# Many as One

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The problem of the many challenges our way of counting ordinary objects. We say that on an open plain on the northern boundary of Tanzania stands one mountain, Kilimanjaro. Yet there are many distinct, overlapping, mountain-shaped aggregates of rocks, each of which is an equally good candidate to be this mountain. How can it be true, then, that there is one mountain on the plain, as opposed to many?

Some reply that the many distinct aggregates are one and the same mountain. This slogan leaves our practice of counting mountains unscathed, but comes with a catch: orthodox, absolute identity is insufficient to sustain it. What is needed for the 'double-count' of aggregates and mountains is a notion of sortal-relative identity, which is standardly taken to replace the absolute notion. Irreducible relative identity, however, is plagued with problems. 'Do not mess with identity', critics urge, leaving the relative-identity solution to the problem of the many with few adherents.

This paper is a re-evaluation of the slogan 'The many aggregates are one mountain' as a response to the problem of the many. In order to sustain our ordinary conception of mountains in the face of this challenge, I shall develop and defend a metaphysically innocent theory of sortal-relative *de re* predication, which renders sortal-relative identity compatible with absolute identity. According to this theory, sorts do not carve reality at its joints; sorts represent or misrepresent reality. The theory will be shown to avoid substantial problems for the traditional account of sortal-relative identity, and to afford a solution to the problem of the many that is superior to competing solutions that also promise a metaphysically conservative vindication of ordinary mountain-talk.

## 1 The problem of the many

Focus on Kilimanjaro, a mountain on an open plain. The mountain is alone, unaccompanied by any other mountains in the immediate vicinity. Seen from the distance, the mountain's boundary appears precise. However, mountains are composed of rocks; and for many rocks on the mountain's border, there is no determinate answer to the question whether or not they are part of the mountain; it is not clear where the mountain ends and the surrounding countryside begins. So our mountain lacks a precise boundary; there is not just one way of drawing the mountain's boundary, there are many ways. To each boundary we can draw corresponds an aggregate of rocks—assuming that for each set of rocks, there is an object composed of the rocks in the set. Each of these aggregates is a candidate to be the mountain. If among many candidates a single one is a mountain, then there must be a fact of the matter singling out one candidate. Since each candidate has everything it takes to be a mountain, each of them is an equally good candidate to be the mountain, and hence there is no fact of the matter singling out one candidate. It follows that there are either many mountains or none where we thought there was just one.

What holds for mountains, holds for other macroscopic material objects. These are all composed of particles, and have imprecise boundaries, with particles on the surface being neither clearly part nor clearly not part of the object. Accordingly, there are many ways of drawing the object's boundary and many corresponding aggregates of particles, each a candidate equally suited to be the object. But without the means of selecting one, there are many or there is none. This is Peter Unger's *problem of the many*.[1]

Among recent treatments of the problem, some surrender to the conclusion that there are many mountains or none, thereby revising our ordinary conception of mountains.[2] Others save the latter conception by departing from a moderate metaphysics of material objects and their parts. An instance of this strategy is to deny that there are many aggregates, on the grounds that, mysteriously, among many largely intersecting sets of rocks only one such set has a fusion.[3] A third approach to the problem is constituted by the hope of reconciling our ordinary conception of mountains with a moderate metaphysics of material objects. An instance of this strategy is to allow the many distinct aggregates to be one and the same mountain. In what follows, I shall attempt a defense of this approach.[4]

[1] See Unger (1980). The similar 'problem of 1001 cats' appears in Geach (1962).

[2] See Unger (1980).

[3] See Markosian (1998). For another way of twisting mereological orthodoxy, see Hudson (2001).

[4] For overviews of existing solutions and references, see Hudson (2001: Ch. 1) and Weatherson (2003b). For a discussion of two further instances of the strategy of reconciliation, the almost-one solution and the standard supervaluationist solution, see Section

## 2 The many are one

Observing that in ordinary statements of identity of the form '$a$ is the same K as $b$' the identity predicate is relativized to a sortal term 'K', Peter Geach claimed that $a$ may be the same K as $b$ but a different K* than $b$, where 'K' and 'K*' are terms for different sorts. Suppose that the identity over time of persons is a matter of psychological continuity and that the identity over time of human beings is a matter of biological continuity. In a case of cerebrum-transplant from person/human being $a$ to person/human being $b$ with the result of $a$'s being psychologically but not biologically continuous with $b$, $a$ is the same person as $b$ but a different human being than $b$. Let us call this phenomenon 'sortal variation'. Given the close relationship between the concept of identity and the concept of number, if statements of identity are sortal-relative, then so are statements of cardinality, statements about the number of things. If asked to count Ks, we collect things under the relation 'is the same K as'. If asked to count K*s, we collect things under the relation 'is the same K* as'. Taken by itself, the sortal relativity of cardinality is just as commonplace as the sortal relativity of identity. It is only when charged with sortal variation that the sortal relativity of cardinality receives philosophers' attention. For then there may be two Ks while there is only one K*, as in the mentioned case there are two human beings but only one person.[5]

If sortal variation obtains, statements of the form '$a$ is the same K as $b$' cannot be analysed as '$a$ is a K, $b$ is a K, and $a$ is identical with $b$'. For then the conjunction of '$a$ is the same K as $b$' with '$a$ is a different K* than $b$' yields a contradiction. How, then, are relative-identity predicates of the form 'is the same K as' related to the absolute-identity predicate 'is identical with', or 'is the same thing as'? Geach proposed to abandon the absolute predicate in favor of sortal-relative predicates: relative-identity predicates are primitive, or irreducible, and the absolute-identity predicate is meaningless. To construe relative-identity predicates as primitive is to hold that there are no more basic truths about $a$ and $b$ that make it the case that $a$ is the same K as $b$. As a corollary, 'is the same K as' is not understood in terms of absolute identity and 'is a K'; rather, 'is a K' is understood in terms of the primitive 'is the same K as', by reading '$a$ is a K' as '$a$ is the same K as some thing'.[6]

The problem of the many is the challenge to explain how it can be true

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[5] See Geach (1962) and (1967).

[6] This is Geach's derelativization thesis; see Geach (1962).

that there is one mountain on the plain, while there are many overlapping, mountain-shaped aggregates of rocks, $a_1$ ... $a_n$, each of which is an equally good candidate to be this mountain. In response, Geach proposes to treat any massively overlapping, mountain-shaped aggregates $a_i$ and $a_j$ as distinct aggregates but as the same mountain. Given that K-relative identity predicates are the basis for counting Ks, the aggregates are many but the mountains are one, just as expected. Since there is no absolute identity, there is no absolute count of how many mountain-shaped things there are on the plain. Facts of identity and cardinality are irreducibly sortal-relative, and hence metaphysically ultimate.

The notion of relative identity at the heart of Geach's solution to the problem of the many faces a number of substantial problems. I shall focus on the following two.

The first problem concerns the thesis that relative identity replaces absolute identity. Can we do without absolute identity in ordinary thought and talk? Suppose that I believe that my friend, a person, is able to transform into a cat. Upon visiting her house, I find a cat, and ask: Is the person I saw yesterday (identical with, the same thing as) the cat in front of me now? Of course, my belief is false. Given this belief, however, my question is a pre-theoretically sensible one. The problem for Geach is that my question makes no sense if there is no absolute identity. I have in mind neither the question whether the person I saw yesterday is the same person as the cat in front of me now, nor the question whether the person I saw yesterday is the same cat as the cat in front of me now. For both of these sortal-relative versions of my original question have a trivially negative answer, whereas my original question does not. The point is that my question is a sensible question concerning inter-sortal identity over time. But absolute identity is indispensable to the concept of inter-sortal identity over time. Hence my question cannot be asked.

Setting aside the role of absolute identity in ordinary discourse, can we do without absolute identity outside of ordinary thought and talk? Can we do mathematics and logic without absolute identity? It is hard to see how we can. Set theory provides a case in point. Our concept of a set is built upon the axiom of extensionality: a set $x$ is identical to a set $y$ iff $x$ and $y$ have the same members. This axiom employs the notion of absolute identity. If absolute identity is rejected, then it is unclear how the concept of a set is to be understood, and a significant portion of logico-mathematic orthodoxy is threatened.[7]

[7]For further endangered concepts from classical logic and semantics, see Hawthorne

The second problem concerns the qualitative profiles of mountains, and is meant to be independent of the status of absolute identity. Since the aggregates of rocks on the plain differ in their qualitative profile, and since they are the mountain on the plain, the mountain has an inconsistent qualitative profile. For example, it may be true that the mountain on the plain both has and lacks a certain part at $t$, assuming that 'The mountain on the plain has/lacks $o$ as a part at $t$' is read as 'There is a mountain on the plain, all mountains on the plain are the same mountain as it, and it has/lacks $o$ as a part at $t$'.[8]

Are these inconsistencies a threat to our ordinary conception of mountains? One might deny that they are, on the grounds that the qualitative differences between aggregates that count as the same mountain are small, and that we ignore these small differences in ordinary contexts. The latter claim, however, is incorrect; we do not ignore these small differences in all ordinary contexts. We do perhaps ignore them when describing a mountain from a distance, judging naïvely that its boundary is clear-cut. But suppose that upon moving closer, I point to a rock at the foot of the mountain, a rock that is a part of some but not all overlapping mountain candidates on the plain, and ask 'Is the rock a part of the mountain?'. This question draws attention to a 'small difference' that appears firmly on the radar of ordinary intuition. In the capacity of ordinary speakers, we would certainly not consider it a sensible response to the question that the rock both is and is not a part of the mountain. Yet this is the correct response if distinct aggregates with varying mereological profiles all count as the mountain on the plain. What we would respond to the question is that the status of the rock as a part of the mountain is indeterminate; it is neither clearly a part nor clearly not a part of the mountain. So, we ascribe these mountains a qualitative profile that is free of contradiction and sensitive to small differences between mountain candidates. If mountains are individuated by mountain-relative identity, however, we cannot ascribe mountains a qualitative profile that is free of contradiction and sensitive to small differences. Hence, a significant portion of our ordinary conception of mountains cannot be captured.

For a case involving diachronic as opposed to synchronic sortal-relative identity, suppose that as a consequence of a cerebrum-transplant there are

(2003).

[8] Alternatively, 'The mountain on the plain has/lacks $o$ as a part at $t$' may be read as 'Something is the same mountain as all mountains on the plain, and every mountain on the plain has/lacks $o$ as a part at $t$'. On this reading, the statements 'The mountain on the plain has $o$ as a part at $t$' and 'The mountain on the plain lacks $o$ as a part at $t$' may both be false, which is just as troubling as the possibility for both statements to be true.

absolutely distinct human beings, $a$ and $b$, such that $a$ exists at $t$ but $b$ does not, and that $a$ is psychologically continuous with $b$. If personal identity is a matter of psychological continuity, and if identity may be relative to personhood, then $a$ is the same person as $b$. Does this person have a certain mass, shape and size at $t$? Since $a$ exists at $t$ while $b$ does not, the answer is 'yes and no'. Hence, the *entire* qualitative profile that we would ordinarily ascribe to a person at a time may be in danger if persons are individuated by person-relative identity.[9]

My aim is to develop and defend a sortal-relativity solution to the problem of the many, captured by the slogan 'The many aggregates are one mountain', which avoids the massive costs of Geach's view listed above. The key to this new solution is an account of sortal-relative identity in terms of sortal representation.

## 3 The many are represented as one

How can it be true that there is one mountain on the plain, while there are many overlapping, mountain-shaped aggregates of rocks, each of which is an equally good candidate to be this mountain? The answer I propose goes roughly as follows. There is a multitude of absolutely distinct, mountain-shaped aggregates of rocks—for short, mountain candidates— on the plain. When we count the mountains on the plain, we are not counting mountain candidates. What are we counting instead? We are counting *mountain-representations*. A mountain-representation is something that groups together mountain candidates in virtue of having these candidates as subjects. Counting mountains on the plain is counting mountain-representations with mountain candidates on the plain as subjects—in other words, counting mountains on the plain is counting mountain-representations that are 'realized' on the plain. If there are two mountains on the plain, one on the left, the other on the right, then there is a group of absolutely distinct, massively

[9]In Geach's framework, inconsistent profiles are worrying not only because they threaten our ordinary conception of material objects, but also because they point to a failure of Leibniz's Law for sortal-relative identity. That is, the following inference schema is invalid:

$\alpha$ is F at $t$.
$\alpha$ is the same K as $\beta$.
Therefore, $\beta$ is F at $t$.

In the absence of absolute identity, Geach is thus left without any version of Leibniz's Law to characterize identity.

overlapping mountain candidates on the left, and a group of absolutely distinct, massively overlapping mountain candidates on the right. There is, further, a mountain-representation that has each candidate on the left but no candidate on the right as subject, while there is a distinct mountain-representation that has each candidate on the right but no candidate on the left as subject. If, as in the case of Kilimanjaro, there is only one mountain on the plain, then all of the absolutely distinct mountain candidates on the plain are subjects of the same mountain-representation. The purpose of the present section is to specify the details of this picture.

I shall begin by developing the notion of a K-representation. An *individual concept*, as I shall use the term, is a partial function whose domain is a set of pairs of instants, or times, and spatial regions, or places, which assigns to each time $t$ and place $p$ in its domain a material object $x$ that exists at $t$, and that exactly occupies place $p$ at $t$.[10] To an ordinary sortal term 'K', such as 'mountain', corresponds a certain class of individual concepts, namely the class of individual concepts that are *K-unified*. An individual concept is K-unified if its values are maximally inter-related by the unity relation for Ks. Since we are, as far as the problem of the many is concerned, only interested in unity relations between objects existing at the same time, we may blank out cross-temporal unity relations, and restrict our attention to K-unification at a time $t$:

(K) An individual concept $i$ is K-unified at $t$ iff the set of $i$'s values at $t$ is the maximal set of objects $a_1$ ... $a_n$, such that $a_1$ ... $a_n$ are all K-shaped at $t$, and overlap extensively at $t$.

Finally, a K-unified individual concept is a *K-representation* of each of its material values. While a K-representation has distinct material objects as values, I shall assume that a material object is a value of at most one K-representation. By (K), distinct objects are subjects of the same K-representation if they are K-shaped and overlap extensively.

As Geach pointed out, ordinary statements of identity of the form '$a$ is the same K as $b$' are relativized to a sortal term 'K'. In order to regiment the sortal relativity of predications of identity, I shall introduce a sortal modifier 'qua K' (or 'as a K'), whose syntactic function is to combine with a singular noun phrase to form a sortal-relative noun phrase. The ordinary sentence '$a$ is the same mountain as $b$' is to be read as '$a$ *qua* mountain is identical

[10] Carnap (1947). Letting the domain of the function be a set of triples of times, places and possible worlds is required for certain applications of individual concepts, but not for their application to the problem of the many.

with $b$ *qua* mountain'. I shall further assign the operator '*simpliciter*' the function of indicating the absence of sortal relativization by way of '*qua* K'. Thus, '$a$ is identical with $b$, simpliciter' is a sortally unrelativized predication of identity. Given the close relationship between the concept of identity and the concept of number, if statements of identity are sortal-relative, then so are statements of cardinality, statements about the number of things.

The semantic function of '*qua* K' in terms of the form '$a$ *qua* K' is to trigger a shift from a term designating a material object to a sortal-relative term designating the K-representation of that material object. Sortal-relative statements of identity may then be given the following truth conditions: for any material objects $x$ and $y$,

(T1) $x$ *qua* K is identical with $y$ *qua* K iff the K-representation of $x$ is identical with the K-representation of $y$.

For illustration of (T1), consider a mountain-representation $i$. If function $i$ returns an object $a$ for a time $t$ and a place $p$ as arguments, and if the same function $i$ returns an object $b$ for time $t$ and a place $p'$ as arguments, then $i$ represents $b$ as the same mountain as $a$. Further, if $i$ is the only function that has one or more objects with attribute $\phi$ as values, then it is true that there is one mountain with attribute $\phi$. If, however, there is a mountain-representation $i'$ distinct from $i$, and both $i$ and $i'$ have one or more objects with attribute $\phi$ as values, then it is true that there are at least two mountains with attribute $\phi$. When counting mountains, we are not counting material objects; we are rather counting mountain-representations of material objects.

Now back to the problem of the many. Given the representational function of sortal terms in predication, we must distinguish between descriptions of a situation as it really is and descriptions of a situation as it is represented under a sort. I shall assume that the following sortally unrelativized facts constitute the real basis of our case: there are various mountain-shaped aggregates of rocks that overlap extensively, and that are distinct simpliciter.[11] Our aim is to sustain a description of this case 'at the level of mountains', according to which the absolutely distinct aggregates are represented as the same mountain. By principle (T1), '$x$ is the same mountain

[11]So talk of distinct aggregates is to be understood as talk of objects that are distinct simpliciter (though not disjoint, since distinct aggregates may overlap). It is, of course, possible to treat 'aggregate' as a sortal term and mean by 'distinct aggregates' objects that are distinct *qua* aggregate. Such relativized aggregate-talk, however, would be of little use for present purposes.

as $y$' is true in virtue of $x$ and $y$ being subjects of the same mountain-representation. Principle (K) tells us what makes $x$ and $y$ subjects of the same mountain-representation; $x$ and $y$ are mountain-shaped, and overlap extensively. Given the real basis of our case, as specified above, it follows by (T1) and (K) that our aggregates are identical, *qua* mountain; many aggregates are one mountain.

Note that the representation of distinct objects as one mountain raises an issue concerning proper names. Suppose that the proper name 'Kilimanjaro' is introduced to designate the mountain at coordinates $03\,^{\circ}04'33''$S and $37\,^{\circ}21'12''$E. According to the representational account of sortal-relative identity, there is a range of absolutely distinct aggregates of rocks with the mentioned coordinates, such that each aggregate in the range is the same mountain as any other aggregate in the range; in short, each aggregate is *the* mountain at the mentioned coordinates. Then which of these aggregates does the proper name 'Kilimanjaro' designate? I will not address this issue in any detail but mention a natural view to take in response. On this view, the proper name 'Kilimanjaro' is a vague term in virtue of lacking a precise referent. What the term has is a range of suitable candidate referents, the set of candidates being the maximal set of distinct, mountain-shaped aggregates of rocks with the mentioned coordinates. Statements containing the name may then be assigned supervaluational truth-conditions (see Section 6). Given the generality of the problem of the many, this view has the consequence that most ordinary proper names are vague terms.[12]

I have offered the core of a solution to the problem of the many in terms of sortal-relative statements of identity in which the predicate of identity is itself unrelativized. Since sortal-relative statements of identity ascribe the relation of absolute identity, there are no brute facts of relative identity. Sortal-relative facts of identity are facts about how reality is represented under a sort. Sortal relativity is metaphysically modest. Owing to this modesty, the present picture avoids the indispensability problem for Geach's framework. For illustration, consider again the issue of inter-sortal identity over time. We may ask whether a person existing at one time is the same person as a person existing at another time. We may further ask whether a person existing at one time is the same thing as a cat existing at another

[12]See Hawthorne (2003). Another suggestion is to treat 'Kilimanjaro' as an *instantial term*: the name is introduced by existential instantiation and designates an arbitrary member of the maximal set of distinct aggregates of rocks with the mentioned coordinates; see Deutsch (2002). Geach's distinction between a name *for* a mountain and a name *of* a mountain must also be mentioned in this context. For compact discussions, see Hawthorne (2003) and Noonan (1997: 641-2).

time. Both questions are pre-theoretically sensible. Within the present framework, the first question is a matter of whether material objects are subjects of a common person-representation, whether they are represented as the same, whereas the second question is a matter of whether material objects really are same. The present framework, unlike Geach's, thus renders the second type of question just as meaningful as the first.[13]

The aim of this paper is to develop a solution to the problem of the many that respects our ordinary conception of mountains, trees, persons, and so on; a solution that 'saves the appearances'. The picture so far captures our everyday cardinality judgements on the basis of a moderate metaphysics of material objects. But there is more to saving the appearances than saving compelling cardinality claims; more work lies ahead. For the problem of inconsistent profiles encountered in Section 2 arises for *any* version of the relative-identity solution to the problem of the many, whether or not absolute identity is admitted, and hence the problem still arises within the present framework.

## 4 Sortal-relative multiple location and variation

The problem of inconsistent profiles is the following. We ordinarily ascribe mountains a qualitative profile that is free of contradiction and sensitive to small differences between mountain candidates. However, if mountains are individuated under mountain-representations, then it seems that we cannot ascribe mountains a qualitative profile that is free of contradiction and sensitive to small differences. The mountain-shaped aggregates of rocks on the plain differ in their qualitative profile; since they are the mountain on the plain, the mountain has an inconsistent qualitative profile. Hence a significant portion of our ordinary conception of mountains is lost. In this section, I shall sketch a two-step extension of the framework of sortal representation, which guarantees that every material object has a consistent qualitative profile when individuated under a K-representation.

First step: multiple spatial location. Consider distinct aggregates on the plain, $a_1$ and $a_2$: $a_1$ exactly occupies place $p$ at $t$, and $a_2$ does not exactly occupy place $p$ at $t$, where $a_1$ and $a_2$ are mountain-shaped and overlap

[13] The account of sortal-relative identity in terms of sortal representation belongs to the same family as the semantic theories developed in Lewis (1971), Gibbard (1975), and Gupta (1980). Space does not permit a discussion of how and why my picture differs from these. (I take up this issue elsewhere.) Note, however, that neither Lewis nor Gibbard nor Gupta employ their theories in response to the problem of the many.

extensively.[14] It follows that the mountain on the plain exactly occupies $p$ at $t$ and does not exactly occupy $p$ at $t$, assuming that 'The mountain on the plain exactly occupies $p$ at $t$' is read as 'There is a mountain on the plain, all mountains on the plain are identical with it, *qua* mountain, and it exactly occupies $p$ at $t$'. How can locational inconsistency be avoided?

K-representations not only identify, but also qualify. A material object may be represented as being identical with an object, from which it is really distinct. Likewise, a material object may be represented as having a certain qualitative profile, which it really lacks. Correspondingly, sortal relativity, understood as invoking K-representation, is not confined to statements of identity. Ordinary *de re* temporal predications of the form '$x$ is F at $t$' may be sortal-relative in virtue of containing implicit sortal modifiers of the form '*qua* K' with the syntactic and semantic function specified in Section 3.[15]

Let us focus on spatial location. If $x$ is thought of as a mountain, then '$x$ exactly occupies $p$ at $t$' is elliptical for '$x$ *qua* mountain exactly occupies $p$ at $t$'. Given that '*qua* mountain' invokes the mountain-representation of x, $x$ *qua* mountain exactly occupies $p$ at $t$ just in case $x$ exactly occupies $p$ at $t$ according to its mountain-representation. How does a mountain-representation represent location? A mountain-representation is a function from pairs of times and places to objects. Such a function represents an object $x$ as exactly occupying $p$ at $t$ iff $x$ is a value of the function, and the function is defined at the pair of $t$ and $p$—recall that if the function is defined at the pair of $t$ and $p$, its value at this pair exactly occupies $p$ at $t$, which value may or may not be identical with $x$. Sortal-relative locational statements thus get the following truth conditions: for any material object $x$,

[14] A word on the notion of exact occupation is in order. An object exactly occupies a spatial region at a time if it fits into the region perfectly, without leaving any gaps. This is a gloss on exact occupation, not a definition, since the notion will be taken as primitive. See Sattig (2006: 48) for more details on this notion of occupation.

[15] There are a number of ways in which a relativizing sortal term in a temporal predication may be specified. Typically, when a predication contains a subject term that is governed by a sortal term 'K', then the predication is implicitly relativized by 'K' as well. So 'The K is F at $t$' has the default reading 'The K *qua* K is F at $t$'. However, a relativizing sortal need not be specified by a noun phrase in subject position. There are cases in which non-linguistic context determines a relativizing sortal that trumps the sortal in the subject term. And there are cases in which non-linguistic context determines a sortal that relativizes a predicate, while no sortal governs the subject term. For a recent discussion of sortal relativity that questions its viability as a hypothesis about ordinary language, see Fine (2003). For responses, see Frances (2006), King (2006), and Sattig (2006: Section 5.6).

(T2) $x$ *qua* K exactly occupies $p$ at $t$ iff the K-representation of $x$ is defined at $\langle t, p \rangle$.

Returning to our initial example, aggregate $a_1$ exactly occupies place $p_1$ but not $p_2$ at $t$, simpliciter, and aggregate $a_2$ exactly occupies place $p_2$ but not $p_1$ at $t$, simpliciter. Since $a_1$ and $a_2$ are subjects of the same mountain-representation, it follows by (T2) that both $a_1$ and $a_2$ exactly occupy $p_1$ and $p_2$ at $t$, *qua* mountain. In the framework of K-representation, objects that are really uniquely spatially located at a time are represented as multiply spatially located. Hence, it is false that the mountain on the plain *qua* mountain exactly occupies $p_1$ at $t$, and fails to occupy $p_1$ at $t$. To sum up, locational inconsistency is avoided if statements of location about mountains are read as sortal-relative and sortal relativity is understood as K-representation.

Second step: spatial variation. Consider again our distinct aggregates on the plain, $a_1$ and $a_2$: $a_1$ has rock $o$ as a part at $t$, whereas $a_2$ lacks $o$ as a part at $t$. Since $a_1$ and $a_2$ are the same mountain, it seems to follow that the mountain on the plain has $o$ as a part at $t$, and lacks $o$ as a part at $t$. How can mereological inconsistency be avoided?

The answer is spatial variation. Consider the temporal case first. Ordinary objects exist at different times; and as persisting things they may change through time, possessing different, incompatible attributes at different times. If, analogously, ordinary objects exactly occupy different places at the same time, then, as spatially persisting things, they may change through space, possessing different, incompatible attributes at different places, at the same time. Now add sortal relativity to the mix. If a material object $a$ *qua* mountain exactly occupies multiple places at the same time, then $a$'s attributes, *qua* mountain, need not only be relativized to times but also to places, so that $a$ *qua* mountain may vary in attributes not only relative to different times but also relative to different places it occupies. In short, there is no sortal relativity without spatial relativity.

The thesis of sortal relativity is that many ordinary predications contain implicit sortal modifiers. The thesis of spatial relativity is that sortal-relative predications contain implicit spatial modifiers of the form 'at $p$', where '$p$' is a spatial singular term designating a spatial region, which allow objects to vary in attributes across space, according to a K-representation. The sentential operator 'at $p$' attaches to '$a$ *qua* K is F' to yield '$a$ *qua* K is F, at $p$'. The operator 'at $t$' then attaches to '$a$ *qua* K is F, at $p$' to yield '$a$ *qua* K is F, at $p$, at $t$'. Let us call these spatial modifiers 'spatial variation-modifiers', since they are designed to allow the attribution of incompatible attributes to the same object at the same time. And let us assume for the moment that the spatial singular term '$p$' in 'at $p$' designates a spatial region determinately (we shall have reason to refine this picture shortly).

Notice that none of our ordinary forms of spatial modification can perform the function assigned to variation modifiers. One familiar kind of spatial modifier is present in the statement 'Alex is sitting in her car (at $t$)'. Here the spatial modifier 'in her car' is detachable, in the sense that the statement implies that Alex is sitting (at $t$). Our modifier 'at $p$', on the other hand, is non-detachable, for otherwise '$a$ has mass $m$, at $p$, at $t$, and $a$ does not have mass $m$, at $p^*$, at $t$' would collapse into a contradiction. Another familiar kind of spatial modifier is present in the statement 'The road is bumpy in the mountains (at $t$)'. Here the spatial modifier 'in the mountains' has the function of shifting the subject of predication from the road to a spatial part of the road, so that the sentence may be read as 'The road has a spatial part in the mountains that is bumpy (at $t$)'. Our modifier 'at $p$', however, is no such shifter, since in '$a$ has mass $m$, at $p$, at $t$, and $a$ does not have mass $m$, at $p^*$, at $t$' $a$ enjoys multiple exact spatial locations at $t$, and varies in its mass across space at $t$, as opposed to just having different spatial parts at $t$, each possessing a different mass.

Given that ordinary spatial modifiers cannot perform the function assigned to variation modifiers, there is likely to be no linguistic evidence available for spatial relativity. Is this a serious defect of the proposal? The thesis of spatial relativity is forced upon us by a gap, a mismatch, between how we represent the world in thought and talk, and how the world really is. Implicit spatial variation-modifiers are posited in order to close this gap, in order to save the appearances. The thesis of spatial relativity is thus not an empirical hypothesis. It is driven by metaphysical considerations, and therefore rests on a firm foundation even if no linguistic evidence for the presence of spatial variation-modifiers is available. For a precedent, compare the status of temporal relations in special relativity. In relativistic time no temporal relation is instantiated absolutely; it is not meaningful to ask whether an event is simultaneous with or earlier than another event. Instead, all temporal relations are relativized to frames of reference. Prima facie, ordinary thought and talk presupposes absolute temporal relations, and hence is out of sync with relativistic reality. Ordinary temporal talk may be saved, however, its mismatch with reality repaired, by positing a relativization to frames of reference that is hidden from ordinary speakers.[16]

Having recognized implicit spatial variation-modifiers, truth conditions

[16]See Sattig (2006: 41-2).

of spatially as well as sortally modified *de re* predications may be specified as follows: for any material object $x$,

(T3) $x$ *qua* K is F, at $p$, at $t$ iff the K-representation of $x$, $i$, is such that $i(t, p)$ is F at $t$.

For illustration of (T3), suppose that aggregate $a_1$, which has rock $o$ as a part at $t$, simpliciter, exactly occupies $p_1$ at $t$, and that aggregate $a_2$, which lacks $o$ as a part at $t$, simpliciter, exactly occupies $p_2$ at $t$. Since $a_1$ and $a_2$ are subjects of the same mountain-representation, it follows by (T3) that $a_1$ *qua* mountain has $o$ as a part, at $p_1$, at $t$, and lacks $o$ as a part, at $p_2$, at $t$. Likewise for $a_2$. Hence, the mountain on the plain *qua* mountain has $o$ as a part, at $p_1$, at $t$, and lacks $o$ as a part, at $p_2$, at $t$. In the framework of K-representation, objects that are really uniquely spatially located at a time and have their attributes in a spatially insensitive way are represented as multiply spatially located at the same time and as varying in their attributes across these locations.

The problem of mereological inconsistency was this: when objects are individuated under a mountain-representation they seem to end up with inconsistent mereological profiles. This consequence is avoided if mountain-representations are construed as triggering spatial variation; a mountain-representation represents a material object as having slightly different mereological profiles relative to different places at the same time. Accordingly, a mereologically consistent profile for mountains may be secured by reading mereological statements about mountains as both sortal-relative and spatial-relative. By reading 'The mountain on the plain has $o$ as a part at $t$ and lacks $o$ as a part at $t$' as 'The mountain on the plain *qua* mountain has $o$ as a part, at $p_1$, at $t$ and lacks $o$ as a part, at $p_2$, at $t$' the threat of inconsistency is banned. This is how sortal relativity plus spatial relativity guarantees that every material object has a consistent qualitative profile when individuated under a K-representation.

Now that we are able, within the framework of sortal representation, to ascribe mountains a consistent profile, the question arises whether we can ascribe mountains a profile that matches the one we ordinarily ascribe. This question will be addressed in the following two sections.

## 5 Sortal-abstract unique location

Prima facie, the thesis of sortal-relative multiple spatial location—the thesis that mountains and other ordinary objects exactly occupy multiple spatial regions at the same time—is unacceptably counterintuitive. For the thesis together with the innocuous assumption that mountains are macroscopic material objects seem to violate the platitude of common sense that macroscopic material objects exactly occupy a unique spatial region at a time.[17]

Why do we find this uniqueness principle so plausible? We are not committed to the principle because it derives from the specific ways in which we think about mountains and other kinds of material object. The impression that a mountain cannot be multiply located is independent of the geological and social features that make it a mountain, just as the impression that a person cannot be multiply located is independent of the psychological and biological features that make it a person; likewise for other sorts of material object. I suggest that we find the uniqueness principle so compelling because it partly constitutes our conception of macroscopic material objects in abstraction from the sorts to which they belong. Multiple exact location is a conceptual impossibility for distinct mountains, persons and plants *simpliciter* (recall that 'simpliciter' is used to indicate abstraction from K-representation). In short, the uniqueness principle is a sortal-abstract principle, and may be stated perspicuously as follows:

(U) Macroscopic material objects exactly occupy a unique spatial region at a time, *simpliciter*.

Now reconsider the troubling inference we started with, this time premised on (U):

> Macroscopic material objects exactly occupy a unique spatial region at a time, *simpliciter*.
> Mountains are macroscopic material objects.
> Therefore, mountains exactly occupy a unique spatial region at a time, *simpliciter*.

The conclusion of this valid inference poses no threat to the thesis of sortal-relative multiple spatial location, since occupying multiple regions at the same time, according to a K-representation, is compatible with occupying a unique region at a time, simpliciter. The point is that if the platitude of common sense is understood as the sortal-abstract principle (U), then the platitude is compatible with the thesis of sortal-relative multiple spatial location. In other words, the thesis of sortal-relative multiple spatial location

[17] One might add the qualification that multiple exact spatial location is a nomological impossibility for macroscopic material objects as long as we ignore the possibility of time-travel, and hence the possibility of an object meeting its younger self.

stands in no conflict with the platitude of common sense that macroscopic material objects occupy a unique place at a time, because the thesis and the platitude manifest different but compatible perspectives on the material world. The thesis manifests a sortally sensitive perspective on the material world, whereas the platitude manifests a sortally insensitive perspective, a perspective that abstracts from sortal input. The compatibility of these perspectives is afforded by the metaphysical innocence of sortal-relative discourse about material objects: K-representations do not always mirror reality; K-representations are often misrepresentations of reality. I conclude that the present picture of location is far less radical than it may have appeared at first. The friend of the representational account of sortal relativity may appeal to sortal-relative multiple spatial location in order to secure consistent qualitative profiles for mountains without violating our intuitions about the spatial profile of material objects on the whole.[18]

## 6 Mereological indeterminacy

When setting up the problem of the many, we started with the intuition that a mountain can be alone, unaccompanied by other mountains in a given area. We then turned our attention to a further intuition: mountains lack precise mereological boundaries; for each mountain, there are things that are neither determinately part nor determinately not part of that mountain. Mereological indeterminacy of this type led us to a multitude of aggregates, corresponding to each suitable boundary that can be drawn for any mountain, thereby casting doubt on the initial intuition that a mountain can be alone in a given area. The primary task posed by the problem of the many is to save the first intuition concerning the number of mountains. The second intuition concerning the fuzzy boundaries of mountains, however, constitutes a serious constraint on any attempt to save the first: whatever guarantees that mountains can be unaccompanied by other mountains must allow that mountains have questionable parts.[19] This constraint poses a challenge to

[18]Hud Hudson (2001: Ch. 2) builds his relative-identity free approach to the problem of the many on a rejection of the uniqueness principle, claiming that macroscopic material objects exactly occupy multiple spatial regions at a time, simpliciter. While this is the end of metaphysical innocence, Hudson claims that the price is right.

[19]With mereological indeterminacy come other forms of indeterminacy, such as indeterminacy of mass; it is unclear whether the indeterminate part's mass should be counted towards the mountain's mass. For simplicity, I shall focus on indeterminacy of parthood, mereological indeterminacy. The account of mereological indeterminacy given below may be straightforwardly extended to account for related forms of indeterminacy, such as inde-

the sortal-representation approach as it stands. According to the latter, each mountain is an aggregate of physical particles. None of these aggregates has any questionable parts; for any aggregate $a$ and any particle $o$, it is a determinate matter whether $a$ has $o$ as a part at any time. Moreover, when the aggregates are represented as a single mountain, this mountain inherits not only the aggregates' spatial locations but also their determinate mereological boundaries, which the mountain possesses relative to different places. How, then, is the sortal-representation approach to capture the full story about mountains? Is there room for an account of a mountain's imprecise mereological boundaries? In this section, I shall propose such an account within the framework of supervaluationism.[20]

According to the theory of vagueness known as supervaluationism, vagueness is a linguistic phenomenon; there are no vague properties, objects or states of affairs, just vague linguistic expressions. To the supervaluationist, an expression is vague when its meaning can be extended, can be made more precise in different ways, each consistent with the expression's intuitive behavior determined by its original content. A classical example of a vague expression is 'heap'. The meaning of 'heap' and non-linguistic facts about piles of sand determine that some piles are heaps, some are not heaps, and others occupy a grey area, to the effect that the question whether they are heaps lacks an answer. The first cases are the clear cases, the second are the clear non-cases, and the third are the borderline cases. While the expression 'heap' leaves a grey area of application, there are many ways of extending its meaning. Each of these extensions of meaning is a *precisification.* A precisification of 'heap' is *admissible* iff it respects our intuitive assignments of truth and falsity to statements in English—that is, iff it makes 'heap' true of the clear cases, false of the clear non-cases, and either true or false of the borderline cases. As regards the borderline cases, an admissible precisification must further respect *penumbral constraints* arising from the expression's original meaning.[21] For example, if piles of sand $a$ and $b$ are borderline cases of 'heap' that differ from each other only in that $b$ contains one grain of sand more than $a$, then the statement 'If $a$ is a heap, then $b$ is a heap' is intuitively true. This intuition yields the constraint that no precisification is admissible that makes $a$ a heap but not $b$. That is, no matter where we draw the line, we cannot turn a heap into a non-heap by

terminacy of mass, as well. Indeterminacy of location, however, is a special case to which I shall return at the end of this section.

[20]The standard way of putting to work supervaluationism in response to the problem of the many will be discussed in the final section.

[21]The notion of a penumbral constraint is introduced in Fine (1975).

*adding* a grain of sand.

With the notion of an admissible precisification at her disposal, the supervaluationist introduces the notion of truth on an admissible precisification, and defines super-truth and super-falsity in terms of the latter: it is *super-true* that $x$ is a heap iff it is true on all admissible precisifications that $x$ is a heap; and it is *super-false* that $x$ is a heap iff it is false on all admissible precisifications that $x$ is a heap. Truth in the vague object-language is super-truth; and falsity in the object-language is super-falsity. Accordingly, if $x$ is a borderline case of 'heap', then it is neither true nor false that $x$ is a heap. Super-truth may be expressed in the object-language by means of a new operator 'determinately': 'Determinately $s$' is true iff '$s$' is super-true.[22] Then $x$'s being a borderline case of 'heap' can be expressed by saying that $x$ is neither determinately a heap nor determinately not a heap.[23]

Among the types of expression supervaluationism recognizes as vague are singular terms. Central to present purposes is the notion of a vague spatial singular term. Consider the sentence 'There is where we first danced', and suppose that its utterances are accompanied by a gesture of pointing in a certain direction.[24] The expression 'there' in this sentence is a spatial singular term, in that it purports to designate a particular spatial region. The expression is vague, in that there is no determinate answer, no fact of the matter, as to which spatial region it picks out. We may say that associated with 'there' is a descriptive condition that is sensitive to the non-linguistic context of an utterance of the sentence; roughly, a condition along the lines of being a place in the direction of the pointing and the vicinity of the speaker. Several distinct places are natural satisfiers of this descriptive condition in each context in which 'There is where we first danced' is uttered; and each of these places is an admissible precisification of 'there'. In supervaluational manner, an utterance of 'There is where we first danced' is super-true iff it is true on all admissible precisifications I of 'there', that we first danced in I(there); an utterance of the sentence is super-false iff it is false on all admissible precisifications I of 'there', that we first danced in I(there); and an utterance is neither super-true nor super-false iff it is true only on some admissible precisifications I of 'there', that we first danced in I(there).

[22] More precisely, since standard supervaluational model theory only permits 'super-truth at a model $m$' and 'truth at an admissible point $i$, at a model $m$', 'determinately' should rather be introduced as follows: for all models $m$, for all admissible points $i$ in $m$: 'Determinately $s$' is true at $i$ in $m$ iff '$s$' is super-true in $m$.

[23] For detailed introductions to supervaluationism, see Keefe (2000: Ch. 7) and Williamson (1994: Ch. 5).

[24] This is an adaptation from an example in Schiffer (2000).

Now recall the thesis of spatial relativity (Section 5), according to which ordinary, sortal-relative *de re* predications are in need of spatial relativization, which allows objects to vary in attributes across space, according to a K-representation. In the previous section, I sketched a straightforward way of spatially relativizing sortal predications by incorporating spatial variation-modifiers of the form 'at $p$', where '$p$' is a spatial singular term. Now we need to be more careful, and ask not only how sortal predications can be spatially relativized, but also how ordinary sortal predications are in fact spatially relativized.

The picture I suggest is roughly the following. While an ordinary sortal predication about a material object $a$ that is a K requires relativization to a place exactly occupied by $a$ at a given time $t$, *qua* K, no such predication is relativized to a determinate place, since $a$ *qua* K exactly occupies multiple, minutely differing places at $t$, and neither the intentions of speakers nor the contexts in which the predication is uttered manage to select one place from this range of candidates. Note, then, that ordinary sortal predications are never relativized to any particular place in the way ordinary predications are typically relativized to a particular time (now; July 6, 2007, etc.). While ordinary sortal predications are not in fact relativized to a determinate place, such predications may in principle be so relativized. If it makes no difference to which place, out of a range of admissible places, the predication is relativized, then the predication is true. If, on the other hand, it does make a difference, then the predication lacks a truth-value, which is the mark of indeterminacy.

The core details of this proposal, as applied to predications of parthood, may be filled in as follows. Ordinary, object-language predications of parthood are temporally, sortally and spatially modified. The spatial modifier in such predications contains a spatial singular term. This term is vague similarly to 'there' in the example 'There is where we first danced'. Ordinary sortal-relative predications of parthood thus have the form '$a$ *qua* K has $b$ as a part, at $\mathbf{p}$, at $t$, where the bold-face '$\mathbf{p}$' is a vague spatial singular term, reserving the italic '$p$' for precise spatial singular terms, which are confined to the meta-language.[25] The expression '$\mathbf{p}$' is a spatial singular term, in that it purports to designate a particular place. The expression is vague, in that there is no determinate answer as to which place it picks out. Associated with '$\mathbf{p}$' is a descriptive condition that is sensitive to the linguistic context—that is, sensitive to structure and components of the predication

[25] It is for reasons of simplicity that predications of parthood are here taken to contain only a single implicit sortal modifier; '$a$' but not '$b$' is modified.

in which '**p**' occurs. Roughly, associated with '**p**' is the descriptive condition of being a spatial region exactly occupied by the subject of the predication at the relativizing time, *qua* the relativizing sort. Thus, in '$a$ *qua* K has $b$ as a part, at **p**, at $t$', the vague spatial singular term '**p**' purports to designate the spatial region exactly occupied by $a$ *qua* K at $t$. The subject of an ordinary *de re* predication, such as the predication of parthood under consideration, is a macroscopic material object, an aggregate of particles.[26] By the thesis of sortal-relative multiple spatial location, each macroscopic material object that is a K exactly occupies multiple spatial regions at any time of its existence, *qua* K. Consequently, multiple distinct spatial regions satisfy the descriptive condition associated with '**p**' in '$a$ *qua* K has $b$ as a part, at **p**, at $t$'—assuming that the singular term '$a$' designates a material object that is a K—and each of these spatial regions is an admissible precisification of '**p**'. The referent of '**p**' in '$a$ *qua* K has $b$ as a part, at **p**, at $t$' is thus constrained but not fully determined by $a$, $t$ and K. Sortal-relative predications of parthood containing variation-modifiers with vague spatial singular terms may be given the following supervaluational truth conditions:

(P) An utterance of '$a$ *qua* K has $b$ as a part, at **p**, at $t$' is super-true (super-false) iff it is true (false) on all admissible precisifications I of the object-language, that I($a$) *qua* K has I($b$) as a part, at I(**p**), at $t$.[27]

Accordingly, an utterance of '$a$ *qua* K has $b$ as a part, at **p**, at $t$' is neither super-true nor super-false iff it is true only on some admissible precisifications I of the object-language that I($a$) *qua* K has I($b$) as a part, at I(**p**), at $t$.

Mountains have questionable parts. For each mountain, there are rocks existing at a time $t$, such that it is not clear whether they are parts of the mountain at $t$. Consequently, there are distinct sets of rocks, where each rock exists at $t$, such that for each set, it is not clear whether its member-rocks compose the mountain at $t$. This is the mereological indeterminacy intuition at the heart of the problem of the many. Any solution to the problem must be able to explain this type of indeterminacy. The vague spatial-modifier view of predications of parthood delivers such an explanation within the framework of sortal representation.

Focus on the mountain on the plain at time $t$ and on a rock $o$ existing at the same time. Given the thesis of the sortal-relative spatial variation

[26] Ordinary *de re* predications may have a vague singular term—a term, such as 'Kilimanjaro', that lacks a determinate material object as referent—in subject position. I shall ignore this feature in my exposition but factor it into truth conditions (P) below.

[27] (P) allows '$a$' and '$b$' to be vague singular terms of material objects.

of parthood, we may assume that the mountain on the plain *qua* mountain exactly occupies multiple spatial regions at $t$, that the mountain on the plain *qua* mountain has $o$ as a part at some regions it occupies at $t$, and that it fails to have $o$ as a part at other regions it occupies at $t$.[28] Note that these assumptions are stated in a meta-language with non-vague spatial variation-modifiers. Now consider the object-language predication of parthood 'The mountain on the plain *qua* mountain has $o$ as a part at $t$'. On the vague spatial-modifier view, this sentence is elliptical for

> The mountain on the plain *qua* mountain has $o$ as a part, at $\mathbf{p}$, at $t$,

where 'at $\mathbf{p}$' is a variation modifier containing a vague spatial singular term '$\mathbf{p}$'. Given the supervaluational truth-conditions stated in (P), each utterance of this sentence is neither super-true nor super-false, since it is true on some admissible precisifications I of '$\mathbf{p}$'—each I($\mathbf{p}$) being a region exactly occupied by Kilimanjaro at $t$, *qua* mountain—that the mountain on the plain *qua* mountain has $o$ as a part, at I($\mathbf{p}$), at $t$, but false on other admissible precisifications of '$\mathbf{p}$'.[29]

What holds for the mountain on the plain, holds for every mountain; every mountain has questionable parts. More perspicuously,

> For all objects $x$, if $x$ is a mountain, then there is an object $y$ and a time $t$, such that it is indeterminate whether $x$ has $y$ as a part at $t$.

On the sortal-representation account, this universal claim of mereological indeterminacy is elliptical for the following sortally and spatially relativized one:

> For all objects $x$, if $x$ is a mountain, then there is an object $y$ and a time $t$, such that it is indeterminate whether $x$ *qua* mountain has $y$ as a part, at $\mathbf{p}$, at $t$.

[28] The definite description 'the mountain (currently) on the plain' is understood as having a Russellian analysis involving identity *qua* mountain. As pointed out earlier, several absolutely distinct aggregates of particles satisfy this definite description.

[29] I suggested earlier that the proper name 'Kilimanjaro' is vague. This vagueness is not needed to secure the indeterminacy of 'Kilimanjaro *qua* mountain has $o$ as a part, at $\mathbf{p}$, at $t$'. 'Kilimanjaro' has a range of massively overlapping, mountain-shaped aggregates of rocks, $a_1$ ... $a_n$, as admissible candidate-referents. For each $a_i$ from this range, it is neither super-true nor super-false that $a_i$ *qua* mountain has $o$ as a part, at $\mathbf{p}$, at $t$, since each $a_i$ *qua* mountain has multiple exact locations. Hence, each admissible precisification of 'Kilimanjaro' has an indeterminate mereological boundary. Indeterminacy arising from spatial relativization is independent of whether or not proper names are vague.

Assuming the supervaluationist truth conditions (P) of sortal-relative predications of parthood containing variation-modifiers with vague spatial singular terms, this claim of mereological indeterminacy comes out true.[30]

In summary, the source of the mereological indeterminacy of mountains is the following. By thinking of a material object as a mountain, we represent it as exactly occupying a multitude of massively overlapping spatial regions at a time and as having its parts relative to these regions at that time. Ordinary attributions of parthood to a mountain, while sensitive to spatial relativization, fail to single out a determinate relativizing place. Such attributions are not, but can in principle be relativized to a particular place. If it makes no difference to which place, out of a range of admissible places, of places exactly occupied by the mountain, the attribution is relativized, then the attribution is true. Since it does make a difference to which admissible place mereological statements about mountains are relativized, such statements are indeterminate.[31]

One loose end remains. We commonly believe that mountains lack a determinate decomposition, that they have a fuzzy mereological boundary. But that is not all. We also commonly believe that mountains lack a determinate location, that they have a fuzzy spatial boundary. The mereological belief can be captured within the framework of sortal representation, but the spatial belief is lost, since a mountain's exact location is determinate; the mountain exactly occupies multiple spatial regions at a time. This is a tolerable cost of the theory. While the theory does not render the spatial belief true, it does capture the source of this belief. Spatial regions are empirically inaccessible. So where does our false belief in the fuzzy spatial boundary of the mountain on the plain come from? I suggest that this belief has its

[30] To be precise, (P) requires a slight modification to handle the universal claim. Assuming that the variables '$x$' and '$y$' range over material objects and are not vague, an utterance of '$x$ *qua* K has $y$ as a part, at **p**, at $t$' is super-true (super-false) iff it is true (false) on all admissible precisifications I of '**p**' that $x$ *qua* K has $y$ as a part, at I(**p**), at $t$.

[31] The present theory explains how an object that is determinately a mountain can have indeterminate parts. So the theory does not locate the source of mereological indeterminacy in the vagueness of the sortal term 'mountain'; mereological indeterminacy arises whether or not 'mountain' is vague. (For a theory that does locate the source of mereological indeterminacy in the vagueness of 'mountain', see Section 7).

Yet the vagueness of 'mountain' must be recognized. An object $x$ is a mountain just in case $x$ is a value of a mountain-representation. By (K), $x$ is a value of a mountain-representation just in case $x$ is mountain-shaped. This is, of course, a rough approximation of the application conditions of the sortal 'mountain' and of the predicate 'is a mountain'. But even if those conditions are stated more cautiously, taking into account all sorts of geological and social factors that determine mountainhood, there will be objects that are neither clearly mountains nor clearly not mountains.

source in a true belief about the mountain's parts, which are empirically accessible; namely the belief that the mountain has a fuzzy mereological boundary: it is indeterminate where the mountain is located, because it is indeterminate what the mountain's parts are. The spatial belief is a mere shadow of the mereological belief. Losing the former is tolerable as long as the latter is captured.[32]

# 7 Alternatives

The sortal-representation solution to the problem of the many is metaphysically conservative. In line with metaphysical orthodoxy, there are, in our example involving Kilimanjaro, absolutely distinct, massively overlapping, mountain-shaped aggregates of rocks on a plain, each occupying a unique place at a time, and each having a slightly different qualitative profile from the rest. At the same time, the sortal-representation solution respects our ordinary conception of mountains. In line with this conception, there is, in our example, exactly one mountain on the plain. I shall close with a brief discussion of two alternative solutions that also promise a metaphysically conservative vindication of ordinary mountain-talk. My aim is to adduce some considerations on the topic of the previous section, mereological indeterminacy, that show these alternatives as inferior to the sortal-representation solution.

## 7.1 The many are almost one

Each of the mountain-shaped aggregates in our example is a mountain. If we count by identity, we get the result that there many mountains on the plain instead of one. The aggregates, however, overlap extensively, and hence are *almost* (or partially) identical. In everyday contexts, we do not count by identity, but rather by the weaker relation of almost-identity. That is, in ordinary contexts, the cardinality statement 'There is one mountain on the plain' receives the reading 'There is a mountain on the plain, and all mountains on the plain are almost identical with it'. Since this reading is true in our case, we get the desired count of one mountain.[33]

The almost-one solution captures our everyday cardinality judgements. It does not, however, save the appearances completely. When mountains

[32]Of course, not all intuitions about location are shadows of intuitions about parthood. See the discussion of principle (U) in Section 5.

[33]The almost-one solution is proposed in Lewis (1993).

are individuated by almost-identity, then these mountains have inconsistent qualitative profiles. For example, it may be true that the mountain on the plain both has and lacks a certain part at $t$, assuming that 'The mountain on the plain has/lacks $o$ as a part at $t$' is read as 'There is a mountain on the plain, all mountains on the plain are almost identical with it, and it has/lacks $o$ as a part at $t$'.[34] With the aim of alleviating the threat these inconsistencies pose to our ordinary conception of mountains, one might emphasize that the qualitative differences between almost identical aggregates are small, and claim that we ignore these small differences in ordinary contexts. As pointed out in Section 2, however, the latter claim is incorrect; we do not ignore these small differences in all ordinary contexts. Perhaps we do ignore them when looking at a mountain from a distance. But suppose, again, that upon moving closer, I point to a rock at the foot of the mountain, a rock that is a part of some but not all overlapping mountain candidates on the plain, and ask 'Is the rock a part of the mountain?'. This question draws attention to a 'small difference' to which we, in the capacity of ordinary speakers, are not blind. Surely, we would deny that the rock both is and is not a part of the mountain. Yet this is the correct answer according to the almost-one approach. What we would respond to the question is that the status of the rock as a part of the mountain is indeterminate; it is neither clearly a part nor clearly not a part of the mountain. So, we do in ordinary contexts ascribe mountains a qualitative profile that is free of contradiction and sensitive to small differences between mountain candidates, which differences appear in our conception of mountains as indeterminacies. Since the almost-one solution to the problem of the many, in the form stated above, secures a consistent profile of mountains, as individuated by almost-identity, only if small differences are ignored, the almost-one solution does not allow taking seriously the mentioned intuitive indeterminacies, and hence fails to capture a significant portion of our ordinary conception of mountains. In light of the considerations of previous sections, I conclude that the almost-one solution is inferior to the sortal-representation solution.[35]

[34] Alternatively, 'The mountain on the plain has/lacks $o$ as a part at $t$' may be read as 'Something is almost identical with all mountains on the plain, and every mountain on the plain has/lacks $o$ as a part at $t$'. On this reading, the statements 'The mountain on the plain has $o$ as a part at $t$' and 'The mountain on the plain lacks $o$ as a part at $t$' may both be false, which is just as worrying as the possibility for both statements to be true.

[35] In response to this type of problem, Lewis proposes to combine the almost-one solution with the standard supervaluationist solution; see Lewis (1993: 181-2). The latter will be criticized below, in a way that is independent of whether or not almost-identity is in the picture.

## 7.2 The many and the super-one

Vagueness is a linguistic phenomenon as explained by supervaluationism. The sortal term 'mountain' is vague in this sense. It has many clear non-cases, but no clear cases. There is a set of massively overlapping, mountain-shaped aggregates of rocks, $a_1$, $a_2$, ..., $a_n$, each of which forms a candidate to be in the extension of 'mountain'—for short, there is a set of massively overlapping mountain-candidates. (I shall assume that 'the set of mountain candidates' is precise, and thereby ignore issues of higher-order vagueness.) For each of the mountain candidates, $a_1$, $a_2$, ..., $a_n$, there are no linguistic or non-linguistic facts that settle the question as to whether it falls in the extension of 'mountain'. So each candidate is neither determinately a mountain nor determinately not a mountain, and hence any precisification of 'mountain' can make each statement attributing mountainhood to one of the candidates either true or false.

Given the vagueness of 'mountain', the standard supervaluationist captures the intuition that there is exactly one mountain on the plain in the following way. While each mountain candidate is neither determinately a mountain nor determinately not a mountain, it is true that there is exactly one mountain on the plain, since supervaluationism allows existential statements to be determinately true without any instance being determinately true. The trick is to require that on each admissible precisification of 'mountain', at most one of massively overlapping candidates be in the extension of 'mountain'. Since for any mountain candidate on the plain, $a_i$, there is an admissible precisification of 'mountain' that puts $a_i$ but none of the other candidates in the extension of 'mountain', it is true on each admissible precisification, and hence super-true, that there is exactly one mountain on the plain.[36]

In securing the intuition that no mountain massively overlaps with other mountains, which grounds the desired count of mountains on the plain, the supervaluationist does not offer independent specifications of admissibility, but rather construes this intuition as a penumbral constraint on which precisifications of 'mountain' count as admissible. The supervaluationist claims that this strategy is innocuous, since the problem of the many does not pose the task of explaining uniqueness, but rather the mere task of sustaining uniqueness, in the sense of requiring a model in which the claim that there

[36]Put in terms of the scope of 'determinately'—the $\triangle$-operator—the reading of 'There is exactly one mountain on the plain' intended by the supervaluationist is the wide-scope reading '$\triangle\exists!x\mathrm{M}x$', as opposed to the narrow-scope reading '$\exists!x\triangle\mathrm{M}x$', where 'M' stands for 'is a mountain on the plain'.

is one mountain on the plain is true.[37]

Whatever guarantees that mountains can be unaccompanied by other mountains must allow that mountains have questionable parts. This was earlier formulated as a constraint on any solution to the problem of the many. How does the standard supervaluationist solution fare with respect to mereological indeterminacy? Let us begin with the following singular claim of mereological indeterminacy:

> There is an object $x$ and a time $t$, such that it is indeterminate whether the mountain on the plain has $x$ as a part at $t$.

This is a perspicuous statement of the claim that the mountain on the plain has questionable parts. The standard supervaluationist is able to render this claim true (super-true) by holding that different admissible precisifications of 'mountain' put different candidates, from of a range of massively overlapping candidates, into the extension of 'mountain'. If rock $o$ is a part of one mountain-candidate on the plain at $t$ but fails to be a part of another, massively overlapping candidate at $t$, then $o$ makes our singular claim of mereological indeterminacy true.

So far, so good. A major problem lies ahead, though. The mountain on the plain is not the only mountain with questionable parts. Surely, every mountain has questionable parts. This universal claim of mereological indeterminacy has the following more perspicuous form:

> For all objects $x$, if $x$ is a mountain, then there is an object $y$ and a time $t$, such that it is indeterminate whether $x$ has $y$ as a part at $t$.

On standard supervaluationism, this claim is false (super-false), since on each admissible precisification of 'mountain', the aggregates that are mountains have all their parts at any time of their existence determinately. The universal claim of mereological indeterminacy is therefore out of reach for standard supervaluationism; a significant shortcoming.

Compare how the sortal-representation account handles this case. On the latter account, the universal claim of mereological indeterminacy is elliptical for the following sortally and spatially relativized one:

> For all objects $x$, if $x$ is a mountain, then there is an object $y$ and a time $t$, such that it is indeterminate whether $x$ *qua* mountain has $y$ as a part, at $\mathbf{p}$, at $t$.

[37] The standard supervaluationist solution appears most prominently in Lewis (1993) and McGee and McLaughlin (2000); see also Heller (1990) and Lowe (1995).

The representational account of sortal-relative predications and the supervaluationist truth-conditions (P) of sortal-relative predications of parthood containing variation-modifiers with vague spatial singular terms (see Section 6) have the consequence that the universal claim of mereological indeterminacy comes out true. By recognizing spatial modifiers as a source of indeterminacy in predications of parthood, the sortal-representation account has the significant advantage over the standard supervaluationist account of capturing the mereological-indeterminacy intuition both in its singular and in its universal form.

I conclude that from the trio of solutions to the problem of the many promising a metaphysically conservative vindication of ordinary thought and talk, the sortal-representation solution is the most powerful.[38]

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