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A GUNK-FRIENDLY MAXCON

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Hud Hudson has argued that if MaxCon, Ned Markosian's favoured answer to the Simple Question, is true, then there couldn't be gunky objects. If Hudson's argument succeeds, then those who believe that gunky objects are possible have a good reason to reject MaxCon. However, I show that Hudson's argument relies on substantive metaphysical claims that a proponent of MaxCon need not accept. Thus, one who endorses MaxCon need not reject the possibility of gunky objects and those who believe that gunky objects are possible need not reject MaxCon.

Introduction

The Simple Question may be formulated as follows [Markosian 1998]:

> **The Simple Question (SQ):** What are the necessary and jointly sufficient conditions for an object's being a simple?[1]

Ned Markosian (1998) has argued in favour of the following answer to SQ:

> **The Maximally Continuous View of Simples (MaxCon):** Necessarily, for all x, x is a simple iff x is a maximally continuous object.[2]

In this paper, I discuss an argument due to Hud Hudson [2001] for the conclusion that if MaxCon is true, then there couldn't be gunky objects.[3] I argue that Hudson's argument relies on substantive metaphysical claims that a proponent of MaxCon need not accept. The upshot is twofold. First, MaxCon itself is consistent with the possibility of gunky objects. It is only when conjoined with other substantive metaphysical claims that there is an inconsistency. Second, if a proponent of MaxCon can reasonably deny these claims, then she may reasonably allow for the possibility of gunky objects.

The paper proceeds as follows. In Section I, I make some preliminary remarks concerning MaxCon and Hudson's argument. Then, in Section II, I present Hudson's argument. Next, in Section III, I identify the substantive metaphysical claims on which Hudson's argument relies, discuss them, and argue that a proponent of MaxCon can reasonably deny them, thus showing

[1] x is a simple $=_{df}$ x has no proper parts. x is a proper part of y $=_{df}$ x is a part of y and x is not identical to y.
[2] I have added the "for all x" clause to Markosian's formulation of MaxCon.
[3] x is a gunky object $=_{df}$ every part of x has proper parts.

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that Hudson's argument does not compel a proponent of MaxCon to reject the possibility of gunky objects. In the concluding section, I briefly discuss some other issues involving MaxCon and the possibility of gunky objects.

I. Preliminary Remarks

The first point I would like to make concerns the domain for which MaxCon and the conclusion of Hudson's argument are intended to hold. As Markosian [1998: n. 10] makes clear, he intends the quantifier in MaxCon to be restricted to *physical* objects. Hudson similarly restricts his argument to *material* objects, stating that his 'goal is to demonstrate that [MaxCon] rules out the possibility of material atomless gunk' [Hudson 2001: 86]. I will assume here that these restrictions are the same; that is, I will assume that the domain of physical objects is necessarily coextensive with the domain of material objects. Given this, Hudson's argument is, strictly speaking, an argument for the conclusion that if MaxCon is true, then there couldn't be gunky material/physical objects. However, in what follows I will leave the restriction to material/physical objects tacit because it unnecessarily complicates the formulation of Hudson's argument.

In addition to leaving the restriction to material/physical objects tacit, I will assume that something is a material/physical object just in case it is spatially located. Markosian [2000] argues for this claim and Hudson [2005: 2] endorses it. In addition, Hudson's argument seems to presuppose it. Although a proponent of MaxCon might wish to reject this claim, this issue is distinct from those I would like to raise. Thus, I grant the claim for the sake of argument.

The next preliminary point concerns the motivation for this paper: Why should we care whether Hudson's argument is compelling? There are, I think, at least two reasons. The first is that the question of whether adopting MaxCon compels denying the possibility of gunky objects is relevant to those of us who are interested in assessing our reasons for believing claims concerning the metaphysical structure of the world. The second is pragmatic. Many philosophers are strongly inclined to think that there could be gunky (spatially located material) objects. If Hudson's argument is compelling, then it provides these philosophers with a reason to reject MaxCon and adopt a different answer to SQ. On the other hand, if Hudson's argument is not compelling, then it is open to them to endorse MaxCon. Thus, whether Hudson's argument is compelling will partially determine whether these philosophers will take MaxCon to be an acceptable answer to SQ.

The final issue I would like to address before concluding this section concerns how we are to understand MaxCon. According to MaxCon, a simple is just a maximally continuous object. But what is a maximally continuous object? Following Markosian [1998], we may explicate this notion as follows:

> x *is a maximally continuous object* $=_{\mathrm{df}}$ x is a spatially continuous object and there is no continuous region of space, R, such that (i) the region occupied by x

is a proper subset of R, and (ii) every point in R falls within some object or other.

This definition raises many issues. In the remainder of this section, I will discuss these issues.

First, notice that clause (i) suggests that Markosian identifies regions of space with sets of some sort. With which sets does he identify them? In a footnote, he states that he takes 'regions of space to be sets of points' [Markosian 1998: n. 16]. Although I am inclined to reject this identification, I follow Markosian in making it here.[4]

Second, the definition of 'is a maximally continuous object' makes use of the notions of an object being spatially continuous, a region of space being continuous, an object occupying a region of space, and a point falling within an object. Thus, in order to understand the definition and thereby understand MaxCon, we must first understand these notions. How are we to do so?

Following Markosian, let us take the notion of a point falling within an object as primitive and explicate what it is for an object to occupy a region of space as follows [ibid. 216]:

x *occupies* R $=_{\mathrm{df}}$ R has as members all and only those points that fall within x.

Then let us define what it is for an object to be spatially continuous as follows [ibid. n. 21]:

x *is spatially continuous* $=_{\mathrm{df}}$ x occupies a continuous region of space.

Given these definitions (and assuming that we have a prior grasp on the notion of a point falling within an object), the only remaining bar to understanding the definition of 'is a maximally continuous object' is understanding what it is for a region of space to be continuous. This can be explained using the following definitions originally due to Cartwright [1975] [Markosian 1998: n. 21]:

R *is continuous* $=_{\mathrm{df}}$ R is not discontinuous.

R *is discontinuous* $=_{\mathrm{df}}$ R is the union of two non-null separated regions.

R and S *are separated* $=_{\mathrm{df}}$ the intersection of either R or S with the closure of the other is null.

The closure of R $=_{\mathrm{df}}$ the union of R with the set of all its boundary points.

p *is a boundary point of* R $=_{\mathrm{df}}$ every open sphere about p has a non-null intersection with both R and the complement of R.

[4]One reason to deny that regions of space are sets of points of space is that doing so seems to be in tension with defining points of space as unextended regions of space that lack proper subregions, where, necessarily, for all R and S, R is a proper subregion of S iff R is a subregion of S and R is not identical to S. Thanks to Joshua Spencer for discussion.

R *is an open sphere about* p $=_{df}$ the members of R are all and only those points that are less than some fixed distance from p.

The complement of R $=_{df}$ the set of points in space that are not members of R.

In this section I have addressed preliminaries concerning the correct interpretation of MaxCon and of Hudson's argument as well as the issue of why we should care whether Hudson's argument is compelling. This discussion should have provided a sufficient grasp on the issues addressed in this paper for the reader to understand Hudson's argument, to which I now turn.

II. Hudson's Argument

Hudson presents his argument for the conclusion that if MaxCon is true, then there couldn't be gunky objects in the following passage:

> Let us assume (toward *reductio*) that there is some hunk of material atomless gunk, H. Now, since any hunk of material atomless gunk exactly occupies some region or other and since any region has at least one (possibly point-sized) continuous subregion, there is some (possibly point-sized) continuous subregion of the region exactly occupied by H—hereby named 'S'. Now S itself is either a proper subregion of some extended, continuous region, every point in which falls within some object or other—or not. If not, then (by MaxCon) it follows that there is a simple at S (which would then be a part of H) and since ([by the definition of 'is a gunky object']) it also follows that H does not have any simple as a part, we have contradicted our assumption. Consequently, S is a proper subregion of some extended, continuous region, every point in which falls within some object or other. But every such region (i.e., every region such that every point in it falls within some object or other) either contains a maximally continuous object or else is a subregion of a region that contains a maximally continuous object. Since we are now committed to such a region, we are therefore committed to some maximally continuous object, M. Let R name the region exactly occupied by M. Now (by MaxCon) M is a material simple, and thus ([by the definition of 'is a gunky object']) we may derive
>
> (P) M is neither a part of H nor identical to H.
>
> Recall that M exactly occupies R. But this fact, together with the fact that M is a simple, guarantees that no subregion of R is a subregion of any region that is exactly occupied by a material object (unless that material object has M as a part or is identical to M). But, earlier we secured the result that S, which is a subregion of R, is a subregion of the region exactly occupied by H. So, we may derive
>
> ($\sim$P) M is either a part of H or identical to H.
>
> Consequently, we have arrived at (P & $\sim$P), and our *reductio* is complete. Accordingly, since the truth-value of (MaxCon) is not a contingent matter, it would seem that if (MaxCon) is the right view about simples, then we have a simple demonstration of the impossibility of material atomless gunk.
>
> [Hudson 2001: 86–7]

Unfortunately, although relatively clear, this formulation of Hudson's argument is not particularly helpful for my purposes in this paper. The fact that it is presented in paragraph form makes it difficult to identify the substantive metaphysical claims on which, I claim, the argument relies. A formulation of it in which each of the premises is separated from each of the others and is explicitly numbered would make this task quite a bit easier. I will turn shortly to constructing such a formulation.

Before constructing this formulation, however, I should note that in doing so I will not adhere slavishly to the argument's surface structure nor to the exact phrasing of its premises. My goal is to interpret Hudson's argument in an attempt to uncover the reasoning that underlies it. So, for instance, the formulation of the argument I present below does not contain a premise corresponding exactly to the inference Hudson makes when he says: '. . . M exactly occupies R. But this fact, together with the fact that M is a simple, guarantees that no subregion of R is a subregion of any region that is exactly occupied by a material object (unless that material object has M as a part or is identical to M)' [ibid. 87]. It does not include such a premise because, I suspect, one who believes the claim that no subregion of a region occupied by a simple is a subregion of a region occupied by a material object that neither has that simple as a part nor is identical to that simple believes it because she accepts other, more basic, claims from which it follows.[5] In formulating Hudson's argument, then, I attempt to uncover these more basic claims.

In addition, let me introduce some technical terminology in order to simplify my formulation of Hudson's argument. Let us say that a region of space is matter-filled iff every point in it falls within some object or other. And let us say that a region of space is a maximally continuous matter-filled region of space iff it is continuous, it is matter-filled, and it is not a proper subregion of a continuous, matter-filled region of space. With this terminology in hand, MaxCon turns out to be equivalent to the claim that necessarily, for all x, x is a simple iff x occupies a maximally continuous matter-filled region of space.

[5]One can capture the inference in question by employing the following principle:

> **Simples, Subregions, and Parts (SSP):** Necessarily, for all x and R, if x is a simple, R is a region of space, and x occupies R, then for all y, S, and T, if S is a subregion of R, S is a subregion of T, and y occupies T, then x is a part of y.

Acceptance of SSP, however, can be justified by appeal to the following principle, which I discuss below in Section III:

> **Subregions to Parts (SP):** Necessarily, for all x, y, R, and S, if R and S are regions of space, R is a subregion of S, x occupies R, and y occupies S, then x is a part of y.

Suppose that o is a simple, R is a region of space, and o occupies R. Now let S be a subregion of R, T be a region of space such that S is a subregion of T, and o* be an object that occupies T. There are two possibilities: (i) T is a subregion of R and (ii) R is a subregion of T. If SP is true, then given either (i) or (ii), o is a part of o*. To see this, suppose first that (i) is true. Then, if SP is true, o* is a part of o. However, since o is a simple, o is identical to every part of o. So, if SP is true, o is identical to o*. But everything identical to o* is a part of o*, by the reflexivity of parthood. So, given SP, if (i) is true, o is a part of o*. Now suppose that (ii) is true. Then, if SP is true, o is a part of o*, since o occupies a subregion of the region occupied by o*. So, if SP is true, o is a part of o*. Therefore, if SP is true, then SSP is true. Acceptance of SP justifies acceptance of SSP.

Having made these remarks, let me now turn to reconstructing Hudson's argument. I begin my formulation by assuming, for *reductio*, that:

1. For all x, x is a simple iff x occupies a maximally continuous matter-filled region of space, and there is a gunky object. [Assumption for *reductio*]

By conjunction elimination on (1) and existential instantiation, we derive:

2. h is a gunky object.

Now from (1), (2), and necessitated premises, we argue as follows:

3. Necessarily, for all x, if x is a gunky object, then there is an R such that R is a region of space and x occupies R.[6]

4. Therefore, there is an R such that R is a region of space and h occupies R. [From (2) and (3)]

5. Therefore, T is a region of space and h occupies T. [From (4) by existential instantiation]

6. Necessarily, for all regions of space R such that there is something that occupies R, R is a matter-filled region of space.

7. Therefore, T is a matter-filled region of space. [From (5) and (6)]

8. Necessarily, for all matter-filled regions of space R, R is a continuous matter-filled region of space or R is a discontinuous matter-filled region of space.

9. Therefore, T is a continuous matter-filled region of space or T is a discontinuous matter-filled region of space. [From (7) and (8)]

We have now reached a dilemma. If we can show that neither horn of the dilemma is true, we will have shown that our original assumption is false. We do so by first assuming for *reductio* the second horn of the dilemma and showing that it is false, as follows:

10. T is a discontinuous matter-filled region of space. [Assumption for *reductio*]

11. Necessarily, for all discontinuous matter-filled regions of space R, there is an S such that S is a maximally continuous matter-filled region of space and S is a subregion of R.

12. Therefore, there is an S such that S is a maximally continuous matter-filled region of space and S is a subregion of T. [From (10) and (11)]

[6]Remember that we are restricting our attention to material/physical objects and assuming that each material/physical object is spatially located.

13. Therefore, U is a maximally continuous matter-filled region of space and U is a subregion of T. [From (12) by existential instantiation]

14. Necessarily, for any maximally continuous matter-filled region of space R, there is an x such that x occupies R.

15. Therefore, there is an x such that x occupies U. [From (13) and (14)]

16. Therefore, i occupies U. [From (15) by existential instantiation]

17. Therefore, i is a simple. [From (1), (13), and (16)]

18. Necessarily, for all x, y, R, and S, if R and S are regions of space, R is a subregion of S, x occupies R, and y occupies S, then x is a part of y.

19. Therefore, i is a part of h. [From (5), (13), (16), and (18)]

20. Necessarily, for any simple x and gunky object y, x is not a part of y.

21. Therefore, i is not a part of h. [From (2), (17), and (20)]

But now we have a contradiction between (19) and (21). So we can conclude that the second horn of the dilemma is false; that is:

22. It is not the case that T is a discontinuous matter-filled region of space. [By *reductio*]

Let us turn, then, to showing that the first horn of the dilemma is also false:

23. T is a continuous matter-filled region of space. [Assumption for *reductio*]

24. Necessarily, for all continuous matter-filled regions of space R, there is an S such that S is a maximally continuous matter-filled region of space and R is a subregion of S.

25. Therefore, there is an S such that S is a maximally continuous matter-filled region of space and T is a subregion of S. [From (23) and (24)]

26. Therefore, V is a maximally continuous matter-filled region of space and T is a subregion of V. [From (25) by existential instantiation]

27. Therefore, there is an x such that x occupies V. [From (14)[7] and (26)]

28. Therefore, j occupies V. [From (27) by existential instantiation]

29. Therefore, j is a simple. [From (1), (26), and (28)]

30. Therefore, h is a part of j. [From (5), (18), (26), and (28)]

[7]Note that although (14) originally appeared in a different reductio argument, it is legitimate to appeal to it here since it was a premise of that reductio, not derived from the assumption for reductio. Similar remarks apply to use of (18) to derive (30), below.

31. Necessarily, for any gunky object x and simple y, x is not a part of y.

32. Therefore, h is not a part of j. [From (2) and (29)]

(32) contradicts (30), however. So the first horn of our dilemma is false:

33. It is not the case that T is a continuous matter-filled region of space. [By *reductio*]

Having thus shown that neither horn of our dilemma is true, we can conclude that our original assumption is false:

34. Therefore, it is not the case that (for all x, x is a simple iff x occupies a maximally continuous matter-filled region of space, and there is a gunky object). [By *reductio*]

Our reconstruction of Hudson's argument is not quite complete yet, for we have yet to derive the desired conclusion that if, necessarily, for all x, x is a simple iff x occupies a maximally continuous matter-filled region of space, then it is not the case that, possibly, there is a gunky object. To reach this desired conclusion, notice first that (34) is equivalent to:

35. Therefore, either it is not the case that for all x, x is a simple iff x occupies a maximally continuous matter-filled region of space or it is not the case that there is a gunky object.

Which entails:

36. Therefore, if for all x, x is a simple iff x occupies a maximally continuous matter-filled region of space, then it is not the case that there is a gunky object.

Now since we have reached (36) using only valid inference rules and necessitated claims, we can infer:

37. Therefore, necessarily, if for all x, x is a simple iff x occupies a maximally continuous matter-filled region of space, then it is not the case that there is a gunky object.

From which it follows by the modal inference rule K that:

38. Therefore, if necessarily, for all x, x is a simple iff x occupies a maximally continuous matter-filled region of space, then necessarily, it is not the case that there is a gunky object.

And from this, given that possibility is the dual of necessity (and valid inference rules concerning the use of double negation within the possibility operator), we can derive our desired conclusion:

39. Therefore, if, necessarily, for all x, x is a simple iff x occupies a maximally continuous matter-filled region of space, then it is not the case that, possibly, there is a gunky object.

Which is simply a slightly more formal way of stating the intended conclusion of Hudson's argument: that if MaxCon is true, there couldn't be gunky objects.

In this section I have presented Hudson's original argument and a formalization of it. This formalization should make it easier to identify the substantive metaphysical claims underlying the argument. In the next section, I will identify and discuss these claims and argue that a proponent of MaxCon can reasonably deny them.

III. Substantive Metaphysical Claims

Hudson's argument relies on two substantive metaphysical claims. These claims are stated in premises (14) and (18):

14. Necessarily, for any maximally continuous matter-filled region of space R, there is an x such that x occupies R.

18. Necessarily, for all x, y, R, and S, if R and S are regions of space, R is a subregion of S, x occupies R, and y occupies S, then x is a part of y.

Let us call these claims, respectively, 'Maximally Continuous Matter-Filled Regions to Objects' (for short, 'MCMRO') and 'Subregions to Parts' (for short, 'SP'), respectively. In this section I will discuss MCMRO and SP and argue that a proponent of MaxCon can reasonably deny them.

I begin with MCMRO. First let me clarify the relationship between MCMRO and MaxCon. Notice that MCMRO and MaxCon jointly entail the following thesis:

Maximally Continuous Matter-Filled Regions to Simples (MCMRS): Necessarily, for any maximally continuous matter-filled region of space R, there is an x such that x is a simple and x occupies R.

Notice, however, that MaxCon does not by itself entail MCMRS. It is consistent with MaxCon that there is a maximally continuous matter-filled region of space that is not occupied by anything at all. So, since MaxCon and MCMRO jointly entail MCMRS but MaxCon does not itself entail MCMRS, MaxCon does not entail MCMRO.

It is worth noting in connection with this point that although MaxCon does not entail MCMRO, Markosian endorses the latter:

> ... MaxCon is consistent with there being a continuous, matter-filled region of space that is not occupied by any physical object. It might be desirable to add to MaxCon the following thesis, in order to have a theory of physical simples that rules out the possibility of matter without physical objects.

> **Against Matter Without Objects (AMWO):** Necessarily, if R is a continuous, matter-filled region of space, and there is no continuous, matter-filled region of space, R′, such that R is a proper subset of R′, then there is a physical object that occupies R′.
>
> While I personally endorse AMWO, I have not officially conjoined it with MaxCon in my discussion because I want to consider MaxCon, as an answer to the Simple Question, independently of other, related issues.
>
> [Markosian 1998: n. 23][8]

Markosian's AMWO is (roughly) equivalent to our MCMRO.

Despite the fact that Markosian endorses MCMRO, I will argue that it can reasonably be denied by a proponent of MaxCon. Notice first that some may endorse MCMRO primarily because they endorse the following principle:

> **Matter-Filled Regions to Objects (MRO):** Necessarily, for any matter-filled region of space R, something occupies R.[9]

However, this reason for endorsing MCMRO will likely not motivate a proponent of MaxCon, since a proponent of MaxCon is unlikely to endorse MRO. For she is likely to believe that it is possible for there to be a simple that occupies an extended region of space none of whose proper subregions are occupied by any object. So since the proper subregions of such a region would be matter-filled, a proponent of MaxCon will likely deny MRO.

Thus, one of the primary reasons for endorsing MCMRO will not motivate many proponents of MaxCon. However, it is worth asking whether a proponent of MaxCon might have reasons to deny MCMRO. I think that there are at least two such reasons a proponent of MaxCon might have. First, if she believes that there could be gunky objects, then she might perform a so-called G.E. Moore-shift, denying MCMRO on the grounds that it is a premise in an argument for the conclusion that if MaxCon is true, there couldn't be such objects. In other words, a proponent of MaxCon who reasonably believes MaxCon and who reasonably believes that there could be gunky objects can reasonably deny MCMRO on that basis.

There is also another, more interesting, reason a proponent of MaxCon might have to deny MCMRO. Suppose that MaxCon and MCMRO are both true and that at a certain time a cat, Cat, occupies a discontinuous region of space, Cat-Region, that consists entirely of a continuous tail-shaped region, Tail-Region, and a continuous tail-remainder-shaped region,

[8]Markosian [2004: 409–10] calls the conjunction of MaxCon and AMWO 'MaxCon+' and endorses it.

[9]MRO has some of the same consequences as the conjunction of the liberal view of receptacles (see Hudson [2002] and Uzquiano [2006])—that is, the claim that every region of space is occupiable—with van Inwagen's Doctrine of Arbitrary Undetached Parts:

> **The Doctrine of Arbitrary Undetached Parts (DAUP):** For every material object M, if R is the region of space occupied by M at time t, and if sub-R is any occupiable sub-region of R whatever, there exists a material object that occupies the region sub-R at t [van Inwagen 1981: 123].

Both entail that any subregion of a region of space that is occupied by a material object is occupied as well.

Remainder-Region. Given MaxCon and MCMRO, at that time there is a simple, Tail, that occupies Tail-Region and a simple, Remainder, that occupies Remainder-Region and these simples are distinct.[10] Now it might happen that at some later time Tail is annihilated. But if that did happen, both Cat and Remainder would survive and each would occupy Remainder-Region. So, if MaxCon and MCMRO are both true, it might happen that two distinct objects, Cat and Remainder, occupy the very same region of space.[11,12] Thus, a proponent of MaxCon who believes that it is impossible for two distinct objects to occupy the very same region of space has a reason to deny MCMRO. I conclude, then, from the considerations adduced in this and the preceding paragraph that a proponent of MaxCon can reasonably deny MCMRO and thus that Hudson's argument does not compel her to reject the possibility of gunky objects.

Having concluded that a proponent of MaxCon can reasonably deny MCMRO, I will now argue that a proponent of MaxCon can reasonably deny SP. SP, remember, is the following claim:

> **Subregions to Parts (SP):** Necessarily, for all x, y, R, and S, if R and S are regions of space, R is a subregion of S, x occupies R, and y occupies S, then x is a part of y.

Again, there is a rather uninteresting reason a proponent of MaxCon might have to deny SP. If she reasonably believes MaxCon and reasonably believes that there could be gunky objects, then she may reasonably deny SP via a G.E. Moore-shift.

There are, in addition, more interesting reasons that a proponent of MaxCon might have to deny SP. First, a proponent of MaxCon might believe that there could be coincident objects—objects, that is, that are distinct yet occupy the very same region of space.[13] According to some metaphysicians, a statue and the lump of clay from which it is made, for instance, are distinct and yet occupy the very same region of space. Furthermore, some among these metaphysicians hold that the arm of the statue is a part of the statue but is not a part of the lump of clay although it occupies a subregion of the region occupied by the lump of clay. Thus, a proponent of MaxCon who reasonably accepts these claims can reasonably deny SP.

Not all proponents of MaxCon will accept the possibility of coincident objects, of course. Indeed, as we saw above, one reason a proponent of

[10]Tail and Remainder are distinct because an object occupies a region of space just in case that region of space has as members all and only those points that fall within that object. So, since Tail occupies Tail-Region, Tail-Region has as members all and only those points that fall within Tail. But Tail-Region has none of the members of Remainder-Region as members (since Cat-Region is discontinuous and consists entirely of Tail-Region and Remainder-Region). Thus, none of the members of Remainder-Region fall within Tail and so Tail does not occupy Remainder-Region. But Remainder occupies Remainder-Region. Therefore, Tail and Remainder are distinct.

[11]This is, of course, a variant of van Inwagen's [1981] argument against DAUP.

[12]I should note that the argument makes some assumptions that some might wish to deny. For instance, it assumes that a region such as Cat-Region is occupiable. However, as long as a proponent of MaxCon can reasonably accept such assumptions, I will still have successfully shown that a proponent of MaxCon can reasonably reject MCMRO.

[13]Hudson [2001: 87–8] explicitly notes that his argument does not compel a proponent of MaxCon who accepts the possibility of coincident entities to reject the possibility of gunky objects.

MaxCon might have for denying MCMRO is that she rejects the possibility of such objects. In addition, not all of those proponents of MaxCon who accept the possibility of coincident objects will accept that they could differ with respect to their parts. Thus, it is worth considering whether there are reasons a proponent of MaxCon might have to deny SP that do not commit her to the possibility of coincident objects.

There are. In a recent paper, Raul Saucedo [forthcoming] presents an argument against SP.[14] Thus, a proponent of MaxCon who reasonably accepts the premises of Saucedo's argument can reasonably deny SP. Saucedo's argument proceeds as follows. Any pattern of instantiation of any pairwise wholly distinct fundamental properties and relations is possible.[15,16] The relations of being a part of, occupying, and being a subregion of are fundamental and pairwise wholly distinct [Saucedo forthcoming: 7–8].[17] Therefore, any pattern of instantiation of *being a part of*, *occupying*, and *being a subregion of* is possible. One pattern of instantiation of *being a part of*, *occupying*, and *being a subregion of* is the following: there are an x, y, R, and S such that R is a subregion of S, x occupies R, y occupies S, and x is not a part of y. So, possibly, there are an x, y, R, and S such that R is a subregion of S, x occupies R, y occupies S, and x is not a part of y. Therefore, SP is false.

Saucedo's argument raises many interesting issues that it is beyond the scope of this paper to address. However, it is clear that a proponent of MaxCon who reasonably accepts each of the premises of that argument can reasonably reject SP.[18] What is less clear is that she can do so without committing herself to the possibility of coincident objects. After all, the relation of identity is, plausibly, both a fundamental relation and wholly distinct from the relation of occupying. And anyone who accepts each of the premises of Saucedo's argument is committed both to the claim that *occupying* is a fundamental relation and to the claim that any pattern of instantiation of any pairwise wholly distinct fundamental properties and

[14]Technically, he presents an argument against a principle that is worded slightly differently. However, that principle is equivalent to SP given certain plausible assumptions.

[15]A property or relation is fundamental just in case it is one of David Lewis's perfectly natural properties and relations; that is, just in case it is among the 'properties and relations that explain cases of genuine similarity, and that constitute the supervenience base of the world' [Saucedo forthcoming: 6]. (See [Lewis 1986].) It is more difficult to state what it is for two properties or relations to be wholly distinct. Here are some examples from Saucedo [forthcoming: 7]: the properties of being round and having a mass of one gram are wholly distinct, as are the properties of being round and being yellow, the properties of being round and having mass, and the properties of being round and being water; the properties of having mass of one gram and having mass of two grams are not wholly distinct, nor are the properties of being round and being round and yellow, the properties of being round and being shaped, and the properties of being water and being oxygen.

[16]Saucedo [forthcoming: 7] calls this principle 'Pattern-to-Possibility'.

[17]Actually, Saucedo does not explicitly claim that *being a subregion of* is fundamental nor that it is wholly distinct from *being a part of* and *occupying*. However, it is clear that he needs this claim in order to argue against SP in the manner he does.

[18]Or, at least, it is relatively clear. As we saw above, Markosian takes *being a point that falls within* as a primitive and defines occupation in terms of it. As such, Markosian will likely reject the claim that occupation is a fundamental relation. In addition, Markosian thinks of regions of space as sets of points of space and takes the relation *being a subregion of* to be the relation *being a subset of a set of points*. So, he will likely not take *being a subregion of* to be fundamental either. And presumably he will not take *being a subset of* to be fundamental; he will take it to be analysable in terms of the membership relation. Since the proponent of MaxCon that I am considering here agrees with Markosian on these points, he or she cannot quite accept Saucedo's argument as it stands. However, if she thinks that *being a point that falls within, being a member of*, and *being a part of* are fundamental and pairwise wholly distinct, he or she can offer an argument against SP that is very similar to Saucedo's.

relations is possible. So it seems that a proponent of MaxCon who accepts each of the premises of Saucedo's argument is committed to the claim that the following pattern of instantiation of identity and occupying is possible: There are an x, y, and R such that x occupies R, y occupies R, and x is not identical to y. Thus, it would seem that a proponent of MaxCon who accepts each of the premises of Saucedo's argument is committed to the possibility of coincident objects.

However, owing to certain technical features of Saucedo's claim that any pattern of instantiation of any pairwise wholly distinct fundamental properties and relations is possible, a proponent of MaxCon who accepts each of the premises of Saucedo's argument need not be committed to the possibility of coincident objects. To see why this is so, let L be a quantified first-order language such that each predicate of L expresses a fundamental property or relation and each fundamental property or relation is expressed by a predicate of L. Then something is a pattern of instantiation of some pairwise wholly distinct fundamental properties and relations $P_1 \ldots P_n$ just in case it is expressed by a sentence S of L such that (i) S contains only the logical vocabulary of L and predicates that express $P_1 \ldots P_n$ and (ii) there is a model M such that S is true in M and every sentence S′ of M that contains only the logical vocabulary of L and only one of the predicates that express $P_1 \ldots P_n$ and that expresses a necessary truth is true in M [Saucedo forthcoming: 10]. But the identity relation will be expressed by part of the logical vocabulary of L.[19] So a sentence of L that expresses the claim that it is not the case that there are an x, y, and R such that x occupies R, y occupies R, and x is not identical to y contains only the logical vocabulary of L and a predicate of L that expresses the occupation relation. Thus, since one who denies the possibility of coincident objects will claim that such a sentence expresses a necessary truth, she will hold that the claim that there are an x, y, and R such that x occupies R, y occupies R, and x is not identical to y is not a pattern of instantiation of the identity relation and occupation. Therefore, a proponent of MaxCon who denies the possibility of coincident objects is not committed to that possibility by affirming the claim that any

[19]If the claim that any pattern of instantiation of any pairwise wholly distinct fundamental properties and relations is possible is to be at all plausible, the identity relation will have to be expressed by part of the logical vocabulary of L. To see why this is so, suppose that it is not. Then consider the following sentence of L in which '=' expresses the identity relation and 'P' is another predicate of L that expresses a fundamental property that is wholly distinct from the identity relation:

(S) $\exists x \exists y\ (x = y\ \&\ Px\ \&\ {\sim}Py)$

Given the assumption that the identity relation is not expressed by part of the logical vocabulary of L, (S) contains only the logical vocabulary of L and predicates that express pairwise wholly distinct fundamental properties and relations. In addition, given that assumption, there is a model M such that (S) is true in M and every sentence S′ of M that contains only the logical vocabulary of L and only one of the predicates that express the identity relation and the property expressed by 'P' and that expresses a necessary truth is true in M. So, if the identity relation is not part of the logical vocabulary of L, (S) expresses a pattern of instantiation of the identity relation and the property expressed by 'P'. But then, according to the principle that any pattern of instantiation of any pairwise wholly distinct fundamental properties and relations is possible, the proposition expressed by (S) is possible. The proposition expressed by (S) is a violation of the Principle of the Indiscernibility of Identicals (PII), though. So, since a proponent of the principle that any pattern of instantiation of any pairwise wholly distinct fundamental properties and relations is possible will certainly not want to deny PII, she will have to hold that the identity relation is part of the logical vocabulary of L.

pattern of instantiation of any pairwise wholly distinct fundamental properties and relations is possible.

I conclude that a proponent of MaxCon can reasonably deny SP. She can do so either via a G.E. Moore-shift, by accepting the possibility of coincident objects of a certain sort, or by accepting the premises of Saucedo's argument against SP. In addition, as we saw earlier, a proponent of MaxCon can reasonably deny MCMRO. But both MCMRO and SP are premises in Hudson's argument for the conclusion that if MaxCon is true, then there couldn't be gunky objects. So Hudson's argument does not compel a proponent of MaxCon to reject the possibility of gunky objects.

In the next section, I briefly consider some other issues concerning MaxCon and the possibility of gunky objects. However, let me conclude this section by discussing what sorts of gunky objects a proponent of MaxCon can reasonably countenance. Since MaxCon entails that any object that occupies a maximally continuous matter-filled region is a simple, and hence not a gunky object, a proponent of MaxCon cannot reasonably countenance the possibility of a gunky object that occupies such a region. Consider, however, the following sorts of gunky object:

Sort 1: A gunky object that occupies a discontinuous region of space,

Sort 2: A gunky object that occupies a proper subregion of a maximally continuous matter-filled region of space.

A proponent of MaxCon can, I claim, reasonably countenance the possibility of gunky objects of both Sort 1 and Sort 2. Consider, first, gunky objects of Sort 1. To countenance the possibility of such objects, a proponent of MaxCon must deny either MCMRO or SP. For if she conceded MCMRO, she would have to accept that every maximally continuous matter-filled subregion of the region occupied by such a gunky object would be occupied by a simple and if she conceded SP, she would have to accept that any such simple would be a part of that gunky object. So, since the region of space occupied by such a gunky object would have at least one maximally continuous matter-filled subregion and it is impossible for a simple to be a part of a gunky object, a proponent of MaxCon must deny either MCMRO or SP to accept the possibility of gunky objects of Sort 1.

Consider now gunky objects of Sort 2. Again, a proponent of MaxCon who countenances the possibility of such objects must deny either MCMRO or SP. For if she conceded MCMRO, she would have to accept that a gunky object of Sort 2 would occupy a proper subregion of a region occupied by a simple; and if she conceded SP, she would have to accept that such a gunky object would be a part of that simple. So, since it is impossible for a gunky object to be a part of a simple, a proponent of MaxCon must deny either MCMRO or SP to accept the possibility of gunky objects of Sort 2.

Thus, to countenance the possibility of gunky objects of either Sort 1 or Sort 2, a proponent of MaxCon must deny either MCMRO or SP. This is a pleasing symmetry. Further, since we have seen in this section that a proponent of MaxCon can reasonably deny these claims, we have shown that a proponent of MaxCon can reasonably accept the possibility of gunky objects of Sort 1 and of Sort 2.

Can a proponent of MaxCon reasonably accept the possibility of gunky objects that are of neither Sort 1 nor Sort 2? No. To see this, notice that any region occupied by a gunky object will be either a discontinuous region or a continuous region of space. Now any gunky object that occupies a discontinuous region of space will be a gunky object of Sort 1. On the other hand, any gunky object that occupies a continuous region of space will occupy a matter-filled region of space. So, since every region of space is a subregion of itself, any gunky object that occupies a continuous region of space will occupy a subregion of a continuous matter-filled region of space. But every continuous matter-filled region of space is a subregion of a maximally continuous matter-filled region of space. Consequently, any gunky object that occupies a continuous region of space will occupy a subregion of a maximally continuous matter-filled region of space. However, a proponent of MaxCon cannot accept the possibility of gunky objects that occupy maximally continuous matter-filled regions of space. Thus, given MaxCon, any gunky object that occupies a continuous region of space will occupy a proper subregion of a maximally continuous matter-filled region of space, and thus be a gunky object of Sort 2. Therefore, any gunky object will be of either Sort 1 or Sort 2, given MaxCon.

Concluding Remarks

In the last section, I argued that Hudson's argument does not compel a proponent of MaxCon to reject the possibility of gunky objects and that she can reasonably accept the possibility of gunky objects of the following sorts:

<u>Sort 1</u>: A gunky object that occupies a discontinuous region of space,

<u>Sort 2</u>: A gunky object that occupies a proper subregion of a maximally continuous matter-filled region of space.

Further, I argued that these are the only sorts of gunky objects whose possibility a proponent of MaxCon can reasonably accept.

Here I would like to briefly consider some other issues concerning MaxCon and the possibility of gunky objects.[20] Suppose that MaxCon and MCMRO are both true. MCMRS, the claim that necessarily, every maximally continuous matter-filled region of space is occupied by a simple, follows. Now consider any world w in which there is a gunky object, g, of Sort 2. Given the previous suppositions, g occupies a subregion, R, of a region, S, occupied by a simple, a, in w. Now suppose that there is a fusion,[21] f, of g and a in w. Given plausible assumptions, f will occupy S

[20]I would like to thank an anonymous referee for this journal for comments that provoked me to consider the issues discussed in this section.
[21]*x is a fusion of* yys $=_{\mathrm{df}}$ each of yys is a part of x and every part of x overlaps at least one of yys.

in w.[22] But S is a maximally continuous matter-filled region and so, given MaxCon, any object that occupies S is a simple. But f is not a simple in w, since it has a gunky object, g, as a part. Thus, if MaxCon and MCMRO are both true, then necessarily, for any gunky object of Sort 2, that gunky object will occupy a subregion of the region occupied by a simple although it and that simple do not have a fusion. So a proponent of MaxCon who accepts MCMRO and the claim that, possibly, there are gunky objects of Sort 2, will have to deny certain claims concerning fusions. In particular, she will have to deny any claim concerning fusions which, in conjunction with the claims she accepts, entails that, possibly, there is a fusion of a gunky object of Sort 2 with a simple that occupies a superregion of the region occupied by that gunky object.[23] Among the claims concerning fusions that such a proponent of MaxCon will have to deny are Unrestricted Composition (UC),[24] the claim that, necessarily, for all x and y, if x occupies a subregion of the region occupied by y, then there is a fusion of x and y, and also (assuming that the appropriate causal or spatial relations could obtain between such a gunky object and such a simple) claims according to which certain causal or spatial relations between two objects are sufficient for there to be a fusion of them.

Thus the conjunction of MaxCon with MCMRO and the claim that, possibly, there are gunky objects of Sort 2, places very strong constraints on which claims concerning fusions are true. Accepting such constraints may well be too high a price to pay in order to maintain the conjunction of these three theses. For these reasons, it may be best for a proponent of MaxCon who accepts the possibility of gunky objects of Sort 2 to deny MCMRO.

The possibility of gunky objects of Sort 1 raises similar issues. Again, suppose that MaxCon and MCMRO are both true. Now consider any world w* in which there is a gunky object, g*, of Sort 1. Given the previous suppositions, there is a simple, a*, that occupies a subregion, R*, of the region, S*, occupied by g* in w*. Now suppose that there is a fusion, f*, of g* and a* in w*. Given plausible assumptions, f* will occupy S* in w*. But g* is a gunky object and f* is not, since it has a simple, a*, as a part. Thus, although g* and f* each occupy S* in w*, they are distinct. So a proponent of MaxCon who accepts MCMRO, accepts the claim that possibly, there are gunky objects of Sort 1, and accepts the claim that colocation is impossible, will have to deny certain claims concerning fusions. In particular, she will have to deny any claim concerning fusions which, in conjunction with the claims she accepts, entails that, possibly, there is a fusion of a gunky object of Sort 1 with a simple that occupies a subregion of the region it occupies. Among the claims concerning fusions that such a proponent of MaxCon will have to deny are those mentioned above in connection with gunky objects of Sort 2.

Again, the conjunction of MaxCon with certain additional claims places very strong constraints on which claims concerning fusions are true, and accepting such constraints may well be too high a price to pay to maintain the conjunction of these theses. In this case, however, a proponent of

[22]See, however, Saucedo [forthcoming].

[23]Necessarily, for all R and S, R is a superregion of S iff S is a subregion of R.

[24]**Unrestricted Composition (UC):** Necessarily, for any xxs, there is a y such that y is a fusion of xxs.

MaxCon who accepts the possibility of gunky objects of the sort in question (e.g., Sort 1) has options. She may either deny MCMRO or accept the possibility of coincident objects.

Let me conclude this discussion of other issues concerning MaxCon and the possibility of gunky objects by connecting it with my earlier discussion of Hudson's argument. There we saw that a proponent of MaxCon can reasonably allow for the possibility of gunky objects either by denying MCMRO or by denying SP. Here we have seen that a proponent of MaxCon who merely does the latter may still face problems if she allows for the possibility of gunky objects. This strongly suggests that a proponent of MaxCon who accepts the possibility of gunky objects ought to reject MCMRO.

In this paper, I have argued that Hudson's argument for the conclusion that if MaxCon is true, then there couldn't be gunky objects, is not compelling. That argument relies on substantive metaphysical claims that, I have argued, a proponent of MaxCon can reasonably reject. Because of this, a proponent of MaxCon can reasonably accept the possibility of gunky objects of Sort 1 and Sort 2, and thus someone who accepts the possibility of gunky objects need not deny MaxCon on that basis. Finally, I have explored some other issues concerning MaxCon and the possibility of gunky objects that strongly suggest that a proponent of MaxCon who accepts that possibility should deny MCMRO.[25]

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