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Maximality, Function, and the Many

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Abstract: In the region where some cat sits, there are many very cat-like items that are proper parts of the cat (or otherwise mereologically overlap the cat), but which we are inclined to think are not themselves cats, e.g. all of Tibbles minus the tail. The question is, how can something be so cat-like without itself being a cat. Some have tried to answer this “Problem of the Many” (a problem that arises for many different kinds of things we regularly encounter, including desks, persons, rocks, and clouds) by relying on a mereological maximality principle, according to which, something cannot be a member of a kind K if it is a large proper part of, or otherwise greatly mereologically overlaps, a K . It has been shown, however, that a maximality constraint of this type, i.e. one that restricts mereological overlap, is open to strong objections. Inspired by the insights of, especially, Sutton and Madden, I develop a type of *functional*-maximality principle that avoids these objections (and has other merits), and thereby provides a better answer to the Problem of the Many.

Keywords: function, maximality, mereology, the problem of the many

Introduction

Geach (1980, 215) has us imagine Tibbles the cat, alone on a mat. For any one of the hairs on Tibbles’ body, we can imagine all of Tibbles minus that one hair. There is c_1 , which is all of Tibbles except for hair₁, there is c_2 , which is all of Tibbles except for hair₂, and so on. Each of these many proper parts of Tibbles – c_1 , c_2 , ..., and c_n – is quite cat-like, no different from Tibbles, it seems, in terms of cat features. So, it seems, if Tibbles counts as a cat, so does each of c_1 – c_n . We appear to be led to the absurd conclusion that there are countless cats on the mat.

The “Problem of the Many,” as Unger (1980) labelled it, arises not only with cats, but also with humans, desks, clouds, rocks, and many other sorts that we encounter in our daily experience. For any of these kinds, K , and for any member, x , of that kind, it seems there are many proper parts of x that are negligibly different from x in terms of features distinctive of K s. The worry is that there is no non-arbitrary reason to believe that x is a K without also admitting

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that each of those K-like proper parts of x is a K. And the difference between the K and its parts needn't be as small as a hair to raise concerns about there being too many Ks; even though Tibbles' majestic tail is much larger than any one hair, all of Tibbles minus its tail seems as negligibly different from Tibbles in terms of being a cat as any of c_1-c_n .¹ Also, the many to which we seem committed are not limited to the proper parts of a K. The fusion of Tibbles plus a few hairs sprinkled onto its head is not identical with Tibbles but seems every bit as cat-like. The cloud plus a few molecules just past its eastern-most edge seems every bit as cloud-like. In general, there are many kinds of things, such that for any of these kinds, K, and any member x of K, there are many items that mereologically overlap x , each of which seems to have equal right to be considered a K. There is pressure, then, to count each of the many overlappers as being a K, which conflicts with our inclination to count only one K in each of those cases.²

One way to avoid the conclusion that there are many Ks present while also avoiding the nihilistic view that there are no Ks is to show that in the examples used to illustrate the Problem of the Many, there is a significant difference between one of the many items that appear equally K-like and each of the others, a difference in virtue of which only the one is a K. For example, it has been proposed that ordinary sortal concepts are *maximal*. When we consider all of Tibbles minus some small bit (a hair, a nail, the tail), we are inclined to regard that feline aggregate as not itself a cat because the concept of a cat is meant to apply to the whole organism and not some proper part of it.

Burke notes the maximality of many of our concepts, mentioning in particular "that the concept of a person is maximal, that is, that proper parts of persons are not themselves persons" (1994, 134). Sider expresses the maximality point in terms of properties: "Many ordinary sortal predicates express maximal properties," where a property F is maximal "iff, roughly, large parts of an F are not themselves Fs" (2001, 357).³ Let's formulate the idea in terms of the kinds of

¹ Wiggins (1968) presents the example of Tibbles and Tib (Tibbles minus the tail), a puzzle that Wiggins mentions was "contrived by Geach out of a discussion in William of Sherwood" (p. 94).

² The Problem of the Many gains additional urgency when we consider that for many kinds of objects, the spatial boundaries are vague, as Unger's (1980) presentation makes quite clear. There are countless water droplets at the edges of a cloud, for which it is not clear, and seemingly indeterminate, whether they are parts of the cloud. Take any one such water droplet, and consider any two cloud-like aggregates that differ only in terms of whether they contain that droplet. The two aggregates seem equally entitled to be considered a cloud. Since there are so many borderline droplets, it seems there are vastly many aggregates of water droplets in that region with an equally good claim to be a cloud.

³ See also Sider (2003).

thing we represent with our sortal concepts, where ‘kind’ here is not restricted to an item’s essential or fundamental kind (so that, for example, we belong to the kind, *animal*, even if we are not essentially animals). The maximality proposal can then be phrased as follows:

(MAX) many sortal concepts represent maximal kinds, where a kind *K* is maximal =_{df} no relatively large proper part of a *K* is a *K*.

The emphasis on *large*, i.e. relatively large, proper parts allows, for example, that cats can have cats (fetal cats) as proper parts, and that multi-cellular organisms in general can have organisms (individual cells) as proper parts.⁴ What is ruled out is that a relatively large proper part of a cat/organism, such as all of Tibbles except for a hair or a tail, itself counts as a cat/organism. Also ruled out as being a cat or an organism is the fusion of Tibbles and a few hairs sprinkled onto its head or the fusion of Tibbles and a few molecules just beyond its left paw, for these aggregates have a cat and organism (i.e. Tibbles) as a large proper part.

In the next section, I mention objections to MAX that have been raised, which I believe successfully show that the principle is false. Based on ideas presented by Sutton (2015) and Madden (2016), I formulate a maximality principle that relies on the notion of *functional* rather than mereological maximality. It is shown that the functional maximality principle I offer, labelled ‘F-MAX’, gives the intuitively correct results in cases that threaten MAX; and additional reasons are offered for preferring F-MAX. (F-MAX is also preferable, for the same reasons, to a variant on MAX, MAX*.)

In my concluding remarks, I note how F-MAX is neutral on a host of philosophical issues that arise in discussions of the Problem of the Many, including the issue of whether there is ontic vagueness, whether constitution is identity, whether all identity is relative, and whether mereological universalism is true or some type of restricted nihilism is correct. I take neutrality on these matters to be a point in favor of F-MAX, given that our intuitive judgements of there being only one *K* in the various cases discussed do not hinge on our verdict regarding these highly complex and difficult issues. Granted, the mereological maximality principles discussed here, MAX and MAX*, also remain neutral on these issues, but F-MAX is to be preferred for the reasons described in my explanation and defense of the principle.

⁴ Although, regarding fetal “parts” we should heed Bailey’s point (in response to a different case) that being *inside of* one is not obviously sufficient for being *part of* one (2014, 154). Bailey (2014) supports a maximality principle applied to conscious beings as one explanation of why no pair of persons can itself be conscious.

Objections to MAX

Hudson acknowledges that “the principle that no human person has another human person as a proper part can drastically reduce the number of persons ... but not to one” (2001, 27). Hudson has in mind the following type of case. Consider the large aggregate of particles that comprise some person, A. Also consider all of A except for some tiny bit of matter in the outermost region of A’s right hand; call this proper part, ‘A-’. Since A- is a large proper part of A, and A is a person, MAX tells us that A- is not a person. But now consider the fusion of A- and some little bit of matter just beyond A’s left hand. Like A- this item contains a little less than A, but unlike A- it also contains a little more than A. Let’s call it ‘A+’. Since A+ contains a bit more than A and also a bit less, it is not a proper part of A and A is not a proper part of it. So MAX does not give the desired result that there is only one person in this case. Here “ruling out one person as a proper part of another simply never comes into play” (2001, 27).⁵ The A+ case does not show that MAX is false. It shows only that MAX by itself does not solve the Problem of the Many, since it does not reduce the number of Ks present to only one.⁶

However, there are cases that seem to show that MAX is false, by showing that it classifies too many K-like items as being non-Ks. Sutton (2014) has us consider a mosaic tile composed of a large central tile surrounded by a border of many small tiles. The large center piece qualifies as a tile even though it is a large proper part of the mosaic tile. Sutton also describes a heavy-duty coat that is comprised of two coats that zip together, an inner lightweight coat and an outer heavy coat, the latter comprising 95% of the combined heavy-duty coat. On moderate days, you might wear only the inner lightweight layer, the heavy layer is used for cold days, and the two layers zipped together would be worn in conditions of more extreme or sustained cold. The outer heavy layer qualifies as a coat despite being a large proper part of the combined heavy-duty coat. Sutton also has us consider an academician who organized exactly one conference to date so that the file labelled ‘conference organizing’ in the desk drawer contains within it exactly one file, the file for that one conference. Assuming that this is a large file, we have here a case in which an office file has a file as a large proper part.

⁵ See also Hudson’s (2000, 558) description of this limitation with the maximality proposal.

⁶ Hudson does rely on MAX applied to human persons for the exclusion power it does have, solving worries that remain about the many with his ingenious *Partism* proposal (2001, ch. 2) that parthood be understood as a three-part relation between two objects and not just a time, but a region of *space-time*.

MAX does not claim that *all* sortal concepts, or even all ordinary sortal concepts represent maximal kinds. Yet, as Sutton (2014, 385–6) points out, the large proper parts in the cases described do seem just the sort of thing a maximality principle is designed to preclude from being a member of the kind in question, and it does seem arbitrary to disqualify the surplus of cats, humans, thinkers, rocks, and clouds, but not the surplus of tiles, coats, and files.

Against MAX, Madden (2016) describes a ‘sub-car’, which is the whole of an automobile minus its four doors. The sub-car is a large proper part of an automobile. So MAX supports the intuition that the sub-car is not itself an automobile. But, Madden reports, in addition to a sub-car, “[w]e can quite easily imagine a kind of automobile which has a quick-escape ‘mini-car’ built into its structure, designed to detach and drive away in emergencies. That kind of automobile *does* have an automobile as a large proper part” (p. 197). Madden also mentions that if we believed that a Chinese-nation system of the sort Block (1978) described could have consciousness all its own, we would probably not retract this verdict if it so happened that “one of the members of the Chinese nation swells up to colossal size, so that he becomes a spatially large proper part of the whole system” (2016, 198).⁷ We would then be thinking of a large proper part of a conscious subject as a conscious subject itself. Since ‘conscious subject’ and ‘automobile’ do not appear atypical as far as ordinary sortal concepts go, the cases Madden describes threaten MAX.

The examples Sutton and Madden present also threaten a modification of MAX one might offer to cover the sort of case mentioned above that Hudson describes. Recall A+ which is mereologically a little more than person A and also a little less, containing all of A’s parts except for one bit of matter and plus an extra bit. Regarding cats, Lewis notes that something cat-like is not a cat when

it is just a little less than a whole cat, almost all of a cat with just one little bit left out. Or when it is just a little more than a cat, a cat plus a little something extra. Or when it is both a little more and a little less. (1993, 28)

MAX has trouble with the third sort of case, when something overlapping a K is both a little more and a little less than the K. To deal with this sort of case, the fan of a mereological maximality principle might replace MAX with

(MAX*) many sortal concepts represent maximal* kinds, where a kind K is maximal* =_{df} for any x and y , if $x \neq y$ and they mereologically overlap to a relatively massive degree, then if x is a K, y is not a K,⁸

⁷ Madden (2016, fn. 22) thanks Ian Phillips for this example.

⁸ Unger mentions that one might try, unsuccessfully he contends, to solve the Problem of the Many with the principle that “each of those (minutely differing) entities is a member of the same

and as with MAX, the kinds mentioned will include but are not restricted to an item's essential or fundamental kind(s).

MAX* gives the right result in the type of case Hudson describes; since A+ greatly mereologically overlaps person A, A+ is not itself a person according to MAX*. However, the counter-examples to MAX offered by Sutton and Madden are reasons to reject MAX* as well. The problematic proper parts in these examples are relatively large enough that they clearly count as relatively large proper parts of the whole, overlapping the whole to a relatively massive degree. The proponent of MAX or MAX* might reply by modifying the thesis so that the degree of overlap mentioned is *nearly complete coincidence* – so that, for example, Tibbles minus one hair (or one cell, or one molecule) counts as a large enough proper part of Tibbles, mereologically overlapping Tibbles to a great enough degree, to forfeit being a cat, while the large inner mosaic tile, for example, is not a large enough proper part of the containing tile, not sufficiently overlapping that larger tile, to be disqualified from being a tile itself.⁹ This would amount to replacing MAX* with the view that something just very little more or just very little less than a K is not a K. However, if the focus were restricted to those K-like items that almost wholly coincide with the K, the proposal would be of no help in those cases where we want to say that some K-like item is not a K even though the coincidence is less than nearly complete – e.g. when the K-like item is Tib (Tibbles minus the big tail), or the sub-car (the car minus its four doors), or the left quarter of the cloud.

To isolate a crucial difference between one of the many K-like items and each of the others, a difference in virtue of which only one of the many contenders is a K, it might be preferable to focus on *functional* overlap rather than mereological overlap.

Functional Overlap: Prelude

Madden mentions that as a first attempt at characterizing what an automobile is, we might propose that “x is an automobile iff x contains parts – principally wheels coupled to an internal engine – which together have the causal capacity

kind *except for those that* share ‘too much’ space, or ‘too much’ matter, with the aforementioned putative typical member” (1980, 448). Also see Weatherston’s (2016, section 9) mention of the proposal that no two clouds massively overlap.

⁹ Unger mentions that one might try (unsuccessfully) to avoid the Problem of the Many with the following exclusion principle: “If two entities both occupy *nearly*, or *virtually*, all of the same space, as each other, at a given moment of time, then they cannot both be chairs, or both be stones” (1980, 449).

to move x around as a whole” (2016, 196). If we add to this that the parts “have the *function* of moving x around as a whole,” then we get the right result, Madden suggests, that the mini-car is an automobile but the sub-car is not, for unlike the parts of the mini-car, “the parts of the sub-car do not have the function of moving the sub-car around, although they have the causal capacity to move the sub-car around. They were put together in order to move the whole car around” (pp. 197–8). So “the functional criterion for an automobile gives a principled way of solving the ‘too-many-cars’ problem” (p. 198). And suppose we endorse the following functional characterization of a conscious subject: “ x is a conscious subject iff x has parts whose *function* it is to causally coordinate in a complex way the inputs of x and the outputs of x .” Then we can say that the Chinese Colossus is a conscious subject without having to say that any of our overlappers (e.g. all of you minus some small bit) is a conscious subject, for those overlappers, Madden claims, “have the function of coordinating the inputs and outputs of the whole organism only” (p. 198).

I am not sure that the functional proposal Madden considers does much better than MAX or MAX*. Madden admits that the sub-car does have the causal capacity to move itself around, but denies that this is part of its function. It is not clear, however, that the sub-car shouldn’t be viewed as having the function of moving itself around. The car was designed with many goals in mind, one of which is that if the doors were removed, the car without the doors would still be able to move itself. Of course, the sub-car is different from the car after its doors are removed; the former has doors attached and the latter does not. However, it does not seem implausible to believe that the proper part which is the sub-car was designed to move itself so that if the doors were removed, the resulting object could move itself. Also, it does not seem implausible to claim that, say, Jan-minus (e.g. all of Jan minus the left hand) has the function of coordinating the inputs and outputs of Jan-minus. We were evolutionarily designed so that if we lost a hand, we would still be able to perceive the environment and reason about how to move around in it. So it does not seem to me misguided to believe that the large proper part of any of us that is all-but-the-hand was evolutionarily designed to coordinate the inputs and outputs definitive of consciousness for itself as well as for the whole organism.

Perhaps it could be adequately shown that the non- K overlappers of a K have the function of coordinating the inputs and outputs (definitive of being a K) *of the K only*, and Madden (2016, section 9.3.3) furthers the case that the overlappers of a thinker or a conscious being do not have the function of coordinating for themselves the inputs and outputs definitive of thinking/consciousness.¹⁰

¹⁰ Also see Madden’s (2017) teleological attempt to identify a type of self-awareness had by the whole animal and not by the brain (in support of a brand of Animalism and against the view

However, in the next section I offer what seems to me a more effective functional approach to dealing with the problem of too many Ks.

Sutton (2015) appeals to *functional overlap* along with mereological overlap in order to modify Lewis' *almost-identity* solution to the Problem of the Many. Lewis (1993) proposed that when we are inclined to believe there is only one K in the region despite the many similar K-candidates present, we are not counting by identity (since the many K-candidates are numerically distinct). When we count one K we are counting by almost-identity: the many Ks mereologically overlap to such a high degree that we judge them to be almost identical on the spectrum from numerical identity to complete mereological distinctness.¹¹ Sutton shows that when counting by almost-identity, functional overlap matters more than mereological overlap. One of the examples offered is a conjoined twin scenario. The part of the brain that the twins share is very large compared to the part that is not shared. Although the region of the brain not shared is relatively small, in the alien population of which they are members, this unshared region is responsible for reflective thinking and other higher-level cognitive processes. Despite the large mereological brain overlap, we count two brains and two minds in this case, given the functional differences.¹² Sutton concludes that in cases where mereological and functional overlap come apart, we focus on functional overlap in our counting. Thus, Sutton modifies Lewis's almost-identity proposal by suggesting that we count by *functional almost-identity*. "Candidates *x* and *y* for kind-*K* are almost identical Ks if their token *K*-functions significantly overlap as a result of mereological overlap. If they are almost identical, then we count them as one *K*" (2015, 48).

Rather than using the notion of functional overlap to support the view that we count by almost-identity, I propose that in the application of many ordinary sortal terms, considerations of functional overlap are used to select one of the many Ks as identical with, not merely almost-identical with, the K.

that we are our brains). Consider, as well, the *Life–Thought* strategy Yang (2015) describes for dealing with the problem of too many conscious beings. According to that strategy, "there is at most a single life present in the region given that there is a single largest system for which all the activities of the various sub-systems contribute," and since "conscious states also contribute to the overall system, ... we should assign such states to the organism as a whole" (p. 649).

¹¹ The idea that we count by almost-identity is the second part of Lewis' (1993) two-part answer to the Problem of the Many, the first part being supervenientism.

¹² Sutton also describes the case of two semi-detached houses, madly designed so that the shared interior wall, which is gigantically thick, makes up 95% of the total parts of the two houses. Here we count two houses rather than one despite the great mereological overlap. Incidentally, this example and the conjoined twin case threaten MAX*.

Functional Overlap: F-MAX

Recall the proper part of a car that Madden calls the ‘sub-car’ – all of the car except for the four doors. Also recall the mini-car Madden describes, built into the structure of a car and designed to detach and be able to drive away in emergencies. Let’s use ‘ c ’ to designate some particular car, which has a mini-car, ‘ m ’, as a proper part. And let ‘ s ’ denote the sub-car that c contains. We are inclined to think that s is only a proper part of a car, and not itself a car, while m is a car in addition to the car, c , of which it is a proper part. But why is m a car and not s ? What is the crucial difference between the two?

The difference is not that one is a large proper part of a car while the other isn’t, or that one greatly mereologically overlaps a car while the other doesn’t; both s and m are large proper parts of c and therefore both greatly mereologically overlap c . Also, it is not clear that there is the functional difference between s and m that Madden describes. However, there is a more obvious functional difference between the two. The sub-car, s , has many car-like features. The part of a car which is all but the four doors not only looks very much like a car, but also has a full range of automotive capacities. However, when s is engaged in automotive activity, that activity is nothing in addition to the automotive activity that c exhibits. For instance, c ’s transporting its driver down the road involves every bit of, and a bit more of (with doors included), s transporting the driver down the road. When s is in the garage, not being used, it does have the capacity to engage in car-like activity. Yet, so long as s is a proper part of c , s ’s automotive capacities are nothing in addition to c ’s automotive capacities; e.g. c ’s capacity to transport includes its capacity to transport even if its windows were absent, which is s ’s capacity to transport. So what s offers in terms of automotive capacities is already provided by c . Overall, then, there is no more in terms of automotive character that s provides than what c already provides. We might put the point by saying that c ’s functioning as a car *exhausts* s ’s functioning as a car.

The relation between c and m is different. Perhaps some of the mechanisms and processes that enable m to function as a car include some of what enables c to function as a car; e.g. maybe some of m ’s parts structurally support some of the components responsible for c ’s automotive activity and capacities. Also, so long as m is not detached or becoming detached, there is no automotive activity that m exhibits that goes beyond the automotive activity of c . However, even when not detached, m has automotive *capacities* that outstrip those of c . We can fully describe c ’s automotive capacities without mentioning m ’s quick-escape ability to detach from c and drive away in emergencies. So the ability of m to

function as a car is something in addition to, not exhausted by, the ability of *c* to function as a car.

Let's use 'K-features' to designate features, including capacities (K-capacities), distinctive of being a K, whatever kind K is. And let us use 'functioning as a K' and 'K-functioning' interchangeably, to designate instances of K-features. Since K-features include K-capacities, the car in the drive functions as a car even though not actually engaged in automotive activity, and the office file that is not being used still functions as a file due to its file-capacities. Also, let's say that *x* exhibits K-functioning or functions as a K if and only if *x* has some of, although perhaps not all of, the features distinctive of being a K. So in this sense, even if K is a functional kind, something can exhibit K-functioning, i.e. function as a K, without actually being a K – just as *s* exhibits automotive functioning without being a car, and Tib (Tibbles minus the tail) is so cat-like in its functioning without itself being a cat. Consider, then, the view that

(F-MAX) many sortal concepts represent kinds that are *f-maximal*, where a kind K is f-maximal =_{df} for any *x* and *y*, if $x \neq y$ and they mereologically overlap, and both function as a K, and *x*'s K-functioning exhausts *y*'s K-functioning, then if *x* is a K, *y* is not a K, where *x*'s K-functioning *exhausts* *y*'s K-functioning =_{df} for any K-feature that *y* has, *y* has that feature solely in virtue of *x*'s having K-features.

And as before and in what follows, 'kind' here is not restricted to essential or fundamental kinds.¹³

This functional account (with 'F' for 'functional') captures the intuition that if something overlaps a K, and its being K-like is a matter of nothing more than the other item's being K-like, then it is not a second K. Also, the proposal captures this intuition in a way that gives the intuitively correct result in those cases mentioned that threaten MAX and MAX*. Mini-car *m*'s automotive capacities are not solely a function of the automotive capacities of *c*. That is why, given F-MAX applied to cars, we are inclined to consider *m* not just a proper part of a car, but a car all its own. On the other hand, so long as *s* is a proper part of *c*, *s* does not add anything in terms of car-features, including car-capacities, to those that *c* provides. Granted, lacking four doors is a feature that *s* has and *c* lacks, and *s*'s having that feature is not a matter of *c*'s having any of its car-features.

¹³ With talk of exhaustion I am reminded of, or perhaps I was inspired by, the label 'the Principle of Physical Exhaustion' that Hellman and Thompson (1975) gave to the physicalist view that "everything concrete is *exhausted* by basic physical objects" (p. 555). Of course, F-MAX is clearly neutral with respect to physicalism.

However, while lacking four doors is a feature that some cars have, it is not a car-feature, as ‘K-feature’ is being used here, since it is not a feature distinctive of cars. In this sense of ‘K-feature’, by *c* having car-features (having a chassis, an engine, a transmission system, etc.), *s* thereby has all of its car-features, and that is why, according to F-MAX, we do not consider *s* itself a car, but only a proper part of a car.

The heavy-duty coat, call it ‘*d*’, is composed of a heavy outer layer that is designed to detach from a light inner layer and function as a coat on its own. Of course, *d* itself would function as a coat in just the way that it does even if the heavy inner layer were not detachable from the light layer. So the coat-capacity of the heavy outer layer is something in addition to the coat-capacity of *d*; i.e. the heavy outer layer’s having its coat-capacity is more than a matter of *d*’s coat-capacity. Of course, the same is also true of the light inner layer. Either layer’s capacity to serve as a coat when detached from the other layer is not just a matter of *d*’s coat-capacity. So the inner layers’ coat-functioning is not exhausted by *d*’s coat-functioning, which is why, according to F-MAX applied to coats, we are inclined to think that the inner layers qualify as coats.

F-MAX also explains why we believe that one office file can contain another file as a proper part, even if it is a large proper part. The folder labelled ‘conference organizing’, call it ‘*f*’, functions as a file and so does the record of the one conference organized to date. But containing a folder that functions as a file is not what makes it the case that *f* itself functions as a file. The record of the one conference organized brings with it file-features/capacities that are more than just a matter of *f* having its file-features/capacities. So *f*’s file-functioning does not exhaust the file-functioning of the folder within.

Also recall Sutton’s conjoined twins case described earlier. While the brains of the twins mereologically overlap to a very large degree, the part of the brain they do not share is responsible for higher-level cognitive features. So the brains, call them ‘*b*₁’ and ‘*b*₂’, fail to functionally overlap in significant respects, and Sutton suggests, the insufficient functional overlap inclines us to count two brains and two minds in this case despite the great mereological overlap. F-MAX, applied to brains and to minds, honors the intuition that there are two brains and two minds in this case. In the shared region, the mental episodes of *b*₁ and *b*₂ might overlap, with some of the very same mental episodes occurring in the brains of both twins. However, in the regions not shared, the particular mental episodes are not the same (even if they happen to be instances/tokens of some of the same mental types). The instances of mental activity in either unshared region are in addition to, not solely a function of, the instances of mentality in the other unshared region. So the brain/mental functioning of one region is not exhausted by the brain/mental functioning of the other.

Talk of functioning as a K (K-functioning) is perfectly at home where artefactual kinds are concerned since these are clear cases of functional kinds. Given the popularity of functionalist accounts of the mind, it also seems quite natural to view mentality as at least partly functional. But what about kinds that are not so obviously functional? Consider the property of being a cloud. While perhaps not obviously a functional kind, this property may plausibly be considered functional, where the function in this case is to carry water-droplets and distribute rain.¹⁴ And F-MAX does comfortably apply to clouds. Consider some central portion of a cloud. This central aggregate of water molecules is not an additional cloud, and the reason, according to F-MAX, is that its performing the function of carrying water-droplets and distributing rain is exhausted by the containing cloud's performing that function. Nothing additional is involved in the central portion's cloud-functioning.

What about a rock? Sutton notes that a rock is plausibly described functionally: a rock is a collection of “mineral deposits that *hang together as a solid unit*” (2015, 50). Holding mineral deposits together as a solid unit is not unnaturally viewed as a function that rocks perform. So we may apply F-MAX with the result that if something functions to hold mineral deposits together as a solid unit, and its functioning in that way is exhausted by some other containing or otherwise overlapping item functioning in that way, then it is not a rock if the overlapping item is a rock.

Perhaps it is preferable to remain neutral here on the extent to which rocks or clouds are plausibly construed functionally, and interpret talk of ‘functioning’ in our formulation of F-MAX very loosely so that for any item x of any kind K , x exhibiting K -features/capacities counts as functioning as a K . This is in keeping with the earlier description of ‘ K -functioning’ as designating instances of K -features, including K -capacities, no matter what kind K is. On this construal, whenever some x has features, including capacities, distinctive of being a K , then x exhibits K -functioning – even in the case of clouds and rocks.

Note also that F-MAX, like MAX and MAX*, concerns *many* sortal concepts, not necessarily all. We are using ‘functions as a K ’ and ‘ K -functioning’ to describe anything that has some of, but perhaps not all of, the features distinctive of being a K . So whether K is a rock, a cat, a car, a thinker, a cloud, ..., many items that overlap a K will exhibit K -functioning whether or not they qualify as K s. So, for many K s, F-MAX does not apply to the concept *being something that exhibits K -functioning*. Still, F-MAX does seem true of the more ordinary sortal concepts representing those kinds that we more commonly think and talk about.

¹⁴ See Sutton's (2015, 49 and 52) mention of functional overlap in the case of clouds.

F-MAX and Other Exclusion Principles

Within the region of any cat, there are countless many items that are cat-like but that fail to be a cat. Their failing to be a cat might have nothing to do with mereological or functional overlap. They might simply lack some feature, a feature independent of overlap, which is necessary for being a cat. Imagine the following possible scenario. Some peculiar tiny parasite resides deep within Tibbles. While this parasite is an insect, it happens to have various cat-features; it has a tail, paws, and whiskers, and it even meows. F-MAX does not preclude this item from being a cat since the cat's functioning as a cat does not exhaust the insect's cat-functioning. (And neither MAX nor MAX* preclude the parasite from being a cat since this is not a case of large mereological overlap.) This cat-like overlapper of Tibbles is precluded from being a cat for reasons wholly independent of mereological or functional overlap, one reason being that it's not a mammal.

However, in many cases there is something with everything essential to being a cat (considerations of overlap aside) and yet we are reluctant to consider it a cat. It is here that principles such as MAX, MAX*, and F-MAX are meant to apply. Each serves as what Unger (1980) called an 'exclusion principle', a principle that aims to help narrow the list of overlapping K-like items, ideally to one (i.e. narrowing the list of K-like items that aren't already excluded by considerations other than overlap).¹⁵ Recall, again, Tibbles and Tibbles' proper parts, c_1 – c_n , each of which is all of Tibbles except for one of its hairs. MAX, MAX*, and F-MAX exclude c_1 – c_n despite their being so cat-like. These principles also provide an explanation of why they are excluded, showing that their exclusion is not a brute fact. MAX tells us that c_1 – c_n are excluded because they are large proper parts of cats, MAX* excludes them for mereologically overlapping a cat to a massive degree, and with F-MAX, the reason c_1 – c_n are excluded is that their being cat-like is exhausted by an overlapping cat's being cat-like.

However, there are reasons to prefer F-MAX to MAX and MAX*. For one, F-MAX has more exclusion power. Neither MAX nor MAX* excludes K-like items

¹⁵ Let us call something a 'K*' if and only if it has all of the features necessary for being a K – other than features, such as functional and/or mereological overlap, that an exclusion principle designed to answer the Problem of the Many might highlight. The exclusion principles aim to exclude from the group of overlapping K*s, ideally leaving only one K* in those cases where we judge that there is only one K present; given F-MAX, if two items x and y mereologically overlap and both are K*s, then if x 's K*-functioning exhausts y 's K*-functioning and x is a K, then y is not a K.

that overlap a K to a less than large degree, and in many such cases the K-like overlappers are intuitively non-Ks; e.g. the relatively small bit near the center of the cloud is not itself a cloud despite being very cloud-like. F-MAX is not restricted to cases of massive mereological overlap, and the reason is that even when there is no massive mereological overlap, functional exhaustion might still be present and lead us to conclude in those cases that there is only one K. The relatively small bit near the center of the cloud is not itself a cloud, not because of great mereological overlap (which is absent here), but because the cloud-like aspects of what we do consider the cloud, i.e. the whole cloud, exhaust the cloud-like aspects of the central bit. Of course, one might delete reference to 'large' proper parts in MAX and 'massive' mereological overlap in MAX*. But then these principles would give the intuitively incorrect result in cases where relatively small parts of Ks seem to be Ks themselves (e.g. cells which are proper parts of much larger organisms).¹⁶

Besides having more exclusion power, there is also the fact that F-MAX gives the intuitively correct verdict in cases that prove problematic for MAX and MAX*. Granted, MAX and MAX* do honor our intuitions in many cases. In many cases where a K-like item is a large proper part of, or otherwise greatly mereologically overlaps, another K-like item, we judge there to be only one K present. But it is arguable that MAX and MAX* give the intuitively correct result in these cases only because it often happens that when K-like items mereologically overlap to a high degree, they do so in a way that yields functional exhaustion, where the instantiation of K-features by one item exhausts the instantiation of K-features by the overlappers. When we judge that there is only one K in those cases, it seems it is not the great mereological overlap, but the functional exhaustion that underlies our judgment. So even in those cases where MAX, MAX*, and F-MAX each give the intuitively correct verdict, the explanation F-MAX provides of why we think there is only one K is preferable to the explanation offered by MAX and MAX*. Indeed, the explanations that the latter provide seem far less than satisfactory. We are left wondering why being a large proper part of a K, or otherwise greatly mereologically overlapping a K, should itself prevent one from being a K. Why should it matter (to being a K) whether something is a large proper part of a K as opposed to a modest proper

16 We saw that MAX* excludes in some cases where MAX does not. When y is a little less than and a little more than x , MAX* does while MAX does not give the result that y is not a K if x is. F-MAX also excludes in this sort of case provided that the little extra bit does not add to y 's K-functioning. In the case of A_{+-} , which is a tiny bit of matter less than and a tiny bit more than person A, assuming that the extra bit does not add to A's person-functioning, A_{+-} is not a person according to F-MAX.

part? Why should great overlap as opposed to middling overlap make a difference? And why does overlapping a K to whatever degree even matter to whether something is a K?¹⁷ F-MAX provides a more satisfying explanation of why an overlapper is excluded: if x is a K, then overlappers of x , no matter how K-like, are not additional Ks if their K-functioning is exhausted by x 's K-functioning.

Concluding Remarks

We would like an account of why we suppose in everyday contexts that we are referring to only one K despite the presence of many K-like overlappers, and it seems desirable to find an account that does not impute to us any controversial philosophical beliefs that go well beyond what guides our judgment that there is only one K in those cases. It is, then, a merit of F-MAX that it remains neutral on a number of deep and difficult issues often mentioned in discussions of the Problem of the Many. Not only is F-MAX consistent with different positions on these issues, but it is effective in helping to answer the Problem of the Many no matter which of these positions we take.

F-MAX is neutral on van Inwagen's (1990, 21–32) *Special Composition* question of what it takes for many smaller things to compose a larger whole. Since F-MAX places no restrictions on what it takes for smaller things to compose a larger whole, it is compatible with *mereological universalism*, the view that for any collection of objects, there exists something composed of those objects. We can deny that each of the K-like items is a K (with the help of F-MAX) without denying that each of the K-like aggregates really exists. F-MAX is also compatible with restrictions on composition, even robust restrictions entailing that only a portion of the Ks we ordinarily believe exist actually do exist.¹⁸ What the principle entails is that when the small bits do comprise a K and when there are overlapping K-like aggregates, we can avoid the conclusion that there is more than one K where functional exhaustion is present.¹⁹

¹⁷ See, for example, Madden (2016, pp. 197–8), Yang (2015, 647), and Woods (2019, section 2.3) who mention the arbitrary or ad hoc feel of selecting the K on the basis of mereological maximality.

¹⁸ For instance, we can accept F-MAX and believe with van Inwagen (1990) that the simples compose something only when their activity constitutes a life.

¹⁹ F-MAX also allows that it is a *brute* fact when the x s compose something. (See Markosian, e.g. 1998, for a defense of the view that composition is brute.) There being an explanation, e.g. provided by F-MAX, for why some K-like items fail to be a K does not entail that there is an explanation for why the K-like items and the K itself are composed of smaller things in such a way that they really exist.

F-MAX is neutral as well on the issue of whether constitution is identity. One might try to answer the Problem of the Many by claiming that none of the K-like aggregates is the K since the K is constituted by a K-like aggregate, but not identical with it.²⁰ If we accept that constitution is not identity, then we avoid having to choose which of the many K-like aggregates (e.g. which of the many feline masses of matter) is *identical with* the K (the cat). However, even if we accept that constitution is not identity, the question remains: Which of the many K-like aggregates *constitutes* the K?²¹ There are answers available that do not involve endorsing F-MAX,²² although F-MAX does provide an answer: the K-like aggregate that constitutes a K is the one that constitutes something whose K-functioning is not exhausted by the K-functioning of anything else that is a K.

F-MAX is neutral regarding whether all identity is relative. Geach (1980, section 110) answers the Problem of the Many with the view that claims of the form ‘*x is the same as y*’ are incomplete. On this view, whether *x* and *y* are the same is relative to the kind of thing in question, which allows that *x* and *y* can be *the same K₁* but *not the same K₂* even though they are both K₂s. With the view that identity is relative, we can admit that the many K-contenders (e.g. the many feline aggregates in the region) are *not the same aggregate* without denying that they are the *same K* (the same cat). By being able to claim that the many aggregates are all the same K, it seems we avoid the worry of singling out one of many as the K. However, this reply to the problem is not fully satisfying for it does not explain our inclination in many cases to judge a K-contender as a non-K (e.g. Tib and sub-car). So even if we did accept that all identity is relative, it seems there would still be need for additional explanation of our counting Ks, an explanation that F-MAX provides.²³

20 One reason for believing that constitution is not identity in this case is the reason for believing in general that an object is not identical with the aggregate that constitutes it, i.e. a difference in persistence conditions between the constituter and what it constitutes. It seems that the K (e.g. the cat or the statue) can persist despite changes in what constitutes it, and vice versa. Those who respond to the Problem of the Many with the distinction between constitution and identity include Lowe (1982, 1995) and Johnston (1992).

21 Lewis asks: “[a]fter distinguishing Tibbles from her constituter, would we not still want to think there was only one cat-constituter on the mat?” (1993, 26).

22 See, for example, Lowe’s (1995) response to Lewis; also see Jones’ (2015) presentation and defense of the view that many aggregates can simultaneously constitute a single object (a many-one constitution view as opposed to the many-one identity solution that Woods (2019) presents).

23 Incidentally, see Sattig’s (2010) ingenious attempt to defend the idea that the many aggregates are one K with a representational account of sortal-relative identity statements that renders sortal-relative identity compatible with absolute identity.

F-MAX is also neutral on various issues regarding *vagueness*. When we focus on the boundaries of objects, it is quite tempting to believe that for many tiny items it is indeterminate whether they are part of the K under consideration (an indeterminacy that Unger makes quite vivid with his emphasis on clouds). One might believe that (i) the indeterminacy is purely semantic, solely a function of the vagueness of our words. One might contend that (ii) there is ontic vagueness and that the objects themselves have imprecise boundaries.²⁴ Or one might believe that (iii) the indeterminacy is only apparent – i.e. despite appearances there really is a fact of the matter for any small bit whether it is part of the K.

Suppose we accept (iii). Then we can utilize F-MAX to explain why it is that only one of the K-candidates, each of which (falsely) appears to be indeterminately a K, is the K, and the explanation is that each of the non-K's K-functioning is exhausted by a K's K-functioning.²⁵ If we accept (ii), then we face the question: which of the aggregates with fuzzy boundaries that vie for being the K is the K. How can we non-arbitrarily narrow the list to one given that each of the fuzzy aggregates is so K-like?²⁶ F-MAX provides an answer, and the answer is the same as it would be if the K had precise boundaries: the K is the one whose K-functioning is not exhausted by any other K's K-functioning. And with either (iii) or (ii), we can use F-MAX in those clear, not even apparently indeterminate cases in which a K-like aggregate is a non-K to explain why it is a non-K, e.g. to explain why the sub-car is not a car.

Suppose we accept (i), the view that in many cases there is indeterminacy regarding which of the many tiny items are a part of the K but the indeterminacy is purely semantic. Then we might be inclined to endorse supervaluationism to support the claim that there is exactly one K despite it being semantically indeterminate which K that is. (It is true to say that there is exactly one K, given supervaluationism, if it is true that there is exactly one K on every

²⁴ van Inwagen (1990, section 17) recommends endorsing a fuzzy logic when thinking of the relation between parts and wholes. That way we can say that it is true to such and such degree (e.g. 0.6 or 0.85) that one object is part of another.

²⁵ Proponents of (iii) might accept an *epistemic theory* of vagueness, but they need not do so, believing contrary to the epistemic view that there is a way for us to know, e.g. with the help of F-MAX, which of the K-like items is the K.

²⁶ Hudson points out that the appeal to fuzzy sets leaves us wondering “why the members of one fuzzy set compose a person, while the members of a remarkably similar fuzzy set either compose a non-person or compose nothing at all, even though the failed fuzzy set has exactly the same members to exactly the same degrees (excepting a single simple which differs in its degree of membership only at the billionth billionth place of its decimal expansion)” (2000, 553).

admissible precisification of ‘K’). Yet, even if we accept (i), and even if we add supervaluationism for cases of indeterminacy, there still is reason to accept and plenty of room to employ F-MAX. Even if we believe that there are many K-like aggregates that are not determinately Ks or non-Ks given the vagueness of ‘K’, we can still believe that there are some determinate Ks and some determinate non-Ks (just as we believe that there are determinate cases of being tall and of not being tall despite the vagueness of ‘tall’). And in those cases where we judge that an overlapper is determinately not a K despite being so K-like we can apply F-MAX to explain why.

So F-MAX is neutral on a host of issues that arise in discussions of the Problem of the Many. Not only does F-MAX not entail which position we should take on these matters, it also proves useful in answering the Problem of the Many for different positions we might take. I take this neutrality to be a point in favor of F-MAX, given that our intuitive judgements of there being only one K in the various cases discussed do not hinge on our verdict regarding those complex and difficult issues. Granted, MAX and MAX* also remain neutral on these issues, but F-MAX is to be preferred for the reasons mentioned. To repeat, F-MAX has more exclusion power than MAX and MAX*. F-MAX gives the intuitively correct result in cases that prove problematic for those other two exclusion principles. F-MAX explains why these mereological maximality principles give the right results in those cases in which they do. And its explanation of why a K-contender is a non-K seems less ad hoc and more intuitively satisfying than the explanation provided by MAX and MAX*. If an item’s K-functioning is exhausted by the K-functioning of a K that it overlaps, then there is a strong motivation (at least for many of the kinds we think and talk about) to not consider it a second K.

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