In defence of a hyperintensional conception of properties

J. J. Snodgrass

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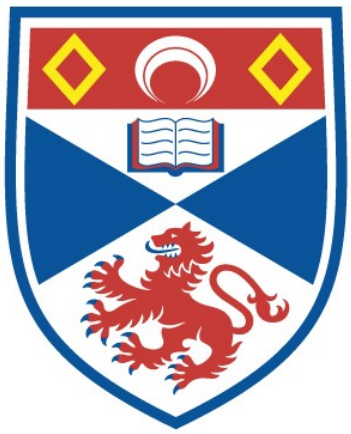

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For Kelsey, a source of light in the darkest of places.

Abstract

In contrast to an intensional conception of properties, which says that sameness of intension among properties implies property identity, a hyperintensional conception of properties says that sameness of intension among properties does not imply property identity, and hence distinct properties may have the very same intension. This PhD thesis is about the metaphysical standing of a hyperintensional conception of properties. While this conception of properties might have an important place in discussions concerning the different ways we represent properties in our language and thought, skepticism looms large among proponents of an intensional conception of properties when a metaphysician takes a hyperintensional conception of properties to extend beyond how we represent properties and into discussions concerning how properties themselves are. The central project of this thesis is to articulate the considerations that underlie this skepticism and defend a hyperintensional conception of properties against them.

In chapter one, I set the scene by addressing a number of preliminary matters that shape my defence of a hyperintensional conception of properties. In chapter two, I consider and respond to objections that this conception of properties relies on distinct properties that do not have the same intension. In chapter three,

I consider and respond to objections that this conception of properties is based upon some linguistic and/or epistemic illusion. In chapter four, I present and examine a modal objection, which calls into question hyperintensional distinctions among properties. In chapter five, I consider and respond to objections that this conception of properties is problematic on theoretical and methodological grounds. In chapter six, I round out my defence by proposing a hyperintensional theory of property identity, in order to resolve two problems that lie at the heart of any metaphysically adequate hyperintensional conception of properties.

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Contents

Introduction

When asked how fine-grained property identity is, we may be tempted with some metaphysicians—the so-called 'extensionalists'—to answer that it is 'extensional'.[1] Let us say that the extension of a property is the set of objects that have that property at the actual world. Then, on an extensional conception of properties, if properties are co-extensional, meaning they share the same extension, this implies that these properties are the same property. Or, equivalently, we can say that mere equivalence among properties is sufficient for property identity.

But in the late 1960s up through the 1980s, during what is now known as the 'intensional revolution' or 'possible worlds revolution', a surge of metaphysicians came to believe that this extensional answer makes property identity too coarse-grained.[2] According to these metaphysicians—'intensionalists' is the usual name for them—the chief problem with this extensional answer is that an extensional criterion of identity for properties is not sensitive to intensional or modal distinctions among properties, distinctions that can distinguish between co-extensional properties.

[1] See W.V. Quine (1956, 1957).

[2] See, most notably, David Lewis (1986b).

Thus, property identity, so answers the intensionalist, is not extensional but rather 'intensional'. Let us say that the intension of a property is the extension of that property at every possible world in the domain of possible worlds. Then, on an intensional conception of properties, if properties are co-intensional, meaning they share the same intension, this implies that these properties are the same property. Or, equivalently, we can say that necessary equivalence among properties is sufficient for property identity, where the necessity in question is absolute or metaphysical necessity, holding in every possible world without restriction.

Over the years, however, starting from as early as the 1970s onward to the present day, the latter half of which is now being described as the 'hyperintensional revolution', a new surge of metaphysicians have come to believe that while an intensional answer is more fine-grained than an extensional one, an intensional conception of properties still makes property identity too coarse-grained.[3] For these metaphysicians—'hyperintensionalists' is their usual name—the main problem with this intensional answer is that an intensional criterion of identity for properties is not sensitive to hyperintensional distinctions among properties, distinctions that can distinguish between co-intensional properties.

Thus, property identity, so answers the hyperintensionalist, is not inten-

[3]For example, see Peter Achinstein (1974), Alvin Plantinga (1976, 2010), George Bealer (1982), Elliot Sober (1982), Edward N. Zalta (1983), Christopher Menzel (1993), Takashi Yagisawa (1988), Roderick Chisholm (1992), David A. Vander Laan (1997), J. P. Moreland (2001), Peter van Inwagen (2004), Francesco Berto (2010), Daniel Nolan (2012, 2013, 2014), Gideon Rosen (2015), Paul Audi (2016), and Ralf Bader (2017), among others. For reasons why conceiving of properties intensionally falls short in accounting for different types of properties, see Kit Fine (1994), Maya Eddon (2011), Bader (2013), Dan Marshall (2015), and Vera Hoffman-Kolss (2015, 2019). On issues surrounding hyperintensional distinctions in general, see Francesco Berto and Daniel Nolan (2021).

sional but instead it is 'hyperintensional'. Let us say that the hyperintension of a property is something more fine-grained than the intension of that property. Then, on a hyperintensional conception of properties, if properties are co-hyperintensional, meaning they share the same hyperintension, this implies that these properties are the same property. Or, equivalently, we can say that necessary equivalence among properties is not sufficient for property identity, and hence distinct properties may be necessarily equivalent.

Skepticism Towards a Hyperintensional Conception of Properties in Metaphysics

Even though the view that property identity calls for a hyperintensional answer seems very popular these days, there remains in several metaphysical quarters a deep suspicion of it. Intensionalists, in particular, have expressed skepticism towards conceiving of properties hyperintensionally—much like extensionalists with conceiving of properties intensionally.

Skepticism varies from intensionalist to intensionalist. One sometimes hears the complaint that the properties at issue are not genuine cases of co-intensional properties. Another complaint often raised is that conceiving of properties hyperintensionally is problematic for theoretical and methodological reasons. Intensionalists also frequently accuse a hyperintensional conception of properties for resting on superficial semantic and/or epistemic motivations, as well as being a conception of linguistic or mental entities (as opposed to extra-linguistic and extra-mental entities). Because of this, a hyperintensional conception of proper-

ties is routinely dismissed or explained away. Thus Timothy Williamson:[4]

> Hyperintensionality arises at the level of thought and linguistic meaning, and should be explained at that level, not at the level of anything like a general theory of properties…[A] coarse-grained intensional standard of individuation is more plausible, and certainly much simpler.

What intensionalists like Williamson advocate, in effect, is that hyperintensionality, as W.V. Quine once said of necessity, lies in the way we talk or think about properties, not in the properties we talk or think about.[5] To conceive of properties hyperintensionally, one might say from the perspective of the intensionalist, is to give life to the real creatures of darkness.

All of these considerations give the strong impression that intensionalists think that a hyperintensional conception of properties is, at bottom, a case of 'second-rate' theorising about properties; something that is not to be taken seriously in metaphysics. Such considerations, therefore, call into question the metaphysical standing of a hyperintensional conception of properties. It is time that hyperintensionalists cast a critical eye on them and address them head on. The purpose of this PhD thesis is to articulate these considerations and defend a hyperintensional conception of properties against them.

[4]Timothy Williamson, *Modal Logic as Metaphysics.* (Oxford: Oxford University Press, 2013), p. 266.

[5]W. V. Quine, *The Ways of Paradox and Other Essays.* (New York: Random House, 1966), p. 174.

An Outline of My Defence of a Hyperintensional Conception of Properties

My defence of a hyperintensional conception of properties unfolds as follows.

In the first chapter, I attend to some preliminary matters. I begin by unpacking two background concepts that are central to my defence: starting with the concept of a property, followed by the concept of a criterion of identity. I then motivate a hyperintensional conception of properties. I do this by surveying two sets of data that generate counterintuitive consequences for the intensional criterion of property identity. The first set of data is that there seem to be distinct but co-intensional properties, and yet the intensional criterion renders all of them identical. The second set of data is that these properties seem to be responsible for the differences in truth-value between various propositions in which they figure, and yet the intensional criterion renders such propositions with the same truth-value. With sufficient motivation in place, I turn in subsequent chapters to consider possible intensionalist objections.

In the second chapter, I dispel of two objections intended to show that the counterintuitive consequences arising from the first set of data are only apparent. These objections attack a hyperintensional conception of properties for relying on distinct properties that are not co-intensional. The first objection I call the 'Relational Objection'. It says that the properties relied on may be relational properties, and therefore are not co-intensional. In response, I point out that it is not obvious all co-intensional properties are relational, and for those that seem relational, this gives no good reason to think they fail to be co-intensional. The

second objection I call the 'Restriction Objection'. It says instead that the properties relied on may be the result of tacitly restricting their intensions. In response to this, I show that while the objection might succeed with a few examples of co-intensional properties, there are still many other examples where the intensions of such properties are not plausibly restricted.

In the third chapter, I deal with two objections that try to show that the counterintuitive consequences stemming from the second set of data are only apparent. These objections attack a hyperintensional conception of properties for confusing a single property with some linguistic or mental representational surrogates of that property. One objection, the 'Wittgensteinian Objection' as I call it, draws on Ludwig Wittgenstein's epistemological account of aspect perception. It claims that the hyperintensionalist confuses one property with different mental concepts, or 'aspects', of that property. I respond by first raising two problems with appeals to aspects that give the hyperintensionalist sufficient grounds to resist the objection. Then I argue that the Wittgensteinian Objection appears more like a strategy for salvaging an intensional conception of properties rather than a genuine objection to a hyperintensional conception. The other objection, what I call the 'Fregean Objection', comes from Gottlob Frege's account of meaning (or semantic content). It states that the hyperintensionalist confuses one property with different senses of that property. I counter this objection by doing two things. First, I argue that the notion of 'sense' is subject to three problems, each of which provide the hyperintensionalist adequate reason to find the objection unconvincing. And second, I contend that the Fregean Ob-

jection suffers from the same defect as the Wittgensteinian Objection: it looks more like another strategy to protect an intensional conception of properties than an objection to a hyperintensional conception.

In the fourth chapter, I present and examine an objection that attacks a hyperintensional conception of properties for permitting what I refer to as 'modally inseparable properties'. This objection targets the defining characteristic of the hyperintensionalist's view of properties, one that calls into question the status of hyperintensional distinctions between properties. It shows that hyperintensional distinctions are merely representational distinctions as opposed to non-representational distinctions. They are, in other words, distinctions without a metaphysical difference. Hence, the counterintuitive consequences arising from the two sets of data laid out in the first chapter can only be apparent. I call this objection the 'Modal Separability Argument', and I respond to it by explaining that certain premises rely crucially on assumptions that the hyperintensionalist is not rationally obligated to accept.

In the fifth chapter, I evaluate four objections that attack a hyperintensional conception of properties for being problematic on theoretical and methodological grounds, particularly when compared to an intensional conception of properties. The first objection I consider shows via *reductio* that a hyperintensional conception of properties has a multiplication problem: roughly, it allows us to endlessly multiply co-intensional properties. I refer to this *reductio* as the 'Multiplication Argument'; and I first respond by identifying three issues with the *reductio* that make it a non-starter. Then I present a modified version of the *reductio* that avoids

the three issues, investigate the justification for one of its premises, and then argue that this revised version is also unsuccessful. Next, I discuss two objections that claim that a hyperintensional conception of properties violates principles of parsimony unnecessarily: qualitative parsimony and quantitative parsimony. I refer to the objection from qualitative parsimony as the 'Qualitative Parsimony Argument', and the objection from quantitative parsimony as the 'Quantitative Parsimony Argument'. I respond that there are two options for how the hyperintensionalist can resist both arguments. One option is to deny that there is any presumption in favour of either principle of parsimony. Another option is to point out that it is not clear whether a hyperintensional conception of properties violates these principles any more than an intensional conception. But even if it does, there are good reasons that could be given to justify such a violation. The data presented in chapter one, along with my responses to the objections from chapters two, three, and four, provide these reasons. The fourth objection accuses a hyperintensional conception of properties for multiplying the degrees of freedom in our theory of properties unnecessarily. And the reason why is that this conception of properties overfits the data used for thinking that property identity is more fine-grained than necessary equivalence. I call this objection the 'Multiplying Degrees of Freedom Argument'; and I respond by arguing that if a hyperintensional conception of properties multiplies the degrees of freedom in a theory of properties, the discussion of the preceding chapters attest that this need not be done without good reason. Based on that discussion, I contend that an intensional conception of properties, in fact, underfits the available data.

In the sixth and final chapter, I take up an objection that claims that a hyperintensional conception of properties is a cheap substitute for an intensional conception, because insufficient attention has been paid to the hyperintension of a property. This objection comprises of two serious yet closely related problems, which I refer to as the 'Granularity Problem' and the 'Difference-Maker Problem'. The Granularity Problem is the problem of giving a criterion of identity for properties that is more fine-grained than the intensional criterion. The Difference-Maker Problem is the problem of determining what makes a given hyperintensional distinction between properties a non-representational difference and not a merely representational one. By way of response, I propose a hyperintensional theory of property identity and show how it resolves each problem. After that, I consider two objections to this theory and defend it from both of them.

This concludes my defence of a hyperintensional conception of properties.

Chapter 1

Preliminaries for My Defence of a Hyperintensional Conception of Properties

The aim of this chapter is to lay the groundwork for my defence of a hyperintensional conception of properties. This chapter is divided into four main sections, with the first two sections dedicated to introducing key background concepts. In section 1.1, I will characterise the concept of a property. In section 1.2, I will clarify the concept of a criterion of identity. Moving on to section 1.3, I will motivate a hyperintensional conception of properties by elaborating on some ways the intensional criterion of property identity appears too coarse-grained. This section will provide a *prima facie* case to go beyond an intensional conception of properties to a hyperintensional conception. Finally, in section 1.4, I will conclude with a brief summary.

1.1 The Concept of a Property

Set with the task to characterise the concept of a property, it is convenient to start with a very general but rather mundane pre-theoretic observation. It is a datum of our ordinary and scientific experience that there are things out in the

world. For example, there are such things as books, tennis balls, electrons, and of course, you and me. These kinds of things are what we call 'particulars'. It is also a datum of our ordinary and scientific experience that there are certain respects in which particulars are. My copy of the book *On the Various Kinds of Distinction* is sky blue. Tennis balls are spherical. Any given electron is negatively charged. My teachers are wise. These certain respects—that is, *being sky blue*, *being spherical*, *being negatively charged*, and *being wise*, are paradigmatic of the kinds of things we call 'properties' (or, synonymously, 'attributes', 'features', and 'characteristics').

Properties may be distinguished between those which are qualitative and those which are non-qualitative.[1] What exactly distinguishes qualitative from non-qualitative properties is not altogether clear.[2] Very roughly, though, the idea is that the former properties do not in some way *involve* any particulars, but the latter do. Typically, examples of qualitative properties include properties like *being sky blue*, *being spherical*, *being negatively charged*, and *being wise*, whereas typical examples of non-qualitative properties include identity properties, like *being identical to Francisco Suárez*. I will restrict my usage of the term 'properties' to qualitative properties. While not essential to my defence, this restriction helps bring the core issues between intensionalists and hyperintensionalists into

[1]For discussion, see Michael J. Loux (1978), Gary S. Rosenkrantz (1979), Sam Cowling (2015), Hoffmann-Kolss (2015, 2019), and Jan Plate (2022).

[2]For instance, John Divers (2002: p. 349, fn. 12) states, "I know of no detailed discussion of the qualitative/non-qualitative distinction for properties." Since Divers made that statement, however, metaphysicians of properties have made attempts to better understand the qualitative/non-qualitative distinction. See especially Cowling (2015) and Hoffman-Kolss (2015, 2019) for such attempts.

sharper focus. Therefore, my defence of a hyperintensional conception of properties is first and foremost a defence of qualitative properties.

One approach to coming to further grips with what kinds of things properties are, if not the most prominent approach among metaphysicians, is to look at the roles that properties might be thought to serve in our philosophical and scientific theories. The primary reason is that if we can identify those roles that are supposed to be distinctive of properties, we can gain important metaphysical insights into what properties themselves are like. "To deserve the name of 'property'", as David Lewis puts it, "is to be suited to play the right theoretical role."[3] In this section, I will present and explain the theoretical roles that metaphysicians have taken to be distinctive of properties.

1.1.1 Putting Properties to Work

Metaphysicians of properties have invoked properties to account for a host of phenomena.[4] I will discuss five that have been at the center of debates about the metaphysics of properties. By doing so, this will help draw out the most common theoretical roles that properties are called upon to play. The first two phenomena fall under the 'non-semantic phenomena': qualitative similarity and causal powers. The other three fall under the 'semantic phenomena': subject-predicate discourse, abstract reference, and quantification.

[3]David Lewis, *On the Plurality of Worlds*. (Oxford: Blackwell Publishers, 1986b), p. 55.

[4]For example, see Loux (1978), Lewis (1983, 1986b), Phillip Bricker (1996), Alex Oliver (1996), Chris Swoyer (1999), Douglas Edwards (2014: ch. 1), and Robert C. Koons and Timothy H. Pickavance (2017: ch. 7).

1.1.1.1 Qualitative Similarity

The first phenomenon that properties are invoked to account for concerns the qualitative similarity among things. Many distinct things that populate the world appear to be exactly similar in certain respects. Take a pair of ordinary particulars—say, a red ball and a blue ball. There are several respects in which these two particulars are exactly similar. One respect is in shape: they are both spherical. That they are both spherical cries out for an account: how is it that these two distinct particulars are similar in one and the same respect?[5] By invoking properties, we can say that there is something, a property, that they both 'share' or 'have in common'. For example, the red ball and the blue ball are exactly similar with respect to shape by having the property of *being spherical* in common. Or, stated in the metaphysician's vernacular, we say that the red ball and the blue ball both 'instantiate' the property of *being spherical*, and the red ball and the blue ball are both 'instances' of the property of *being spherical*. If the blue ball had instantiated the property of *being red*, the blue ball would be an instance

[5]This is often known as the problem of the 'One over Many'. Importantly, this metaphysical problem should be distinguished from its semantic and epistemological interpretations. The semantic interpretation asks for an account of how one and the same predicate may correctly apply to distinct particulars. The epistemic interpretation asks for an account of how we can know that one and the same predicate correctly applies to distinct particulars. D.M. Armstrong (1978a and 1989: ch. 1) is a notable advocate of the problem of the One over Many. A classic debate on the seriousness of this problem can be found in the exchange between Armstrong (1980) and Michael Devitt (1980). Further discussion on the topic can be found in Quine (1980), Lewis (1983), James van Cleve (1994), Oliver (1996), Moreland (2001), Nolan (2008), Paul Gould (2012), Edwards (2014: ch. 4), and Matthew Tugby (2016a). However, it is hard to say how exactly the problem of the One over Many is really a problem. It is often seen as a demand for an account of qualitative similarity (or attribute-agreement). This is the primary reason why I prefer to speak in terms of the phenomenon of qualitative similarity rather than the problem of the One over Many. For related discussion, see Loux (2017).

of the property of *being red*, and in turn the two balls would then no longer be dissimilar with respect to their colour. Hence, the qualitative similarity among things is accounted for by the properties that they instantiate.

1.1.1.2 Causal Powers

The second phenomenon that properties are invoked to account for concerns the causal powers (or dispositions) of things.[6] Many distinct things that populate the world also appear to possess certain causal powers. By this I mean there are things in the world disposed to behave in certain ways under certain conditions. Here are just a few (defeasible) examples to illustrate:

> A particular glass vase is disposed to shatter when it is dropped from a high enough distance onto a ceramic tile floor.
>
> A particular rubber band is disposed to stretch when it is pulled in opposite directions.
>
> A particular sugar cube is disposed to dissolve when it is mixed in with water.
>
> Any two given electrons are disposed to exert force on and repel each other, in keeping with Coulomb's inverse-square law, when their electrical fields interact.

[6]For example, see Armstrong (1978b), Sydney Shoemaker (1980), Keith Campbell (1981), Peter Menzies (1989), C.B Martin (1993), Swoyer (1999), Nancy Cartwright (1999), Brian Ellis (2001), John Heil (2003, 2012), Peter Simons (2005), Alexander Bird (2007), Stephen Mumford and Rani Lill Anjum (2011), Tugby (2013ab, 2016b, 2022), Barbara Vetter (2015), Neil E. Williams (2019), and Travis Dumsday (2019). For discussions on the relationship between properties, causal powers, and the laws of nature, see Fred I. Dretske (1977), Michael Tooley (1977, 1987), Armstrong (1983), Lewis (1983), Ellis (2001), Stephen Mumford (2004), E.J. Lowe (2006), Maya Eddon and C. J. G. Meacham (2015), Tugby (2016b, 2022), Williams (2019), and Dumsday (2019).

If all this is right, then how is it that these particulars—that glass vase, this rubber band, our sugar cube, and any two given electrons, are disposed to behave in these so-and-so ways under these such-and-such conditions? By invoking properties, we can say that it is their properties that determine why such particulars are disposed to behave in the ways that they do under the given circumstances they find themselves. For example: it is by instantiating the property of *being fragile* that the glass vase is disposed to shatter when it is dropped from a high enough distance onto a ceramic tile floor; it is by instantiating the property of *being elastic* that the rubber band is disposed to stretch when it is pulled in opposite directions; it is by instantiating the property of *being soluble* that our sugar cube is disposed to dissolve when it is mixed in with water; and, it is by instantiating the property of *being negatively charged* that any two given electrons are disposed to exert force and repel one another, in keeping with Coulomb's inverse-square law, when their electrical fields interact. Hence, the causal powers of things are accounted for by the properties that they instantiate.

1.1.1.3 Subject-Predicate Discourse

The third phenomenon that properties are invoked to account for is subject-predicate discourse.[7] Subject-predicate discourse generally takes the form of English subject-predicate sentences. Some examples of subject-predicate sentences are:

[7]For example, see Loux (1978, ch. 2), Moreland (2001: ch.1), Stephen Schiffer (2003), Bob Hale and Crispin Wright (2009), Edwards (2014: ch. 1), and Michael J. Loux and Thomas Crisp (2017: ch. 1).

Francisco Suárez is human.

This electron is negatively charged.

The act of torturing children is wrong.

The number 2 is even.

When we assert subject-predicate sentences, we seem to do at least two things. Firstly, we use the subject term, which is often a singular term like a proper name ('Francisco Suárez'), a demonstrative pronoun ('this' or 'that'), a definite description ('The act of torturing'), or a singular personal pronoun ('you' and 'he'), to refer to something, like a particular or an act. Secondly, we use the predicate, which is often treated as a general term ('human'), to describe whatever occupies the subject position as being some way.[8] For instance, when we assert the sentence 'Francisco Suárez is human.', we use the proper name 'Francisco Suárez' to refer to the flesh-and-blood person, and then use the predicate 'human' to say something important about what kind of thing Francisco Suárez is—namely, that Francisco Suárez is human.

Now suppose that these subject-predicate sentences are true. How is it that they manage to be true? Just think about the sentence 'Francisco Suárez is hu-

[8]Informally, predicates are also treated as the copula combined with a general term, such as 'is human', or the copula along with a general term and an article, as in 'is a human being'. Formally, in a subject-predicate sentence like 'Francisco Suárez is human.', this sentence takes the form 'P(a)', where the expressions 'human', 'is human', and 'is a human being' are all represented using the single predicate letter 'P'. In formal languages, predicates can also be represented as a formula with one or more free variables; for example, the predicate 'human' can be represented as 'P(x)'. Throughout my defence, I will freely use both informal and formal usages interchangeably, and I will assume that they are just different ways of expressing properties.

man.'. Presumably, if this sentence is true, then, given the referential role of the proper name 'Francisco Suárez', the semantic value of this proper name—and more generally, the truth-value of the sentence, has something to do with the flesh-and-blood person, Francisco Suárez. But then, what are we to make of the semantic value of the predicate 'human'? This predicate is not only a meaningful unit of language, but it also appears to contribute something important to the truth-value of the sentence. The predicate represents Francisco Suárez as being a certain way: that is, the predicate represents him as being human. Furthermore, the semantic value of the predicate 'human' is seemingly not some particular human, since this one predicate could be predicated of each and every human in the set of humans. By invoking properties, we can treat predicates as referential devices like singular terms, except that properties are what serve as the semantic values for predicates. So, for example, the proposition expressed by the sentence 'Francisco Suárez is human.' has the person, Francisco Suárez, for its subject, and it predicates of him the property of *being human*. Effectively, then, what the sentence 'Francisco Suárez is human.' says is that Francisco Suárez instantiates the property of *being human*. Hence, by construing predicates as referential devices, the truth of our subject-predicate discourse can be adequately accounted for when the subject term and predicate term both have distinct extra-linguistic entities as their semantic values: particulars and properties, respectively.

1.1.1.4 Abstract Reference

The fourth phenomenon that properties are invoked to account for is abstract

reference.[9] Abstract reference most often occurs with sentences that contain abstract singular terms. An abstract singular term is a type of singular term that is the result of a nominalisation operation usually performed on a general term, which converts the general term into a noun or noun phrase. For example: 'rectangularity' is converted from 'rectangular'; 'honesty' is converted from 'honest'; 'blueness' is converted from 'blue'; and gerundive constructions like 'the property of *being red*' is converted from 'red'. Some examples of sentences that contain abstract singular terms are the following:

> Rectangularity is a shape.
>
> Honesty is a virtue.
>
> Blueness is a colour.
>
> The property of *being red* is more similar to the property of *being orange* than it is to the property of *being green*.

Suppose now that these sentences are true. How then do they manage to be true? Given the referential role of singular terms, the truth-value of these sentences seemingly has something to do with the referents of the abstract singular terms they contain. But what are supposed to be the referents of such terms? In other words, what serves as their semantic values? Consider, for example, the abstract singular term 'rectangularity'. It does not seem right to say that the referent of

[9]For example, see Arthur Pap (1959), Frank Jackson (1977), Loux (1978: ch. 4), Lewis (1983), Moreland (2001: ch. 1), Armstrong (2010: ch. 2), Edwards (2014: chs. 1 and 7), William Lane Craig (2016: chs. 6-10, 2017: chs. 3-11), and Loux and Crisp (2017: ch. 1).

'rectangularity' is some rectangular particular; for what principled reason would we have to select one rectangular particular and not some other rectangular particular? By invoking properties, we can say that the semantic value of this term is the property of *being rectangular*, something that all rectangular particulars have in common. Hence, if abstract singular terms are contained in sentences that are true, the truth of such sentences can be adequately accounted for if abstract singular terms are treated as referential devices, with properties as their semantic values.

1.1.1.5 Quantification

The fifth and the last of the phenomena that properties are invoked to account for has to do with quantification.[10] In particular, it concerns the sort of quantification that occurs in sentences that contain property quantifiers.[11] An example of a property quantifier is an existential quantifier that appears to involve quantification over properties. Existential quantifiers would be expressions like 'There is', 'There are', 'There is at least one', and 'some'. The following are examples of sentences that contain property quantifiers:

> Butane has some chemical characteristics in common with isobutane.

> Some virtues are best exercised in political discussions.

[10]For example, see Quine (1948), William Alston (1958), Hilary Putnam (1970), Loux (1978: ch. 4), Armstrong (1980), Lewis (1983), van Cleve (1994, 2016), Chisholm (1996: ch. 3), D.H. Mellor and Alex Oliver (1997: introduction), van Inwagen (2004, 2014: ch. 7, 2015, 2016, and 2023: ch. 3), Craig (2016: chs. 6-10, 2017: chs. 3-11), and Nicholas K. Jones (2018).

[11]The term 'property quantifiers' comes from Mellor and Oliver (1997: p. 12).

> There are some shapes that are not instantiated.
>
> This book and that book share some colour.

Suppose that these sentences are true. On the face of it, each of them has their own ontological commitments or existential implications. Take just the sentence 'Butane has some chemical characteristics in common with isobutane.' as an example. This sentence implies:

> There are some chemical characteristics that butane has and isobutane also has.

Paraphrasing this sentence using predicate logic, we get the following:

$$\exists x \text{ Chemical Characteristic}(x) \wedge \text{Has}(\text{Butane}, x) \wedge \text{Has}(\text{Isobutane}, x),$$

where this reads that there is at least one x such that x is a chemical characteristic and butane has x and isobutane has x. But then, this raises a question: what is supposed to be the semantic value of the (first-order) variable 'x' that is bound by the property quantifier in this sentence? Or less formally: what could be a chemical characteristic? It seems most natural to say that a chemical characteristic is a property, not some particular. Hence, by invoking properties, the truth of sentences containing property quantifiers can be adequately accounted for if properties are treated as the semantic values of the variables that our property quantifiers range over.

1.1.2 The Theoretical Roles of Properties

Taking the discussion of the non-semantic and semantic phenomena together, a picture begins to emerge of the distinctive theoretical roles of properties:

> A property is something that is responsible for the qualitative similarity among the things that instantiate it.

> A property is something that is responsible for the causal powers among the things that instantiate it.

> A property is something that serves as the semantic value for our meaningful predicates.

> A property is something that serves as the semantic value for our meaningful abstract singular terms.

> A property is something that serves as the semantic value for the variables that our property quantifiers range over.

We can see that there is a clear division between the types of theoretical roles that properties play. The non-semantic phenomena are associated with the 'non-semantic roles': being responsible for qualitative similarity and causal powers. The semantic phenomena are associated with the remaining three roles, the 'semantic roles': serving as the semantic value for our meaningful predicates, our meaningful abstract singular terms, and the variables that our property quantifiers range over.

This division between the semantic and non-semantic roles corresponds to two fundamentally different conceptions of properties, respectively: an abundant conception of properties and a sparse conception of properties.[12] Each conception falls on a spectrum of positions a metaphysician can occupy, but a general overview of the two basic conceptions will suffice for this chapter.[13]

One way to think about an abundant conception of properties is that properties so conceived correspond to any (or at least most) meaningful predicates in a language, provided that the conditions for using them have been clearly specified.[14] On this conception of properties, for every set of things—it does not matter how utterly miscellaneous they are from one another—there is some abundant property that is instantiated by the members of that set. Abundant properties are well suited to play the semantic roles, but they appear to be poorly suited

[12]The 'sparse' and 'abundant' terminology originate from Lewis (1983: pp. 344-347 and 1986b: ch. 1, p. 60). However, as Theodore Sider (1995: pp. 360-361) points out, the distinction between sparse and abundant properties was already present in the earlier works of D.M. Armstrong (1978a and 1978b: ch. 13, pp. 7-9). In subsequent works, Lewis used the terms 'perfectly natural' and 'less-than-perfectly natural' properties as alternatives for 'sparse' and abundant' respectively: for example, see Lewis (1986b: ch. 1, pp. 60-61). Apart from 'sparse' and 'abundant', various other labels have been employed to describe this distinction. Bealer (1982: Introduction, pp. 9-10, and ch. 8, pp. 177-187) uses the terms 'Conception 1 Properties' (or 'qualities') and 'Conception 2 Properties' (or 'concepts') as alternatives for 'sparse' and 'abundant', respectively. Swoyer (1996) characterises the sparse and abundant distinction as the 'minimalist conception' and the 'maximalist conception'. Robert C. Stalnaker (2003: Introduction, p. 9) refers to sparse and abundant properties as 'thick' and 'thin' properties, respectively. Bob Hale (2013b) describes the abundant conception as the 'deflationary' (or 'metaphysically lightweight') conception of properties.

[13]For more discussion, see Swoyer (1996) and Jonathan Schaffer (2004).

[14]Predicates like 'not self-instantiable' are exceptions, as they result in Russell-like paradoxes. To illustrate, suppose that 'not self-instantiable' can be successfully predicated. Then there would be the property of *being not self-instantiating*. But if that is right, this property must either instantiate itself or not. If it does not, it becomes an instance of itself, which entails a contradiction. But if it does instantiate itself, it becomes an instance of itself, which also entails a contradiction. In either case, we end up with a contradiction.

for non-semantic roles. To see why, consider a pair of electrons. Both share the property of *being negatively charged*. This property makes them similar with respect to their charge, and it confers on them the ability to interact with each other through electrostatic forces, which is their causal power. But these electrons also share the disjunctive property of *being negatively charged or a kangaroo*, which is an abundant property. Yet this abundant property does not contribute to any *salient* similarity between the electrons, nor does it confer on them any causal powers.

A sparse conception of properties, however, says properties so conceived correspond to the meaningful predicates in a language only if those properties make for *salient* qualitative similarity or confer causal powers among the members of a set. Sparse properties—as the saying goes—fix reality at its joints. By settling what the facts are about the instantiation of these properties, we settle all the qualitative facts. As Lewis says, "…there are only just enough [sparse properties] to characterize things completely and without redundancy."[15] Thus, sparse properties are well suited to play the non-semantic roles, yet they seem poorly suited for the semantic ones.

Metaphysicians, including both intensionalists and hyperintensionalists, disagree on whether properties are abundant or sparse because they disagree about which theoretical roles should be assigned to properties. Some metaphysicians reject abundant properties in favour of sparse properties due to the issues related to the non-semantic phenomena. Conversely, others reject sparse properties in

[15]Lewis, *On the Plurality of Worlds*, p. 60.

favour of abundant ones due to the issues related to the semantic phenomena. And, of course, there are also metaphysicians who accept both abundant and sparse properties due to the issues from both phenomena. For the purposes of my defence, I will assume that whatever plays the semantic or non-semantic roles deserves the name 'property', and therefore properties may either be abundant or sparse.

1.2 The Concept of a Criterion of Identity

I turn next to the concept of a criterion of identity.[16] In this section, I will explain what a criterion of identity is. I do this by addressing the function of a criterion of identity, along with the interpretations and formulations of a criterion of identity.

1.2.1 The Function of a Criterion of Identity

In the broadest sense, a criterion of identity is a principle by which to determine when things x and y of a given kind are identical or distinct. In other words, it is a principle that specifies the identity conditions of x and y, the necessary and jointly sufficient conditions under which x and y are one and the same thing as

[16]In so far as I can tell, Gottlob Frege (1950) introduced the term 'criterion of identity' in analytic philosophy. It is important to clarify that in discussing the concept of a criterion of identity, I am referring to what is classically known as absolute identity and not to relative identity. Roughly, the difference is this. To say that identity is absolute is to say that there is a single identity relation that each thing bears to itself and to nothing else. This relation is represented by the predicate 'is identical to'; or, more formally: '='. On the other hand, to say that identity is relative is to say that there are many identity relations associated with a variety of kinds (or sortals), such that things can bear one identity relation to each other while not bearing another identity relation. These kind-relative identity relations are represented by the predicate 'is the same F as', where 'F' is some general term; or, more formally: '$=_F$'. The earliest and most well-known proponent of relative identity is P. T. Geach; for example, see Geach (1967, 1973). For further discussion on this distinction and related issues, see John Hawthorne (2003) and references therein.

opposed to two distinct things.

Crucially, however, a criterion of identity is *not* a principle by which to define or analyse the identity relation into something more basic. The identity relation is in a rough and ready sense a *topic-neutral relation*—or better yet, an *invariant relation*, one that every single thing, regardless of its kind, bears to itself and nothing else. This means that even though the identity conditions of one kind of thing may vary from the identity conditions of another kind of thing, the identity relation itself does not vary from one kind of thing to another kind of thing, let alone vary between distinct things of the same kind. As Katherine Hawley reminds us:[17]

> It is received wisdom that the variety in identity criteria does not reflect variety in identity relations: personal identity, set identity, and the like are all just identity. Criteria of identity do not tell us about identity as such. Instead, they tell us about minimal differences between [things] of a given kind: distinct sets must differ in their membership, distinct physical objects (let's suppose) must differ in their spatial locations.

1.2.2 The Interpretations of a Criterion of Identity

A criterion of identity may be interpreted as an epistemic principle or as a metaphysical principle.[18] If a criterion of identity is an epistemic principle, then it is a principle that specifies the conditions under which we can *know* that things x and y of a given kind are identical or distinct. If, however, a criterion of identity

[17]Katherine Hawley, 'Principles of Composition and Criteria of Identity', *Australasian Journal of Philosophy*, 84 (2006), 481-493 (p. 488).

[18]For discussion, see Williamson (1990: ch. 9), Lowe (1998: ch. 2), and Francesco Berto and Matteo Plebani (2015: ch. 3).

is a metaphysical principle, then it is a principle that specifies the conditions under which things x and y of a given kind are identical or distinct, *irrespective* of whether we can know that x and y are identical or distinct. Naturally enough, since my defence of a hyperintensional conception of properties is meant to be a metaphysical defence, I will be concerned with a criterion of identity interpreted as a metaphysical principle.

1.2.3 The Formulations of a Criterion of Identity

A criterion of identity may be formulated (at least) as a one-level criterion or as a two-level criterion.[19] A one-level criterion of identity specifies the identity conditions of things of a given kind in terms of an equivalence relation that holds among those exact things whose identity is being specified.[20] This equivalence relation is referred to as a 'criterial relation'. The form of one-level criteria is stated as follows:

$$\forall x \forall y \, ((K(x) \wedge K(y)) \supset (x = y \equiv R(x, y))$$

(Read: for every x and y, if x and y are things of kind K, then x is identical to y if and only if x stands in some criterial relation R to y.)

The axiom of extensionality for sets is an often-cited example of a one-level criterion:

[19] See Williamson (1990: ch. 9, pp. 145-148), Lowe (1998: ch. 2, pp. 41-45) and Leon Horsten (2010). Fine (2016) substitutes 'one-level' and 'two-level' for 'direct' and 'indirect', respectively.

[20] An equivalence relation is a relation R that is reflexive, symmetric, and transitive:
Reflexivity: $\forall x Rxx$
Symmetry: $\forall x \forall y((Rxy) \supset Ryx)$
Transitivity: $\forall x \forall y \forall z((Rxy \wedge Ryz) \supset Rxz$

$\forall x \forall x$ ((Set(x) $\wedge$ Set(y)) $\supset$ (x = y $\equiv$ $\forall$z (z $\in$ x $\equiv$ z $\in$ y))

(Read: for every x and y, if x and y are sets, then x is identical to y if and only if x and y have the exact same members.)

Here the identity conditions of sets are specified in terms of the criterial relation of *having the exact same members as*, which holds among those particular sets whose identity and distinctness is in question.

By contrast, a two-level criterion of identity specifies the identity conditions of things of one kind in terms of a criterial relation that holds among things that are of a different kind but, nevertheless, stand in a *functional* relationship to the things of the former kind. The form of a two-level criterion is expressed in the following way:

$\forall x \forall y$ ((K(x) $\wedge$ K(y)) $\supset$ (f(x) = f(y) $\equiv$ R(x, y))

(Read: for any x and y, if x and y are things of kind K, then the function of x is identical to the function of y if and only if x stands in some criterial relation R to y.)

Notice this formulation leaves open whether x itself is identical to y itself. Two-level criteria express whether the *function* of x and the *function* of y are identical, since it is the functions of x and y that flank the identity sign '='. But the identity of the functions of x and y is secured only by the criterial relation that holds between those things that fall within the range of 'x' and 'y'. On a two-level criterion, there are two domains of things of distinct kinds. The first domain consists of those things that the variables 'x' and 'y' range over, and these things

get mapped onto, via the functional terms, to those things of a different kind that fall within the second domain. If, therefore, the functions are identical, then the criterial relation is said to hold between the relevant things from the first and second domains. Frege's criterion of identity for directions is an often-cited example of a two-level criterion:[21]

$$\forall x \forall y \, ((\text{Line}(x) \wedge \text{Line}(y)) \supset (d(x) = d(y) \equiv \text{Parallel}(x, y))$$

(Read: for every x and y, if x and y are lines, then the direction of x is identical to the direction of y if and only if x and y are parallel.)

Here the identity conditions of directions are specified in terms of the criterial relation of *being parallel to*, which holds among lines.

Metaphysicians are divided about which of these two formulations should be endorsed.[22] There is also disagreement about whether all criteria of identity can be formulated as exclusively one-level or two-level criteria.[23] However, in this defence, I will not be considering those sorts of disputes as they are largely irrelevant to the specific debate between intensionalists and hyperintensionalists that I am addressing, and so they will be left aside. Instead, the main emphasis will be on the particular identity conditions that are specified by a given criterion of identity, regardless of whether that criterion is already formulated or can be formulated as a one-level or a two-level criterion.

[21] Gottlob Frege, *The Foundations of Arithmetic*, trans. by J. L. Austin (Oxford: Blackwell Publishing, 1950), pp. 74-5.

[22] For more discussion, see Lowe (1989, 1991), Williamson (1990: ch. 9, 1991), and Horsten (2010).

[23] Again, see Horsten (2010).

1.3 Problems with the Intensional Criterion of Identity for Properties

Having discussed the concepts of a property and a criterion of identity, I will now motivate a hyperintensional conception of properties. My plan is to draw out various counterintuitive consequences with the intensional criterion of property identity. This criterion takes the form of a one-level criterion:

$$\forall F \forall G\ ((\text{Property}(F) \wedge \text{Property}(G)) \supset (F = G \equiv \Box \forall x\ (F(x) \equiv G(x))))$$

(Read: for every F and G, if F and G are properties, then F is identical to G if and only if it is necessary that, for any x, x instantiates F if and only if x instantiates G; or, more simply, properties F and G are identical if and only if F and G are co-intensional.)[24]

For this criterion, the identity conditions of properties are specified in terms of the criterial relation of *having the exact same possible instances as*.

The goal of this section is *not* to argue that the counterintuitive consequences of the intensional criterion establishes the truth of a hyperintensional conception of properties. On the contrary, the goal is more modest. It is to show only that these consequences provide a *prima facie* case to cast doubt on the claim that necessary equivalence among properties implies property identity. To do this, I will provide two sets of data that give rise to these counterintuitive consequences.

[24]For clarity, the intensional operators 'it is necessary that' represented with the symbol '$\Box$' and 'it is possible that' represented with the symbol '$\Diamond$' are understood as quantification over possible worlds, respectively: every possible world and some possible world.

1.3.1 Dataset (1) The Property-Catalogue of Co-intensional Properties

The first set of data is that there seem to be distinct but co-intensional properties. Let us use the 'property-catalogue' as a name for the collection of these properties. The property-catalogue divides co-intensional properties into two general types: necessarily co-instantiated properties and impossibly co-instantiated properties. Necessarily co-instantiated properties are pairs (or triples or more) of co-intensional properties that can be instantiated at possible worlds such that at every possible world that one property is instantiated, the other property is also instantiated, and vice versa. Impossibly co-instantiated properties are pairs (or triples or more) of co-intensional properties that cannot be instantiated at any possible world. I will explain what the necessarily co-instantiated properties are, and then I will explain what the impossibly co-instantiated properties are.

But, in doing so, I make no claim about comprehensiveness. I present here only a partial list of the respective properties that fall within the property-catalogue. A complete list is not only unrealistic but unnecessary. Although I provide additional examples of co-intensional properties in later chapters, the examples I list below suffice as a minimal basis for my defence. I also make no claim about commitment to the existence of these properties: some hyperintensionalists say they exist; some say they don't. But I believe that these properties serve as a useful starting point and guide for understanding the considerations at issue between intensionalists and hyperintensionalists.

1.3.1.1 Necessarily Co-instantiated Properties

Necessarily co-instantiated properties may be divided into at least four different types: mathematical properties, determinable properties, natural kind properties, and great-making properties.

1.3.1.1.1 Mathematical Properties

Mathematical properties are properties of mathematical objects, like numbers and geometrical figures. These would include properties such as *being a prime number* and *being a line segment.* It is natural to say that the properties in each pair of mathematical properties in (1a) and (1b) on the one hand, and in (2a) and (2b) on the other, are distinct from each other:

(1a) The property of *being the second smallest prime number*

(1b) The property of *being the cube root of the number 27*

(2a) The property of *being trilateral*

(2b) The property of *being triangular*

Nevertheless, (1a) and (1b) are co-intensional and so are identical. Likewise, *mutatis mutandis*, for (2a) and (2b).

1.3.1.1.2 Determinable Properties

Let us say that property F is a determinate of property G if and only if F is a specific way of being G. For example: *being spherical* is a specific way of *being*

shaped; *being red* is a specific way of *being coloured*; and *being a foot in length* is a specific way of *being sized*. If property F is a determinate property of property G, then G is said to be a determinable property of F. Examples of determinable properties are *being shaped*, *being coloured*, and *being sized*. It is natural to say that the pair of determinable properties in (1a) and (1b) are distinct from one another:

(1a) The property of *being shaped*

(1b) The property of *being sized*

Nevertheless, (1a) and (1b) are co-intensional and so are identical.

1.3.1.1.3 Natural Kind Properties

Natural kind properties are roughly properties of objects, typically objects like fundamental particles, chemical elements, and biological species, that are collectively similar to each other in one respect and not similar to any other object in that respect.[25] Among the natural kind properties are properties such as, *being an electron*, *being a carbon atom*, and *being a kangaroo*. It is natural to say that the natural kind properties in (1a) and (1b) are distinct from one another:

(1a) The property of *being a carbon atom*

(1b) The property of *being an atom with atomic number 6*

[25] Some might say that determinable properties are in fact natural kind properties. For example, see Campbell (1990: ch. 4). If they are natural kind properties, this does not affect my case. I choose to distinguish determinables from natural kind properties because they raise issues of their own that are relevant to my discussion.

Nevertheless, (1a) and (1b) are co-intensional and so are identical.

1.3.1.1.4 Great-Making Properties

In perfect being theology, God is defined as the greatest possible being. We can put this more precisely as follows. Following Jeff Speaks, let us say that it is necessarily the case that, for every x, x is God if and only if x is the greatest possible being.[26] The greatest possible being is a being with all the compossible great-making properties. Among the great-making properties of this being, there are such properties as *existing necessarily*, *being maximally powerful*, *having maximal knowledge*, and *being maximally good*. It is natural to say that the great-making properties in (1a), (1b), and (1c) are distinct from one another:

(1a) The property of *being maximally powerful*

(1b) The property of *having maximal knowledge*

(1c) The property of *being maximally good*

Nevertheless, (1a), (1b), and (1c) are co-intensional and so are identical.

1.3.1.2 Impossibly Co-instantiated Properties

Impossibly co-instantiated properties may be divided into at least three different types: contradictory properties, categorically mistaken properties, and contrary

[26] Jeff Speaks, 'The Method of Perfect Being Theology', *Faith and Philosophy: Journal of the Society of Christian Philosophers*, 31 (2014), 256-66 (p. 256). For an introduction on perfect being theology, see Michael Murray and Michael Rea (2008: ch.1).

properties.[27]

1.3.1.2.1 Contradictory Properties

Let us say that property F is a contradictory property if and only if the instantiation of F entails that some object jointly instantiates property G and property not G. The property of *being scarlet all over and not scarlet all over* is an example of a contradictory property. This is because the instantiation of this property entails that some object jointly instantiates the properties of *being scarlet all over* and *being not scarlet all over*. It is natural to say that the contradictory properties in (1a) and (1b) are distinct from one another:

(1a) The property of *being scarlet all over and not scarlet all over*

(1b) The property of *being human and not human*

Nevertheless, (1a) and (1b) are co-intensional and so are identical.

1.3.1.2.2 Categorically Mistaken Properties

Let us say that property F is a categorically mistaken property if and only if the instantiation of F entails that some object jointly instantiates property G and property H such that, if some object instantiates G, then that very object necessarily does not instantiate H, and vice versa. Categorically mistaken properties, therefore, concern *de re* necessity. An example of a categorically mistaken

[27] Both categorically mistaken and contrary properties are subtypes of contradictory properties, but they seem important enough to be treated separately in what follows.

property is the property of *being a talking number*; for the instantiation of this property entails that some object jointly instantiates the properties of *talking* and *being a number* such that, whenever some object instantiates *talking*, then that very object necessarily does not instantiate *being a number*, and vice versa. It is natural to say that the categorically mistaken properties in (1a), (1b), and (1c) are distinct from one another:

(1a) The property of *being a talking number*

(1b) The property of *being a circular cube*

(1c) The property of *being a reptilian kangaroo*

Nevertheless, (1a), (1b), and (1c) are co-intensional and so are identical.

1.3.1.2.3 Contrary Properties

Finally, let us say that property F is a contrary property if and only if F is not a categorically mistaken property, but the instantiation of F entails that some object jointly instantiates property G and property H such that, necessarily, if some object instantiates G, then that object does not instantiate H, and vice versa. Contrary properties are therefore concerned with *de dicto* necessity. The property of *being scarlet all over and sky blue all over* is an example of a contrary property; for the instantiation of this property entails that some object jointly instantiates the properties of *being scarlet all over* and *being sky blue all over* such that, necessarily, whenever some object instantiates *being scarlet all over*, then that object

does not instantiate *being sky blue all over*, and vice versa. It is natural to say that the contrary properties in (1a) and (1b) are distinct from one another:

(1a) The property of *being scarlet all over and sky blue all over*

(1b) The property of *being a married bachelor*

Nevertheless, (1a) and (1b) are co-intensional and so are identical.

1.3.2 Dataset (2) Classificatory Propositions and Co-intensional Properties

The second set of data is that the truth-value of many propositions seems to turn on distinct but co-intensional properties. Here, for this set of data, we need the notion of 'hyperintensionality'. Hyperintensionality, as I will understand it, is a feature of sentential contexts.[28] Following standard practice, a context is hyperintensional if substituting co-intensional expressions within that context can result in a change in truth-value, where expressions are co-intensional when they have the very same referent across every possible world.[29] Whenever there is a

[28] A context is a position in a sentence. So, for example, the proper name 'Francisco Suárez' contained in the sentence 'Francisco Suárez is human.' occupies a sentential context: it occupies the subject position.

[29] Two clarificatory comments need to be made. First, while M. J. Cresswell (1975) described hyperintensional contexts in connection with logical equivalence, these days 'logical equivalence' is typically replaced with the broader notion of 'necessary equivalence'. On this point, see Nolan (2014) and Bjørn Jespersen and Marie Duži (2015). Second, strictly speaking, when treating properties as the referents of both predicates and abstract singular terms in the way I am, this characterisation of a hyperintensional context gives rise to problems of grammaticality. Here's one example to show you what I mean. Reconsider the following subject-predicate sentence:

(1a) Francisco Suárez is human.

substitution of co-intensional expressions within the very same hyperintensional context, we say that there is a hyperintensional distinction.

The hyperintensional contexts I consider occur in what I call 'classificatory sentences'.[30] Classificatory sentences are sentences that contain abstract singular terms, wherein these terms are used to classify a property (or properties) in some way or another. Classificatory sentences express 'classificatory propositions'. In the two sections that follow, I provide four examples of classificatory propositions whose truth-value seems to turn on distinct necessarily co-instantiated properties and distinct impossibly co-instantiated properties.

1.3.2.1 Classificatory Propositions and Necessarily Co-instantiated Properties

The first two examples of classificatory propositions involve necessarily co-instantiated properties. Consider, for example, the pair of propositions expressed by sentences (1a) and (1b):

Suppose that we treat the predicate in (1a) as 'is human'. By nominalising this predicate, we can convert it into the gerundive construction 'the property of *being human*'. In doing so, we could then substitute 'is human' in (1a) with 'the property of *being human*' and obtain the following:

(1b) Francisco Suárez the property of *being human*.

Unlike (1a), (1b) is not true but it is also not even grammatically well formed. However, both the predicate 'is human' and the abstract singular term 'the property of *being human*' are co-intensional expressions, since they have the property of *being human* as their referent across every possible world. This example would satisfy the definition of a hyperintensional context, which is not a good outcome. One way of solving this sort of problem is to add the qualification to a hyperintensional context that the sentence at issue does not also become grammatically ill formed when substituting co-intensional expressions. With this qualification, even though the substitution of 'is human' for 'the property of *being human*' results in a change in truth-value, it also results in the sentence becoming grammatically ill formed. When I speak of hyperintensional contexts throughout this PhD thesis, I will always have this qualification in mind.

[30] Classificatory sentences are drawn from the discussion of classificatory contexts in Loux (1978: ch. 4).

(1a) The property of *being trilateral* is more similar to the property of *being an open straight-sided figure having three sides* than the property of *being triangular* is to the property of *being an open straight-sided figure having three sides*.

(1b) The property of *being triangular* is more similar to the property of *being an open straight-sided figure having three sides* than the property of *being trilateral* is to the property of *being an open straight-sided figure having three sides*.

It is natural to say that (1a) is true and (1b) is false: while *being trilateral* is more similar to *being an open straight-sided figure having three sides* than *being triangular* is to *being an open straight-sided figure having three sides*, it is not the case that *being triangular* is more similar to *being an open straight-sided figure having three sides* than *being trilateral* is to *being an open straight-sided figure having three sides*. Nevertheless, since 'the property of *being trilateral*' and 'the property of *being triangular*' refer to, respectively, the mathematical properties of *being trilateral* and *being triangular*, it follows that (1a) and (1b) have the same truth-value.

Here is the second pair of classificatory propositions involving necessarily co-instantiated properties, which are expressed by sentences (2a) and (2b):

(2a) The property of *being spherical* is a determinate of the property of *being shaped*, and the property of *being shaped* is a determinable of the property of *being spherical*.

(2b) The property of *being spherical* is a determinate of the property of *being sized*, and the property of *being sized* is a determinable of the property of *being spherical*.

It is natural to say that (2a) is true and (2b) is false: while *being spherical* is a determinate of *being shaped*—that is, *being spherical* is a specific way of *being shaped*—and *being shaped* is a determinable of *being spherical*, *being spherical* is not a determinate of *being sized*—that is, *being spherical* is not a specific way of *being sized*—and *being sized* is not a determinable of *being spherical*. Nevertheless, since 'the property of *being shaped*' and 'the property of *being sized*' refer to, respectively, the determinable properties of *being shaped* and *being sized*, it follows that (2a) and (2b) have the same truth-value.

1.3.2.2 Classificatory Propositions and Impossibly Co-instantiated Properties

The next two examples of classificatory propositions involve impossibly co-instantiated properties. Consider, for example, the pair of propositions expressed by sentences (1a) and (1b):

(1a) The property of *being a talking number* is more similar to the property of *being a number* than it is to the property of *being a kangaroo*.

(1b) The property of *being a reptilian kangaroo* is more similar to the property of *being a number* than it is to the property of *being a kangaroo*.

It is natural to say that (1a) is true and (1b) is false: while *being a talking number* is more similar to *being a number* than *being a talking number* is to *being a kangaroo*, it is not the case that *being a reptilian kangaroo* is more similar to *being a number* than *being a reptilian kangaroo* is to *being a kangaroo*. Nevertheless, since 'the property of *being a talking number*' and 'the property of *being*

a reptilian kangaroo' refer to, respectively, the categorically mistaken properties of *being a talking number* and *being a reptilian kangaroo*, it follows that (1a) and (1b) have the same truth-value.

Here is the second pair of classificatory propositions involving impossibly co-instantiated properties, which are expressed by sentences (2a) and (2b):

(2a) The property of *being a circular cube* is a determinate of the property of *being shaped*, and the property of *being shaped* is a determinable of the property of *being a circular cube*.

(2b) The property of *being a married bachelor* is a determinate of the property of *being shaped*, and the property of *being shaped* is a determinable of the property of *being a married bachelor*.

It is natural to say that (2a) is true and (2b) is false: while *being a circular cube* is a determinate of *being shaped*—that is, *being a circular cube* is a specific way of *being shaped*—and *being shaped* is a determinable of *being a circular cube*, *being a married bachelor* is not a determinate of *being shaped*—that is, *being a married bachelor* is not a specific way of *being shaped*—and *being shaped* is not a determinable of *being a married bachelor*. Nevertheless, since 'the property of *being a circular cube*' and 'the property of *being a married bachelor*' refer to, respectively, the categorically mistaken property of *being a circular cube* and the contrary property of *being a married bachelor*, it follows that (2a) and (2b) turn out to have the same truth-value.

Here ends my survey of the two sets of data. After collecting and observing the data, we can see that the intensional criterion yields several counterintuitive consequences for property identity, which, in turn, suggest that this criterion is

too coarse-grained. We thus have *prima facie* motivation for a more fine-grained criterion of property identity and, subsequently, a conception of properties that is hyperintensional.

1.4 Chapter Summary

In this chapter, I have discussed the concept of a property, the concept of a criterion of identity, and their relevance in the forthcoming chapters. I have also motivated a hyperintensional conception of properties by providing two sets of data that generate counterintuitive consequences for the intensional criterion of property identity. The first set of data showcased a variety of examples of properties that are intuitively distinct but co-intensional. The second set revealed how these properties—or, at any rate, some of them—appear to be responsible for the difference in truth-value between various classificatory propositions in which they figure. I have therefore laid the groundwork for my defence of a hyperintensional conception of properties.

I now turn to consider objections that might be said to underlie the intensionalist's skepticism towards a hyperintensional conception of properties. I will explain in the upcoming chapters what I take those objections to be, and I will explain how the hyperintensionalist may respond to them seriatim.

Chapter 2

Distinct Properties that are Not Co-intensional

In this first chapter of objections and responses, I will consider objections that attack a hyperintensional conception of properties for relying upon distinct properties that are not co-intensional. These objections are intended to show that the counterintuitive consequences that arise from the property-catalogue are merely apparent. There are two objections to be considered.

2.1 Relational Properties in Disguise

One objection comes from Gonzalo Rodriguez-Pereyra, and it draws on the concept of a relational property.[1] A relational property is roughly a property 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

[1]See Gonzalo Rodriguez-Pereyra (2002: ch. 5). See also Allen (2016: ch. 4, pp. 72-77). For more on this concept, see Armstrong (1978b: ch. 19, pp. 78-80, 2010: ch. 2, pp. 14-5), Edward J. Khamara (1988), I. L Humberstone (1996), Josh Parsons (2001), Rodriguez-Pererya (2002: ch. 4, p. 55-6, 2003, 2022: ch. 1), Jonathan Cohen (2009: ch. 1, p. 8), Hoffman-Kolss (2015), and Anna Marmodoro and David Yates (2016).

relation of *being shorter than* to St Salvator's Chapel; but *being an electron* is non-relational because that which instantiates it does so *not* by standing in a relation to something. With the concept of a relational property in hand, the present objection says that the properties used to motivate a hyperintensional conception of properties may only be relational properties, and thus, are not co-intensional.

Rodriguez-Pereyra introduces this objection by initially focusing on co-extensional properties. Metaphysicians of properties have traditionally thought that *being cordate* and *being renate* are co-extensional.[2] But Rodriguez-Pereyra challenges this thought. He contends:[3]

> 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 presses this same line of objection against properties believed to be co-intensional. He uses *being trilateral* and *being triangular* as his paradigmatic examples. In his view, these properties are not co-intensional, since they

[2]For instance, see Quine (1951), Lewis (1986b), Armstrong (1989), Bricker (1996), Mellor and Oliver (1997), William Hasker (1999), Derek Ball (2011), Edwards (2014), William Jaworski (2016), Bart Streumer (2017), and Francesco Orilia and Michele Paolini Paoletti (2022). That these properties are genuinely co-extensional is very controversial. An obvious reason is that there are individuals without hearts but who still have kidneys. Consider a person who undergoes a successful heart transplant. There is a time t at which that person lacks a heart but not kidneys. See Ghislain Guigon (2015) and Allen (2016: ch. 4, p. 73) for more reasons. But I will set this issue aside for purposes of discussion.

[3]Gonzalo Rodriguez-Pereyra, *Resemblance Nominalism: A Solution to the Problem of Universals.* (Oxford: Oxford University Press, 2002), p. 97.

are not even co-extensional. And the reason for this, according to Rodriguez-Pereyra, is that the predicates '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:[4]

> 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's basic charge here can be outlined as follows:[5] *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."[6]

[4]Rodriguez-Pereyra, *Resemblance Nominalism: A Solution to the Problem of Universals*, p. 97.
[5]Rodriguez-Pereyra has confirmed this in personal correspondence.
[6]Rodriguez-Pereyra, *Resemblance Nominalism: A Solution to the Problem of Universals*, p. 100.

I will call this first objection the 'Relational Objection'. What should we make of it? To properly assess the objection, let us start by taking a closer look at how it applies specifically to *being trilateral* and *being triangular*.

2.1.1 *Being Trilateral* and *Being Triangular* as Relational Properties? No, Maybe, Yes—but so What?

We are to think that *being trilateral* and *being triangular* are relational properties. But why? The answer given by Rodriguez-Pereyra is because 'is trilateral' and 'is triangular' are relational predicates. Yet I detect an immediate problem with this answer. Reflect, for a moment, on what a relational predicate is. A relational predicate is a monadic predicate that contains within it a polyadic predicate.[7] 'Is shorter than St Salvator's Chapel', for example, is a relational predicate, since it contains the dyadic predicate 'is shorter than'; 'is an electron', on the other hand, is an example of 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. But if that is right, the hyperintensionalist can reject Rodriguez-Pereyra's claim that *being trilateral* and *being triangular* are relational properties.

Perhaps, you worry, this response fails to really get at the heart of the matter. Even though 'is trilateral' and 'is triangular' appear as non-relational predicates, this appearance could be the result of their surface grammar. The suggestion here is that, for Rodriguez-Pereyra, these predicates do not overtly exhibit their

[7] Here I follow the formulation of a relational predicate in Parsons (2001: p. 20). I have slightly modified that formulation just to streamline it.

relational structure. But once properly paraphrased, these predicates come out as relational, and so, the properties each express, in fact, turn out to be relational ones after all.

Suppose this worry is right. What might 'is trilateral' and 'is triangular' properly paraphrased look like, given Rodriguez-Pereyra's view? Sometimes the best course of action is to begin with what could not be meant.

Our first attempt is to paraphrase 'is trilateral' as (1a) and 'is triangular' as (1b):

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

(Read: w has x as a side, and 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, v is identical to either x, y, or z.)

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

(Read: w has x as an angle, and 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, v is identical to either x, y, or z.)

It is clear that (1a) and (1b) are not what Rodriguez-Pereyra has in mind, because they are not relational predicates. They are instead polyadic predicates. If they

were used to express *being trilateral* and *being triangular*, it would imply that these properties are relations, not relational properties. For example, if (1a) expresses *being trilateral*, then *being trilateral* is a tetradic relation; it is the tetradic relation that one particular jointly instantiates (or stands in) with three other particulars that are sides. Similarly, if (1b) expresses *being triangular*, then *being triangular* is a tetradic relation; it is the tetradic relation that one particular jointly instantiates (or stands in) with three other particulars that are angles.

(1a) and (1b) have their flaws, but they could still offer a basis for the relational predicates that Rodriguez-Pereyra may be after. Notice that (1a) and (1b) both contain polyadic predicates that express different relations: (1a) contains the dyadic predicate 'has __as a side', a predicate that expresses the relation of *having __as a side*; whereas (1b) contains the dyadic predicate 'has __as an angle', a predicate that expresses the relation of *having __as an angle*. We can build on this insight by substituting constants for the individual variables 'x', 'y', and 'z' in (1a) and (1b) to create relational predicates.

Our second attempt is to paraphrase 'is trilateral' as (1a*) and 'is triangular' as (1b*):

(1a*) $\text{Side}(w, a) \wedge \text{Side}(w, b) \wedge \text{Side}(w, c) \wedge a \neq b \wedge a \neq c \wedge b \neq c \wedge w \neq a \wedge w \neq b \wedge w \neq c \wedge \forall v\, \text{Side}(w, v) \supset v = a \vee v = b \vee v = c.$

(Read: w has a as a side, and w has b as a side, and w has c as a side, and a, b, and c are not identical to each other and not identical to w, and for all v, if w has v as a side, v is identical to either a, b, or c; more briefly, w has a, b, and c as sides.)

(1b*) $\text{Angle}(w, d) \wedge \text{Angle}(w, e) \wedge \text{Angle}(w, f) \wedge d \neq e \wedge d \neq f \wedge e \neq f \wedge w \neq d \wedge w \neq e \wedge w \neq f \wedge \forall v\, \text{Angle}(w, v) \supset v = d \vee v = e \vee v = f.$

(Read: w has d as an angle, and w has e as an angle, and w has f as an angle, and d, e, and f are not identical to each other and not identical to w, and for all v, if w has v as an angle, v is identical to either d, e, or f; more briefly, w has d, e, and f as angles.)

(1a*) and (1b*) provide a possible reason for why Rodriguez-Pereyra holds that *being trilateral* and *being triangular* are relational properties. If this is what he really means, is this reason any good? I think not. While (1a*) and (1b*) are relational predicates, neither is an adequate paraphrase. (1a*) says that w has those three specific sides designated by the constants 'a', 'b', and 'c'. But this is not what 'is trilateral' means. 'Is trilateral' means 'has three sides'—or, better, 'has some three sides'. So, (1a*) is a relational predicate, and it expresses a relational property—the property that one particular instantiates by standing in the relation of *having* __*as a side* to particulars a, b, and c; but that relational property is not the property of *being trilateral*. Likewise, (1b*) says that w has those three specific angles designated by the constants 'd', 'e', and 'f'. But this is not what 'is triangular' means. 'Is triangular' means 'has some three angles'. So, (1b*) is a relational predicate, and it also expresses a relational property—the property that one particular instantiates by standing in the relation of *having* __*as an angle* to particulars d, e, and f; but the property of *being triangular* is not that relational property. In short, the problem with paraphrasing 'is trilateral' as (1a*) and 'is triangular' as (1b*) is that they fail to capture the sort of generality

that is meant by ‘is trilateral’ and ‘is triangular’. If, therefore, Rodriguez-Pereyra intends ‘is trilateral’ to mean what (1a*) means and ‘is triangular’ to mean what (1b*) means, the hyperintensionalist can still reject his claim that *being trilateral* and *being triangular* are relational properties.

The issue of generality for (1a*) and (1b*) indicates another way to paraphrase ‘is trilateral’ and ‘is triangular’ as relational predicates. Rather than substituting the variables ‘x’, ‘y’, and ‘z’ with constants in (1a) and (1b), we could bind them with existential quantifiers. In doing this, we can create a new pair of relational predicates that avoid the generality issue we encountered with (1a*) and (1b*).

Our third attempt is to paraphrase ‘is trilateral’ 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, v is identical to either x, y, or z; more briefly, w has some x, y, and z as sides.)

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

(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, v is identical to either x, y, or z; more briefly, w has some x, y, and z as angles.)

(1a**) and (1b**) provide a second possible reason for why Rodriguez-Pereyra maintains that *being trilateral* and *being triangular* are relational properties. Is this reason any good? Well, it seems initially plausible to view *being trilateral* as the relational property that one particular instantiates by standing in the relation of *having __as a side* to some three other particulars, and to view *being triangular* as the relational property that one particular instantiates by standing in the relation of *having __as an angle* to some three other particulars.

But this reason is not uncontroversial. To a hyperintensionalist like myself, the use of paraphrasing from 'is trilateral' to (1a**) and from 'is triangular' to (1b**) is questionable. Paraphrasing was used here to *interpret* Rodriguez-Pereyra, not to provide evidence in favour of the claim that *being trilateral* and *being triangular* are relational properties. Even if (1a**) is equivalent to 'is trilateral' and (1b**) is equivalent to 'is triangular'—as all good paraphrases ought to be—why should this count as evidence against the claim that *being trilateral* and *being triangular* are non-relational properties? The fact that we can paraphrase 'is trilateral' as (1a**) and 'is triangular' as (1b**) is no more of a reason to think the properties each predicate expresses are relational as opposed to non-relational.[8] Therefore, Rodriguez-Pereyra must give us hyperintensionalists further reason to distrust the surface grammar of 'is trilateral' and 'is triangular', if

[8]This response echoes the responses of metaphysicians who attempt to use paraphrase to eliminate their ontological commitments to properties. See the classic paper by Alston (1958).

we are to think *being trilateral* and *being triangular* are relational properties.

But put this aside and grant that *being trilateral* and *being triangular* are relational properties 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**) also apply to the exact same possible particulars, so this same reasoning holds, *mutatis mutandis*, for the intensions of these properties. Perhaps Rodriguez-Pereyra assigns extensions and intensions to predicates in a way that deviates from what is standard. If so, then we need more information about it. But, as of now, hyperintensionalists can affirm that *being trilateral* and *being triangular*, considered as relational properties according to (1a**) and (1b**), are not only co-extensional but also co-intensional.

I am now out of ideas as to how else to understand 'is trilateral' and 'is triangular' as relational predicates on Rodriguez-Pereyra's view. I am therefore unsure why he holds that *being trilateral* and *being triangular* are not co-intensional properties. What Rodriguez-Pereyra owes us, it seems to me, is a more detailed

account of his view about these properties. Until then, however, the Relational Objection gives hyperintensionalists no reason to deny that *being trilateral* and *being triangular* are co-intensional properties.

2.1.2 Evaluating the Prospects of the Relational Objection

So far, I have focused on the Relational Objection only as it applies to *being trilateral* and *being triangular*. I now want to broaden my focus and evaluate how this objection fares with more examples of co-intensional properties. Despite unsuccessfully showing *being trilateral* and *being triangular* are not co-intensional, this objection may explain away other examples of co-intensional properties. Previous remarks made above by Rodriguez-Pereyra certainly suggest that it would. And if this objection has these wider implications, it might discharge a range of counterintuitive consequences presented by the property-catalogue. This, in turn, could threaten our case for a hyperintensional conception of properties.

How serious is this threat? Very serious, if the Relational Objection has these consequences. But I see no compelling reason to think that it does, and here's why. First, there are plenty of examples of co-intensional properties that are not obviously relational. And second, even for those that are seemingly relational, the objection fails to provide adequate details as to why they would not still be co-intensional. To support these points, I will discuss a sample of properties believed to be co-intensional, including both examples of necessarily co-instantiated properties and impossibly co-instantiated properties. My discussion

of these properties extends to others as well.[9]

I begin with necessarily co-instantiated properties. These properties fall into four distinct types: mathematical properties, determinable properties, natural kind properties, and great-making properties. I will discuss examples from each of these types. First, consider the following pair of mathematical properties:

(1a) The property of *being the second smallest prime number*

(1b) The property of *being the cube root of the number 27*

Prima facie, (1a) and (1b) are relational properties. (1a) is relational because the number 3 instantiates it by standing in the relation of *being smaller than or equal to* to all the prime numbers, including itself. (1b) is also relational since the number 3 instantiates it by standing in the relation of *being the cube root of* to the number 27. But we encounter a similar issue with (1a) and (1b) as we did with *being trilateral* and *being triangular*. Just because these properties are relational, the fact that the number 3 instantiates them by standing in different relations does not offer a plausible reason to conclude that (1a) and (1b) fail to be co-intensional.

Second, consider the following pair of determinable properties:

(2a) The property of *being shaped*

(2b) The property of *being sized*

[9]The following discussion in this section may seem like overkill to some. But I want to address the Relational Objection carefully and thoroughly in order to be as charitable to Rodriguez-Pereyra here as I reasonably can be.

Prima facie, (2a) and (2b) are relational properties as well. (2a) is relational because an object that instantiates it does so by standing in the relation of *instantiation* to a shaped-determinate property, such as *being spherical* or *being cubical*. (2b) is relational since an object that instantiates it does so by standing in the relation of *instantiation* to a sized-determinate property, like *being a foot in length* or *being a yard in length*. But their being relational does not give us good grounds to believe that these properties fail to be co-intensional. Note also that objects that instantiate (2a) and (2b) do not do so by standing in different relations. Rather, they do so by standing in the very same relation: the relation of *instantiation*.

Third, consider the following pair of natural kind properties:

(3a) The property of *being a carbon atom*

(3b) The property of *being an element with atomic number 6*

Prima facie, (3a) is a non-relational property, while (3b) is a relational one. For example, (3b) can be considered relational because a carbon atom instantiates it by standing in the relation of *being composed of* to six protons.[10] However, even if (3a) is non-relational and (3b) is relational, this does not provide good reason to suppose that these two properties fail to be co-intensional with each other.

Fourth, consider the following three great-making properties:

(4a) The property of *being maximally powerful*

[10] Another possible reason to think of (3b) as a relational property is because a carbon atom instantiates it by standing in the relation of *having an atomic number equal to* to the number 6.

(4b) The property of *having maximal knowledge*

(4c) The property of *being maximally good*

Prima facie, (4a), (4b), and (4c) are non-relational properties. Moreover, as far as I am aware, there is no discussion amongst perfect being theologians or philosophers of religion suggesting otherwise. As a result, the Relational Objection misfires when directed at these great-making properties.

When we consider impossibly co-instantiated properties, the Relational Objection doesn't fare any better than it did with necessarily co-instantiated properties. In fact, its prospects are much worse. There are three types of impossibly co-instantiated properties: contradictory properties, categorically mistaken properties, and contrary properties. The following are examples from each type, where (5a) and (5b) are contradictory properties, (6a), (6b) and (6c) are categorically mistaken properties, and (7a) and (7b) are contrary properties:

(5a) The property of *being scarlet all over and not scarlet all over*

(5b) The property of *being human and not human*

(6a) The property of *being a talking number*

(6b) The property of *being a circular cube*

(6c) The property of *being a reptilian kangaroo*

(7a) The property of *being scarlet all over and sky blue all over*

(7b) The property of *being a married bachelor*

The question is whether (5a) through (7b) are relational or not. At first glance, these properties seem to be non-relational. To be relational, there would need to be objects in the domain of possible worlds that instantiate these properties by standing in a relation to themselves or to something else. But the problem is that there are no such objects. Just take (5a) and (5b) as an example. (What I say of them applies, *mutatis mutandis*, to the other examples of impossibly co-instantiated properties on this list.) No object in the domain of possible worlds is both scarlet all over and not scarlet all over, or both human and not human. Since there are no objects to instantiate these properties by standing in a relation to themselves or to something else, it follows that (5a) and (5b) are non-relational properties, and consequently, are properties that are co-intensional.

However, a case might be made by those hyperintensionalists who believe in the existence of impossible worlds that some of these properties are relational.[11] Impossible worlds are roughly ways things could not be, in contrast to possible worlds, which are ways things could be—maximal ways.[12] Hyperintensionalists of this sort may contend that (7b) is a relational property because at some impossible world, there is an impossible object that is both a bachelor and instantiates (7b) by standing in the relation of *being married to* to someone else. Be that as it may, because there are no married bachelors in the domain of possible worlds, (7b) is still co-intensional with the other properties on our list.

[11]For example, see Yagisawa (1988) and Nolan (2013).

[12]For a comprehensive introduction on impossible worlds, see Francesco Berto and Mark Jago (2019). A more condensed introduction can be found in Nolan (2021).

These examples of necessarily co-instantiated properties and impossibly co-instantiated properties mount a good case for thinking that the Relational Objection by Rodriguez-Pereyra won't pose a significant threat to a hyperintensional conception of properties.

2.2 Tacitly Restricting the Intensions of Properties

In this section, I will discuss the second objection to a hyperintensional conception of properties. Some intensionalists may object to this conception of properties by claiming that the properties used to motivate it might actually stem from tacitly restricting the intensions of properties.[13]

For example, consider again the properties of *being trilateral* and *being triangular*. If *being trilateral* and *being triangular* are co-intensional, then these two properties have the very same intension. But to say that *being trilateral* and *being triangular* are co-intensional is to tacitly restrict the intensions of *being trilateral* and *being triangular* to the extension of the set of closed geometrical figures with three straight sides at every possible world. The absolutely unrestricted intension of *being trilateral* includes the extension of the set of closed geometrical figures with three straight sides and the extension of the set of open geometrical figures with three straight sides at every possible world, while the absolutely unrestricted intension of *being triangular* includes the extension of

[13]For discussion, see Streumer (2008, 2013, p. 320, and 2017: ch. 2, p. 13-14). See also Matthew Kramer (2009, pp. 210-11).

the set of closed geometrical figures with three straight sides and the extension of the set of open geometrical figures with four straight sides at every possible world. Therefore, *being trilateral* and *being triangular* do not have the very same intension. Therefore, *being trilateral* and *being triangular* are not co-intensional.

I will call this objection the 'Restriction Objection'. In responding to it, I will concentrate on two issues. The first is whether the hyperintensionalist tacitly restricts the intensions of *being trilateral* and *being triangular*. The second is how this objection fares with other examples of properties believed to be co-intensional, besides *being trilateral* and *being triangular*. If the objection can rule out more examples, it may dissolve many of the counterintuitive consequences of the intensional criterion, just like the Relational Objection. As a result, this could weaken our motivation to conceive of properties hyperintensionally.

2.2.1 Amending *Being Trilateral* and *Being Triangular*

It seems plausible that if there are closed geometrical figures, then there are also open geometrical figures. However, it is not obvious that a hyperintensionalist tacitly restricts the intensions of *being trilateral* and *being triangular*. The reason why is that there are alternative diagnoses. For instance, the issue here may be a matter of surface grammar; something akin to our earlier discussion with the predicates 'is trilateral' and 'is triangular'. The hyperintensionalist might use 'the property of *being trilateral*' and 'the property of *being triangular*' as shorthand for the properties of *being a closed straight-sided figure having three sides* and *being a closed straight-sided figure having three interior angles*, respectively.

This abbreviation of property-talk is common in metaphysics, especially for co-intensional properties.[14] The hyperintensionalist could opt for this diagnosis, and thereby deny that either property's intension has been restricted.

But the intensionalist's diagnosis is a very reasonable one and it would be better to not assume that all hyperintensionalists use 'the property of *being trilateral*' and 'the property of *being triangular*' in the way just described. If we do, we risk getting distracted with unhelpful interpretive disputes about how these expressions are used by different hyperintensionalists or how they should be used. Fortunately, there is a more auspicious way to proceed.

Suppose we accept the intensionalist's diagnosis. Then I suggest that hyperintensionalists dispense with *being trilateral* and *being triangular* and introduce in their stead *being a closed straight-sided figure having three sides* and *being a closed straight-sided figure having three interior angles*. Even if the Restriction Objection shows that *being trilateral* and *being triangular* are not co-intensional, this need not worry us. We can replace these properties with the ones just mentioned, as the intensions of *being a closed straight-sided figure having three sides* and *being a closed straight-sided figure having three interior angles* are the same.

Of course, some might protest that this replacement of *being trilateral* and *being triangular* has further implications than I am letting on. For example, if we grant that these properties are not co-intensional, then the counterintuitive consequences that were generated by them in the classificatory propositions dis-

[14] See Sober (1982), Armstrong (1989: ch. 2, pp. 25-6), and Paul Oppenheimer (2020), to name at least three.

cussed in chapter one, section 1.3.2, turn out to be only apparent. To illustrate, recall the classificatory propositions expressed by the following two sentences:

(1a) The property of *being trilateral* is more similar to the property of *being an open straight-sided figure having three sides* than the property of *being triangular* is to the property of *being an open straight-sided figure having three sides*.

(1b) The property of *being triangular* is more similar to the property of *being an open straight-sided figure having three sides* than the property of *being trilateral* is to the property of *being an open straight-sided figure having three sides*.

Intuitively, (1a) is true and (1b) is false. But this difference in truth-value is not due to co-intensional properties. Rather, it is because of co-extensional properties: the intension of *being trilateral* and the intension of *being an open straight-sided figure having three sides* both include the extension of open geometrical figures with three straight sides at every possible world, while the intension of *being triangular* does not.

To remedy this situation, my suggestion is to continue with the replacement. That is, hyperintensionalists should replace 'the property of *being trilateral*' with 'the property of *being a closed straight-sided figure having three sides*', and replace 'the property of *being triangular*' with 'the property of *being a closed straight-sided figure having three interior angles*' in (1a) and (1b). By doing so, this furnishes us a new pair of classificatory propositions, which are expressed with the following two sentences:

(1a*) The property of *being a closed straight-sided figure having three*

sides is more similar to the property of *being an open straight-sided figure having three sides* than the property of *being a closed straight-sided figure having three interior angles* is to the property of *being an open straight-sided figure having three sides*.

(1b*) The property of *being a closed straight-sided figure having three interior angles* is more similar to the property of *being an open straight-sided figure having three sides* than the property of *being a closed straight-sided figure having three sides* is to the property of *being an open straight-sided figure having three sides*.

(1a*) is intuitively true and (1b*) is intuitively false: while *being a closed straight-sided figure having three sides* is more similar to *being an open straight-sided figure having three sides* than *being a closed straight-sided figure having three interior angles* is to *being an open straight-sided figure having three sides*, it is not the case that *being a closed straight-sided figure having three interior angles* is more similar to *being an open straight-sided figure having three sides* than *being a closed straight-sided figure having three sides* is to *being an open straight-sided figure having three sides*. This difference in truth-value between (1a*) and (1b*) cannot be explained by a difference in the intensions of *being a closed straight-sided figure having three sides* and *being a closed straight-sided figure having three interior angles*, on account of the fact that both properties have the same intension. Therefore, since 'the property of *being a closed straight-sided figure having three sides*' and 'the property of *being a closed straight-sided figure having three interior angles*' refer to properties that are co-intensional, it follows by the intensional criterion that (1a*) and (1b*) have the same truth-value.

Hyperintensionalists may, therefore, concede to the Restriction Objection

that *being trilateral* and *being triangular* are not co-intensional properties. But this is not a significant concession since hyperintensionalists can replace these properties with *being a closed straight-sided figure having three sides* and *being a closed straight-sided figure having three interior angles*.

2.2.2 Evaluating the Prospects of the Restriction Objection

I now turn to evaluate whether the Restriction Objection eliminates other examples of co-intensional properties, to the extent that it would hinder our motivation towards a hyperintensional conception of properties. I believe that this prospect is not good. There are two reasons why.

First, we could seemingly replace the eliminated properties with others whose intensions are not the result of a tacit restriction, much like what we did with *being trilateral* and *being triangular*. For example, some hyperintensionalists might think that the properties of *being quadrilateral* and *being quadrangular* are co-intensional. But this is because they tacitly restrict the intensions of these properties to closed straight-sided figures with four sides. The absolutely unrestricted intension of *being quadrilateral* includes the extension of the set of closed geometrical figures with four straight sides and the extension of the set of open geometrical figures with four straight sides at every possible world. Likewise, the absolutely unrestricted intension of *being quadrangular* includes the extension of closed geometrical figures with four straight sides and the set of open geometrical figures with five straight sides at every possible world. So, to accommodate this tacit restriction, hyperintensionalists can replace *being quadrilateral* and *be-*

ing quadrangular with the properties of *being a closed straight-sided figure having four sides* and *being a closed straight-sided figure having four interior angles.*

The second reason is that there are numerous examples of co-intensional properties that are plausibly not the result of tacitly restricting their intensions. To see this, I will only discuss a selection of examples from the property-catalogue, but my discussion can be expanded to include additional examples.

As before, I begin with the necessarily co-instantiated properties. Consider, first, the following mathematical properties:

(1a) The property of *being the second smallest prime number*

(1b) The property of *being the cube root of the number 27*

A prime number is a number greater than the number 1 that only has two factors: itself and the number 1. The second smallest prime number is the number 3. For some number x, the cube root of x is a number y such that: $y^3 = x$. Since $3^3 = 27$, the cube root of the number 27 is the number 3. Given that the number 3 is the second smallest prime number and the cube root of the number 27 (and that nothing else can be the second smallest prime number or the cube root of the number 27), the number 3 is the only object in the extension of the set of objects that instantiates (1a) and (1b) at every possible world in the domain of possible worlds. Therefore, there is no tacit restriction of the intensions of (1a) and (1b).

Second, consider the following determinable properties:

(2a) The property of *being shaped*

(2b) The property of *being sized*

(2a) is a determinable of the shaped-determinate properties. (2b) is a determinable of the sized-determinate properties. Intuitively, there are no objects in any possible world that have a shape but no size, or a size but no shape. That seems plausible. Thus, the intensions of (2a) and (2b) don't involve any tacit restrictions.

Third, consider the following natural kind properties:

(3a) The property of *being a carbon atom*

(3b) The property of *being an atom with atomic number 6*

In the actual world, science teaches us that a carbon atom is also an atom with atomic number 6 and vice versa. Yet, science does not seem to tell us about whether it is possible for an object to be a carbon atom but not an atom with atomic number 6 or vice versa. We have to instead rely on modal intuition. Modal intuition tells me that it does not seem possible that there can be an object at some possible world that is a carbon atom but not an atom with atomic number 6 and vice versa. And the reason is that what it is to be an atom that is carbon just is to be an atom with atomic number 6 and vice versa. Hence, there does not seem to be a tacit restriction of the intensions of (3a) and (3b).

Fourth, consider the following great-making properties:

(4a) The property of *being maximally powerful*

(4b) The property of *having maximal knowledge*

(4c) The property of *being maximally good*

Provided perfect being theology, (4a), (4b), and (4c) are co-intensional. Perfect being theology is contentious of course. For example, some may argue that there could be objects in other possible worlds that are maximally powerful and evil but lack maximal knowledge, or have maximal knowledge and are maximally good but not maximally powerful. Either would provide grounds to think that the intensions of (4a), (4b), and (4c) have been restricted in some way. But I will not take a stance on the truth of perfect being theology. The crucial thing is that if the God of perfect being theology exists, then (4a), (4b), and (4c) are not the result of a tacit restriction.

Moving to the impossibly co-instantiated properties, consider the following examples of contradictory properties (5a) and (5b), categorically mistaken properties (6a), (6b), and (6c), and contrary properties (7a) and (7b):

(5a) The property of *being scarlet all over and not scarlet all over*

(5b) The property of *being human and not human*

(6a) The property of *being a talking number*

(6b) The property of *being a circular cube*

(6c) The property of *being a reptilian kangaroo*

(7a) The property of *being scarlet all over and sky blue all over*

(7b) The property of *being a married bachelor*

Pick any pair of these properties, for instance (5a) and (5b). The intension of (5a) is empty. For there is no possible world with an object that is both scarlet all over and not scarlet all over. The intension of (5b) is also empty. For there is no possible world with an object that is both human and not human. Since the intensions of (5a) and (5b) are both empty, (5a) and (5b) are not the result of any tacit restriction. *Mutatis mutandis* for the other impossibly co-instantiated properties on the list.

Taken together, these examples of necessarily co-instantiated properties and impossibly co-instantiated properties, provide good reason against thinking that the Restriction Objection will cause any serious harm for a hyperintensional conception of properties.

2.3 Chapter Summary

In the course of this chapter, I have considered two objections that challenged a hyperintensional conception of properties on the grounds that it may rely upon distinct properties that are not co-intensional. The first objection, the Relational Objection, charged that the intuitively distinct but co-intensional properties could be relational properties and therefore not co-intensional. The second objection, the Restriction Objection, charged that the intuitively distinct but co-intensional properties may be the result of tacitly restricting the intensions of these properties. I have weighed both objections and have found them wanting.

Chapter 3

The Mere Illusion of Co-intensional Properties

In this second chapter of objections and responses, I will consider objections that attack a hyperintensional conception of properties for having its source in an illusion fobbed off on us by something linguistic or epistemic in nature. The objections here target the counterintuitive consequences that stem from classificatory propositions. These objections say that such consequences are merely apparent, since the hyperintensional distinctions at work are not actually between different properties but between different linguistic or mental representational surrogates of one and the same property. There are two objections to be considered.

Before going directly to them, there is a preliminary matter to discuss. As far as I know, hyperintensionalists have not used classificatory propositions to motivate a hyperintensional conception of properties and, as a result, these propositions have not been at the receiving end of intensionalist attacks. This is apt to raise the following question about my defence of a hyperintensional conception of properties: why avail myself to these classificatory propositions if intensionalists have not attacked them? My answer is twofold. First, these propositions

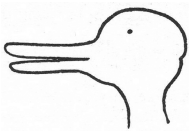
ought to be regarded as part of the data for thinking that property identity is more fine-grained than necessary equivalence. They generate counterintuitive consequences for the intensional criterion and do so by exploiting an important theoretical role of properties: namely, serving as the semantic value for our meaningful abstract singular terms. Second, the objections discussed in this chapter serve as an opportunity to draw out and further clarify intensionalist misgivings about incorporating hyperintensional distinctions in our theorising about the metaphysics of properties. Indeed, these objections will prepare the way for additional objections in the subsequent chapters, which, in my view, reflect the primary concerns that intensionalists have with making hyperintensional distinctions between properties. Therefore, I think the two objections to be discussed are worthy of our attention.[1]

3.1 One Property, Different Wittgensteinian Aspects

The first of these objections says that the differences in truth-value between classificatory propositions should be taken with a grain of salt, because these differences arise out of confusing one property with different abstractions from, or

[1]To clarify: I do not attribute the objections in this chapter to any specific intensionalist. Instead, these objections provide an opportunity for speculating about how intensionalists might respond to the counterintuitive consequences that arise from classificatory propositions. It is worth noting, though, that these speculations are drawn, to some extent, from the writings of intensionalists and others who harbour reservations about the existence of distinct but co-intensional properties. Some relevant sources include Shoemaker (1980), Jackson (1998: ch. 5, pp. 125-26), Benjamin Schneider (2004), Wolfgang Künne (2006), Lowe (1999, 2006: ch. 5, pp. 85-6), Guigon (2015), Williamson (2013, 2016), and Darragh Byrne and Naomi Thompson (2019).

aspects of, that property. We can get a handle on this objection if we begin by considering a simple case of the phenomenon of aspect perception, or what Ludwig Wittgenstein refers to as "noticing an aspect".[2] Have a look at the so-called 'duck-rabbit image' below:



The duck-rabbit image is an ambiguous image: it can sometimes be seen as a duck looking to the left, and it can sometimes be seen as a rabbit looking to the right. Let us call the 'duck aspect' what we see, when we see the image as a duck looking to the left, and let us call the 'rabbit aspect' what we see, when we see the image as a rabbit looking to the right. The duck-rabbit image raises a question: when we see the image, how is it that we fail to see the image's duck aspect in one moment, yet in another moment fail to see the image's rabbit aspect? It does not seem right to say that the change is with the image itself. It also does not seem right to say that the change is with how the retina of the eye processes light from the image. What does seem right is what Wittgenstein tells us: we fail to see the image as a *mere* image; rather, when we see the image, what we see is the image *as something*. The idea is that the perceptual experiences that we have of this one image are filtered by the various mental concepts that we possess, and

[2]Ludwig Wittgenstein, *Philosophical Investigations*, trans. by G. E. M. Anscombe (Oxford: Basil Blackwell, 1958), p. 193.

it is these different concepts that enable us in gestalt fashion to either represent in our minds the image's duck aspect in one moment or represent in our minds the image's rabbit aspect in another moment.

This case of 'noticing aspects', suggests something roughly analogous could be going on with classificatory propositions. To see how, consider *being shaped* and *being sized*. If necessary equivalence among properties implies property identity, then these determinable properties are really one and the same property. Call this property the 'property of *being shaped/sized*' or '*being shaped/-sized*' for short. While *being shaped/sized* is associated with an intension, it is also associated with different ways of abstracting from a grid of cells—more exactly, a grid of determinate cells. Let us say that a grid of cells is a partition, where a partition is a classification of some set that breaks down that set into mutually disjoint non-empty subsets: what we call 'cells'. Then let us say that a grid of determinate cells is a partition that classifies the set of objects at every possible world in accordance with the extension of determinate properties in those worlds.

Being shaped/sized is associated with two grids of determinate cells whose union is that property's intension. One grid of cells is the grid of shaped-determinate cells; it classifies the set of objects at every possible world in accordance with the extension of shaped-determinate properties in those worlds. Thus, the set {*being spherical*, *being cubical*, *being cylindrical*,...} serves as the shaped-determinate cell. Call this first grid the 'shaped aspect'. The other grid is the grid of sized-determinate cells; it classifies the set of objects at every possible world in ac-

cordance with the extension of the sized-determinate properties in those worlds. Thus, the set {*being a foot in length*, *being a yard in length*, *being a mile in length*,...} serves as the sized-determinate cell. Call this second grid the 'sized aspect'.

Now, let us consider the classificatory propositions expressed by the following two sentences:

(1a) The property of *being spherical* is a determinate of the property of *being shaped*, and the property of *being shaped* is a determinable of the property of *being spherical*.

(1b) The property of *being spherical* is a determinate of the property *being sized*, and the property of *being sized* is a determinable of the property of *being spherical*.

Intuitively, (1a) is true and (1b) is false. But this intuition can be defused because different aspects of *being shaped/sized* are being made salient in (1a) and (1b). For example, in (1a) our use of 'the property of *being shaped*' makes salient the shaped aspect of *being shaped/sized*. But in (1b) our use of 'the property of *being sized*' makes salient the sized aspect of *being shaped/sized*. The reason why we believe that (1a) and (1b) differ in truth-value has to do with, in the first place, thinking of the shaped aspect of *being shaped/sized* while failing to think of that property's sized aspect in (1a); and, in the second place, thinking of the sized aspect of *being shaped/sized* while failing to think of that property's shaped aspect in (1b). Thus, in hyperintensional contexts like (1a) and (1b), what is happening is that we are failing to think of *being shaped/sized* as a *mere* property. We have a sort of duck-rabbit experience: when we think of *being shaped/sized*, we

think of the property under different aspects, which are just different mental concepts in our minds that track the respective grids of determinate cells. And it is these different aspects that enable us in gestalt fashion to either think of the property's shaped aspect in one set of possible worlds or think of the property's sized aspect in another set of possible worlds, in spite of the fact that the union of the shaped aspect and the sized aspect is just the intension of *being shaped/sized*. So, when we use 'the property of *being shaped*' and 'the property of *being sized*', even though they share *being shaped/sized* as their referent, we make salient different aspects of that property's intension. The hyperintensional distinction in (1a) and (1b) is really between these different aspects, and this is why the hyperintensionalist is wrong to think that (1a) is true and (1b) is false.

I will call this objection the 'Wittgensteinian Objection'. In the next two sections, I will discuss two ways for how the hyperintensionalist can resist it.

3.1.1 Problems with Appeals to Wittgensteinian Aspects

One way to resist the Wittgensteinian Objection is to point out that the appeal to aspects does not seem to work in every case. And in those that it might originally be thought to work, there are grounds for the hyperintensionalist to think that the appeal is inadequate. We can see this by concentrating on two problems.

The first problem is that it is unclear how distinct grids of cells get assigned to impossibly co-instantiated properties. For example, let us consider *being a talking number* and *being a reptilian kangaroo*. If we assume with the intensionalist that necessary equivalence among properties implies property identity, then

these categorically mistaken properties are really one and the same property. Call this property the 'property of *being a talking number/a reptilian kangaroo*' or *'being a talking number/a reptilian kangaroo* for short'.

Now, consider the classificatory propositions expressed by this pair of sentences:

(1a) The property of *being a talking number* is more similar to the property of *being a number* than it is to the property of *being a kangaroo*.

(1b) The property of *being a reptilian kangaroo* is more similar to the property of *being a number* than it is to the property of *being a kangaroo*.

The abstract singular terms that would make salient different aspects in (1a) and (1b) are 'the property of *being a talking number*' and 'the property of *being a reptilian kangaroo*'. These terms share *being a talking number/a reptilian kangaroo* as their referent. But this property is an impossible property, which means there are no objects in the domain of possible worlds that instantiate it. Thus, there are no different grids of cells that can be assigned to it. If there are no different grids of cells that could be assigned to it, then our use of 'the property of *being a talking number*' and 'the property of *being a reptilian kangaroo*' in (1a) and (1b) would not make salient different aspects. But if that is right, the hyperintensionalist cannot be accused of confusing different aspects of one property.

The second problem builds off the first one, and it concerns the appeal to aspects we saw earlier in the case of 'the property of *being shaped*' and 'the property of *being sized*'. Suppose that a hyperintensionalist agrees that these terms

do refer to the single property *being shaped/sized*. But suppose this hyperintensionalist also thinks that there are determinate properties that have no instances in the domain of possible worlds. An example of such a property is *being a circular cube*. If such properties exist, then they should be included among those in the shaped aspect. Therefore, even if 'the property of *being shaped*' and 'the property of *being sized*' share *being shaped/sized* as their referent, this appeal to aspects falls short in accommodating all the shaped-determinate properties.

3.1.2 A Dubious Diagnosis: Another Look at the Duck-Rabbit Image

The appeal to aspects has its problems, but let us suppose our Wittgensteinian intensionalist can patch them up. The hyperintensionalist should then dispute the Wittgensteinian Objection by pointing out a flaw in its reasoning. This objection claims that the hyperintensionalist confuses different aspects of one property, but that accusation is highly suspect. Let us take a step back and revisit the motivation behind the Wittgensteinian Objection, which was the analogy with the duck-rabbit image. This analogy is flawed from the outset because, unlike in cases of aspect perception, where there is a prior agreement that there is only one image at issue, there is no prior agreement between the hyperintensionalist and the Wittgensteinian intensionalist that there is only one property at issue.

So what does this mean for the Wittgensteinian Objection? Effectively, what it means is that this objection only carries weight if one already believes that properties have intensional identity conditions. This is especially so, I think, be-

cause the sentences under consideration seem *semantically innocent*. That is to say, these sentences do not incorporate any linguistic devices that are notoriously known for triggering issues of opacity, such as modal operators, psychological verbs like 'thinks' or 'believes', and Abelardian predicates.[3] Without some independent consideration from the Wittgensteinian intensionalist, I see no reason for hyperintensionalists to think they are confusing different aspects of one property, aside from a prejudice against there being distinct but co-intensional properties. As it stands, the Wittgensteinian intensionalist's appeal to aspects is less of an objection and more of a *mere* strategy for trying to explain away the awkward results from their commitment to the intensional criterion.

3.2 One Property, Different Fregean Senses

The second objection, instead of relying on Wittgenstein, relies on the counsel of Gottlob Frege. This objection takes its start from Frege's conception of meaning (or semantic content).[4] For Frege, the meaning of each expression in a language has two parts: a reference (*bedeutung*) and a sense (*sinn*). The reference of an expression is the object to which the expression refers, and it's what contributes

[3]For more on these sorts of devices, consult the following: Frege (1948), Quine (1956, 1961), Allan Gibbard (1975), Lewis (1986b: ch. 4), Harold W. Noonan (1991), and Fine (2003).

[4]See Frege (1948, 1956). Frege's conception of meaning has been an important source of inspiration for the development of one general approach to hyperintensional phenomena known as 'two-dimensional semantics'. On this point, see David J. Chalmers (2002, 2006). Different versions of two-dimensional semantics have been proposed by Gareth Evans (1979), Martin Davies and Lloyd Humberstone (1980), David Kaplan (1989), Chalmers (1996), and Jackson (1998), among others. For the details on these versions and additional perspectives, consult Chalmers (2006). A short overview of two-dimensional semantics as a general approach to hyperintensional phenomena can be found in Berto and Nolan (2021).

to the truth-value of the sentence that contains that expression. The sense of that expression is characterised as the mode of presentation of that object, which is the way the object is presented to us or the way we think about it.

To illustrate this distinction, let us consider an example using the terms 'the morning star' and 'the evening star'. Ancient Greek astronomers used these terms to refer to, respectively, the brightest celestial body visible in the eastern sky at dawn and the brightest celestial body visible in the western sky at sunset. However, after engaging in some astronomical investigation, it was later discovered that both terms actually referred to the same celestial body, the planet Venus. Despite having the same reference, 'the morning star' and 'the evening star' have different senses because they are associated with different descriptions of the same object. 'The morning star' has the sense expressed under the definite description 'the brightest celestial body visible in the eastern sky at dawn', whereas 'the evening star' has the sense expressed under the definite description 'the brightest celestial body visible in the western sky at sunset'. So while these two terms have the same reference (Venus), the different senses had by each term reflect the different ways we think about that reference.

Once armed with Frege's reference/sense distinction, the intensionalist may charge that the hyperintensionalist's intuitions about the truth-values of classificatory propositions are not misleading because of a confusion between one property and its different aspects, but because of a confusion between one property and its different senses.[5] For example, let us consider *being a closed straight-sided*

[5]Instead of senses, certain intensionalists may side with certain extensionalists and claim that

figure having three sides and *being a closed straight-sided figure having three interior angles*. If necessary equivalence among properties implies property identity, then these mathematical properties are really one and the same property. Call this property (albeit longwinded) the 'property of *being a closed straight-sided figure having three sides/a closed straight-sided figure having three interior angles*'.

Next, the semantic values of the abstract singular terms 'the property of *being a closed straight-sided figure having three sides*' and 'the property of *being a closed straight-sided figure having three interior angles*' comprise of reference and sense. Both terms have the same reference: the property of *being a closed straight-sided figure having three sides/a closed straight-sided figure having three interior angles*. But these two terms have different senses. The first term has—perhaps among other senses—the sense expressed under the definite description 'the trilateral shape'. The second term has—perhaps among other senses—the sense expressed under the definite description 'the triangular shape'.

Let us now have a look at the classificatory propositions expressed by these two sentences:

(1a) The property of *being a closed straight-sided figure having three sides* is more similar to the property of *being an open straight-sided figure having three sides* than the property of *being a closed straight-sided figure having three interior angles* is to the property of *being an open straight-sided figure having three sides*.

the hyperintensionalist is confused about different guises of one property. Extensionalists like Guigon (2015) hold this sort of view. Although the exact difference between the natures of senses and guises is not at all clear to me, most of the issues I discuss in the next two sections regarding senses can also apply to guises. Notably, when it comes to discussions about propositional attitude reports, some metaphysicians criticise the distinction between guises and senses as being unclear. Interested readers can consult Graeme Forbes (1987) for more discussion of this critique.

(1b) The property of *being a closed straight-sided figure having three interior angles* is more similar to the property of *being an open straight-sided figure having three sides* than the property of *being a closed straight-sided figure having three sides* is to the property of *being an open straight-sided figure having three sides*.

Intuitively, (1a) is true while (1b) is false. But this intuition can be explained by the fact that our use of the terms 'the property of *being a closed straight-sided figure having three sides*' and 'the property of *being a closed straight-sided figure having three interior angles*' makes salient different senses of the same reference. For example, when we use 'the property of *being a closed straight-sided figure having three sides*' in (1a), we make salient the sense expressed under 'the trilateral shape', which picks out in every possible world the extension of both closed and open straight-sided geometrical figures having three sides in those worlds. By contrast, when we use 'the property of *being a closed straight-sided figure having three interior angles*' in (1b), we make salient the sense expressed under 'the triangular shape', which picks out in every possible world the extension of closed and open straight-sided geometrical figures having three interior angles in those worlds. The reason we mistakenly believe that (1a) and (1b) have different truth-values is because we fail to distinguish between the reference and the sense of the two abstract singular terms. We thus find ourselves in a situation reminiscent of the morning star/evening star scenario: we are using different terms to refer to the same property in hyperintensional contexts like (1a) and (1b), but we are thinking about that property in different ways due to the different descriptions associated with those terms. The different senses that are made

salient in (1a) and (1b) reflect the different ways we think about the same property. Therefore, the hyperintensional distinction in (1a) and (1b) is not between different properties, but between different senses of one property.

I will call this next objection the 'Fregean Objection'. How might the hyperintensionalist respond to it? There are two approaches that could be taken. The first is to criticise the notion of 'sense'. Alternatively, the hyperintensionalist could challenge the accusation that they really do confuse different senses of one property. This second approach aligns with our earlier discussion of the Wittgensteinian Objection. I will discuss these approaches one after the other.

3.2.1 Problems with Fregean Senses

The notion of 'sense' faces one of three problems. First of all, there is the problem regularly voiced in the literature that senses are obscure entities.[6] What exactly are they, from a metaphysical perspective? Senses are typically introduced and described as being modes of presentation (as witnessed above), but this only seems to add to the confusion, as modes of presentation themselves are just as obscure as senses.[7] For example, when analytic philosophers discuss modes of presentation, they tend to resort to informal and cursory descriptions, merely characterising these entities in passing as, for instance, 'a way of presenting' or 'a way of thinking about' the reference of an expression. So, this casual treatment of modes of presentation can hardly be said to shed light on

[6]For example, see Chalmers (2012: ch. 5), Mark Jago (2014: ch. 1), Berto and Jago (2019: ch. 9), and Mattias Skipper and Jens Christian Bjerring (2020).

[7]This complaint is also raised by some intensionalists. For example, Stalnaker (2012: p. 758) raises it against Jason Stanley (2011: ch. 4).

what senses are supposed to be. Furthermore, according to the traditional and widely-held view of senses, which traces back to Frege, they are neither physical entities nor mental entities, such as ideas or images in one's mind; rather, senses are primitive abstract entities—entities that are non-spatial, non-temporal, non-causal, yet nevertheless graspable by the mind.[8] But this still leaves us with a lot of unanswered questions, too much about the nature of senses. A hyperintensionalist may therefore find the Fregean Objection unconvincing because, in their view, the Fregean intensionalist posits disreputable entities to dissolve the counterintuitive consequences that arise from classificatory propositions.

The second problem that might be raised with the notion of 'sense' is that it relies specifically on Frege's two-dimensional view of meaning. But there may be other views of meaning that are also two-dimensional. While hyperintensionalists and Fregean intensionalists could agree that meaning is two-dimensional, hyperintensionalists might have different ways of conceiving of the distinction between reference and sense. For example, some hyperintensionalists may reconceive of that distinction between something else, say between the intension of a property and the property itself.[9] Under this sort of view, both the property

[8]See Frege (1948, 1956). For more discussion, see Michael Dummett (1973: ch. 6, p. 154), Tyler Burge (1992, 2005: introduction, p. 58 and ch. 6, p. 247), A. W. Moore (2012: ch. 8, p. 212), and Peter Hanks (2015: ch. 1). The traditional view seems to be embraced by some opponents of a hyperintensional conception of properties: Darragh Byrne and Naomi Thompson (2019: p. 154), for example, tell us that, "…senses are not ethereal, subjective or psychological. Senses are objective representational perspectives: they do not spring from the representational activities of particular human thinkers."

[9]Philosophers have often reconceived of Frege's distinction between reference and sense. Several notable examples include Rudolf Carnap (1947), Lewis (1970), who adopts Carnap's conception, Jerry Fodor (1990, 1998), Chalmers (2002, 2012), and Skipper and Bjerring (2020). Some intensionalists, like Stalnaker (2012: p. 759), have even suggested that senses can be recon-

and its intension contribute to the semantic value of an abstract singular term and the truth-value of the corresponding sentence in which that term occurs. In a hyperintensional context, such as those found in the sentences that express classificatory propositions, substitutions of these abstract singular terms will be sensitive to the properties themselves. This means that the truth-value of the sentence changes depending on which property is being referred to. In contexts that are not hyperintensional, substitutions of these terms will only be sensitive to the intensions of the properties, and not to the properties themselves. Since these hyperintensionalists have a different two-dimensional view of meaning than the Fregean intensionalist, they can reject the Fregean Objection.

The third problem that could be raised with the notion of 'sense' is that it simply relies on a two-dimensional view of meaning. However, there may be alternative views of meaning that are not two-dimensional. One such alternative is a one-dimensional view of meaning, according to which the meaning of an expression in a language is determined solely by its reference. If a hyperintensionalist adopts this one-dimensional view of meaning, this hyperintensionalist might hold that the semantic value of an abstract singular term is solely determined by the property to which the term refers. In this case, the meaning of an abstract singular term is reduced to a single dimension, rather than the two dimensions required by the Fregean intensionalist. Because the Fregean intensionalist assumes that meaning is two-dimensional, the hyperintensionalist who

ceived as properties. Moreover, certain hyperintensionalists suggest that their properties may be viewed as senses, depending on how the notion of 'sense' is cashed out. An example of such a hyperintensionalist is van Inwagen (2004).

subscribes to a one-dimensional view can dismiss the Fregean Objection.

3.2.2 Another Dubious Diagnosis: A Second Look at 'the Morning Star' and 'the Evening Star'

Putting these problems aside, the hyperintensionalist should still not find the Fregean Objection convincing. The accusation this time around is that the hyperintensionalist confuses different senses of one property. But this accusation seems to be flawed for comparable reasons as the Wittgensteinian Objection. To see why, it is important to review the reason Frege introduced the reference/sense distinction in the first place. The distinction was introduced by Frege to solve puzzles of cognitive significance (oftentimes known as 'Fregean puzzles'). Puzzles of cognitive significance arise when the meaning of an expression is taken to be exhausted by its reference. One puzzle involves informative identity statements. For example, consider the following two identity statements:

(1a) The morning star is identical to the morning star.

(1b) The morning star is identical to the evening star.

(1a) is knowable a priori and is an analytic truth, but (1b) was (as pointed out above) an astronomical discovery and, as such, is knowable a posteriori and is a synthetic truth. If we assume that reference is all there is to the meaning of an expression, then we are faced with a puzzle: why is (1a) uninformative while (1b) is informative? Frege postulated the notion of sense because he saw this difference in informativeness as evidence that there is more to meaning than

reference. However, note that in all puzzles of cognitive significance, such as in (1a) and (1b), it is already assumed that the expressions in question have the same reference. That is what gets the puzzle up and running, after all. But this is not the case with the sort of classificatory propositions I have presented. What is at issue with them is whether or not the abstract singular terms have the same reference. The hyperintensionalist says no; the Fregean intensionalist says yes. That there is no agreement between them about the reference of abstract singular terms is what makes their dispute fundamentally different from the puzzles of cognitive significance that Frege's reference/sense distinction was intended to resolve.

So understood, this suggests that the Fregean Objection is not much of an objection, unless one already believes that properties have intensional identity conditions. Our discussion of the semantic innocence of sentences expressing classificatory propositions reinforces this point, as these sentences do not embed any of the suspicious linguistic devices that are customarily thought to induce a shift from reference to sense, like modal operators, psychological verbs, and Abelardian predicates. In the absence of further considerations, I do not see a reason why hyperintensionalists should accept the accusation made by the Fregean intensionalist, except for a bias against the existence of distinct but co-intensional properties. Like the Wittgensteinian Objection, the Fregean Objection appears to be another *mere* strategy employed by intensionalists to cope with the counterintuitive consequences arising from classificatory propositions.

3.3 Chapter Summary

The task of this chapter was to controvert two objections to a hyperintensional conception of properties. These objections claimed that the differences in truth-value between classificatory propositions were due to confusing one property with different linguistic or mental representational surrogates of that property. The Wittgensteinian Objection claimed that the surrogate was an aspect, while the Fregean Objection said it was a sense. I have contended that neither objection on its own presents a genuine obstacle for the hyperintensionalist. Both objections look more like tactics used by intensionalists to preserve their prior conviction about property identity.

That being said, intensionalists might have other considerations for preferring an intensional conception of properties over a hyperintensional conception. These considerations could turn the objections discussed in this chapter into stronger ones against embracing a hyperintensional conception of properties. In the remaining chapters, I will explore these other considerations. One important consideration is an objection that takes direct aim at the idea that there can be hyperintensional distinctions between properties. It says that hyperintensional distinctions between properties are distinctions without a metaphysical difference. I will give attention to this objection in the next chapter.

Chapter 4

The Modal Inseparability of Co-intensional Properties

The purpose of this chapter is to address an objection that strikes at the very heart of a hyperintensional conception of properties. This objection targets the metaphysical status of hyperintensional distinctions between properties. It seeks to show that since co-intensional properties are modally inseparable, meaning they stand in two-way necessary connections, any distinctions between them can only be differences in how we represent one and the same property in our language and thought. For according to this objection, intensional or modal distinctions are what shape our theorising about property identity. They serve as the sole litmus test for determining when it is that there is one property and not two.

I will call the objection in this chapter the 'Modal Separability Argument'. No one has yet, to my knowledge, given an explicit statement of this argument. But I believe that the argument brings several important considerations out into the open that seem to be tacitly at work, to various degrees, in the minds of

many intensionalists.[1] Additionally, it might also be worth mentioning that this argument draws its inspiration primarily from the ideas explored by medieval philosophers like Thomas Aquinas, John Duns Scotus, William of Ockham, and Francisco Suárez regarding the doctrine of divine simplicity. I have come to believe that the considerations in the contemporary debate between intensionalists and hyperintensionalists on the metaphysical status of hyperintensional distinctions have deep roots in these medieval discussions. My hope is that by bringing these considerations into the open, it will give us a 'commanding view' of why intensionalists are so suspicious of conceiving of properties hyperintensionally.

I will begin by spelling out the Modal Separability Argument. Then I will discuss how the hyperintensionalist may respond to it.

4.1 The Modal Separability Argument Explained

The Modal Separability Argument proceeds from two premises, the first of which is:

> (1) If there is a metaphysical distinction between properties F and G, then there is some way that a world is when F is instantiated that is not the way that world is when G is instantiated.

The word 'metaphysical' in the phrase 'metaphysical distinction between properties' is used here to mark a divide between two *types* of distinctions among

[1] For a sample of relevant literature exploring some of these considerations, including works by intensionalists, hyperintensionalists, and others, see Stalnaker (1976, 2003), Lewis (1986b), Jackson (1998: ch. 1, pp. 15-6, and ch. 5, pp. 125-26), Rodriguez-Pereyra (2002: ch. 5), Schneider (2004), Künne (2006), Galen Strawson (2008, 2009: ch. 6, pp. 306-07), Agustín Rayo (2013), Jonas Olson (2014), Jeremy Goodman (2016), Teemu Toppinen (2016), Streumer (2013, 2017: ch. 2), Williamson (2013, 2016), Bader (2017), van Cleve (2018ab), and Victor Moberger (2020).

properties: representational distinctions and non-representational distinctions. Representational distinctions are those that reflect differences in how we talk and think about properties, without there being any difference between the properties themselves. These distinctions arise from differences in our language use and thought, as well as other aspects of our representational practices. For example, when we use different words to talk about the same property or employ different concepts to think about it, we make representational distinctions.[2] Non-representational distinctions reflect differences between properties themselves. While still expressed through language and thought, they are not merely differences in how we talk or think about properties. Distinctions falling within this latter type are what we call the 'metaphysical distinctions between properties'.

In order for there to be a metaphysical distinction between properties F and G, what (1) says is that there must be a difference at a given world between the instantiation of F and the instantiation of G, in the sense that there will be some set of truths that are entailed by the instantiation of F at that world that are not entailed by the instantiation of G at that same world. To give an example, let us say that F is the property of *being spherical* and G is the property of *being red*. If there is a red spherical object at a world, then there are certain truths that follow from an object instantiating *being spherical* that do not follow from it instantiating *being red*. Some of these entailments are the following: that the

[2]Representational distinctions are analogous to what is frequently referred to as 'nominal distinctions' in these discussions. For instance, Strawson (2008, 2009: ch. 6, pp. 306-07) and Bader (2017) use this terminology. For more examples of representational distinction, see Francisco Suárez's (2007: ch. 1, p. 18) treatment of what he calls 'distinctions of reasons'.

object has a constant curvature across its entire surface; that the object has a center point that is equidistant from all points on its surface; that the diameter of the object is twice the radius; and that the surface area of the object is equal to four times pi times the square of its radius.

So much for the first premise of the argument. The second premise is this:

> (2) If there is some way that a world is when F is instantiated that is not the way that world is when G is instantiated, then F and G are modally distinct.

Modally distinct properties are properties that could be instantiated without one another. *Being spherical* and *being red*, for example, are modally distinct properties. It is possible that *being spherical* is instantiated by some object that *being red* is not, and vice versa. So: there could exist objects that are spherical but not red, and objects that are red but not spherical.

Properties that are co-intensional, however, such as *being a closed straight-sided figure having three sides* and *being a closed straight-sided figure having three interior angles*, are modally inseparable: it is impossible for one of them to be instantiated by some object without the other being instantiated by that same object, and vice versa. These properties, therefore, stand in two-way necessary connections. More specifically, they are related in a way that, necessarily, for every object x, x instantiates one property if and only if x instantiates the other property.

Suppose now that F and G are co-intensional. Then they are not modally distinct. But if they are not modally distinct, then there is not some way that a

world is when F is instantiated that is different from the way that world is when G is instantiated. It then follows that there can be no metaphysical distinction between F and G. According to (2), it is the modal separability of properties that is the sure sign of a metaphysical distinction between properties.

From (1) and (2), we may infer by transitivity (or hypothetical syllogism) that:

> (3) If there is a metaphysical distinction between properties F and G, then F and G are modally distinct.

A hyperintensional distinction between properties is defined as a distinction between properties that are co-intensional, which is just to say that such distinctions are between properties that are not modally distinct. By this definition, it follows from (3) that:

> (4) A hyperintensional distinction between properties F and G is not a distinction between properties that are modally distinct.

If (3) and (4) are true, then we may conclude by modus tollens that:

> (5) A hyperintensional distinction between properties F and G is not a metaphysical distinction between F and G.

The Modal Separability Argument is valid. Thus, in order to maintain that a hyperintensional distinction between properties is a metaphysical distinction, a hyperintensionalist will have to dispute either (1), (2), or (4).

4.2 The Modal Separability Argument Examined

As a first pass, one might think that some hyperintensionalists will take issue with (1). For example, it may be thought that the truth of (1) commits us to there being such things as worlds, since (1) contains the phrase 'a world': a quantificational phrase that ranges over a domain of worlds. But suppose a hyperintensionalist does not believe that there are worlds to begin with, possible or impossible. Then metaphysical distinctions between properties, for this hyperintensionalist at any rate, will not be distinctions that correspond to differences between ways that a world is.

It would be unfair demanding all hyperintensionalists believe in worlds. But I am not insisting the truth of (1) requires belief in things that are worlds, only belief in worldly things. Whether (1) commits a hyperintensionalist to belief in worlds is a matter of how that hyperintensionalist interprets 'a world'. Of course, some hyperintensionalists may interpret this phrase as quantifying over a domain of possible worlds. Other hyperintensionalists may interpret the phrase as quantifying over a domain of both possible worlds and impossible worlds. But the phrase need not be. A hyperintensionalist is free to interpret the phrase as quantifying over a domain of something else. But whatever that something else is, it better be worldly—something that is extra-linguistic and extra-mental. For representational distinctions are not what we are after in (1). We are after metaphysical distinctions between properties. And if that is how the phrase is to be understood, no hyperintensionalist who is metaphysically serious about

properties ought to dispute (1) on those grounds; otherwise, the hyperintensionalist who does so will only be asking for trouble—for it invites the charge from the intensionalist that hyperintensional distinctions between properties are not metaphysical distinctions. So, it appears that hyperintensionalists can accept (1).

But not all of us do. Hyperintensionalists like myself will take issue with (1) for a different reason. I hold that there is a metaphysical distinction between impossible properties like *being a talking number* and *being a reptilian kangaroo*, but I don't think that these types of co-intensional properties are instantiated at any worlds, be they possible or impossible worlds. In my view, therefore, not all metaphysical distinctions are distinctions that correspond to differences between ways that a world is when one property is instantiated at that world versus another at that same world. Despite this contention, however, I am willing to temporarily set this issue aside and, for the sake of argument, accept (1).

What about (2) and (4)? Both premises make reference to modally distinct properties. But this notion of 'modally distinct' could use some clarification since our present definition of it can be understood in more than one sense. Following Daniel Stoljar, let us distinguish two senses, a strong and a weak, in which properties may be modally distinct:[3]

> Properties F and G are strongly-modally distinct if and only if (i) it is possible that F is instantiated by some object that G is not, and (ii) it is possible that G is instantiated by some object that F is not.

[3]Daniel Stoljar, 'Distinctions in Distinctions', in *Being Reduced: New Essays on Reduction, Explanation, and Causation*, ed. by Jakob Hohwy and Jesper Kallestrup (New York: Oxford University Press, 2008), pp. 263-279 (pp. 265-66).

> Properties F and G are weakly-modally distinct if and only if (i) it is possible that F is instantiated by some object that G is not, or (ii) it is possible that G is instantiated by some object that F is not.

The central difference between properties that are strongly-modally distinct and properties that are weakly-modally distinct is that the former satisfy the conjunction of (i) and (ii), whereas the latter satisfy the disjunction of (i) and (ii). No matter which sense of 'modally distinct' is at issue in both (2) and (4), the hyperintensionalist will at least accept (4). The reason is obvious: hyperintensional distinctions between properties are between co-intensional properties, which are modally inseparable; and properties that are modally inseparable are neither strongly-modally distinct nor weakly-modally distinct.

This leaves the hyperintensionalist with (2). (2) states that in order for there to be some way that a world is when property F is instantiated that is not the way that world is when property G is instantiated, F and G must be modally distinct. When (2) is combined with (1), (1) and (2) jointly entail (3), which says that for there to be a metaphysical distinction between F and G, F and G must be modally distinct; or, viewed in its contrapositive, (3) states that if F and G are not modally distinct, then there is no metaphysical distinction between them. In short, metaphysical distinctions between properties are just modal distinctions between properties. Read as 'strongly-modally distinct' or as 'weakly-modally distinct', (2) is what ultimately does the work in the Modal Separability Argument to bar hyperintensional distinctions between properties from qualifying as metaphysical distinctions. The hyperintensionalist will therefore dispute (2), in

either its strongly-modally distinct or weakly-modally distinct readings.

Now the intensionalist cannot accept both readings of (2), and that is because the strongly-modally distinct reading only allows for a subset of the metaphysical distinctions between properties that are permitted by the weakly-modally distinct reading. The strongly-modally distinct reading rules out metaphysical distinctions between determinate and determinable properties, like *being spherical* and *being shaped*. On the other hand, the weakly-modally distinct reading acknowledges such a distinction, given that these properties are weakly-modally distinct. For example, it is impossible that *being spherical* is instantiated by some object without *being shaped* also being instantiated by that same object. But the reverse is not true.

So, the key question for us to consider is which reading of (2) does the intensionalist accept and why: its strongly-modally distinct reading or its weakly-modally distinct reading? I will examine each reading to answer this question.

I turn first to (2)'s strongly-modally distinct reading.

4.2.1 The Strongly-Modally Distinct Reading and Hume's Dictum

Let us call the intensionalist who accepts the strongly-modally distinct reading of (2) an 'S-intensionalist'. Strongly-modally distinct properties stand in no necessary connections: they can be co-instantiated with one another, and they can fail to be co-instantiated with one another. This suggests that the S-intensionalist accepts this reading of (2) on the basis of 'Hume's Dictum', the metaphysical

principle that there are no necessary connections between distinct entities.[4]

A few points to make. Firstly, the types of entities Hume's Dictum is often applied to include properties.[5] Secondly, Hume's Dictum does not just apply to causal (or nomological) necessary connections, but also to metaphysical ones, of which causal necessary connections are a subset.[6] Thus, two-way necessary connections between properties are among the necessary connections that fall within the scope of this principle. And thirdly, applications of Hume's Dictum vary depending on how one interprets 'distinct'.[7] But when this principle is applied to properties, the S-intensionalist interprets 'distinct' as numerically distinct, where entities are numerically distinct if and only if they are not identical.

These points noted, the S-intensionalist accepts the strongly modally distinct reading of (2) because of the following interpretation of Hume's Dictum:

> (HD) There are no necessary connections between numerically distinct properties.

This interpretation prompts the question of why (HD) is held in the first place. (HD) is not neutral between the S-intensionalist and the hyperintensionalist; it is simply the denial of a hyperintensional conception of properties dressed in

[4]In the literature, the intensional criterion is oftentimes referred to as 'Hume's Dictum'. This can be seen in works such as Olson (2014: ch. 5), Toppinen (2016), and Moberger (2020). For a comprehensive analysis of Hume's Dictum and its different interpretations, see Jessica Wilson (2010). Furthermore, while the connection between Hume's Dictum and the philosopher David Hume is an interesting topic, it is not relevant to our discussion and will therefore be set aside.

[5]For example, see Lewis (1986b), Armstrong (1997), Stoljar (2008, 2010), Wilson (2010), and Bricker (2017).

[6]See Stoljar (2008: p. 266).

[7]I direct the reader, again, to Wilson (2010).

humean garb. Thus, if we are to believe that there can only be metaphysical distinctions between strongly-modally distinct properties, the S-intensionalist needs to provide the hyperintensionalist with some independent reason to endorse (HD). The question then is, what reason might the S-intensionalist give?

4.2.1.1 Necessary Connections are Objectionably Mysterious

The S-intensionalist may claim that there is a presumption in favour of (HD), a presumption that is characteristic of the humean contempt for necessary connections. Namely, the presumption that necessary connections between numerically distinct properties are objectionably mysterious. Is there something to this charge? Maybe so. Or maybe not. It all hangs on what is meant by 'objectionably mysterious'. I can think of three things that might be meant: either that the necessary connections at issue are unintelligible, unintuitive, or unexplained. By 'unexplained', I mean these necessary connections commit us to brute metaphysical necessities, where a necessity is said to be brute if there is no explanation for its being necessary.[8] I will reply to these charges in turn.

4.2.1.1.1 The Charge of Unintelligibility

If the charge of the S-intensionalist is that the necessary connections at issue are unintelligible, then I reply that this charge seems dubious. The S-intensionalist

[8] These complaints are frequently raised against necessary connections in one form or another. For example, see Lewis (1983, 1986ab), Armstrong (2005), Fraser Macbride (2005, 2015), Ross Cameron (2008ab), Cian Dorr (2004, 2008), Louis deRosset (2009), Wilson (2010), Helen Beebee and Fraser Macbride (2015), and van Cleve (2018ab), among others.

cannot genuinely think that necessary connections between numerically distinct properties are literally unintelligible. This is because the S-intensionalist accepts (HD), which is a principle that denies that there are necessary connections between numerically distinct properties. Presumably, if the S-intensionalist accepts (HD), the S-intensionalist understands what that principle denies. Why accept a principle, you don't understand?

4.2.1.1.2 The Charge of Unintuitiveness

If instead the charge by the S-intensionalist is that the necessary connections at issue are unintuitive, then my reply is that this charge is hard to take seriously. Note just how extreme this charge really is. The charge is that *every* necessary connection that holds between *any* numerically distinct properties is unintuitive. But this is too extreme to be plausible. For example, consider one-way necessary connections between properties. Properties that stand in one-way necessary connections are related in a way that, necessarily, for every object x, if x instantiates the one property, then x instantiates the other property, *or* if x instantiates the one property, then x does not instantiate the other property. These necessary connections are frequently presupposed in discussions of the metaphysics of properties, and within metaphysics more generally. Here is a list of some of the most prominent examples of one-way necessary connections:

> There is a one-way necessary connection between a determinate property that stands in the specification relation to a determinable property: for instance, necessarily, for every object x, if x instantiates *being spherical*, then x instantiates *being shaped*.

There is a one-way necessary connection, or 'necessary exclusion', between numerically distinct properties that stand in the specification relation to the very same determinable property: for instance, necessarily, for every object x, if x instantiates *being spherical*, then x does not instantiate *being cubical*.

There is a one-way necessary connection between a property that stands in the species relation to a genus property: for instance, necessarily, for every object x, if x instantiates *being a kangaroo*, then x instantiates *being a marsupial*.

There is a one-way necessary connection, or 'necessary exclusion', between numerically distinct properties that stand in the species relation to the very same genus property: for instance, necessarily, for every object x, if x instantiates *being a kangaroo*, then x does not instantiate *being a koala*.

There is a one-way necessary connection, or 'necessary exclusion', between numerically distinct genus properties: for instance, necessarily, for every object x, if x instantiates *being a marsupial*, then x does not instantiate *being a reptile*.

There is a one-way necessary connection between a natural kind property and the intrinsic properties associated with that kind property: for instance, necessarily, for every object x, if x instantiates *being an electron*, then x instantiates *being negatively charged*.

There is a one-way necessary connection, or 'necessary exclusion', between a natural kind property and the intrinsic properties associated with some other natural kind property: for instance, necessarily, for every object x, if x instantiates *being an electron*, then x does not instantiate *being positively charged*.

There is a one-way necessary connection between properties and the logical combinations of those properties: for instance, necessarily,

> for every object x, if x instantiates *being spherical*, then x instantiates the disjunctive property of *being spherical or a human*.

This list is not by any means meant to be exhaustive. But I believe that it is substantial enough to show how implausible the charge of unintuuitiveness is.

4.2.1.1.3 The Charge of Unexplainedness

If, finally, the charge by the S-intensionalist is that the necessary connections at issue are unexplained, then I have two replies to make. First, this charge relies in large part on modal reductivism, which is the view that all modal notions (like necessity and possibility) can be analysed in terms of or reduced to non-modal notions. On this view, the language of a theory of modality can be replaced by a language that only contains non-modal notions. But this is a substantive and very contentious view to impose on the hyperintensionalist, for four reasons. One, there are plausible alternative views on modality, such as modal primitivism, which holds that modal notions are primitive and cannot be reduced to non-modal notions.[9] If some version of modal primitivism is correct, then the present charge is misconceived. Two, not all intensionalists agree with modal reductivism.[10] Three, it is questionable whether even those who do, like Lewis,

[9]Modal primitivism encompasses a broad range of views. Some of them come from the 'modalist' camp, like those presented in Forbes (1989) and the postscript to A. N. Prior and Kit Fine (1997). Other versions are associated with the 'classical actualist' camp, such as those of Robert Merrihew Adams (1974), Plantinga (1974, 1976), and Stalnaker (1976). The 'new actualists', as Vetter (2011) calls them, also have their own versions of modal primitivism, such as those proposed in Ellis (2001), Bird (2007), Michael Jubien (2007, 2009), Andrea Borghini and Neil E. Williams (2008), Jonathan D. Jacobs (2010), Jennifer Wang (2013), and Vetter (2015).

[10]For instance, among them is Stalnaker, who in his (2003: p. 7) holds that "…modal notions are basic notions, like truth and existence, which can be eliminated only at the cost of distorting

succeed in giving a genuinely reductive theory of modality.[11] This latter point is significant because Lewis' theory is the most notable attempt among intensionalists to provide a reductive theory of modality.[12] Four, by relying on modal reductivism to defend (HD), the S-intensionalist is taking a hardline stance on a wide range of individually controversial issues. These issues are not only beyond the scope of the current chapter and the main focus of my broader project, but they are also independent of the first-order metaphysical dispute about property identity and distinctness. Some examples of these issues include: assessing the theoretical merits and ideological commitments between competing theories of modality, determining the appropriate system of modal logic and its corresponding semantics, and weighing the methodological strengths and weaknesses of approaches used to address questions in both modal metaphysics and epistemology. This stance taken by the S-intensionalist is highly contestable, and the hyperintensionalist is under no obligation to adopt it.

The second reply is related but disputes that necessary connections between numerically distinct properties entail brute metaphysical necessities. The crux of the issue here concerns the source of necessity. One approach to modality, which we can call the 'essence-first approach', states that the source of necessity

them. One clarifies such notions, not by reducing them to something else, but by developing one's theories in terms of them."

[11]Some have argued that Lewis' theory does not fully eliminate primitive modality. These include William G. Lycan (1988), Scott A. Shalkowski (1994), John Divers and Joseph Melia (2002, 2003, 2006), and Javier Kalhat (2009). For responses to some of these critiques, see Sider (2003) and Cameron (2012).

[12]The theory was originally introduced in Lewis (1973), but a more detailed development and defence of it can be found in Lewis (1986b).

lies in the essences of things that actually exist.[13] [14] The traditional approach to modality analyses essence in terms of properties that objects instantiate necessarily.[15] In particular, it says that an object, x, instantiates a property essentially if and only if x instantiates that property at all possible worlds in which x exists. Both approaches agree that essence has modal implications, but the essence-first approach only accepts the left to right direction of the biconditional, not the right to left direction. Instead, this approach treats the essence of an object as its real definition.[16] The real definition of a thing is a specification of what it is to be that thing—what is essential to it, as opposed to a nominal definition, which specifies the meaning of a word or phrase in a language. On the essence-first approach, metaphysical necessities entailed by necessary connections between numerically distinct properties can have explanations.

For example, reconsider the following one-necessary connection between determinate and determinable properties: necessarily, for every object x, if x instantiates *being spherical*, then x instantiates *being shaped*. To understand why this is necessary, we must first understand what it is for an object to be shaped.

[13] The use of the word 'actually' in 'actually exist' is to highlight that only the things that exist in the actual world are being referred to.

[14] This approach to modality is championed in Fine (1994), Lowe (2008, 2012), and Hale (2013a, 2018), among others. Penelope Mackie (2020) is to be credited with coining the label 'essence-first', although the basic approach is also known by other names. For example, Lowe (2008) calls it 'serious essentialism', and David S. Oderberg (2007) refers to it as 'real essentialism'.

[15] One defender of this approach is Plantinga (1974). For criticisms of this approach, see the seminal work of Fine (1994).

[16] The notion of 'real definition' has received extensive attention, with a number of advocates. For example, see Fine (1994, 1995), Mark Johnston (2006), Lowe (2012), Kathrin Koslicki (2012ab), Boris Kment (2014), Rosen (2015), Audi (2016), and Hale (2018). Notably, van Cleve (2018a) discusses this notion in detail within the context of brute necessities.

For an object to be shaped is for the object to have a particular form or structure, such as to be spherical, or cubical, or cylindrical; and so forth. Why then is the above truth necessary? Well, because *being spherical* and *being shaped* are essential properties of objects that are spherical. Essential properties are properties that an object must instantiate in order to be what it is. *Being spherical* and *being shaped* are properties that any object must instantiate in order to be spherical.

The presumption for (HD) says that necessary connections between numerically distinct properties are objectionably mysterious. These necessary connections are charged for being either unintelligible, unintuitive, or unexplained. But none of these charges hold up to scrutiny. I recognise no presumption in favour of (HD), and, therefore, maintain that the hyperintensionalist is at liberty to reject the strongly-modally distinct reading of (2).

I now turn to the weakly-modally distinct reading.

4.2.2 The Weakly-Modally Distinct Reading and Suárez's Dictum

Let us call the intensionalist who accepts the weakly-modally distinct reading of (2) a 'W-intensionalist'. Weakly-modally distinct properties, contra strongly-modally distinct ones, may stand in one-way necessary connections: they can be co-instantiated with one another, but at least one of them can be instantiated without the other. This suggests that the W-intensionalist accepts this reading of (2) because of a metaphysical principle that I refer to as 'Suárez's Dictum'. Suárez's Dictum, named in honour of the philosopher Francisco Suárez, states

that there are no two-way necessary connections between distinct entities.[17]

Like Hume's Dictum, Suárez's Dictum applies to different types of entities, including properties. Suárez's Dictum also applies to metaphysical necessary connections, including two-way necessary connections between properties. The interpretation of the term 'distinct' in Suárez's Dictum can vary as well, just as it does in Hume's Dictum. However, when this principle is applied to properties, the W-intensionalist interprets 'distinct' to mean numerical distinctness.

So understood, the W-intensionalist accepts the weakly-modally distinct reading of (2) by relying on the following interpretation of Suárez's Dictum:

> (SD) There are no two-way necessary connections between numerically distinct properties.

(SD) seems more plausible than (HD), since it allows for one-way necessary connections between numerically distinct properties. But, one wonders, if there can be metaphysical distinctions between numerically distinct properties that stand in one-way necessary connections, why stop there? (SD) is just as much of a flat denial of a hyperintensional conception of properties as (HD). So the W-intensionalist needs to give the hyperintensionalist some independent reason to endorse (SD). But what reason might the W-intensionalist have?

[17] On Suárez's view, as explained by Sydney Penner (2013), the sure sign of a modal distinction between entities x and y is one-way separability: x could exist without y but not vice versa, or y could exist without x but not vice versa. While modal distinctions and one-way separability applies to the existence of entities for Suárez, we can see a parallel idea at work here when it comes to the instantiation of properties.

4.2.2.1 Two-Way Necessary Connections are Objectionably Mysterious

The natural suggestion is that the W-intensionalist takes there to be a similar presumption in favour of (SD) that the S-intensionalist holds for (HD). But where the S-intensionalist thinks that both one-way and two-way necessary connections are objectionably mysterious, the W-intensionalist only thinks this about two-way necessary connections. It is these necessary connections that are charged with being either unintelligible, unintuitive, and unexplained.

My replies to the charges of unintelligibility and unexplainedness largely overlap with those I gave to the corresponding charges from the S-intensionalist. I will quickly reply to these two charges first, before turning to the charge of unintuitiveness.

4.2.2.1.1 The Charge of Unintelligibility

The charge of unintelligibility seems dubious. W-intensionalists accept (SD), which denies that there are two-way necessary connections between numerically distinct properties. By accepting (SD), it implies an understanding of what this principle denies. Thus, it is doubtful that W-intensionalists think that such connections are literally unintelligible. Conversely, if W-intensionalists really do think that about two-way necessary connections, it raises for them the awkward question of why they accept (SD) to begin with.

4.2.2.1.2 The Charge of Unexplainedness

As for the charge of unexplainedness, it is bound up with modal reductivism, which, for the same reasons I mentioned earlier, is a view of modality that should not be foisted upon the hyperintensionalist. Furthermore, this charge can be challenged by appealing (once again) to the essence-first approach to modality. This approach not only allows us to explain one-way necessary connections between numerically distinct properties, but also two-way necessary connections.

Consider, for example, the following two-way necessary connection between a pair of mathematical properties: necessarily, for every object x, x instantiates *being a closed straight-sided figure having three sides* if and only if x instantiates *being a closed straight-sided figure having three interior angles*. Why is this truth necessary? As before, the answer lies in the essence of the objects under consideration, which in this case are triangles. To be a triangle is to be a two-dimensional geometrical shape formed by connecting any three non-collinear points in a plane using straight line segments. This connection of points results in a shape that is a closed straight-sided figure with three sides and with interior angles, where each side is formed by the intersection of two adjacent line segments, and each interior angle is formed between the two adjacent sides. The fact that *being a closed straight-sided figure having three sides* and *being a closed straight-sided figure having three interior angles* are essential properties of triangles explains why this truth is necessary.

4.2.2.1.3 The Charge of Unintuitiveness

Now for the charge of unintuitiveness. One knee-jerk reply is inspired by Lewis' response to the criticism that Armstrongian universals are unintuitive.[18] Armstrongian universals are frequently said to be unintuitive because they are repeatable (that is, entities which are 'wholly present' in all their instances). But Lewis contends that this charge is not all that damaging, because it relies on intuitions nurtured by particulars and not by universals. In a similar vein, the hyperintensionalist can reply to the charge of unintuitiveness by contending that by standing in two-way necessary connections, numerically distinct but co-intensional properties only defy intuitions that are nurtured by weakly-modally distinct properties. But since co-intensional properties are not weakly-modally distinct, the charge of unintuitiveness is not a damaging one.

Unfortunately, this reply may not be entirely satisfactory. There seems to be a crucial difference between the reply given by Lewis and the one proposed here. Lewis' reply gets its traction against critics of Armstrongian universals because they fail to distinguish intuitions related to different types of entities: properties and particulars. More specifically, the critics mix up their intuitions by mistakenly applying those associated with particulars to judge properties. But the proposed reply relies exclusively on intuitions related to one type of entity: properties. It signals therefore that the charge of unintuitiveness is problematic because the W-intensionalist fails to distinguish intuitions related to different types of entities, which is evidently not the case. Consequently, the current reply

[18] See Lewis (1983: p. 345). For more on Armstrongian universals, see Armstrong (1978ab).

against the unintuitiveness charge does not hold up as effectively as Lewis' reply against the critics of Armstrongian universals.

Perhaps a more prudent way to reply to this third charge is to consider the reasons why the W-intensionalist might find these two-way necessary connections so unintuitive. It is worth remembering, after all, that in chapter one, a hyperintensional conception of properties was motivated using several examples of intuitively distinct but co-intensional properties, which the intensional criterion failed to distinguish between. So, what are the specific reasons that may be said to characterise this charge by the W-intensionalist? Two worries come to mind: an anthropomorphic worry and a difference-maker worry.

Take the anthropomorphic worry first.[19] Hyperintensionalists oftentimes posit co-intensional properties because of epistemic concerns, like to accommodate an agent's *de re* beliefs.[20] To illustrate, consider the following prototypical argument:

> Take an agent who believes *de re* of some object that it is a vixen. This means that the agent's belief is directed towards that particular object as instantiating the property of *being a vixen*. However, this agent may not believe *de re* of the same object that it is a female fox, and so their belief will not be directed towards that object as instantiating the property of *being a female fox*. (The converse of course might also be the case.) If necessary equivalence among properties implies property identity, it follows that *being a vixen* and *being a female fox* are one and the same property. But if that is right, it implies that our agent has the same *de re* beliefs, which seems mistaken. Hence, *being a vixen* and *being a female fox* cannot be the

[19] Hints of this worry can be found in Jackson (1998: ch. 5, pp. 125-26), Schneider (2004), and Künne (2006).

[20] For example, see Yagisawa (1988).

same property.

Or so the argument goes. But the problem with this sort of argument is that it is vulnerable to counterexamples having to do with the agent, not properties. For instance, in the argument just given, it seems that the agent simply does not understand that the predicates 'vixen' and 'female fox' are synonyms, and thus fails to recognise that they mean the same thing in the English language.[21] Here, the issue does not stem from the agent holding different *de re* beliefs due to different properties, but rather from the agent's unfamiliarity with the use and meaning of the different English predicates.

In reply to the anthropomorphic worry, I fully agree that it is important to not overlook synonyms when trying to explain an agent's *de re* beliefs with co-intensional properties. This applies not only to the example of 'vixen' and 'female fox' but also to pairs of predicates such as 'bachelor' and 'unmarried male', 'canine' and 'dog', and 'feline' and 'cat', among others. Any attempt to explain an agent's *de re* beliefs by positing co-intensional properties based on these pairs of predicates seems to be guilty of failing to recognise synonyms. However, there are cases where the differences in *de re* beliefs are not due to a lack of understanding of English synonyms. This is because the pairs of predicates in question might not be synonyms at all. For instance, if we replace 'vixen' and 'female fox' with 'closed straight-sided figure having three sides' and 'closed straight-sided figure having three interior angles' and run the same basic argument, the differences in *de re* beliefs cannot be attributed to the agent's failure to recognise synonyms.

[21] This point is also made in Ira Kiourti (2010).

Instead, they can plausibly be attributed to the properties of the object: *being a closed straight-sided figure having three sides* and *being a closed straight-sided figure having three interior angles*.

Still, though, positing co-intensional properties to accommodate an agent's *de re* beliefs has one significant drawback: it is susceptible to charges of opacity. Many analytic philosophers will be quick to complain that verbs expressing psychological states such as 'believes' generate opaque contexts. This issue was touched on in chapter three. Thus, it would be better if hyperintensionalists could respond to the anthropomorphic worry by positing co-intensional properties for reasons other than accommodating our *de re* beliefs, or any of our *de re* attitudes for that matter. Thankfully, I think that there are other reasons.

As was suggested in chapter one, hyperintensionalists may posit co-intensional properties to serve as the relata of similarity and determinable-determinate relations. Here are two arguments to illustrate: one for similarity relations and the other for determinable-determinate relations:

> *Being a closed straight-sided figure having three sides* is more similar to *being an open straight-sided figure having three sides* than *being a closed straight-sided figure having three interior angles* is to *being an open straight-sided figure having three sides*. If necessary equivalence among properties implies property identity, we must conclude that *being a closed straight-sided figure having three sides* and *being a closed straight-sided figure having three interior angles* are one and the same property. But this implies that these properties do not stand in different similarity relations with *being an open straight-sided figure having three sides*, which seems mistaken. Thus, *being a closed straight-sided figure having three sides* and *being a closed straight-sided figure having three interior angles* cannot be the same

property.

> *Being spherical* is a determinate of *being shaped*, and *being shaped* is a determinable of *being spherical*, but *being spherical* is not a determinate of *being sized*, and *being sized* is not a determinable of *being spherical*. If necessary equivalence among properties implies property identity, then we must conclude that *being shaped* and *being sized* are one and the same property. But this implies that these properties do not stand in different determinate-determinable relations with *being spherical*, which also seems mistaken. Thus, *being shaped* and *being sized* cannot be the same property.

More arguments could easily be given for each type of relation. But the point is that the anthropomorphic worry fails to take into consideration the fact that hyperintensionalists might posit co-intensional properties for reasons beyond just accommodating an agent's *de re* attitudes.

Take next the difference-maker worry. It says that the problem with two-way necessary connections is that they offend against the asymmetry of possibility, and this is because they lack a *difference-maker*. Allow me to elaborate further.

Let us direct our attention to (2) and reflect more carefully on what it says about differences in the ways that a world is when one property is instantiated at that world versus another property. To begin, let us restate (2) using the term 'weakly-modally distinct'. This gives us:

> (2*) If there is some way that a world is when property F is instantiated that is not the way that world is when property G is instantiated, then F and G are weakly-modally distinct.

Next, to make the phrase 'way that a world is' in (2*) more precise, let us understand it as a proposition that is true of a world. This allows us to refine (2*), yielding:

> (2**) If there is some proposition [F] that is true of a world when property F is instantiated that is not the proposition [G] that is true of that world when property G is instantiated, then F and G are weakly-modally distinct.

The shift from (2*) to (2**) reveals a subtle but crucial detail. What (2**) reveals is a constraint on propositions [F] and [G], according to which they can only differ from each other if there is a difference in the possible *instantiation patterns* between properties F and G. More precisely: for there to be a difference between [F] and [G], (2**) states that there must be a difference in some possible world together with an object in that world that instantiates F but not G, or G but not F. Restating (2**) in terms of the definition of weakly-modally distinct properties draws out this constraint. Thus, we can refine (2**) as follows:

> (2***) If there is some proposition [F] that is true of a world when property F is instantiated that is not the proposition [G] that is true of that world when property G is instantiated, then it is possible that F is instantiated by some object that G is not, or it is possible that G is instantiated by some object that F is not.

By formulating it in this way, (2***) hones in on the constraint imposed upon [F] and [G], emphasising that there can be no difference between [F] and [G] unless there is some difference in a possible world-object pair between F and G. Since a possible world-object pair between F and G is responsible for the

difference between [F] and [G], a possible world-object pair between F and G serves as the *difference-maker* between F and G. Therefore, according to (2***), whether or not [F] and [G] are distinct from each other ultimately depends on the presence or absence of this difference-maker between F and G.

This constraint on propositions brings to light the issue with two-way necessary connections between numerically distinct properties. When F and G stand in a two-way necessary connection, there is no difference-maker between them, and hence no difference between [F] and [G]. Conversely, when F and G stand in a one-way necessary connection, there is a difference-maker between them, and hence there is a difference between [F] and [G]. Another way to express the problem is to say that the symmetry of two-way necessary connections entails only differences between properties without a difference-maker, whereas the asymmetry of one-way necessary connections entails differences between properties with a difference-maker.

What can be said in reply? The idea that properties must have difference-makers seems partly motivated by something like the following background explanatory requirement: property identity is default, but property distinctness must be explained. Or, in other words, we should assume properties are identical unless we have some reason to believe otherwise. But this requirement needs further justification. For one thing, it is not manifestly obvious why hyperintensionalists should prefer it over its converse: property distinctness is default, but property identity must be explained. But secondly, it is not even obvious that either requirement should be seen as default in the first place. And that is because

there may be some basic, unexplained property identity and distinctness facts.[22]

But I will not take a stand on that debate. Even if we take the demand for a difference-maker between properties seriously, this does not mean that the hyperintensionalist has no response. While there might be differences between numerically distinct properties that stand in two-way necessary connections without a difference in a possible world-object pair, it does not follow that there is no difference-maker at all. There could be differences between these properties that arise from a *different* difference-maker, for example. In fact, in chapter six, I will explain what such a difference-maker could be. Therefore, the basic problem with the difference-maker worry is that it neglects the fact that the hyperintensionalist may have a different difference-maker than a possible world-object pair.

Yet a question lingers about the W-intensionalist's difference-maker and its bearing on properties that stand in two-way necessary connections. If the W-intensionalist accepts the second premise of the Modal Separability Argument on the basis of (SD), why must differences between [F] and [G] imply differences in a possible world-object pair between F and G? It is not immediately evident as nothing so far has been said about what propositions are, metaphysically speaking. One possibility is that the W-intensionalist conceives of propositions as sets of possible worlds.[23] If this is right, then it is easy to see why differences between [F] and [G] must imply differences in a possible world-object pair between F

[22]Some metaphysicians have argued that every metaphysical system will include some primitive identity facts. For example, Lowe (2003) argues along these lines. It may be that certain facts about property identity and distinctness are among these primitive facts.

[23]See Stalnaker (1976: pp. 79-80) and Lewis (1986b: p. 53).

and G.

Proof: Let us say that proposition [F] is true if property F is instantiated, and proposition [G] is true if property G is instantiated. If [F] and [G] are sets of possible worlds, with a set of objects in each of those worlds, [F] is true of some possible world w if and only if w is a member of [F]. Likewise, [G] is true of some possible world w if and only if w is a member of [G]. Suppose then that [F] and [G] are the same set of possible worlds. This means that there can be no F-objects that are not G-objects in some possible world, and no G-objects that are not F-objects in some possible world. In other words, the extension of F and the extension of G are the same at every possible world that is a member of both [F] and [G]. If so, then there can be no [F]-possible worlds that are not [G]-possible worlds, and no [G]-possible worlds that are not [F]-possible worlds. Therefore, if [F] and [G] are the same set of possible worlds, there can be no difference between them. QED.

But the problem with the W-intensionalist relying on this conception of propositions is that the hyperintensionalist is not forced to conceive of propositions in this way. After all, there are other ways to conceive of propositions where differences between [F] and [G] would not imply differences in a possible world-object pair between F and G. Here are three general ways.

One way is to still treat a proposition as a set of worlds, but with an expanded domain that includes impossible worlds.[24] Under this view, a proposition is more than just a set of possible worlds; it is a set of both possible and impossible worlds.

[24]See Berto and Jago (2019).

A second way treats a proposition as a 0-ary property that is instantiated by worlds.[25] This view of propositions distinguishes them from sets of worlds, whether possible or impossible. By way of analogy, there is the property of *being spherical* and the set of spherical objects, but *being spherical* is not the set of spherical objects. Similarly, there is the proposition and the set of worlds of which that proposition is true, but the proposition is not the set of worlds of which it is true, but a property of those worlds.

A third way, proposed by Jeff Speaks, treats a proposition as a certain kind of $n > 0$-ary property that is true of everything, if it is true of something.[26] For example, the proposition expressed by the sentence 'Francisco walks.' is the property of *being such that Francisco walks*. This proposition is true if and only if everything instantiates it; otherwise, it is false and nothing instantiates it. Generalising to worlds: this proposition is true with respect to a world if and only if were that world actual, everything at that world would instantiate it.

The presumption for (SD) is not that all necessary connections between numerically distinct properties are objectionably mysterious, but only two-way necessary connections. These connections are charged with being unintelligible, unintuitive, or unexplained. But these charges do not hold up under scrutiny either. As I see no presumption in favour of (SD), I claim that the hyperintensionalist is also justified in rejecting the weakly-modally distinct reading of (2).

Here ends my examination of the strongly-modally distinct and weakly-modally

[25] Some intensionalist also think of propositions as 0-ary properties but *identify* them with sets of possible worlds. Lewis (1986b) is an obvious example.

[26] See Jeffrey C. King, Scott Soames, and Jeff Speaks (2014: ch. 5).

distinct readings. The result is that the Modal Separability Argument fails to show that hyperintensional distinctions between properties cannot be metaphysical distinctions.

4.3 Chapter Summary

What I have done in this chapter is present and then examine the Modal Separability Argument. Upon examination, I explained that its second premise seems to depend on one of two assumptions: (HD), if the premise is interpreted in terms of strongly-modally distinct properties, or (SD), if the premise is interpreted in terms of weakly-modally distinct properties. I have argued that the hyperintensionalist is not required to accept either assumption, and so can resist the Modal Separability Argument by denying this premise.

However, this examination does not let us hyperintensionalists off the hook just yet. We still shoulder the serious burden of giving an account of when hyperintensional distinctions between properties do, in fact, qualify as metaphysical distinctions. But I postpone that issue to chapter six. In the meantime, the counterintuitive consequences of the intensional criterion still remain, and cannot be dismissed by the intensionalist as being merely apparent.

Chapter 5

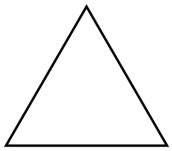
The Promiscuity of Co-intensional Properties

In this next chapter of objections and responses, I will consider objections that attack a hyperintensional conception of properties for theoretical and methodological reasons. These objections are meant to show that the acceptance of such a conception of properties incurs certain costs; costs that are not only, so it would seem, too high to justify, but are ones that an intensional conception of properties does not incur. Therefore, it is better for a theory of properties to just stick with an intensional criterion of identity for properties, in the face of that criterion's counterintuitive consequences. There are five objections to be considered, with four being discussed here and the fifth being taken up in chapter six.

5.1 Multiplying Co-intensional Properties Without End

I turn first to an objection that claims that a hyperintensional conception of properties has a multiplication problem: roughly put, it permits us to multiply properties that are co-intensional without end. In the following passage, which I

quote here at length, Bart Streumer sets out this problem using the predicates 'is a closed figure that has three sides' and 'is a closed figure that has three angles':[1]

> [T]hese predicates do not ascribe different properties. Instead, they both ascribe the property being a figure with the following shape:
>
> 
>
> For suppose that these predicates did ascribe two different properties. Figures with this shape also satisfy the predicate
>
> 'is a triangle'.
>
> If the predicates 'is a closed figure that has three sides' and 'is a closed figure that has three angles' ascribed two different properties, there would be no reason why the predicate 'is a triangle' would not ascribe a third property. But, surely, these predicates do not ascribe three different properties. Therefore, the predicates 'is a closed figure that has three sides' and 'is a closed figure that has three angles' do not ascribe two different properties either.
>
> Moreover, suppose that these predicates did ascribe three different properties. And suppose that we invented a new name for figures with this shape: suppose that we started to call these figures 'Δs' (which we pronounced as 'deltas'). These figures would then also satisfy the predicate
>
> 'is a Δ'.

[1] Bart Streumer, 'Are There Irreducibly Normative Properties', *Australasian Journal of Philosophy*, 86 (2008), 537-61 (pp. 542-43). See also Streumer (2013, 2017).

> If the predicates ‘is a closed figure that has three sides’, ‘is a closed figure that has three angles’ and ‘is a triangle’ ascribe three different properties, there would be no reason why the predicate ‘is a Δ’ would not ascribe a fourth property. But, surely, these predicates do not ascribe four different properties. Therefore, the predicates ‘is a closed figure that has three sides’ and ‘is a closed figure that has three angles’ do not ascribe two different properties either.
>
> Finally, suppose that these predicates did ascribe four different properties. And suppose that we started to call one half of a side a ‘half-side’ and one half of an angle a ‘half-angle’. These figures would then also satisfy the predicate
>
> ‘is a closed figure that has six half-sides and six half-angles’.
>
> If the predicates ‘is a closed figure that has three sides’, ‘is a closed figure that has three angles’, ‘is a triangle’ and ‘is a Δ’ ascribed four different properties, there would be no reason why the predicate ‘is a closed figure that has six half-sides and six half-angles’ would not ascribe a fifth property. But, surely, these predicates do not ascribe five different properties. Therefore, the predicates ‘is a closed figure that has three sides’ and ‘is a closed figure that has three angles’ do not ascribe two different properties either.

I understand Streumer as giving a *reductio ad absurdum* argument:[2] suppose that ‘is a closed figure that has three sides’ and ‘is a closed figure that has three angles’ ascribe numerically distinct but co-intensional properties. Then this supposition leads to the absurd result that if we introduce a third predicate, ‘is a triangle’, that also applies to the same objects as ‘is a closed figure that has three sides’ and ‘is a closed figure that has three angles’, there would be no reason why ‘is a triangle’ does not ascribe a third property that is numerically distinct but co-intensional with the original two. This same reasoning holds for any additional

[2] And I am not alone in this. For example, see David Enoch (2011: ch. 6).

predicates we might invent that apply to the same objects. I will call this *reductio* the 'Multiplication Argument'.

Now the Multiplication Argument seems problematic right from the very beginning. Streumer asserts that 'is a closed figure that has three sides' and 'is a closed figure that has three angles' ascribe the same property—"the property being a figure with the following shape", where that 'following shape' is an image of a regular triangle.[3] Presumably, he thinks that these two predicates ascribe the property of *being a regular triangle*, a property whose intension is the extension of closed straight-sided figures with three sides that are all of equal length and with three interior angles that are all of equal measure—each interior angle measuring 60 degrees, to be exact. But there are three issues with this thought.

In the first place, the two predicates apply to all types of triangles, not just regular ones. Hence, neither predicate ascribes *being a regular triangle*.

In the second place, the two predicates do not even apply to the same objects. For example, 'is a closed figure that has three sides' also applies to objects that are closed sided figures with two straight sides and one curved side, whereas 'is a closed figure that has three angles' does not. Hence, these predicates do not ascribe properties that are co-intensional.

In the third place, even if the two predicates did ascribe *being a regular triangle*, 'is a triangle' applies to all types of triangles. Hence, 'is a triangle' does not ascribe a property that is co-intensional with *being a regular triangle*.

Given these issues, the Multiplication Argument so stated, is a non-starter.

[3]Streumer, 'Are There Irreducibly Normative Properties', p. 542.

Nevertheless, Streumer might be onto something. What we need is a more careful statement of the Multiplication Argument—one that is not vulnerable to the issues previously mentioned. The following version of the argument seems like an improvement:

> (1) Suppose for *reductio* that a pair of predicates 'is F' and 'is G' ascribe numerically distinct but co-intensional properties.
>
> (2) Suppose additional predicates are invented, such as a third, fourth, fifth, and so on, that apply only to the same objects as 'is F' and 'is G' across every possible world.
>
> (3) If 'is F' and 'is G' ascribe numerically distinct but co-intensional properties, then there would be no reason why these additional predicates that apply to the same objects as 'is F' and 'is G' across every possible world do not themselves each ascribe numerically distinct properties that are co-intensional with the two properties ascribed by 'is F' and 'is G'.
>
> (4) The fact that these additional predicates ascribe numerically distinct properties that are co-intensional with the two properties ascribed by 'is F' and 'is G' is absurd.
>
> (5) Therefore, 'is F' and 'is G' do not ascribe numerically distinct but co-intensional properties.

In response to this modified *reductio*, I wish to challenge premise (3). Streumer simply takes it for granted that something like (3) must be true. But what is the justification for that? More exactly, how does the supposition that two predicates ascribe numerically distinct but co-intensional properties result in the egregious multiplication of these properties? I can think of three potential explanations, and I will now address each of them in turn.

The first explanation is based on a certain view of properties, which states that properties, including co-intensional ones, depend for their existence on what actual predicates we use. The idea is that when we introduce a new predicate into our language and use it to make successful predications, we thereby bring into existence a unique property that corresponds to that predicate.

There is, however, an obvious problem with this explanation. Such a view of properties is not forced upon hyperintensionalists. Hyperintensionalists may hold to a view resembling that of intensionalists, claiming that properties are not dependent on language (or the mind, for that matter). On this view, properties are not at all the product of our successful predications; instead, properties already exist and are distributed throughout the world, awaiting to be ascribed by us.

The second explanation is founded on a view of properties that claims that every predicate in our language ascribes a unique property.[4] According to this view, properties are not brought into existence through our successful predications; rather, predicates and properties simply stand in a one-to-one correspondence, with properties being like *mere* shadows of our predicates. The idea here is that all properties, including co-intensional properties, are governed by a property comprehension schema like the following:

Comp: An object x instantiates the property of *being F* if and only if x is F.

But this explanation is also problematic. This is because hyperintensionalists are perfectly free to reject the view that predicates and properties are isomor-

[4]This explanation is hinted at in Streumer (2013: pp. 319-24 and 2017: ch. 2, pp. 11-9).

phic. That view of predicates and properties is not an essential part of a hyperintensional conception of properties, and there are several other reasons why hyperintensionalists might reject such a view.[5] One well-known reason is that there are certain predicates—for example, 'is not self-instantiable'—that generate Russell-like paradoxes.[6]

The third explanation appeals to the absence of a criterion of identity for co-intensional properties. A hyperintensional conception of properties does not offer an alternative criterion of identity for such properties. While co-intensional properties may be numerically distinct from one another, co-hyperintensional properties are supposed to be one and the same. But a property's hyperintension is typically characterised as being something that is more fine-grained than its intension (as evidenced by the Introduction of this PhD thesis). The issue with this negative characterisation is that it fails to give any indication of the conditions under which multiple predicates, which apply to the exact same objects across every possible world, ascribe one and the same property. Failing to have a criterion of identity for numerically distinct but co-intensional properties, hyperintensionalists are unable to stop the multiplication of these properties.

This explanation is no good, however. One problem is that the absence of a criterion of identity for co-intensional properties does not entail that multiple predicates, which apply to the same objects across every possible world, must also ascribe multiple co-intensional properties. It is possible that these predicates

[5]For discussion of possible reasons, see George Molnar (2003: ch. 1, pp. 25-7).
[6]For the details, refer back to footnote 14 in the first chapter of this thesis.

ascribe co-intensional properties that have the same hyperintension and, as a result, these co-intensional properties would turn out to be one and the same.

Another problem is that, although a criterion of identity for co-intensional properties is lacking in our discussion, hyperintensionalists have options available to them. On the one hand, they could adopt an existing criterion of identity.[7] On the other, they could develop what I call a 'hyperintensional theory of property identity'. I discuss what such a theory is and propose one in the next chapter. While we cannot delve into the details of the theory just yet, it does supply hyperintensionalists with a criterion of identity for co-intensional properties.

A final problem is that this explanation assumes that having a criterion of identity for co-intensional properties is sufficient to stop the multiplication of them. But no hyperintensionalist should accept this assumption. This is because the intensional criterion is not even sufficient to stop the multiplication of numerically distinct but co-extensional properties. To illustrate, consider an intensionalist like Lewis, who believes that properties are classes of both actual and possible particulars. For Lewis, there exists a property that corresponds to any predicate, no matter how complex it may be.[8] More carefully, he endorses the following property comprehension schema:[9]

Comp*: For some property F, it is necessarily the case that, for every

[7]Various criteria of identity have been proposed. For example, see Bealer (1982), Chisholm (1992), Vander laan (1997), Moreland (2001), van Inwagen (2004), Jussi Suikkanen (2010), Rosen (2015), and Bader (2017). For brevity, I will not repeat these proposals here. For the interested reader, I recommend Audi (2016) for an overview of some of these proposals.

[8]Lewis, 'New Work for a Theory of Universals', *Australasian Journal of Philosophy*, 61 (1983), 347-77 (p. 350).

[9]Ibid.

> object x, x instantiates the property of *being F* if and only if x is F.

Now suppose that we have two predicates, 'is F' and 'is G', that ascribe properties that are co-extensional. Then, on Lewis' view, we can in principle invent disjunctive predicate after disjunctive predicate, and so on, that ascribe properties that are numerically distinct but co-extensional with those ascribed by 'is F' and 'is G'. For example, if 'is F' ascribes the property of *being F* and 'is G' ascribes the property of *being G*, we can combine 'is F' with 'is G' to form the disjunctive predicate 'is F or G', which ascribes the property of *being F or G*. This newly formed disjunctive predicate can be further combined with another predicate, say, 'is H', which ascribes the property of *being H*, to form the disjunctive predicate 'is F or G or H'. This new predicate, in turn, ascribes the property of *being F or G or H*. We can then repeat this process with other predicates in the language to form more disjunctive predicates that ascribe properties that are also co-extensional with *being F* and *being G*. Lewis' view allows for the multiplication of co-extensional properties through this process, which the intensional criterion won't stop. We cannot therefore expect to hold the hyperintensionalist to one standard and yet hold the intensionalist to another.

Thus, I reach the conclusion that similar to the original statement of the Multiplication Argument, this modified version also proves unsuccessful.

5.2 Running Afoul of Ockham's Razor

Another way to object to a hyperintensional conception of properties stems from considerations about parsimony. Some intensionalists may believe that this conception of properties runs afoul of Ockham's Razor, the principle that tells us that things should not be multiplied more than is necessary.[10] There are two readings of this principle that will concern us. The first reading is the 'qualitative parsimony reading', according to which *the number of kinds of things* should not be multiplied more than is necessary. The second is the 'quantitative parsimony reading', according to which the *number of things* should not be multiplied more than is necessary. Both readings raise separate objections to a hyperintensional conception of properties. I will consider these objections in turn.

5.2.1 Qualitative Parsimony

The objection from the qualitative parsimony reading can be formulated as the following argument:

(1) The number of kinds of things (including properties) should not be multiplied more than is necessary.

(2) To accept co-intensional properties is to multiply the number of kinds of properties unnecessarily.

[10]For example, Enoch (2011: ch. 6, p. 140) claims, "The deep reason…for objecting to distinct [co-intensional] properties has to do not so much with intuitive judgements about some examples, but with parsimony, with the methodological requirement not to multiply entities (including properties) unnecessarily." Byron Simmons (2020: p. 3083) similarly complains: "…[T]he hyperintensionalist seeks to inflate…our overall catalogue of properties." In my conversations with intensionalists and hyperintensionalists, I also frequently encounter similar concerns and complaints about a hyperintensional conception of properties.

(3) Therefore, co-intensional properties should not be accepted.

(4) A hyperintensional conception of properties depends upon whether there are properties that are co-intensional.

(5) Therefore, a hyperintensional conception of properties should not be accepted.

I will call this argument the 'Qualitative Parsimony Argument'. Against it, a hyperintensionalist could counter in two possible ways. The first is to simply deny premise (1). (1) assumes that there is a presumption in favour of qualitative parsimony. But there is no consensus among metaphysicians on there being such a presumption. Terence Parsons, for instance, disputes that there is one:[11]

> ...[U]nadorned appeals to Occam's razor have (or should have) absolutely no force at all. There is no prima facie reason to suppose that the universe contains a small number of things, or a small number of kinds of things. There is no prima facie reason to believe that a theory that endorses a small number of things, or kinds of things, or employs a smaller number of primitives, is simpler or likelier to be true or likely to yield more insight than another. Theories should not be compared by counting entities, kinds of entities, or primitives.

Speaking for myself, I think qualitative parsimony is a theoretical virtue and should be taken into serious consideration when making decisions about which theories to adopt; so I choose the second way to counter the argument: deny premise (2). The issue of increasing the number of kinds of properties seems to be one about the nature of properties. But I have remained neutral about the

[11] Terence Parsons, 'The Methodology of Nonexistence', *Journal of Philosophy*, 76 (1979), 649-62 (p. 660).

nature of properties, treating them as things that serve certain theoretical roles: semantic roles (serving as the semantic value of our meaningful predicates, abstract singular terms, variables that our property-quantifiers range over), and non-semantic roles (being responsible for qualitative similarity and causal powers). Therefore, the issue of multiplying the number of kinds of properties is about the multiplication of the number of kinds of things that can fulfill the roles assigned to properties. In light of this, it is not clear whether accepting co-intensional properties actually increases the number of kinds of properties any more than accepting co-extensional properties does.

For example, let us consider two theories of properties, T_1 and T_2. Both theories assign the same semantic and non-semantic theoretical roles to properties. However, T_1 claims that co-intensional properties are one and the same, while T_2 claims that co-intensional properties may be numerically distinct from one another. The question is, does T_2 introduce more kinds of things to play the roles assigned to properties than T_1? It's difficult to see how. There is no strong reason to believe that co-intensional properties could not turn out to be whatever co-extensional properties turn out to be, and no intensionalist has provided any reason to think otherwise. Perhaps a hyperintensionalist believes in the same kinds of things as an intensionalist to play the roles assigned to properties. Alternatively, a hyperintensionalist might have the same kind of thing to play both semantic and non-semantic roles, such as classes of actual and possible particulars together with a primitive notion of naturalness, whereas an intensionalist has two kinds of things, one for the semantic roles like classes of actual and pos-

sible particulars and the other for the non-semantic roles like an Armstrongian universal.[12] In some cases at least, when compared to accepting co-extensional properties, accepting co-intensional properties would not introduce more kinds of things that play the roles assigned to properties unnecessarily. This is because accepting co-intensional properties would not even increase the number of kinds of things that play the roles assigned to properties in the first place.

In other cases, however, accepting co-intensional properties may in fact increase the number of kinds of things that play the roles assigned to properties, as opposed to accepting only co-extensional properties. Hyperintensionalists must provide justification in these situations. My justification is that there are good reasons to accept co-intensional properties. These reasons include my *prima facie* case made in chapter one and my responses to the objections raised in the preceding three chapters against a hyperintensional conception of properties.

5.2.2 Quantitative Parsimony

What about the objection from the quantitative parsimony reading? It can be stated in terms of the following argument:

(1) The number of things (including properties) should not be multiplied more than is necessary.

(2) To accept co-intensional properties is to multiply the number of properties unnecessarily.

(3) Therefore, co-intensional properties should not be accepted.

[12] These views of properties are put forth in Lewis (1983).

(4) A hyperintensional conception of properties depends upon whether there are properties that are co-intensional.

(5) Therefore, a hyperintensional conception of properties should not be accepted.

I will call this argument the 'Quantitative Parsimony Argument'. The ways a hyperintensionalist could counter this argument parallel those I provided for the Qualitative Parsimony Argument. One way is to reject premise (1) by claiming that there is no presumption against multiplying the number of things in our theories, as witnessed in the above quotation by Parsons. In fact, some intensionalists hold this view of quantitative parsimony. For example, we find Lewis giving assent to it in the following passage: "I subscribe to the general view that qualitative parsimony is good in a philosophical or empirical hypothesis; but I recognise no presumption whatever in favour of quantitative parsimony."[13]

Like qualitative parsimony, I hold that quantitative parsimony is an important theoretical virtue that ought to be considered when selecting theories.[14] Therefore, I opt for the other way to counter this argument: reject premise (2). It is unclear whether accepting the existence of co-intensional properties actually multiplies the number of properties any more than accepting co-extensional properties. For instance, let us consider T_1 and T_2, two theories of properties that claim that the world is infinitely complex.[15] Both theories also claim that in order to account for this complexity, we need to admit the existence of conjunctive

[13]Lewis, *Counterfactuals.* (Oxford: Basil Blackwell, 1973), p. 87.
[14]For arguments that quantitative parsimony is a theoretical virtue, see Nolan (1997).
[15]For discussion, see Armstrong (1978b), D.H. Mellor (1992), Oliver (1992), and Sider (1995).

properties, such that for some conjunctive property, it might be the case that its conjuncts are themselves conjunctive properties, and each of their conjuncts are conjunctive properties, and so on, *ad infinitum*.[16] However, T_1 and T_2 differ in that T_1 holds that co-intensional properties are one and the same, while T_2 says that co-intensional properties may be numerically distinct from one another. The question here is this: does T_2 increase the number of properties more than T_1? It is hard to see how, as both theories admit of an infinite number of properties. In the case at hand, it is unclear whether accepting co-intensional properties would introduce more properties unnecessarily. This is because it is unclear whether accepting co-intensional properties even increases the number of properties at all when compared to accepting co-extensional properties.

But of course it is possible that in some cases a hyperintensional theory of properties has strictly a greater number of properties with respect to cardinality than an intensional theory of properties. After all, we can compare different sizes of infinity. If, for instance, we counted up the hyperintensions and the intensions of both theories, the hyperintensional theory might turn out to have more properties. If a hyperintensionalist holds to such a theory, this needs to be justified. My *prima facie* case presented in chapter one, coupled with my responses to the objections in the previous three chapters, provide my justification.

[16] This view of conjunctive properties is from Oliver (1992: p. 95). We could help ourselves to an analogous view of disjunctive properties as well, where for some disjunctive property, it might be the case that its disjuncts are themselves disjunctive properties, and each of their disjuncts are disjunctive properties, and so on, *ad infinitum*. This is put forward in Mellor (1992: p. 101).

5.3 Running Afoul of Williamson's Razor

The fourth objection is suggested in the work of Timothy Williamson, who, commenting on the hyperintensional revolution, observes the following trend: "Methodologically, a key feature of the hyperintensional revolution is that it is driven by *examples*, especially by apparent counterexamples to intensional principles."[17] But the danger, as he sees it, is that:[18]

> ...[T]he self-proclaimed hyperintensional revolution involves multiplying degrees of freedom in order to explain data which may well be unreliable. That looks like a classic case of overfitting. Disturbingly, there seems to be no awareness within the hyperintensionalist camp that the programme carries these warning signs of bad science. The data are uncritically accepted, and the extra degrees of freedom are uncritically welcomed as increasing flexibility. Consequently, the methodological challenges are not even being addressed. Of course, they *might* turn out to be just teething problems. If the programme can achieve enough explanatory success, it may eventually be vindicated. But, by normal scientific standards, merely accommodating data by multiplying degrees of freedom constitutes little in the way of explanatory success. It comes too cheap. Thus, on present evidence, the so-called hyperintensional revolution may well be a spectacular case of overfitting.
>
> From this perspective, if analytic philosophy is to move up to the next level of methodological sophistication, it must take steps to avoid overfitting, by becoming less profligate in adding degrees of freedom, and more critical in assessing its data.

It is not part of my defence of a hyperintensional conception of properties to try to defend the hyperintensional revolution, *per se*. It is also not to defend

[17] Timothy Williamson, 'Degrees of Freedom: Is Good Philosophy Bad Science?', *Disputatio: International Journal for Philosophy*, 13 (2021), 73-94 (p. 87).

[18] Ibid., (p. 93-94).

what others who have pushed for this revolution have said elsewhere. However, because a hyperintensional conception of properties is part of the hyperintensional revolution, Williamson's remarks signal that this conception of properties runs afoul of what I will call 'Williamson's Razor', the principle that tells us that degrees of freedom should not be multiplied more than is necessary.

An objection that involves Williamson's Razor may be expressed as the following argument:

(1) The degrees of freedom in one's theory (including one's theory of properties) should not be multiplied more than is necessary.

(2) To accept co-intensional properties is to multiply the degrees of freedom in one's theory of properties unnecessarily.

(3) Therefore, co-intensional properties should not be accepted.

(4) A hyperintensional conception of properties depends upon whether there are properties that are co-intensional.

(5) Therefore, a hyperintensional conception of properties should not be accepted.

I will call this argument the 'Multiplying Degrees of Freedom Argument'. I wish to respond to it by denying premise (2). Although the data used to constitute my case in chapter one for a hyperintensional conception of properties may be properly described as 'example driven', I cannot be appropriately accused of *uncritically accepting* the data. I started by gathering and observing two sets of data: that there seem to be numerically distinct but co-intensional properties and that the truth-value of some classificatory propositions seems to turn on these

properties. Based on this data, I concluded that there is a *prima facie* reason to move beyond an intensional conception of properties to a hyperintensional one, since the data appeared to show that the intensional criterion yields counterintuitive consequences for property identity. But I did *not* conclude that this data establishes that properties have more fine-grained identity conditions than necessary equivalence. Rather I went on to test this data. That is, in the subsequent chapters, I subjected the data to a battery of objections, from different angles, concerning a variety of issues and considerations, that have already been made (or that I think might likely be made) by intensionalists to cast doubt on the data. But none of these objections proved compelling. Not to mention, Williamson's many other criticisms against those in the hyperintensional revolution, in particular, do not take aim at the specific data I have provided.

Still, there is more to be said about a hyperintensional conception of properties being example driven. Think about what overfitting is. Overfitting is a phenomenon in data science where a model—usually a statistical model—becomes too sensitive to the training data set, such that the model in one's theory fails to generalise well on any testing data set (the new data). In cases of overfitting, a model memorises all the details of the training data set, along with the so-called 'noise'—all the random, unreliable, and idiosyncratic data within the training data set. Due to this, the model in one's theory is trained to generalise on testing data that includes noise, rather than an underlying trend within the set of training data. If this is what overfitting means, is it *really* the case that all the examples of co-intensional properties are just a bunch of noise?

In chapter four, section 4.1.2, I suggested that some examples like *being a vixen* and *being a female fox* should be considered as noise and, as such, ought not be used as evidence for a hyperintensional conception of properties. But I disagree that every example of co-intensional properties can be so easily dismissed. For there are entire families of different types of co-intensional properties, such as mathematical, determinable, natural kind, great-making, contradictory, categorically mistaken, and contrary properties, that are not just one off, random unreliable examples. Quite the contrary, what these examples reveal is a trend about property identity that the intensional criterion fails to capture; it systematically delivers wrong identity conditions for all the properties in these families. Until we have grounds to think otherwise, I claim that the present evidence suggests that the intensionalist is guilty of underfitting the data. And just as Williamson advises that analytic philosophy should take steps to avoid overfitting, analytic philosophy should also take steps to avoid underfitting, by becoming less miserly in adding degrees of freedom in our theories. Therefore, whatever degrees of freedom that a hyperintensionalist does have to multiply, I maintain that this multiplication need not be done without good reason.

5.4 Chapter Summary

In this chapter, I have outlined four objections to a hyperintensional conception of properties: the Multiplication Argument, the Qualitative Parsimony Argument, the Quantitative Parsimony Argument, and the Multiplying Degrees of Freedom Argument. The Multiplication Argument charges that a hyperin-

tensional conception of properties has a multiplication problem, as it allows us to multiply co-intensional properties without end. The Qualitative Parsimony Argument claims that conceiving of properties hyperintensionally unnecessarily violates the qualitative parsimony reading of Ockham's Razor, whereas the Quantitative Parsimony Argument states that it unnecessarily violates the razor's quantitative parsimony reading. And lastly, the Multiplying Degrees of Freedom Argument says that this conception of properties unnecessarily violates Williamson's Razor. I have provided responses to each objection, arguing that they are not as serious as they initially seemed, or that the costs brought out by them could be managed. Either way, the hyperintensionalist can overcome these objections.

Chapter 6

Co-intensional Properties on the Cheap

I said at the beginning of the last chapter that there were five objections against a hyperintensional conception of properties based upon theoretical and methodological considerations. Only four of those objections were dealt with in that chapter. The objection that remains is the topic of this chapter, and it is the final objection to be considered in my defence. According to this objection, a hyperintensional conception of properties is a cheap substitute for an intensional one. It is a cheap substitute because insufficient attention has been paid to the hyperintension of a property. The objection consists of two interrelated problems.

6.1 The Granularity Problem and the Difference-Maker Problem

First, there is the problem of finding a criterion of identity for properties that is more fine-grained than the intensional criterion. A hyperintensional conception of properties says that whenever properties are co-hyperintensional, this implies property identity. And yet, this conception of properties characterises

a property's hyperintension as being more fine-grained than a property's intension, without ever specifying how much more. In other words, this negative characterisation gives us no answer to the question of just how fine-grained the hyperintensions of properties must be in order to imply property identity.[1] I call this problem the 'Granularity Problem'.

Second, there is the problem of determining what makes a given hyperintensional distinction between properties a non-representational difference as opposed to a merely representational difference. Hyperintensional distinctions between properties mark a divide between the hyperintensions of those properties. But what is it about these hyperintensions, exactly, that renders a hyperintensional distinction between properties more than just a difference in the way we talk or think about those properties? Put more candidly, what about them should lead us to bestow hyperintensional distinctions the honour of being *metaphysical distinctions*? Simply characterising the hyperintension of a property as more fine-grained than the intension of a property does not provide an answer to this question either. This problem I call the 'Difference-Maker Problem'.

It is instructive to point out that solving the Granularity Problem does not guarantee a solution to the Difference-Maker Problem. Suppose the hyperintensionalist proposes the following ultra-fine-grained solution to the Granularity Problem: roughly, sameness of syntactic structure among predicates implies property identity.[2] On this solution, the property expressed by the predicate 'red

[1] An analogous problem crops up for the hyperintensions of propositions. For example, see Jespersen and Duži (2015), Berto and Jago (2019: chs. 1 and 8), and Berto and Nolan (2021).

[2] This solution takes inspiration from several sources: Lewis (1986b: ch. 1), Yagisawa (1988),

and square' is not identical to the property expressed by the predicate 'square and red' because these predicates have different syntactic structures, where a syntactic structure is a sequence of lexical items like words or parts of words. So, for example, the former property has the sequence ⟨ 'red', 'and', 'square' ⟩, while the latter property has the sequence ⟨ 'square', 'and', 'red' ⟩. This solution to the Granularity Problem delivers hyperintensional distinctions between properties, and the reason is because it *builds* into the hyperintension of a property the syntactic structure of the predicate that expresses that property. But this solution, however, gives no reason whatsoever to believe that these hyperintensional distinctions are metaphysical; for these distinctions are only made at the level of syntax, which are representational differences rather than metaphysical ones. Sameness of syntactic structure among predicates implies property identity solves the Granularity Problem, but it will not provide the hyperintensionalist with a solution to the Difference-Maker Problem.

Let us understand the conjunction of the Granularity Problem and the Difference-Maker Problem as a call for the hyperintensionalist to give a hyperintensional theory of property identity. Then, let us say that a *metaphysically adequate* hyperintensional theory of property identity is one that solves both problems. What I mean to do in the rest of this chapter is to present and defend a metaphysically adequate hyperintensional theory of property identity. The theory presented here is not intended to be the final and definitive account but rather a starting point—a proof of concept. Its aim is to show the plausibility of there

Bricker (1996), Allen (2016: ch. 4), and Cresswell (1985).

being such a hyperintensional theory of property identity that can resolve the Granularity Problem and the Difference-Maker Problem. Although I have sought to uphold a neutral standpoint in defending a hyperintensional conception of properties throughout this PhD thesis, I will now take a less neutral stance with the theory I present. It is important to emphasise that this shift in stance will not affect the responses provided to the objections raised in the previous chapters.

In section 6.2, I will introduce the theory and describe its solutions to the Granularity Problem and the Difference-Maker Problem. Then, in section 6.3, I will defend the theory from two objections. I will end in section 6.4, where I provide a summary of the main points discussed and give concluding remarks about my overall defence of a hyperintensional conception of properties.

6.2 A Hyperintensional Theory of Property Identity

The theory I propose is to be understood as a method for specifying our property-talk. It provides a framework for how to conduct our disputes about property identity by specifying which predicates in the language we use to express properties correspond to which properties we recognise in our metaphysic. This theory, at its core, aligns with the spirit of W. V. Quine's theory of ontological commitment.[3] The basic idea of Quine's theory is that the question of what exists can be answered by analysing the quantificational structure of our discourse. Likewise, this theory asserts that the questions of which properties are identical and which

[3]See Quine (1948).

hyperintensional distinctions between them are metaphysical can be answered by examining the predicate structure of our discourse. But before I try to explain more precisely what this theory says about property-talk, I must first explain what exactly this theory says about properties.

6.2.1 Metaphysical Assumptions

The theory is shaped by three metaphysical assumptions about properties. The initial two assumptions were already introduced in chapter one, so some of what I will discuss about them will be a review.

The first assumption is that there are sparse properties. Properties sparsely conceived are expressed by the meaningful predicates in a language only if they account for the salient qualitatively similarities and causal powers of things.

There are different conceptions of which properties the sparse ones might be. There is a conception that says sparse properties are only those invoked in fundamental physics.[4] Another conception claims that sparse properties are the properties invoked across all branches of science, from fundamental physics to chemistry, to biology, to geology, and more.[5] A third conception claims that sparse properties are actually the properties invoked within and outside the sciences, such as normative and moral properties.[6] And, of course, there may be more conceptions than these. But this theory does not assume a specific conception of sparse properties; it allows for these different conceptions.

[4]See Lewis (1986b, 1994), Armstrong (1988, 1989), and Heil (2012).
[5]See Schaffer (2004).
[6]For discussion, see Michael Ridge (2019).

The second assumption is that there are also abundant properties. Properties abundantly conceived are expressed by every meaningful predicate in a language, with the exception of those predicates that give rise to Russell-like paradoxes or express the sparse properties discussed a moment ago. This assumption implies that the theory of property identity is committed to an array of arbitrarily complex properties: negative properties like *being not F*, conjunctive properties like *being F and G*, and disjunctive properties like *being F or G*, among others.

In positing the existence of both sparse and abundant properties, the theory allows for properties to be either immanent or transcendent universals, tropes, or sets of particulars. In fact, the theory allows for a view of properties that treats them as homogenous or heterogenous. Let us say that sparse and abundant properties are homogenous if they are *identified* with the same kind of thing, and heterogenous if not. For example, a homogenous view might identify both sparse and abundant properties with transcendent universals, whereas a heterogenous view may identify sparse properties with immanent universals and abundant properties with sets of particulars. The homogeneity-heterogeneity distinction need not be restricted to sparse and abundant properties alone; sparse properties themselves may be heterogeneous, and the same goes for abundant properties.

The third assumption is that sparse properties are the building blocks of abundant properties. What this means, in effect, is that every abundant property is a *thick property*, a property that is in some way or other built up from sparse properties, which are themselves *thin properties*.[7] I call these sparse properties

[7]My thick and thin properties are not to be confused with the similarly named properties

the 'components' of abundant properties. So, if you pick any abundant property within your preferred metaphysic, then this theory says that property is built up from a set of sparse properties that serve as its components. I call this relation between properties that are sparse and those that are abundant 'componenthood'.

There are different ways of conceiving of the relation of componenthood. Some include conceiving of componenthood as mereological parthood, metaphysical constituency (or non-mereological parthood), constitution, realisation, grounding, and set inclusion.[8] But similar to its treatment of sparse properties, this theory allows for these different conceptions of componenthood. Furthermore, it allows for the possibility for there to be different componenthood relations between sparse and abundant properties. For example, some sparse properties might be the mereological parts of certain abundant properties; other sparse properties may be the ground of certain abundant properties.

This completes my discussion of the assumptions regarding properties on this theory. It is now time to develop the details of property-talk on the theory. Our guiding question for resolving the Granularity Problem and the Difference-Maker Problem will be the following: under what conditions do two predicates in the language we use to express properties, express the same property in our metaphysic? In pursuing this question, I will start by stipulatively introducing a metaphysical language that is tailored for the theory. By 'metaphysical language', I do not mean a natural language like English or Italian; instead, I mean

discussed in Stalnaker (2003: Introduction, p. 9).

[8]See Karen Bennett (2017: ch. 2) for an overview of some of these relations and others.

a formal technical language that is uniquely suited to most accurately represent a domain of discourse.[9] The next section concerns the details of this language.

6.2.2 Metaphysical Language

The theory is formulated in the metaphysical language 'L_C', a monadic first-order language without identity. A formal language comprises of a syntax and a semantics. Following standard practice, I will specify the syntax of the language and then move on to specify its semantics.

6.2.2.1 Syntax

6.2.2.1.1 Vocabulary

The vocabulary of L_C will consist of a countable set of symbols, which are listed below:

- Variables: x, y, z,..., with or without numerical subscripts
- Constants (or names): a, b, c,..., with or without numerical subscripts
- Monadic (or one-place) predicate letters: F, G, H,..., with or without numerical subscripts
- Logical connectives: $\neg$, $\wedge$, $\vee$, $\supset$, $\equiv$
- Quantifiers: $\forall$ (universal) and $\exists$ (existential)

[9] Conducting metaphysical disputes in a metaphysical language is a common practice among analytic metaphysicians. For example, Sider (2009; 2011: ch. 9) advocates conducting metaphysical disputes in a metaphysical language he terms 'Ontologese', whereas van Inwagen (2014: introduction) suggests using a metaphysical language he refers to as 'Tarskian'.

- Brackets: (,)

Distinct monadic predicate letters are introduced for specific properties: namely, the sparse ones. This ensures that every individual sparse property recognised in our metaphysic will have a unique monadic predicate letter associated with it.

6.2.2.1.2 Grammar

The grammar of L_C will consist of both terms and formulas.

- A term is any constant or variable in the vocabulary of L_C.

The formulas in L_C will be defined recursively as follows:

- If τ is any term in the vocabulary of L_C and Π is any monadic predicate letter in the vocabulary of L_C, then $\Pi(\tau)$ is a formula in L_C.
- If ϕ is a formula in L_C, then $\neg\phi$ is a formula in L_C.
- If ϕ and ψ are formulas in L_C, then $(\phi \wedge \psi)$, $(\phi \vee \psi)$, $(\phi \supset \psi)$, and $(\phi \equiv \psi)$ are formulas in L_C.
- If ϕ is a formula in L_C and ν is a variable in the vocabulary of L_C, then $\forall\nu\phi$ and $\exists\nu\phi$ are formulas in L_C.
- Nothing else is a formula in L_C.

Formulas built by monadic predicate letters and terms are the atomic formulas, and those built by logical connectives and quantifiers are compound formulas.

Formulas in L_C fall into two types. Formulas of the first type express propositions and are called 'sentences'. Formulas of the second type express properties and are called 'monadic predicates' or 'predicates' for short. To distinguish between sentences and predicates, let us say that a formula in L_C is open if it contains at least one variable that is not bound by a quantifier. And let us say that a formula in L_C is closed if not open, so every variable contained within that formula (if there are any) is bound by a quantifier. Then a sentence and a predicate in L_C are defined in the following way:

- A sentence is a closed formula in L_C.
- A predicate is an open formula in L_C that has only a single variable free that either occurs once or more than once within the formula.

Predicates in L_C also fall into two types. Those of the first type are called 'atomic predicates', and those of the second type are called 'compound predicates'. The definitions of an atomic predicate and a compound predicate in L_C are as follows:

- An atomic predicate is an atomic formula in L_C that has only a single variable free that occurs only once within the formula.
- A compound predicate is a compound formula in L_C that has either a single variable free that occurs once or more than once in the formula.

Atomic predicates are built by combining the monadic predicate letters with variables. Since a distinct monadic predicate letter only gets introduced into L_C for

each sparse property, each sparse property is expressed by a unique atomic predicate. This establishes a one-to-one correspondence between the atomic predicates and the sparse properties they express. Compound predicates, by contrast, are built by combining the logical connectives and quantifiers with predicates: be they atomic or compound. If sparse properties are only expressed by atomic predicates, abundant properties are only expressed by the compound predicates.

6.2.2.2 Semantics

6.2.2.2.1 Models

A model M of L_C is a pair $\langle$ D, f $\rangle$. D is a non-empty set (the domain of quantification). f is our interpretation function, which must satisfy the following:

- If a is a constant, then f(a) $\in$ D.
- If F is a monadic predicate letter, then f(F) $\subseteq$ D.

Models of L_C are to be thought of as representing possible worlds.

6.2.2.2.2 Variable Assignments

A variable assignment g for a model is a function that assigns each variable from the vocabulary of L_C some object in D.[10] We will write 'g(x) = u' to mean that the function g assigns some object u from D to the variable x.

[10]For example: in a domain with just two objects, u_1 and u_2, one variable assignment g_1 may assign variables x and y to u_1, and the variable z (as well as any remaining variables) to u_2, while another variable assignment g_2 could assign variable x to u_1 and the variables y and z (as well as any remaining variables) to u_2.

Next, in order to evaluate the truth value of a formula relative to a model M under a given variable assignment g, we need to introduce the valuation function '$\nu_{M,\,g}$'. The notation '$\nu_{M,\,g}$' may be read: the valuation relative to model M under variable assignment g. This valuation function can assign truth conditions to both open and closed formulas, as outlined below in section 6.2.2.2.5.

6.2.2.2.3 Variant Variable Assignments

In addition to variable assignments, we require variant variable assignments. Let 'g' be a variable assignment, 'x' be a variable, and 'u' be some object in D. Then '$g^{x,}_{u}$' stands for a variant variable assignment. The notation '$g^{x,}_{u}$' may be read: the variable assignment that is just like g except that it assigns u to x.[11]

6.2.2.2.4 Denotations

We can now define the denotation of a term. The denotation of a term depends on whether the term is a variable or a constant: if it is a variable, the denotation is its variable assignment; if it is a constant, the denotation is its interpretation.

Let 'M' be a model of L_C, 'g' be a variable assignment, and 'τ' be a term. The denotation of τ relative to M under g, symbolised as '$[\tau]_{M,\,g}$', is a function that satisfies one of the following:

- If τ is a variable, then $g(\tau)$.
- If τ is a constant, then $f(\tau)$.

[11] So consider a variable assignment g with two assignments: $g(\mathrm{x}) = \mathrm{u}_1$ and $g(\mathrm{y}) = \mathrm{u}_2$. The variant variable assignment $g^{y}_{u_1}$ is just like g except that, where $g(\mathrm{y}) = \mathrm{u}_2$, $g^{y}_{u_1}(\mathrm{y}) = \mathrm{u}_1$.

6.2.2.2.5 Truth-Conditions

The truth-conditions for (open and closed) atomic formulas in L_C are given by the following clause:

- $\nu_{M,g}\ \Pi(\tau) = 1$ if and only if $[\tau]_{M,g} \in f(\Pi)$; otherwise $\nu_{M,g}\ \Pi(\tau) = 0$.

For (open and closed) compound formulas in L_C, the truth-conditions are given by these clauses:

- $\nu_{M,g}\ (\neg\phi) = 1$ if and only if $\nu_{M,g}\ (\phi) = 0$.
- $\nu_{M,g}\ (\phi \wedge \psi) = 1$ if and only if $\nu_{M,g}\ (\phi) = 1$ and $\nu_{M,g}\ (\psi) = 1$.
- $\nu_{M,g}\ (\phi \vee \psi) = 1$ if and only if $\nu_{M,g}\ (\phi) = 1$ or $\nu_{M,g}\ (\psi) = 1$.
- $\nu_{M,g}\ (\phi \supset \psi) = 1$ if and only if $\nu_{M,g}\ (\phi) = 0$ or $\nu_{M,g}\ (\psi) = 1$.
- $\nu_{M,g}\ (\phi \equiv \psi) = 1$ if and only if $\nu_{M,g}\ (\phi) = \nu_{M,g}(\psi)$.
- $\nu_{M,g}\ (\forall\tau(\phi)) = 1$ if and only if for every object u $\in$ D, $\nu_{M,g^{\tau}_{u}}\ (\phi) = 1$.
- $\nu_{M,g}\ (\exists\tau(\phi)) = 1$ if and only if for some object u $\in$ D, $\nu_{M,g^{\tau}_{u}}\ (\phi) = 1$.

6.2.2.2.6 Extensions

Since predicates are treated as open formulas in L_C with only a single variable free, we need to determine what the associated extensions of those predicates are. How then might we go from the truth-conditions of an open formula under a

given variable assignment to the extension of that formula? Answer: consider all the possible variable assignments that make the open formula true and consider the objects assigned to the open variable in the formula. The extension of the predicate is then defined as the set of objects obtained from these assignments.

Let 'M' be a model, 'g' be a variable assignment, and 'τ' be a variable. The extension of the predicate, symbolised as '$\nu_M\ [\phi(\tau)]$', is given by the following:

- $\nu_M\ [\phi(\tau)] = \{\ \mathrm{u} \in \mathrm{D} \mid g(\tau) = \mathrm{u}$ for every g such that $\nu_{M,g}\ [\phi(\tau)] = 1\ \}$.

This may be read: the extension of the predicate $\phi(\tau)$ relative to model M is identical to the set of all objects u in the domain D such that the variable assignment g assigns u to τ for every g such that the value of $\phi(\tau)$ in M under g is true.

6.2.2.2.7 Components

Finally, we need some way to identify which sparse properties are the components of a given abundant property. Given that sparse properties correspond one-to-one to the atomic predicates in L_C, we just need a way to identify which atomic predicates occur within a given compound predicate. My method of choice will be to introduce a function on the predicates in L_C, which I will call the 'function of componenthood'.[12] This function is intended to serve as the linguistic representation of the componenthood relation between sparse and abundant properties. It represents the relation by mapping the set of both atomic and

[12] As will become clear in moment, our method for identifying the atomic predicates within a given compound predicate has points of contact with the approach to propositional content discussed in Stephen Yablo (2014) and Berto (2017, 2018, 2022).

compound predicates to the power set of the set of atomic predicates; or, in other words, this function takes atomic predicates and compound predicates as inputs and associates them with a set of atomic predicates as outputs. The resulting set of atomic predicates will represent the individual components that make up the property expressed by the input predicate.

Here is an example to show you how the function of componenthood will work. Suppose that we have a compound predicate like F(x) $\vee$ G(x), which expresses the abundant property of *being F or G*. When we input this disjunctive predicate into the function, the function will output a specific set of atomic predicates associated with that predicate. In this case, the function will output the set $\{F(x), G(x)\}$, which consists of the two atomic predicates that make up the disjunctive predicate. The first atomic predicate expresses the sparse property of *being F*; the second expresses the sparse property of *being G*. Hence, the function of componenthood tells us that the abundant property expressed by the compound predicate F(x) $\vee$ G(x) has as its components the sparse properties that are expressed by the atomic predicates F(x) and G(x).

Let 'A' be the set of atomic predicates in L_C, 'P' be the set of both atomic and compound predicates in L_C, and 'c' be the function of componenthood. We then define the function of componenthood inductively as follows:

- If predicate $\phi(\tau) \in$ A, then:

$$c(\phi(\tau)) = \{\phi(\tau)\}.$$

- If predicate $\phi(\tau) \in$ P, then:

$$c(\neg\phi(\tau)) = c(\phi(\tau));$$

$$c(\forall\pi\phi(\tau)) = c(\phi(\tau)); \text{ and}$$

$$c(\exists\pi\phi(\tau)) = c(\phi(\tau)).^{13}$$

- If predicate $\phi(\tau) \in$ P and predicate $\psi(\tau) \in$ P, then:

$$c(\phi(\tau) \wedge \psi(\tau)) = c(\phi(\tau)) \cup c(\psi(\tau));$$

$$c(\phi(\tau) \vee \psi(\tau)) = c(\phi(\tau)) \cup c(\psi(\tau));$$

$$c(\phi(\tau) \supset \psi(\tau)) = c(\phi(\tau)) \cup c(\psi(\tau)); \text{ and}$$

$$c(\phi(\tau) \equiv \psi(\tau)) = c(\phi(\tau)) \cup c(\psi(\tau)).$$

In associating a set of atomic predicates with each atomic predicate and each compound predicate, the function of componenthood provides a metaphysically perspicuous way to identify which abundant properties have which sparse properties as their components, by representing precisely how the abundant properties are built up linguistically in L_C.

Several points are worth noting. First, multiple occurrences of an atomic predicate in a compound predicate do not imply multiple components of a property. Take, for example, the compound predicate (F(x) $\vee$ F(x)) $\wedge$ G(x). This predicate expresses the abundant property of *being (F or F) and G*. The function of

[13] The symbol 'π' is used here as a placeholder for any variable, whether that variable be τ or any other variable.

componenthood maps this compound predicate to the set of atomic predicates $\{F(x), F(x), G(x)\}$. But, due to the axiom of extensionality, notice that even though F(x) occurs twice in (F(x) $\vee$ F(x)) $\wedge$ G(x), the resulting set is identical to the set of atomic predicates $\{F(x), G(x)\}$. Therefore, the components of *being (F or F) and G* are just the sparse properties of *being F* and *being G*.

Second, compound predicates can express either abundant or sparse properties. For example, consider the compound predicate F(x) $\wedge$ F(x). The function of componenthood maps this predicate to the set of atomic predicates $\{F(x), F(x)\}$. But again, by the axiom of extensionality, despite the atomic predicate F(x) occurring twice in $\{F(x), F(x)\}$, the resulting set is identical to the singleton atomic predicate set $\{F(x)\}$. Thus, F(x) $\wedge$ F(x) expresses the sparse property of *being F*.

Third, the occurrence of logical connectives and quantifiers in a compound predicate do not introduce additional components to the property expressed by that compound predicate. The logical connectives and quantifiers are used to combine atomic predicates together to build compound predicates (and they are used to combine those compound predicates to build further compound predicates), but the function of componenthood only decomposes these compound predicates into the atomic predicates used to build them.

Fourth, the function of componenthood implies that a sparse property only has itself as a component—an 'improper component', so to speak. For example, consider the atomic predicate F(x). The function of componenthood maps this predicate to the singleton atomic predicate set $\{F(x)\}$. Therefore, the sparse property of *being F* is an improper component of itself.

The final point is that the order of atomic predicates within a compound predicate does not imply that there is an order of components in a property. For instance, consider the two compound predicates F(x) $\vee$ G(x) and G(x) $\vee$ F(x). The function of componenthood maps the former predicate, which expresses the abundant property of *being F or G*, to the set of atomic predicates $\{F(x), G(x)\}$. On the other hand, the function maps the latter predicate, which expresses the abundant property of *being G or F*, to the set of atomic predicates $\{G(x), F(x)\}$. But, once again, by the axiom of extensionality, despite the different order of atomic predicates, the resulting sets of atomic predicates are identical.

Having introduced the metaphysical language of the theory of property identity, I now turn to answer our guiding question.

6.2.3 The C-schema

The guiding question, remember, is under what conditions do two predicates in the language we use to express properties, express the same property in our metaphysic? The answer given by the theory of property identity is what I call the 'C-schema'. According to the C-schema, two conditions must be satisfied for predicates in L_C to express the same property. First, the two predicates have the exact same extension in all models of L_C. This entails that the properties expressed by each predicate must be necessarily equivalent, meaning that they have the same instances in all possible worlds. Second, the two predicates also have the exact same set of atomic predicates assigned to them. This entails that the properties expressed by each predicate must also be componentry equivalent,

meaning that they have the same components.

Let 'ϕ' and 'ψ' be any two predicates formed from the vocabulary of L_C. Then the C-schema can be put more succinctly as follows:

> (C-schema) ϕ and ψ express the same property if and only if, in every model M of L_C, (i) the extension of ϕ is identical to the extension of ψ, and (ii) the set of atomic predicates assigned to ϕ is identical to the set of atomic predicates assigned to ψ.

Let me now bring before us the two problems that a metaphysically adequate hyperintensional theory of property identity has to resolve, and explain why my theory resolves them.

I begin with the Granularity Problem, the problem of providing a criterion of identity for properties that is more fine-grained than the intensional criterion. The intension of a property is the extension of that property at every possible world, and so the intensional criterion says that necessary equivalence among properties implies property identity. For the theory of property identity to solve this problem, it must give a criterion that allows for properties to be necessarily equivalent without being identical. Does the theory do that? Yes, it does. The theory posits the C-schema as its criterion, which treats the hyperintension of a property as the extension of that property at every possible world together with the set of sparse properties that are the components of that property. In contrast to the intensional criterion, the C-schema says that necessary equivalence among properties *plus* componentry equivalence among those properties

implies property identity. Therefore, it is sufficient for co-intensional properties to be numerically distinct if they differ in their components.

Before turning directly to the Difference-Maker Problem, I want to take a moment to highlight that the C-schema yields a number of attractive results about which co-intensional properties are identical and which are not. Let 'F(x)', 'G(x)', and 'H(x)' be three atomic predicates in L_C. The following are some examples of co-intensional properties that the C-schema renders identical:

De Morgan's Laws

¬ (F(x) ∧ G(x))	=	¬ (F(x) ∨ G(x))
¬ (F(x) ∨ G(x))	=	¬ F(x) ∧ ¬ G(x))

Commutative Laws of Conjunction and Disjunction

F(x) ∧ G(x)	=	$G(x)$∧ F(x)
F(x) ∨ G(x)	=	G(x) ∨ F(x)

Associative Laws of Conjunction and Disjunction

(F(x) ∧ G(x)) ∧ H(x)	=	F(x) ∧ (G(x) ∧ H(x))
(F(x) ∨ G(x)) ∨ H(x)	=	F(x) ∨ (G(x) ∨ H(x))

Idempotent Laws of Conjunction and Disjunction

$$F(x) \wedge F(x) = F(x)$$

$$F(x) \vee F(x) = F(x)$$

Distributive Laws of Conjunction and Disjunction

$$F(x) \wedge (G(x) \vee H(x)) = (F(x) \wedge G(x)) \vee (F(x) \wedge H(x))$$

$$F(x) \vee (G(x) \wedge H(x)) = (F(x) \vee G(x)) \wedge (F(x) \vee H(x))$$

Double Negation Law

$$\neg (\neg F(x)) = F(x)$$

Conditional Equivalences

$$F(x) \supset G(x) = \neg F(x) \vee G(x)$$

$$= \neg G(x) \supset \neg F(x)$$

$$\neg F(x) \supset G(x) = F(x) \wedge \neg G(x)$$

$$F(x) \equiv G(x) = (F(x) \supset G(x)) \wedge (G(x) \supset F(x))$$

Quantifier Equivalences

$$\forall x\,(F(x) \wedge G(y)) \quad = \quad \forall x\,(F(x)) \wedge G(y)$$

$$\exists x\,(F(x) \vee G(y)) \quad = \quad \exists x\,(F(x)) \vee G(y)$$

Contradiction Equivalences

$$F(x) \wedge \neg\, F(x) \quad = \quad \neg\,(\neg\, F(x) \vee F(x))$$

The C-schema distinguishes between all the properties that the intensional criterion distinguishes between. But there are certain cases where the intensional criterion renders co-intensional properties identical, while the C-schema distinguishes between them. The following are some examples of such properties:

Absorption Laws of Conjunction and Disjunction

$$F(x) \quad \neq \quad F(x) \wedge (F(x) \vee G(x))$$

$$\neq \quad F(x) \vee (F(x) \wedge G(x))$$

Conjunction, Disjunction, and Negation Inequivalences

$$F(x) \vee G(x) \quad \neq \quad (F(x) \vee G(x)) \wedge (H(x) \vee \neg\, H(x))$$

$$\neq \quad (F(x) \vee G(x)) \vee (H(x) \wedge \neg\, H(x))$$

Conditional Inequivalences

$$F(x) \supset G(x) \neq (F(x) \supset G(x)) \wedge (H(x) \vee \neg H(x))$$

$$\neq (\neg F(x) \vee G(x)) \wedge (H(x) \supset H(x))$$

Quantifier Inequivalences

$$F(x) \neq F(x) \wedge (\forall x\, (G(x) \vee \neg G(x)))$$

$$\neq F(x) \vee (\forall x\, G(x) \wedge \neg G(x)))$$

$$\neq F(x) \wedge (\exists x\, (G(x) \vee \neg G(x)))$$

$$\neq F(x) \vee (\exists x\, (G(x) \wedge \neg G(x)))$$

Contradiction Inequivalences

$$F(x) \wedge \neg F(x) \neq G(x) \wedge \neg G(x)$$

Now the C-schema may very well solve the Granularity Problem and even do so with some nice results, but, as was pointed out at the start of this chapter, one's solution to that problem does not always offer a solution to the Difference-Maker Problem, the problem of determining what makes a given hyperintensional distinction between properties a metaphysical distinction. But this problem, too, is solved by the C-schema. To see how, let us first consider when a hyperintensional distinction between properties occurs on the proposed theory.

The C-schema tells us that these hyperintensional distinctions occur when the predicates in L_C have the same extension across all models but are assigned *different* atomic predicates. This difference between atomic predicates reflects a hyperintensional distinction between properties that are co-intensional but differ in their components. That is: it reflects a hyperintensional distinction between abundant properties that have the same instances in all possible worlds yet vary with respect to the sparse properties that are their components. Accordingly, then, when hyperintensional distinctions between properties occur, they occur exclusively between the abundant properties.

Now then, is there a reason to think that these hyperintensional distinctions are metaphysical? Indeed, there is. While the C-schema employs predicates in L_C to identify when such distinctions occur, the atomic predicates correspond one-to-one to the sparse properties. If a pair of compound predicates have the same extension in all models of L_C, but are assigned different sets of atomic predicates, it follows that the abundant properties expressed by those compound predicates have different sparse properties as their components. The lesson of the C-schema is this: it is the sparse properties that put the 'metaphysical' in a 'metaphysical hyperintensional distinction'. In line with our discussion from chapter four, the difference-maker between properties for this theory is not merely a pair consisting of a possible world and an object in that world; it is, rather, a triple comprising of a possible world, an object in that world, and a sparse property within that same world.

Since the proposed theory resolves both the Granularity Problem and the

Difference-Maker Problem, it thereby achieves metaphysical adequacy.

6.2.4 Taking Stock

The theory that I have advanced is a proposal about how to conduct our disputes about which properties are identical and which hyperintensional distinctions among them are metaphysical by answering the following question: under what conditions do two predicates in the language we use to express properties, express the same property in our metaphysic? In its simplest form, the recommended strategy for solving the Granularity problem and the Difference-Maker Problem can be outlined in three steps.

> First step: get clear about your properties. Start by distinguishing between those properties that are sparse and those that are abundant, recognising that the abundant properties have the sparse ones as their components.
>
> Second step: get clear about your property-talk. Introduce a metaphysical language where each sparse property corresponds one-to-one to the atomic predicates of this language. (Keep in mind that the sparse properties correspond to the atomic predicates in this way *only* because you introduce an individual predicate letter into the language for each sparse property.) Further, define a function of componenthood onto the predicates of this language such that the function assigns a set of atomic predicates to each predicate within

the language. This definition will be based on the relation of componenthood between the sparse and abundant properties.

Third step: inspect the predicates within your metaphysical language. For any pair of predicates in the metaphysical language, determine whether they are atomic or compound. If the two predicates are compound predicates, manually check which atomic predicates occur in each of them. If the same atomic predicates occur in each compound predicate, and the compound predicates have the same extension in all models of the language, this indicates that the properties expressed by these compound predicates are co-intensional and co-hyperintensional. And therefore, the properties expressed by the two compound predicates are identical, and any differences in atomic predicates between the compound predicates—such as multiple occurrences of one atomic predicate and not another or variations in the order of atomic predicates—does not reflect a metaphysical hyperintensional distinction between properties. If, however, different atomic predicates occur in each compound predicate, but the compound predicates have the same extension in all models of the language, this indicates that the properties expressed by these compound predicates are co-intensional but not co-hyperintensional. And therefore, the properties expressed by the two compound predicates are not identical, and the difference in atomic predicates between the compound predicates reflects a metaphysical hyperinten-

sional distinction between the properties.

I must make it clear that when I claim this theory solves the Granularity Problem and the Difference-Maker Problem, I do not pretend to be presenting a theory that gives comprehensive solutions to these problems. There are clear reasons for this, one of them being the limitations of the metaphysical language tailored for the proposed theory. For example, the language cannot express modal properties like *being possibly such and so* and *being necessarily such and so*, nor can it express polyadic properties (or relations) like *being on top of* and *being shorter than*. Consequently, the present theory cannot provide answers to questions concerning the identity of these properties or whether the hyperintensional distinctions between them are metaphysical. What I am presenting is rather a minimal approach that shows how we hyperintensionalists can, contrary to what the intensionalist alleges, solve the Granularity Problem and the Difference-Problem.

6.3 Objections to the Theory

In this section, I will discuss two objections to the theory. The first objection is that the theory relies on a mysterious componenthood relation between sparse and abundant properties. The second is that the theory builds abundant properties in the image of our predicates.

6.3.1 How are Abundant Properties Built?

An objection that is likely to be raised against the theory concerns its total silence on the nature of componenthood. This theory posits abundant properties are built out of sparse properties, and yet it says nothing about how property-building is supposed to happen. This raises the question: if, as the C-schema asserts, sparse properties are so integral to the identity conditions of abundant properties, then how exactly are these abundant properties built from the sparse ones? The C-schema fails to give an answer.

This is true, but it is not to the point. What matters to the identity conditions of abundant properties is not *how* they are built but *what* they are built from. So regardless of the nature of componenthood, whether it be understood as mereological parthood, metaphysical constituency, or another componenthood relation, the identity conditions of abundant properties is the same. The C-schema serves as a material adequacy condition for the different conceptions of componenthood.

Consider an analogy. Alfred Tarski's T-schema is a material adequacy condition for different conceptions of truth: it specifies the conditions under which a sentence in the object-language is true, but the T-schema does not say what truth is.[14] By accepting the T-schema, the nature of truth will depend on one's theory of truth, which might for all we know be a matter of correspondence, coherence, pragmatic constraints, or something else. Similarly, with the C-schema, it specifies the conditions under which two predicates in the metaphysical language

[14]See Alfred Tarski (1944).

express the same property, but it does not tell us what componenthood is. When a hyperintensionalist accepts the C-schema, the nature of componenthood will turn on that hyperintensionalist's theory of properties.

6.3.2 Building Abundant Properties in the Image of Our Predicates

One might further object to this theory's talk of building abundant properties from sparse properties, complaining that it confuses properties with predicates. The reason that abundant properties are held to be built from the sparse ones in the first place is precisely by analogy with how compound predicates are built from the atomic predicates. But this is to project the structure of our predicates onto the structure of properties.

I find this objection uncompelling, for two reasons. First, property-building can be motivated independently of predicate-building. An attractive way to motivate property-building, in my view, is by tying it to the notion of 'real definition', a notion we discussed earlier in chapter four, sections 4.1.1 and 4.1.2. Recall that a real definition specifies what a thing is; it's a specification of the essence of that thing. Abundant properties are so built because their real definition specifies them as having sparse properties as their components. Thus, for example, part of what it is to be the property of *being F and G* is to be a property that has the property of *being F* as a component and the property of *being G* as another component.

The second reason is that the analogy between predicate-building and property-

building breaks down in at least three important ways. For one thing, compound predicates are built, in part, using logical connectives and quantifiers, but abundant properties are not; they are built from the sparse properties, which are expressed only by atomic predicates. All that the logical connectives and quantifiers do is represent the distribution of instances of a property across possible worlds. For another thing, any combination of atomic predicates with logical connectives and quantifiers results in some compound predicate, but not every compound predicate expresses an abundant property. Some can instead express sparse properties. For example, the conjunctive predicate F(x) $\wedge$ F(x) expresses the sparse property of *being F*. And for a third thing, different compound predicates can express the same abundant property. Take the abundant property of *being F or G* as an example. This property is expressed by both disjunctive predicates F(x) $\vee$ G(x) and G(x) $\vee$ F(x), since they share the same atomic predicates.

6.4 Chapter Summary

In this chapter, I have discussed one objection to a hyperintensional conception of properties. That objection comprised of two problems that concentrate on the negative characterisation of the hyperintension of a property: the Granularity Problem and the Difference-Maker Problem. The Granularity Problem is the problem of finding a criterion of property identity that is more fine-grained than the intensional criterion. The Difference-Maker Problem is the problem of determining what makes a hyperintensional distinction between properties a

metaphysical distinction. I have proposed a hyperintensional theory of property identity that can solve these problems. Although I did respond to two objections made against this theory, I have not tried to argue for the truth of the theory. I have tried to show that this theory gives us hyperintensionalists an in principled way of solving the Granularity Problem and the Difference-Maker Problem.

This brings my defence of a hyperintensional conception of properties to a close. What then is the conclusion of this defence? It boils down to the following. A hyperintensional conception of properties has long been viewed by intensionalists as a second-rate approach to theorising about the metaphysics of properties. But I have shown that this view is unjustified. None of their criticisms have held up to scrutiny. I therefore maintain that a hyperintensional conception of properties is in good metaphysical standing.

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