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The Co-Intension Problem: A Reply to Rodriguez-Pereyra

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Abstract: Gonzalo Rodriguez-Pereyra has presented an objection to the co-intension problem. According to this objection, the examples of properties often cited to motivate the co-intension problem are actually relational properties, and so turn out not to be co-intensional. In this essay, I want to revisit Rodriguez-Pereyra's objection and explain why I find it defective.

Key words: co-intension problem, co-intensional properties, hyperintensional properties, relational and non-relational properties

Take the co-intension problem to be the problem of distinguishing between intuitively distinct but co-intensional properties—that is, properties that have the same instances across every possible world. Gonzalo Rodriguez-Pereyra (2002: chap. 5) has raised an objection to the co-intension problem.[1] Rodriguez-Pereyra charges that the properties typically invoked to motivate this problem are merely relational properties, and thus not co-intensional. If his charge sticks, it could weaken a chief motivation for a hyperintensional conception of properties. Call this objection by Rodriguez-Pereyra, the 'Relational Objection'. In what follows, I will argue that this objection is defective. Too often, criticisms of hyperintensional properties rely on swift dismissals that frequently go unchallenged. My hope here is to bring to light and dispel of one such criticism.

1. RELATIONAL AND NON-RELATIONAL PROPERTIES

First, what distinguishes relational from non-relational properties?[2] The former, but not the latter, are roughly properties that a thing instantiates by standing in a relation to something, whether to itself or to something else. For example: *being shorter than St Salvator's Chapel* is a relational property because that which instantiates it does so by standing in the relation of *being shorter than* to St Salvator's Chapel; but *being an electron* is an example of a non-relational property because that which instantiates it does so *not* by standing in a relation to something.

2. THE RELATIONAL OBJECTION

With this distinction in mind, Rodriguez-Pereyra introduces the Relational Objection by initially focusing on co-extensional properties—that is, properties that have the same instances in the actual world. Metaphysicians of properties have traditionally thought that the properties of *being cordate* and *being renate* are co-extensional.[3] But Rodriguez-Pereyra challenges the foregoing thought. He contends:

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> I do not deny that all and only cordates are renates. . . . But I *do* dispute that these are cases of coextensive properties. They are not coextensive *properties* because the predicates 'is cordate' and 'is renate' are relational ones, applying in virtue of the whole-part relations holding between organisms and hearts, and organisms and kidneys, respectively. . . . So even if the predicates 'is cordate' and 'is renate' apply to exactly the same particulars they do not apply in virtue of the same relation, not even in virtue of coextensive ones. (Rodriguez-Pereyra 2002: 97)

Rodriguez-Pereyra presses this same line of objection against co-intensional properties. He uses *being trilateral* and *being triangular* as his paradigmatic examples. In his view, these properties are not co-intensional since they are not even co-extensional. And the reason for this, according to Rodriguez-Pereyra, is that 'is trilateral' and 'is triangular' are relational predicates; they are two predicates that apply in virtue of different but not co-extensional relations: one relation between trilaterals and sides, and the other between triangulars and angles. He puts the point in these words:

> Similarly for *being trilateral* and *being triangular*. A particular is trilateral in virtue of standing in some relation to three other particulars that are sides, and triangular in virtue of standing in some relation to three other particulars that are angles. But since sides are not angles and vice versa, these relations are not even coextensive. So although the predicates 'is trilateral' and 'is triangular' apply to exactly the same particulars they do not apply in virtue of the same relation, not even in virtue of coextensive ones. (Rodriguez-Pereyra 2002: 97)

Rodriguez-Pereyra's basic charge here can be outlined as follows:[4]

> *Being trilateral* and *being triangular* are relational properties. If *being trilateral* and *being triangular* are relational properties, then they are not co-extensional. Therefore, *being trilateral* and *being triangular* are not co-extensional. But if *being trilateral* and *being triangular* are not co-extensional, then they are not co-intensional. Therefore, *being trilateral* and *being triangular* are not co-intensional.

From this, Rodriguez-Pereyra goes on to ultimately conclude that "the usual examples of such properties, like *being triangular* and *being trilateral* . . . are really only [co-intensional] predicates applying in virtue of different and not coextensive relations" (2002: 100).

3. A CLOSER LOOK AT THE RELATIONAL OBJECTION: *BEING TRILATERAL* AND *BEING TRIANGULAR* AS RELATIONAL PROPERTIES

Rodriguez-Pereyra relies on *being trilateral* and *being triangular* to motivate the Relational Objection, holding that these properties are relational because 'is trilateral' and 'is triangular' are relational predicates. Yet, an immediate concern arises when considering what a relational predicate is. A relational predicate is a monadic predicate that contains a polyadic predicate.[5] For example: 'is shorter than St Salvator's Chapel' is a relational predicate, since it contains the dyadic predicate 'is shorter than'; 'is an electron', on the other hand, is a non-relational predicate, since it does not contain a polyadic predicate. Now, when we reflect on 'is trilateral' and 'is triangular', we find that neither contains a polyadic predicate. Thus, strictly speaking, both predicates are non-relational.

Rodriguez-Pereyra might reply that 'is trilateral' and 'is triangular' could be regimented into relational predicates through paraphrasing, and then the properties that each express would come out as relational. For example, 'is trilateral' may be paraphrased as (1a) and 'is triangular' as (1b):

(1a) $\exists x \exists y \exists z\ \mathrm{Side}(w, x) \wedge \mathrm{Side}(w, y) \wedge \mathrm{Side}(w, z) \wedge x \neq y \wedge x \neq z \wedge y \neq z \wedge w \neq x \wedge w \neq y \wedge w \neq z \wedge \forall v\ \mathrm{Side}(w, v) \supset v = x \vee v = y \vee v = z.$

(Read: there is at least one x, there is at least one y, and there is at least one z, such that: w has x as a side, w has y as a side, and w has z as a side, and x, y, and z are not identical

to each other and not identical to w, and for all v, if w has v as a side, then v is identical to either x, y, or z; more briefly, w has some x, y, and z as sides.)

(1b) $\exists x \exists y \exists z$ Angle(w, x) $\wedge$ Angle(w, y) $\wedge$ Angle(w, z) $\wedge$ $x \neq y \wedge x \neq z \wedge y \neq z \wedge w \neq x \wedge w \neq y \wedge w \neq z \wedge \forall v$ Angle(w, v) $\supset v = x \vee v = y \vee v = z$.

(Read: there is at least one x, there is at least one y, and there is at least one z, such that: w has x as an angle, w has y as an angle, and w has z as an angle, and x, y, and z are not identical to each other and not identical to w, and for all v, if w has v as an angle, then v is identical to either x, y, or z; more briefly, w has some x, y, and z as angles.)

In (1a), *being trilateral* is the relational property that a thing instantiates by standing in the relation of *having __ as a side* to some three other things; in (1b), *being triangular* is the relational property that a thing instantiates by standing in the relation of *having __ as an angle* to some three other things.

There is a drawback with this reply. These paraphrases alone are not enough to show that *being trilateral* and *being triangular* are relational properties as opposed to non-relational ones. If (1a) is a good paraphrase of 'is trilateral', it should be equivalent to 'is trilateral'; and the same goes for (1b) and 'is triangular'.[6] Why not suppose instead that these paraphrases express non-relational properties?

But put this aside and grant that *being trilateral* and *being triangular* are relational based on (1a) and (1b). Does it really follow from their being relational that these properties are not co-extensional and thereby not co-intensional? I don't see how. Rodriguez-Pereyra says so because (1a) and (1b) apply in virtue of relations that are not co-extensional: (1a) in virtue of *having __ as a side*; (1b) in virtue of *having __ as an angle*. But here is the rub: he also maintains (1a) and (1b) apply to the exact same actual particulars. That implies the relational properties expressed by each predicate have the same extension, which is just what it means for them to be co-extensional. The different polyadic predicates that (1a) and (1b) contain are irrelevant to whether the relational properties expressed by (1a) and (1b) have different extensions. Worse yet: he even maintains (1a) and (1b) apply to the exact same possible particulars, so this same reasoning holds, *mutatis mutandis*, for the intensions of these properties.

Perhaps that was too quick. Rodriguez-Pereyra thinks that relational predicates like (1a) and (1b) are to be understood *only* as co-intensional predicates. Therefore, it could be that he endorses a view of relational properties in which a relational property is *nothing over and above* the relation that a thing must stand in to instantiate that property.[7]

But the problem with this sort of view is that the meaning of the phrase 'nothing over and above' is unclear. A natural thought is that it means a relational property is identical to the relation that a thing must stand in to instantiate that property.[8] Yet this thought has dubious implications. For instance, it implies that *being trilateral* is identical to *having __ as a side*, and likewise for *being triangular* and *having __ as an angle*.

Now Rodriguez-Pereyra could supplement this view of relational properties with a meta-theoretic account of properties, which goes something like this.[9] The co-intension problem is a problem only for properties that are sparse, not abundant.[10] Sparse properties are responsible for things like objective qualitative similarities and causal powers. Abundant properties just serve as the semantic values for predicates. Relational properties are of an abundant sort, merely products of our mentally abstracting from the logical combinations of their underlying relations, which are themselves sparse. This is how a relational property is to be thought of as being nothing over and above a relation, and why there is no co-intension problem for *being trilateral* and *being triangular*.

However, this supplemented view faces two serious problems. First, this view claims that relational properties are abundant without explaining why. What makes relational properties abundant? Tradition says that sparse properties are those invoked in fundamental physics; so, the reason

may be that relational properties, such as *being trilateral* and *being triangular*, fall outside this scope. But tradition has no monopoly on which properties are the sparse ones; other conceptions of sparse properties regard properties invoked outside of fundamental physics also as sparse.[11]

Second, even assuming relational properties are abundant, this view claims that the co-intension problem is not a problem for abundant properties without explaining why this is so. What makes abundant properties exempt from this problem? The obvious reason is that abundant properties are mental abstractions on this view, concepts which exist only in the mind, rather than in the mind-independent world. But abundant properties need not be like that. After all, there are alternative conceptions that say abundant properties *do* exist in the mind-independent world.[12]

4. CONCLUDING REMARKS

The properties Rodriguez-Pereyra relies on to make the Relational Objection, *being trilateral* and *being triangular*, are problematic. It is questionable whether these properties are relational in the first place. But even if they are, that does not give us any good reason to think that the properties fail to be co-intensional. These problems expose a substantial gap in the Relational Objection: it is hard to see how and to what extent this objection can be generalised to a wider range of properties that one might cite to motivate the co-intension problem, spanning from other mathematical properties like *being the second smallest prime number* and *being the cube root of the number 27*, to determinable properties like *being shaped* and *being sized*, to natural kind properties like *being a carbon atom* and *being an atom with atomic number 6*, and even to impossible properties like *being a talking number* and *being a reptilian kangaroo*. Maybe more can be said about *being trilateral* and *being triangular* to fill this gap. Until then, however, the Relational Objection is defective as it stands.[13]

NOTES

1. See also Sophie R. Allen (2016: chap. 4) for discussion of this objection.
2. On this distinction, see D. M. Armstrong (1978: chap. 19 and 2010: chap. 2), Edward J. Khamara (1988), I. L Humberstone (1996), Josh Parsons (2001), Rodriguez-Pererya (2002: chap. 4 and 2022: chap. 1), Jonathan Cohen (2009: chap. 1), Vera Hoffman-Kolss (2015), and Anna Marmodoro and David Yates (2016).
3. For example, see W. V. Quine (1951).
4. Rodriguez-Pereyra has confirmed this in personal correspondence.
5. Here I follow the formulation of a relational predicate as described in Parsons (2001: 20), although I have modified that formulation to streamline it. Regarding the term 'contain', I take a neutral stance on its precise interpretation throughout our discussion.
6. For more on good paraphrases, see William Alston (1958).
7. Many thanks to an anonymous reviewer who suggested I expand on this point.
8. This thought draws its inspiration from discussions in mereology concerning the composition as identity thesis, where 'nothing over and above' is perhaps most notably employed. See A. J. Cotnoir (2014) for discussion.
9. Whether the meta-theoretic account to be discussed accurately reflects how Rodriguez-Pereyra sees things is an open question, but employing this account seems to make the Relational Objection more plausible.
10. This includes properties that are either monadic or polyadic (that is, relations). The sparse/abundant distinction traces back to at least D. M. Armstrong (1978ab), but the terminology comes from David Lewis (1983).
11. The so-called 'scientific conception' proposed in Jonathan Schaffer (2004) is a case in point.
12. For example, see Lewis (1983), George Bealer (1986), and Peter van Inwagen (2004).
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