Entangled Gluons: Replies to Casati, Han, Kim, and Yagisawa

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In their essays in the issue of the *IJPS*, Filippo Casati, Sungil Han, Seahwa Kim, and Takashi Yagisawa comment on a number of issues in *One*[1] (mainly its first part). Let me start by thanking them for their thoughtful comments. I very much appreciate the time and care that they have put into these matters. In this essay, I give my thoughts on their thoughts. I will take their four essays in the alphabetical order of their authors. There is much more to be said about all of their ideas, but because of limitations of space, I must restrict myself to what seem to me to be the most important points. Since the papers are short, I forego giving page references.

1 Casati

Heidegger asked what being is. *One* answers the question: each object (being) has a being, or unity, which is its gluon. In Aristotelian terms, the being of each object is a pin (trope); and being is the corresponding universal, which is itself a gluon.[2] As Heidegger is often at pains to stress, being is the ground of beings; and since being is not a being, it itself it is not grounded in the same way.

[1] Priest (2014).
[2] See *One*, ch. 4.

In recent years, the topic of grounding has come in for extensive discussion.[3] Casati (2017) takes up the Heideggerian picture, as viewed through the lens of gluon theory, and applies the ideas of contemporary grounding theory, with striking results. He notes a certain aporia: Heidegger is forced to acknowledge that being, despite not being a being, *is* a being, as well. Another aporia follows: that being *does* have a ground. Being, then is a ground which is not a ground. A very nice paraconsistent model shows the technical coherence of this way of looking at things.

I think that Casati gets the consequences of the Heideggerian picture exactly right;[4] and that in doing so, he has taken grounding theory into a whole new area. The thought that there are inconsistent mathematical structures is not new;[5] the thought that grounding is one of them, however, is entirely so.

There are a number of themes that run though *One*, unifying the book. The notion of grounding does make an explicit appearance in *One*, but only late in the book (Chapters 11-13). I now see that it is there implicitly from near the start, adding another rich vein of continuity. This became clear to me in discussions with Casati, for which I am much indebted. For what I have to say about this whole vein, see Priest (201a).

2 Han

Han (2017) targets two claims that *One* makes:

(G1) A gluon is an object and not an object.

(G2) A gluon is identical to each of the distinct things that compose a single object.

Let us start by getting the relationship between these two things straight. G2 is what explains how it is that a gluon glues the disparate parts of an object into one thing, breaking the Bradley regress. If one is not to infer the clearly unacceptable conclusion that all the parts of a thing are identical, identity must be non-transitive. G1 establishes that the logic of gluons must

[3] See, e.g., Bliss and Trogdon (2014).

[4] I used to think that Heidegger was no dialetheist. Drawing on Heidegger's *Beiträge*, Casati (2016) persuaded me that he became one later in his career.

[5] See Mortensen (2013).

be a paraconsistent one, and so delivers this. Without it, the non-transitivity of identity would be unmotivated.

In what follows, and for the sake of illustration, let us suppose that an object with gluon g has two non-gluon parts, a and b. Han has a swift argument against G2. To unify the parts, we have $g = a$, $g = b$, and, of course, $g = g$. Han points out that we also have $g \neq g$ as well, and appears to think that this undercuts the ability of g to unify. I confess that the reason for this eludes me. He says 'We are never given any ground for thinking that $g = a$ and $g = b$ while $g = g$ *at the same time*' (his italics). Not only does time have nothing to do with the matter, the unity is explained by the fact that $a = g = b$; the consistency or otherwise of g's own self-identity has little to do with the matter.

However, Han's main argument is against G1. The argument for the first conjunct of G1 is straightforward. Anything one can refer to, quantify over, think about, is an object. Hence, a gluon is an object. This is not at issue here.

For the second conjunct of G1, *One* gives two arguments. The first is that if g were an object, the collection comprising a, b, and g, would be just as much a congeries as the collection comprising just a and b. We are, then, bereft of an explanation of how unity is achieved. So g must be quite a different kind of thing. This observation is as old as Aristotle, and as new as Frege and Wittgenstein (in the *Tractatus*).

Han objects. As best I understand it, the objection is this: given that G2 is true, this reasoning no longer works: g is an object, and its behaviour *does* explain how the parts form a unity. What is at issue here is a conditional:

- If g is an object, its behaviour cannot explain how the parts form a unity.

Han observes that I take the antecedent to be true, and the consequent to be false. Hence, the conditional must be false. True; but too fast. In a dialetheic context, it can be true too; and it is! Adding an object to a bunch of objects just gives... more objects. No object can do what needs to be done.

The second argument that g is not an object derives from gluon theory itself. Let us cut some corners. For any object, x, either $g = x$ or $g \neq x$. So, reasoning by cases, and using the fact that $g \neq g$ in the first: for all x, $g \neq x$. That is, g is no thing; it is not something;[6] it is not an object. Han

[6]Han seems to think that I should find the inference from $\mathfrak{A}x\, x \neq g$ to $\neg\mathfrak{S}x\, x = g$ problematic. However, this seems to me the plainest of quantifier inferences.

observes that this argument uses the Principle of Excluded Middle (PEM). We may reject this principle, he says. He seems to suggest that having given up the Principle of Non-Contradiction (PNC) we might as well give up the PEM. This by no means follows: these principles are quite independent of each another.[7] Moreover, there are also independent reasons for adhering to the PNC.[8]

In the present context there is another reason why the PEM cannot be given up by moving to FDE,[9] as Han suggests: were we to do so, the Leibnizian account of identity, which grounds the non-transitivity of identity in a paraconsistent context, would fail. For the account requires $A \equiv B$ to express the thought that A and B are both true or both false—or now, maybe, both neither. Now, if the values of A and B are n, the value of $A \equiv B$ is itself n. Worse, if A is n and B is b, the biconditional is t!

Finally, Han gestures at an argument against the second conjunct of G1. Essentially, it is as follows:

1. If something can be thought/talked about, it is an object
2. So if g is not an object, it cannot be thought/talked about
3. g cannot be thought/talked about

Han takes the conclusion to be unpalatable.

In reply, one might simply deny the contraposition that takes us from 1 to 2. A conditional, $A \to B$, where A is just true and B is both true and false, may well be true. More radically, one might just accept the conclusion of the argument. One can, then, talk/think about something one cannot talk/think about. This is just a paradox on a par with KÃ¶nig's paradox.[10]

3 Kim

In her piece, Kim (2017) argues to the effect that I have a "superabundance of gluons". She gives essentially two argument for this. This first (i) concerns

[7] He says: 'PEM is undeniable if it is confined to consistent objects.'. Many people have denied it in this context, however. He goes on: '[Since PNC breaks down for non-consistent objects], it seems to be natural to think that PEM also breaks down for inconsistent objects'. But of course, if $A \wedge \neg A$, then it follows that $A \vee \neg A$!

[8] See Priest (2006), 4.7.

[9] On FDE, see Priest (2008), ch. 8.

[10] See *One*, 13.6; and for a fuller discussion, see Priest (201b).

objects which are the fusion of things some of which exist and some of which do not exist. The second (ii) concerns the fact that there can be more than one object wholly in the same place.

The argument for (i) depends on the claim that non-existent objects may have existent gluons; and the argument for that goes as follows. Let $\oplus$ indicate mereological fusion, and let $\Sigma = \{a, b, c\}$, where a, b and c are three disparate objects, such that only a exists. $\oplus\Sigma$ (Tom) does not exist, but is an object, and so has a gluon, g. Since a exists and is a part of $\oplus\Sigma$, g exists.

Unfortunately, this reasoning is incorrect. The problem is with the claim that a is a part of $\oplus\Sigma$. The definition of fusion tells us that:

(1) $\mathfrak{A}x(x \circ \oplus\Sigma \leftrightarrow \mathfrak{S}y \in \Sigma x \circ y)$

(where $\circ$ is overlap). Given this, it quickly follows that a is a part of $\oplus\Sigma$. For if not, it has some part, a', which does not overlap $\oplus\Sigma$. But obviously a' overlaps a, so it *does* overlap $\oplus\Sigma$.

The rub is that (1) is guaranteed to hold only if the parts of Σ do not form a disparate collection, which, in this case, they do. Without this, (1) is not guaranteed to hold at the actual world; it holds only at *some* world or other. So a may not, in fact, actually be a part of $\oplus\Sigma$.[11]

Nonetheless, Kim's main claim is correct. Consider $\{a\}$ (same a). According to *One* (p. 142, fn. 6), the parts of this are a and the universal *sethood*. a exists, but $\{a\}$, being a mathematical object, is a non-existent object.[12] The gluon of $\{a\}$ has the properties of a, however, and so exists.

Kim infers that the theory 'implies a superabundance of existent gluons'. No argument is given for this. In some sense, there is certainly an abundance of existent gluons on this account; but I have no idea why this should be "too many".[13]

[11] In the same context, Kim makes reference to *One*'s theory of perception. If someone sees an object, o, then there is an i-pair, p, whose parts comprise the mental state of the person, s, and o (or something more complex constructed from it). s exists, but o may or may not do. (Since seeing may not be veridical.) p has a gluon, g. Since s exists, so does g. Does p itself exist? *One* offers no view on this matter.

[12] Priest (2005), 7.2.

[13] Kim seems to think I hold the view that ('generally') a gluon exists iff the object exists. This is not my view. She quotes two sentences from *One* to justify he claim. The first is that if a car goes out of existence by falling apart, its gluon ceases to exist. The second is that it is not possible for the gluon of a house to exist without the house. In these cases, we are, of course, talking of objects all of whose parts are existent.

Turning to (ii), gluon theory certainly implies that there can be more than one object wholly in the same place. Let y be a part of an object, x, with gluon g; then $y = g$. So if y is wholly in place p, and g is prime, g is also wholly located at p. However, in general, $y \neq g$. Indeed, for every object, z, of which y is a part, the same argument holds. If x and z are distinct, then the gluons of x and z are distinct, so there can be many objects in the same place.

I am quite happy to accept this conclusion, however. Moreover, it is not an unknown one. Many think, for example, that a statue is distinct from the lump of clay from which it is made. Both, however, may be in the same place. *One* (5.6) rejects this particular view. Kim interprets this passage as my saying that two things can never be wholly in the same place. Such in not my view. In that example, the lump and the state are (presumably) quite consistent objects. Gluons are entirely different things. y and g are identical as well as distinct. Moreover, it follows from the gluon theory of universals (*One*, 3.5) that a universal is wholly located wherever a trope of it is. A trope is wholly located wherever the object whose trope it is is located. So a universal (a gluon of a certain kind) and a particular can be in exactly the same place.

In her last paragraph, Kim refers to the fact that I say that non-existent objects do not 'bloat' one's ontology since they do not exist (one's ontology being what one takes to exist). The gluons we have been talking about, however, exist. Does it follow that we have a case of bloating? The word is a piece of Quinean rhetoric for Ockam's razor: objects should not be multiplied beyond necessity. An abundance of existent gluons is, then, objectionable only if there is a theory at least as good but with fewer existential posits. Without such a theory, the charge is unfounded.

4 Yagisawa

In his paper, Yagisawa (2017) offers an ingenious theory of gluons different from that of *One*. Yagisawa asks us to consider a relation he calls *plural identity*. Let's call this ¥. Then, given an object with parts, $a_1, ..., a_n$, there is an object g_y (the Yagiswa gluon), such that $g_y ¥ a_1, ..., a_n$. It is this which accounts for the unity of the object. He claims that this theory of gluons is to be preferred to *One*'s, since (i) it is compatible with classical logic (ii) it solves the problem of unity if *One*'s gluons do so (iii) it gives a better account

of generation and corruption.

He does not argue for (i). He takes it, I presume, that most people will agree with him, since they think that classical logic is correct. If it *is* held to be correct, then compatibility with classical logic will certainly appear to be a virtue. If, however, one is already persuaded that classical logic is wrong, and an appropriate dialetheic logic is correct (say, because of the paradoxes of self-reference), then this is no longer the case. The assumption that classical logic is correct, though perhaps still orthodox, is an enormous assumption. However, this is not the place to take on this issue.

So let us turn to (ii). First, we need to have a clear understanding of the relation ¥. Normal identity, =, is a relation symbol whose grammar requires it to be flanked by two singular terms, as in: Mary = the person who won the race. This is a very familiar relation. There is also a relation of plural identity. Let us write this as $\equiv$. Grammar requires that it be flanked with two plural terms, as in: the members of parliament $\equiv$ the people who are allowed to vote. The relation is not so familiar, but it is a perfectly fine relation. As usual in plural logic, let us write plural variables by doubling up, thus: xx. Then $xx \equiv yy$ iff every z which is one of the xx is one of the yy, and vice versa.[14]

Yagisawa's ¥ is neither of these two. Grammar requires it to be flanked by a singular term on one side, and a plural term on the other, thus: $x¥yy$. As such, it starts life with a strike against it: it is seemingly impossible to give it coherent truth conditions, identifying, as it does, a unity and a plurality.[15] But in any case, the relation looks to have nothing like the properties of normal identity. By its very grammar, it is not reflexive. Both $x¥y$ and $xx¥yy$ are ungrammatical. Symmetry is also ungrammatical, though it can be regained simply, by defining $yy¥x$ as $x¥yy$. Transitivity fails, however, since we may have $x¥yy$ and $yy¥z$; but $x¥z$ is ungrammatical.[16] Finally, it appears to violate the substitutivity of identiticals, since we have have $x¥yy$, but yy are a plurality and x is not.[17] Yagisawa tries to avoid this objection by claiming that the correct formulations of substitutivity concern only =

[14]See Linnebo (2017).

[15]Note that this would not to be the case were ¥ to express composition. x is composed of yys iff $x = \oplus\{z : z \text{ is one of the } yy\text{s}\}$.

[16]Yagisawa claims that the relation is reflexive and transitive, but does not address these issues.

[17]It is true that in *One* identity does not satisfy substitutivity in full generality either; but this fact falls out of a standard definition of singular identity.

and $\equiv$, thus: $x = y, A(x) \models A(y)$ and $xx = yy, A(xx) \models A(yy)$.[18] But this seems overly restrictive if ¥ really is some kind of identity. For suppose that g explains the unity of some object, o, with parts a and b, and g is a, b (supposing this to make sense), then we should be able to infer that a, b explains the unity of o.[19]

But let us set this issue aside, and assume that ¥ is an intelligible notion of identity. In what follows, to illustrate matters, let's take an object, o, with parts a and b. Following Yagisawa, let g_p be the gluon of the object in the sense of *One*, and let g_y be the gluon of the object in the sense of Yagisawa. Yagisawa suggests that *One*'s theory of gluons solves the Bradley regress since postulating the object g_p does not postulate an *additional* object. In the same way, he says, neither does postulating g_y. Now, this is not an accurate way of looking at matters. It is true that $a = g_p = b$; in that sense g_p, is not an "additional" object. But it is equally the case that $a \neq g_p \neq b$; in that sense, it is. And in some sense, the explanation of the unity of a and b *must* postulate a new object: a and b do not unify themselves!

In fact, g_p solves the problem of unity, not because it is not an additional object, but because the fact that g_p is identical with a means that there is no need to postulate a *further* object to account for what it is that unifies a and g_p (and the same for b). Or, to look at it another way, g_p itself already does this, since $a = g_p = g_p$. Whether or not g_p is a new object is, in fact, beside the point.

Now, given Yagisawa's theory, we must still ask what joints a to b. The only answer we have is that it is g_y. But (consistently) $a \neq g_y$. So we must ask what joins a to g_y. We have nothing with which to answer the question except g_y itself. But this answer will not do, since it gives rise to exactly the same question: what, then, joins a to g_y? This is the mark of a vicious regress. Yagisawa's approach does not, then, solve the Bradley regress.

So let us turn to (iii). Yagisawa considers the following situation. The object o is the same as before, but now suppose that it is the kind of thing that can come into and go out of existence. At the first stage, a and b exist, but are not relevantly configured. So o does not exist, and neither does

[18] Presumably, Yagisawa would have no problem with the first of these, and he explicitly endorses the second.

[19] In fairness, to Yagisawa, I note that there have been attempts to make sense of this lopsided notion of identity. For references, see Noonan (2014), §8. Of course, these proposals should be taken on their merits. Clearly, this is not the place to go into these matters.

its gluon, g. At the second stage, a and b are brought into the appropriate configuration. o comes into existence, and so does g. At the third stage, a and b are disconfigured. o goes out of existence, and so does g. For both theories, Yagisawa's theory and *One*'s, configuration brings g into existence, and so creates a unity. How does it do this? For *One*, there is little to be said about this matter. To be one just is to have a gluon, and that's that.[20] Yagisawa thinks that his theory can do better. His example of piano-lifting, he says, shows how configuration does the trick. It does not. Piano-lifting is a physical action, and it is clear how physical configuration is relevant to this causal processes. Identity is not a causal relation; it is a logical relation. So how is physical configuration supposed to be relevant? Yagisawa's theory appears to be no better than *One*'s in this regard. To drive the point home, recall that many objects are not physical objects: numbers, propositions, maybe even stories (types not token). They are not subject to generation and corruption. They are still unities, though. Clearly, then, physical configuration can have nothing to do with this.

A final matter: Yagisawa himself points out that his theory requires an object to have multiple gluons. (One for its bricks, one for the atoms, etc.) *One*'s gluon theory requires only one: a gluon is identical to *every* part—brick, atom, or whatever. So Yagisawa's theory fares badly according to parsimony. Perhaps even worse, it suffers from over-determination and explanatory redundancy. If one of Yagisawa's gluons is sufficient to explain the unity of an object, then the others are otiose.

Yagisawa's theory of gluons, then, does not live up to its advertised billing.

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Clearly, there are differences of opinion between myself and my commentators. One thing we do seem to agree on, however, is that the problem of metaphysical unity is a hard one. There are going to be no simple-minded solutions to it. The theory of *One*, it must be agreed, has features that will rub many people up the wrong way—though once one gets over Aristotle's *horror contradictionis*, most of these fall away. Han and Kim point to

[20] Yagisawa asks why it is that g_ps being identical with a requires the cooperation from b, a completely distinct object. Answer: for the same reason that it needs cooperation from a to be identical with b. a and b mutually cooperate to make g_p identical to both. If you like, you can think of a and b as entangled in the unity—in a metaphysical analogue of entanglement in the quantum mechanical sense.

other problems they take to find. I have explained why I'm not persuaded. Yagisawa essays a consistent solution to the problem, and I have explained why I still prefer the account of *One*. I doubt that what I have said will persuade them. Perhaps such is to be expected in philosophy. Thoughtful disagreement is always a productive matter, however. Whoever is right, one's understanding of matters always deepens in the process.

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