuinely vague or not, which depends on the adopted ontology. Moreover, while the Sorites paradox and the Problem of the Many are intimately connected via their shared boundary regions, they are mutually exclusive. The assumption underlying the Problem of the Many is that the boundary regions are in fact determinate, while appearing to be vague, which per definition excludes genuine vagueness of the individual boundary regions, and thereby the Sorites paradox.

[31] If you are an epistemicist, there is no vagueness at all.

6 Exploring vague objects within a common sense ontology

Having argued that the Sorites paradox and the Problem of the Many, and their appropriate solutions, depend on what ontology one adopts, the pressing question is what ontology we should adopt. This holds for both objects and properties. In this chapter, I shall mainly focus on the ontology of objects. Generally, one can argue that there are only ordinary objects (*commonsensicalism*), that composition is unrestricted (*universalism*), or that there are no objects (*nihilism)*.[32] Examples of ordinary objects are mountains, islands, tables, trees, cars, etc. Those are objects that exist according to our ordinary understanding of the world. According to universalism, composition is unrestricted. This means that any fusion of two objects is itself a single object. This means that there are objects such as trogs (composed of a dog and a tree trunk), an object composed of the Eiffel Tower and my glasses, etc. These are examples of extraordinary objects. According to nihilism, there are no complex objects at all, neither extraordinary nor ordinary objects. There is much discussion on which position to adopt. Commonsensicalism is rejected by many philosophers, as they believe the position gives rise to too many problems. Yet, universalism and nihilism radically clash with our intuitive understanding of the world. Korman (2015) gives an overview of all the different problems that commonsensicalism seems to face, and thereby counts in favor of universalism and nihilism. It is not the aim of this thesis to discuss and contribute to the vast existing literature on these three rival views, as that would provide enough material to write a separate thesis. Yet, based on the arguments provided by Korman (2015), I believe that the arguments in favor of universalism and nihilism and against commonsensicalism face an interesting and defensible response and, therefore, at least establishes that commonsensicalism is an intelligible position to endorse. Rather, the aim of this chapter is to focus on vague objects in the light of a common sense ontology, and argue that the existence of vague objects is both intuitive and philosophically not as problematic as it appears to be. One main contribution of this chapter to the existing literature is to provide a novel argument in favor of vague objects in the light of an ontology based on common sense. I aim to argue that if there exist ordinary objects, then these must have genuinely vague boundaries. The second main contribution of this chapter is to provide a clear argument showing that the existence of vague objects does not entail the vague existence of objects – one of the main worries with respect to vague objects. Moreover, I shall discuss the worry that the existence of vague objects leads to vague identity.

First, in section 6.1.1 I shall give a general outline of what a common sense ontology looks like. In particular, I shall argue that according to our ordinary understanding of

[32] This is a generalization of the many different positions that there are. Korman (2015, 2020) provides an overview of the many different positions that one can adopt. He distinguishes between (i) conservatism, which is what I have labelled commonsensicalism, (ii) permissivism, and (iii) eliminativism. Classical mereological universalism is one form of permissivism. Other forms of permissivism are positions that expand on universalism. For simplicity, I focus only on universalism, as this provides the basis for many permissivist views. With respect to nihilism, there are philosophers who make an exception for certain classes of composites. For instance, van Inwagen (1990) makes an exception for organisms. I will ignore such exceptions in this thesis.

the world, objects have vague boundaries. I shall support this ordinary understanding of objects as having vague boundaries with theoretical considerations by arguing that if there are ordinary objects, then these objects must have genuinely vague spatial boundaries.

As the existence of vague objects is considered to be unintelligible from a theoretical point of view, the second part of this chapter is concerned with the two main theoretical concerns for vague objects, and aims to ward off these worries. These two concerns are (i) that the existence of vague objects leads to vague identity, and (ii) that vague objects vaguely exist. In section 6.2, I shall discuss Evans' argument that the existence of vague identity statements as the result of the vagueness of objects leads to an absurd conclusion. This argument is an influential argument against the existence of vague objects. Yet, I shall argue that the existence of vague objects does not have to lead to (a problematic notion of) vague identity, by presenting existing responses to Evans' argument. In section 6.3, I shall discuss the notion of vague existence and I shall provide a novel argument aiming to show that the existence of vague objects does not have to entail the vague existence of objects.

6.1 Common sense ontology

6.1.1 An outline of commonsensicalism

According to our common sense understanding of the world, the view defended by the commmonsensicalist, the world is filled with objects such as mountains, trees, tables, and cats. Unlike the extraordinary objects that exist according to universalism, they are not just mereological sums. There is a certain connection between their parts, a form of unity and some causal connection.[33]

Moreover, these ordinary objects do not seem to occupy a precise region in three-dimensional space. There is no determinate beginning or end of these objects. A clear example is Kilimanjaro, of which the spatial boundary is not precise. When descending the mountain, it is not clear where the mountain ends and the surrounding field starts. As Tye (1996, p. 215) noted:

[33]deRosset (2020) describes possible positions that a defender of ordinary objects can adopt in order to distinguish ordinary objects from extraordinary objects. One plausible position is *communitarian conservatism*, or *communitarianism* for short. The name results from the emphasis on connection and unity in distinguishing ordinary objects from extraordinary objects. According to the communitarian, a necessary condition for being an ordinary object is to be connected. She claims that there are no highly visible, material objects with disconnected parts. The connection seems to consist in (i) the ability to draw a continuous line from each part to each other part of the object without going through some point that is not occupied by the object (convexity), (ii) the parts of the object being causally linked and (iii) showing some form of unity (deRosset, 2020, p. 10). For instance, the difference between a dog and a trog seems to be that the former does and the latter does not fulfil the above conditions. When taking a point inside the dog's tail and a point inside the tree trunk, it is not possible to draw a continuous path without going through some point that is not part of the trog. Moreover, unlike for the trog, the parts of the dog are causally linked to each other and are in a relevant sense unified. This sense of unity and connection also explains, I believe, the fact that ordinary objects have other, ordinary, persistence conditions than extraordinary objects. Communitarianism in this sense is clearly not a fully worked-out account of what ordinary objects are and how they should be distinguished from extraordinary objects, as it provides necessary conditions - but not sufficient conditions, and the notion of unity has to be clarified. Nevertheless, it seems like a good point to start from for the commonsensicalist.

> "It is part and parcel of our everyday, commonsense view of the world that there are such things as mountains, deserts, and clouds. It is also part and parcel of our commonsense view that these items are not perfectly precise, that they have fuzzy boundaries. These facts, according to commonsense, have nothing to do with language or minds. (...) Intuitively, Mount Everest's boundaries are objectively fuzzy. We do not know precisely where those boundaries lie because there is no objective, determinate fact of the matter to know where."

Similarly, when one scratches a tiny bit of wood off of the table, the table remains the same table, even though its material, and thus spatial, boundary is different from before. Likewise, when one pulls one hair from a cat's fur, her material, and thus spatial, boundary differs while we would nevertheless say she remains the same cat. Therefore, one aspect of ordinary objects seems to be that they have a vague spatial boundary. In section 6.3, I shall discuss the potential vague temporal boundary of ordinary objects. Spoiler: I shall argue that ordinary objects do not have a vague temporal boundary.

It is controversial how to best characterize vague objects, vague properties, and, in general, ontic vagueness. Therefore, I do not attempt to define the notion of a vague object, and thus will not be concerned with the issues presented in Barnes (2010), Rosen and Smith (2004), and Tye (1990). For the purposes of this thesis, the rough characterization given above is sufficient.

Nevertheless, an important consideration is the relationship between language and the world, and for the purposes of this chapter, in particular, the language we use to refer to ordinary, vague objects. According to our common sense, when referring to an ordinary object, it is clear that we are speaking about a specific object. For instance, when we speak about Kilimanjaro, we are speaking about a specific mountain in the world, namely *that* mountain. It is not vague which object we are referring to. Rather, when speaking about Kilimanjaro, we are clearly referring to a specific, vague, mountain in the world. Thus, intuitively, we refer precisely to a vague object.

So, the existence of vague objects thus seems to be intelligible according to our common sense, as it seems to be intelligible that objects have a vague spatial boundary. Nevertheless, the existence of vague objects is very controversial from a theoretical point of view, and is often considered to be plainly unintelligible. Two of the main reasons why it is considered to be unintelligible, is that the existence of vague objects seems to lead to vague identity and to vague existence. These two arguments against the intelligibility of vague objects will be discussed in sections 6.2 and 6.3. But before we will go there, one might wonder whether it is possible to adopt a common sense ontology without invoking the existence of vague objects. That is, perhaps it is possible that ordinary objects are not vague. This option shall be discussed in the next section.

6.1.2 Ordinary objects are vague objects

In the above section, I have argued that, intuitively, our ordinary objects have vague spatial boundaries. For instance, the spatial boundary of objects such as mountains and deserts clearly appears to be vague. Yet, potentially, the spatial boundary of ordinary objects is not genuinely vague, but only appears to be so. This seems to be the case for the temporal boundary of ordinary objects. At first sight, it seems to be vague at what moment a ship starts to exist when assembling it from wooden planks. Yet, when we take a closer inspection, it does not seem to be the case that it is vague of some object at what moment it starts to exist. Rather, it seems to be vague of a clearly existing object whether it forms a ship or not. The discussion of the vague temporal boundaries shall be continued in section 6.3. In this section, I shall argue that if there are ordinary objects, then their spatial boundaries must be genuinely vague, that is, the "points" on the spatial boundary of an ordinary object do not have exact cut-off points, but are genuinely vague boundary regions. To do this, I contrast the vagueness of objects with the usual understanding of the vagueness of vague concepts.

On a natural understanding of the vagueness of vague concepts, it is vague what their precise meaning is. For instance, it is vague whether 'bald' means having fewer than 9999 hairs, having fewer than 9998 hairs, etc; it is vague whether 'tall" means being 1.80m tall, or being 1.81m tall, etc; and it is vague whether 'near' means being 1.2km away, or 1.1km away, etc. If such concepts would have one such precise meaning, then this would be completely arbitrary. Our use of these concepts does not determine a precise cut-off point.

Nevertheless, in different situations, we can use these concepts in such a way that, in these conditions, there are precise application conditions for these concepts. As Korman (2015) explains:

> "Although our actual use of 'bald' does not suffice to determine an exact cut-off, we have a wealth of tacit dispositions to use the word in this or that way in different conditions, which arguably suffice to determine precise application conditions for the word." (Korman, 2015, p. 165)

It thus seems to be the case that vague concepts can have precise application conditions in certain situations, and thus that they can have a precise cut-off point relative to a certain situation. The vagueness of vague concepts is, therefore, often considered to be semantic or representational in nature. The vague concepts, then, are vague predicates. In this respect, Sainsbury's (2013) analysis of the vagueness of predicates is interesting. Sainsbury argues that the vagueness of predicates consists in the fact that they have many permissible boundaries. To explain this claim, he discusses the following situation concerning the predicate 'near':

> "Section 3 paragraph 17 of the first draft of the University Regulations stated: "Faculty must live near campus". This was held to be potentially problematic, and so, after a dozen long and rancorous meetings, the finished version included an asterisk attached to "near", leading to the following note: "For the purposes of this Regulation, "near" means within 20 miles of the Main Building." The ruling was justified by the university's wish to be able to assemble an emergency meeting of all faculty within 45 minutes." (Sainsbury, 2013, p. 233)

Sainsbury claims that while the university could have drawn a different cut-off point, it was permissible to draw it where they did. Yet, crucially, this cut-off point only holds within the local context of this university. If another university admits a different interpretation of 'near', this does not result in a conflict between the two universities. There will not be a discussion between the two universities about which one has drawn the correct cut-off point establishing what counts as near. Each has drawn a cut-off point of what will count as 'near' relative to their own context, each motivated by their own considerations.

The same goes for other vague predicates, such as 'bald', 'tall', 'heap', etc. In one local context, someone with 10.000 hairs does not count as bald, while it does count as bald in another local context.[34] [35]

So according to Sainsbury, the characteristic feature of vague predicates is that they allow for many different precise boundaries. In a certain situation, it can become sensible to select a certain cut-off point. Sainsbury argues that semantics determines which cut-off points are permissible and contexts can make it sensible to select one cut-off point rather than another. Vagueness, thus, is not the same as context dependence. Unlike with context dependence, in cases of vague predicates, the context does not affect the semantics.

Sainsbury thus characterizes the vagueness of predicates as having many permissible boundaries, which can become precise in certain situations. He thereby provides a more general and extensive account to the note made by Korman (2015) that there can be precise application conditions for vague predicates in different situations. In general, it seems to be the case that while our use of vague predicates does not allow for one precise cut-off point, it is allowed to draw a precise boundary relevant to certain distinct situations. This idea seems to match with how we ordinarily use such vague concepts.

Now, when considering the vague spatial boundary of objects, where to place a precise boundary seems to be likewise completely arbitrary. Yet, unlike for vague concepts, it does not seem to be allowed to draw a precise boundary, not even relative to a certain local context. Consider the vague spatial boundary of Kilimanjaro. For each rock on the boundary of Kilimanjaro, it is vague whether it is part of Kilimanjaro or not. There is absolutely no reason why one rock is and another rock is not part of Kilimanjaro. This arbitrariness plays an important role in the Problem of the Many, as seen in section 2.3. Because it is completely arbitrary to draw a precise boundary, so the problem states, there cannot be one mountain but rather there

[34] This characterisation of the vagueness of predicates as permitting many permissible boundaries does not allow the popular characterization of vagueness in terms of the absence of a boundary. Rather, Sainsbury (2013) characterizes vague predicates as predicates without *unique* boundaries, i.e. associated with many boundaries. Similarly, concerning characterizations of vagueness in terms of extension, vague predicates cannot be understood in terms of the absence of an extension, but rather as not having a unique extension. And borderline cases should not be considered to be cases where the semantics plus the facts do not settle a truth value, but rather where they do not settle a truth value uniquely.

[35] Sainsbury uses this account to motivate the supervaluationist approach to vague predicates discussed in section 3.1. The vague predicate invites many different cut-off points, representing the many permissible uses of the predicate, which are reflected in the supervaluationist's sharpenings. And thus, it motivates the supervaluationist solution to the Heap paradox.

are either many or none. Either there are many objects, each corresponding to one precise boundary, or there are no objects and thereby no such precise boundaries. This arbitrariness does not vanish when considering local contexts. There are no specific situations such that there is a reason to include one rock and exclude another rock from the composition of Kilimanjaro. As McKinnon (2002) and Sattig (2013) object to the supervaluationist approach to solving the Problem of the Many, if something is a mountain, this is the case in virtue of non-basic facts. That something is a mountain and the nearby environment is not, is in virtue of certain facts. Yet, on each precisification of 'Kilimanjaro', this won't be true. On each precisification, it will be completely arbitrary which aggregate of rocks will be the mountain Kilimanjaro.

So unlike for vague concepts, drawing a precise spatial boundary for objects is always arbitrary, also relative to a specific situation. Yet, one might think that it is permissible to draw a precise spatial boundary relative to a certain situation, even though the specific situation does not select one specific precise boundary. It might be that a context asks for a precise boundary, yet it is arbitrary which one. For instance, Kilimanjaro lies near the boundary between Tanzania and Kenya. Suppose that part of the boundary of Kilimanjaro also forms part of the boundary between Tanzania and Kenya. As both countries want to know exactly where their piece of land starts, they need this boundary to be precise. This means that they need to determine a precise boundary for Kilimanjaro. In this scenario, a precise boundary for Kilimanjaro will be selected, even though this selection will be completely arbitrary. This would mean that there is an ordinary object, mountain Kilimanjaro, with a precise boundary.

However, there is a mistake in the above reasoning. In postulating a precise boundary of Kilimanjaro, they have not determined the boundary of the mountain itself. Rather, it seems like they have created a new, artificial object, Kilimanjaro*. The process is similar to determining the boundaries of a country. When we determine the boundary of a piece of land and call it, for instance, The Netherlands, we have not determined the genuine boundary of that piece of land. Rather, we have created a new, artificial object: The Netherlands. When crossing the border of The Netherlands, we leave the artificial object that is The Netherlands, but we do not leave the piece of land we are walking on. Somewhat similarly, the vague spatial boundary of Kilimanjaro does not become precise when postulating a precise boundary, but rather postulating a boundary is, at least, a postulation, and at most the creation of a new, artificial object. In any case, the spatial boundary of the mountain itself remains genuinely vague. Generally, in all cases involving the vague spatial boundary of an object, we do not determine the boundary of that object when we set an arbitrary boundary. Rather, we merely postulate its boundaries, thereby possibly creating a new, artificial object, object*.[36]

[36] Note that if nearness is a single property in the world, a similar argument applies. If there is only one property of nearness, then when specifying what we consider to be near in a certain situation, we are not drawing a boundary of what counts as near. Rather, we create a new, artificial property, nearness*. If, on the other hand, there is not a property of nearness in the world, but only precise properties indicating a certain distance, then in specifying what we consider to be near in a certain situation, we merely pick out one of the possible precise properties that can count as near as being the one that applies in that situation. Another option is to say that there are many different precise properties of nearness, each corresponding to a certain distance. Then it follows that we use one of these properties of nearness in a certain situation. Thus, like for objects, if there is one such property

So there is no context or specific situation that makes it permissible to draw a specific boundary of ordinary objects. The spatial boundary of ordinary objects is genuinely vague. Thus, if there are ordinary objects, these objects must have a vague spatial boundary. This theoretical consideration thus matches our ordinary conception of ordinary objects.

There are, however, theoretical concerns for the existence of vague objects. Namely, that they lead to vague identity and vague existence. The remainder of this chapter is devoted to discussing these concerns.

6.2 Vague identity

The identity relation is generally understood to be absolute. If there are vague identity statements, this must be because one of the terms involved is vague, not because the relation itself is vague. As explained in section 3.2, the idea that the identity relation itself is vague, is highly controversial. Yet, the existence of vague objects is often taken to imply the existence of vague identity. Therefore, the idea that there are vague objects is often taken to be problematic. Suppose the identity statement $a = b$ is vague due to the objects to which the names 'a' and 'b' precisely refer. As the names 'a' and 'b' are not vague, the only element in the statement that can give rise to the vagueness of the statement is the identity relation. Hence, the existence of vague objects seems to imply the existence of vague identity.

The most famous argument against the existence of vague objects is Evans' (1978) argument, showing that the vague identity arising from the existence of vague objects results in an absurd conclusion. In this section, I shall first present Evans' argument, after which I shall first argue that the main assumption is false, namely the assumption that the existence of vague objects implies the existence of vague identity statements. Moreover, I shall show that, even if the existence of vague objects implies the existence of vague identity statements, the problematic conclusion can be avoided.

6.2.1 Evans' argument

In *Can There Be Vague Objects?*, Evans (1978) argues against the existence of vague objects, by showing that the vague identity statements to which vague objects give rise lead to an absurd conclusion. Suppose 'a' and 'b' are precise terms of which at least one refers to a vague object, thereby resulting in it being vague whether a is identical to b, expressed by $\triangledown(a = b)$. Then, according to Evans, this results in the following argument.

(1)	$\triangledown(a = b)$	(assumption)
(2)	$\lambda x[\triangledown(x = a)]b$	(abstraction from 1)
(3)	$\neg\triangledown(a = a)$	(logical truth)
(4)	$\neg\lambda x[\triangledown(x = a)]a$	(abstraction from 3)
(5)	$\neg(a = b)$	(from 2 and 4 by contraposition and Leibniz' law)

of nearness, then this property must be vague. Yet, many philosophers believe that there is no such property, but rather take nearness to be a predicate that vaguely refers to different precise properties indicating a certain distance.

So the argument shows that if a is indeterminately identical to b – due to one of them being a vague object – then a and b are simply not identical, which contradicts the assumption. Note that Evans does not take this argument to show that there are no indeterminate identity statements.[37] Rather, he considers this argument to show that the defender of the position that there are vague objects has a serious problem, as it is stuck with an absurd conclusion. Accounts of referential indeterminacy, such as supervaluationism, can avoid this fallacy, since it avoids the inference from (1) to (2).[38] Therefore, Evans takes this argument to show that the only indeterminate identity statements that can arise are the result of referential indeterminacy.

6.2.2 Response 1: Vague objects do not necessarily give rise to vague identity statements

In the argument above, Evans makes a crucial assumption. Namely that the existence of vague objects leads to vague identity statements. In this section, however, I shall argue that this is a false assumption to make, or at least not a trivial one.

Consider again Kilimanjaro and suppose it is a vague object, with genuinely vague spatial boundaries. Moreover, consider Kilimanjaro*, which is an aggregate of rocks mainly overlapping with Kilimanjaro, yet with a determinate boundary. In addition, consider Kilimanjaro**, which like Kilimanjaro* is a precise aggregate of rocks mainly overlapping with Kilimanjaro, yet which differs from Kilimanjaro* with one rock. As Kilimanjaro's boundary is vague, it is vague whether Kilimanjaro is identical to Kilimanjaro* or to Kilimanjaro**, or to another precise aggregate of rocks. While the identity statement 'Kilimanjaro* = Kilimanjaro**' is clearly false, the identity statements 'Kilimanjaro = Kilimanjaro*' and 'Kilimanjaro = Kilimanjaro**', and many others, are vague. At least, that is the idea.

However, it is a mistake to assume that the proponent of vague objects is committed to the claim that there is indeterminate identity. Stalnaker (1988) tries to defend the view that there is no such thing as vague identity and agrees with Evans that all indeterminate identity statements are the result of referential indeterminacy. Yet, he argues that this does not exclude the possibility of the existence of vague objects. As Kilimanjaro is an object with vague boundaries, and Kilimanjaro* an object with a determinate boundary, they cannot be the same thing (Stalnaker, 1988, p. 358, fn. 4). Therefore, 'Kilimanjaro = Kilimanjaro*' is not indeterminate, but plainly false. Likewise for Kilimanjaro and any other precise aggregate. An argument along similar lines is presented by Abasnezhad and Hosseini (2014), who claim that "if vagueness is worldly, no vague object can be identical with any precise one, since one is vague and the other is not." (p. 251). So, vague objects are determinately not identical to the precise aggregates with which they mainly overlap. Therefore, the existence of vague objects does not by itself give rise to vague identity statements.

[37] While it is not immediately clear what exactly Evans aimed to prove, Lewis (1988) explains that the following is what Evans had in mind. Evans confirmed that Lewis's interpretation of his argument was indeed what he meant to argue for.

[38] This is what Barnes (2009), Garrett (1988), Lewis (1988), Noonan (1982), Rasmussen (1986), Thomason (1982), and Williams (2008), and potentially many others, have in mind. The idea is that if 'b' is referentially indeterminate, i.e., 'b' does not refer to one unique object, then it is not possible to say that 'b is such that it has the property being indeterminately identical with a.'

So we can agree with Evans that if there are indeterminate identity statements, then they can only arise from the indeterminacy of reference of the involved terms. Yet, this does not mean that there are no vague objects. Rather, the proponent of vague objects can claim that the existence of vague objects does not by itself give rise to vague identity statements.[39]

6.2.3 Response 2: Vague objects leading to vague identity statements is not necessarily problematic

While the defender of vague objects can thus deny that the existence of vague objects leads to vague identity statements, some might nevertheless prefer a commitment to vague identity statements due to the existence of vague objects. In that case, they need another way to block Evans' argument in order to avoid his problematic conclusion.

Lowe (1994) argues that there is a way the defender of vague objects can block the argument. As the vagueness of objects is a form of ontic vagueness, there is genuinely no objective fact of the matter whether or not a is identical to b. Since there is no such objective fact, it follows that the property $\lambda x[\nabla(x = a)]$ possessed by b is not determinately distinct from the property $\lambda x[\nabla(x = b)]$ possesses by a. This means that b possessing the property $\lambda x[\nabla(x = a)]$ cannot be used to distinguish b determinately from a, since that property is not determinately distinct from the property possessed by a. Since the property $\lambda x[\nabla(x = a)]$ is not determinately distinct from property $\lambda x[\nabla(x = b)]$, which is possessed by a, it cannot be correct to deny that a has this property as stated in (4). Therefore, Lowe concludes, the inference from (3) to (4) is fallacious.

Another possible solution comes from van Rooij (2014), where he uses the ST-logic from Cobreros et al. (2012). They distinguish between strict and tolerant identity, and define abstraction and the two notions of identity in such a way that abstraction preserves truth value and Leibniz' law is *st*-valid, but not valid for strong Kleene. This results in (1) and (3) being strictly true, and (5) being tolerantly true. This means that the inference from (1) and (3) to (5) is *st*-valid. However, this does not mean it is *st*-valid to conclude that (6) $\neg\nabla(x = y)$. In fact, it is not. As (5) is not strictly true, the inference from (1)-(5) to (6) is not *st*-valid. The defender of vague objects can thus avoid the absurdity of the argument by adopting *st*-logic.

There are thus options for the defender of vague objects to avoid the absurd conclusion of Evans' argument, in case she agrees with the assumption of the argument

[39]There might be other grounds on which it might be favorable to admit that identity is not absolute. Consider, for instance, a statue and the piece of clay out of which the statue is made. As the clay and the statue occupy the same space and are made of exactly the same material, it is natural to assume that they are identical. Yet, this identity seems not to be absolute but rather contingent. The piece of clay could be rolled into a ball and turned into a new, completely different statue. In this case, the piece of clay continues to exist, while the original statue would be destroyed. It, thus, seems a matter of contingency that the piece of clay and the actual statue are identical to each other. See van Rooij (2014) for an overview of the existing suggestions on how to deal with this (apparent) contingent identity, and his own suggestion, based on ST-logic. Moreover, he discussed how to possibly deal with relative and vague identity.

that the existence of vague objects gives rise to indeterminate identity statements. However, as shown in the section above, she does not have to.

6.3 Vague existence

Another concern for the existence of vague objects is that it seems to entail vague existence. In this section, however, I shall clarify the notion of vague existence and argue that the existence of vague objects does not entail the vague existence of objects in the light of a common sense ontology.

When discussing vague existence, one could mean the existence of vague objects. Then, indeed, trivially, the existence of vague objects entails vague existence. However, one could also mean more than that, namely as there being degrees of existence, and that there are things that only partially exist and partially do not exist. This latter notion of vague existence is considered to be highly problematic and plainly unintelligible. How can an object partially exist and partially not exist? What would these degrees of existence look like? We do not seem to encounter such cases of vague existence in the world.

There is, however, no reason to suppose that the existence of vague objects entails this problematic notion of vague existence. First, note that I am not concerned with a notion of ordinary objects that is based on sortal concepts or invariant kinds, as I have argued against such an understanding of objects in section 4.1.3. In fact, I have argued against such a notion exactly because it seems to imply the vague existence of objects. Rather, I have characterized ordinary objects in section 6.1.1 as objects that are not just mereological sums but as objects that have a certain connection between their parts, a form of unity, and some causal connection. Moreover, in section 6.1.2, I have argued that ordinary objects have a vague spatial boundary, and are therefore vague. Yet, this vague spatial boundary does not give rise to vague existence of ordinary objects, which are the only complex objects that exist on a common sense ontology. Rather, it is vague of determinately existing particles whether they are part of a determinately existing ordinary object or not. All particles determinately exist. As do ordinary objects. It is just vague of certain particles whether they compose an ordinary object or not. Consider, for instance, Kilimanjaro. While it is vague where the mountain ends, the mountain determinately exists. Moreover, all the rocks on and near its boundary determinately exist. Yet, it is vague of some of these rocks whether they are part of Kilimanjaro or not.

However, if objects have a vague temporal boundary, then ordinary objects do vaguely exist. As explained, the temporal boundary of an object concerns when an object starts to exist and when an object ends to exist. If it is genuinely vague when objects start to exist, then at some moment on this vague temporal boundary, it is vague whether the given object exists or not. Therefore, if objects have vague temporal boundaries on a common sense ontology, they do seem to be committed to a very problematic kind of existence.

Nevertheless, ordinary objects do not have a vague temporal boundary. Rather, it seems to be vague when things that determinately exist start to be of a certain kind. Suppose we are building a ship using wooden planks. At the beginning of the process, it is clear that there does not exist a ship. At the end of the process, there clearly does exist a ship. And it appears to be vague at what point the assembled wooden planks start to form a ship. Nevertheless, at each stage of the process, the assembled wooden planks do not vaguely exist. There seems to be some connection between the wooden planks, some sense of unity and some causal connection. Therefore, at each stage of the assembling process, they seem to determinately be an object. There seems to be nothing that vaguely exists during the assembling process. Rather, it seems to be vague whether the object that determinately exists forms a ship or not. Therefore, according to our common sense understanding of the world, objects do not seem to have vague temporal boundaries. Akiba (2014, p. 12) illustrates this by focusing on the existence of human beings. Suppose that it is vague of some clump of cells, a, in a spacetime region, R, whether it is a person, P. Then one might be tempted to say that it is vague whether person P exists or not, that is, P exists vaguely. It is, however, not vague that the clump of cells a exists in R. Rather, it is vague whether the clumps of cells is a person or not. So, Akiba (2014, p. 12) argues, instead of making the controversial claim that P vaguely exists, one could make the more conservative claim that P is a vague property, or that the state of affairs Pa is vague, or that a is a vague object. It is not needed to resort to vague existence, nor would that provide us with much information about the situation as it is such an unintelligible notion.

Note that this gives rise to a second argument against an ontology based on kinds or sortal concepts, in addition to the argument in section 4.1.3. In section 4.1.3, I have argued that, as classification into kinds is sometimes vague, an ontology where what exists depends on what kind things are leads to the vague existence of objects. Now, moreover, the above paragraph has illustrated that it can be vague when something starts to be of a certain kind. Yet, on a sortal ontology this would mean that at such a moment, it is genuinely vague whether there exists an object (of a certain kind) or not. It would mean that objects have genuine vague temporal boundaries and thus, at this vague temporal boundary, vaguely exist. In the case of a human being, if it is vague whether the clumps of cells forms a human being or not, then at that moment, there vaguely exists a human being. It is not vague of a given object whether it is a human being or not. Rather, an object, a human being, partially exists and partially does not exist. As vague existence is considered to be highly problematic, these considerations form a second argument against an ontology based on kinds or sortal concepts.

So, in the light of a common sense ontology, the existence of vague objects does not have to entail the vague existence of objects. The vague spatial boundary of objects, of which I have argued in section 6.1.2 that ordinary objects have one, does not entail vague existence. Moreover, although a vague temporal boundary does seem to give rise to vague existence, I have argued that ordinary objects do not seem to have a vague temporal boundary according to our common sense understanding of the world. It might be that a defender of vague objects also pleads for vague existence, but I hope to have shown that it is not the case that the defender of vague objects is stuck with vague existence.

To conclude this chapter, in case ordinary objects exist, then these objects must have vague spatial boundaries. Yet, the existence of vague objects does not have to lead to vague identity or vague existence. The defender of the view that there are vague objects can deny that the existence of vague objects leads to vague identity statements, or she can adopt the solutions suggested by Lowe (1994) or van Rooij (2014) in order to avoid the problematic argument of Evans (1978). Furthermore, I have provided an argument showing that the existence of vague ordinary objects does not have to entail the vague existence of objects. First, I have argued that the vague spatial boundary of objects does not give rise to vague existence. Second, I have argued that a vague temporal boundary of objects would give rise to vague existence, but that the defender of vague ordinary objects does not have to be committed to the view that vague ordinary objects have vague temporal boundaries. As the defender of an ontology based on sortal concepts or kinds is, however, committed to objects having a vague temporal boundary, and thus committed to vague existence, this provides a second counterargument to such a position.

7 Conclusion

This thesis has aimed to show five things. First, it has aimed to clarify the relation between different kinds of phenomena of vagueness. In particular, I have argued that vagueness of individuation seems to be more fundamental than vagueness of classification. The nature of objects, and thereby the nature of vagueness of individuation, has to be determined before it is possible to (vaguely) classify these objects. One smaller conclusion of this thesis is that as classification into kinds seems to be vague, an ontology based on classifications into kinds seems to entail the vague existence of objects, a notion that is considered to be highly problematic.

Second, it has aimed to provide a novel insight into the relation between the two main puzzles to which vagueness gives rise, namely Sorites paradox and the Problem of the Many. In particular, I have shown that the two puzzles are connected to each other via the notion of a boundary region. Where the Problem of the Many potentially arises for a collection of many boundary regions, each single boundary region potentially gives rise to the Sorites paradox. Yet, while they are connected via the notion of a boundary region, I have concluded that the Sorites paradox and the Problem of the Many are in fact mutually exclusive. The Problem of the Many arises when the boundary regions appear to be vague but are in fact determinate. This determinacy of the boundary regions per definition excludes the boundary regions to be vague, and thereby excludes the possibility of the Sorites paradox.

Third, this thesis has aimed to show that the notion of a boundary region is not only relevant for establishing the relation between the Sorites paradox and the Problem of the Many, but also is the notion that underlies the essential feature of both puzzles: where the Problem of the Many is essentially concerned with a collection of many apparent vague boundary regions, the Sorites paradox is essentially concerned with one vague boundary region. I have thereby argued that it is not the case that the two puzzles are fundamentally concerned with a particular type of vagueness, and thereby argued that the general understanding of the two puzzles is mistaken. The Sorites paradox is often presented as a paradox that is concerned with vague concepts, and thereby with vagueness of classification. The Problem of the Many, on the other hand, is generally understood to be a problem specific to objects, and thereby essentially concerned with vagueness of individuation. However, both the Sorites paradox and the Problem of the Many can arise for both vagueness of classification and vagueness of individuation, as long as their essential condition is met: their required number of (apparent) vague boundary regions.

Fourth, this thesis has aimed to provide new insights into how our adopted ontology is intertwined with the Sorites paradox and the Problem of the Many. In particular, I have shown that whether the Sorites paradox and the Problem of the Many arise and, if so, what their appropriate solutions are, depends on our adopted ontology of objects and properties.

The fifth and final aim of this thesis was to argue that the existence of vague objects is intuitive and not as theoretically problematic as it appears to be. I have presented an outline of what an ontology based on common sense looks like, and that this includes the existence of ordinary objects. Moreover, I have provided a novel argument aiming to establish that if there exist ordinary objects, then these must be vague. Finally, I have addressed the two main concerns to which the existence of vague objects gives rise, namely vague identity and vague existence. First, I have argued that the existence of vague objects does not have to entail (a problematic notion of) vague identity. The defender of vague objects can deny that the existence of vague objects gives rise to vague identity statements. And even if the existence of vague objects gives rise to vague identity, Evans' argument that aims to show that this is problematic, can be avoided. Second, I have argued that the existence of vague objects does not entail that objects vaguely exist in the light of a common sense ontology. One smaller conclusion is that an ontology based on classifications into kinds, again, seems to lead to the problematic notion of vague existence, as there seem to be cases such that it is vague when objects start to be of a certain kind.

In general, I hope this thesis has contributed to the debate concerning vagueness with respect to (i) the relation between the different kinds of vagueness, (ii) the relation between the two main problems to which vagueness gives rise, (iii) the essential element underlying the two main problems of vagueness, (iv) how our ontology, and thereby the nature of vagueness, has impact on the problems, and finally (iv) the nature of vagueness itself.

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