**Is grounding a hyperintensional phenomenon?**

**Abstract**

It is widely thought that grounding is a hyperintensional phenomenon. Unfortunately, the term ‘hyperintensionality’ has been doing double-duty, picking out two distinct phenomena. This paper clears up this conceptual confusion. We call the two resulting notions hyperintensionalityGRND and hyperintensionalityTRAD. While it is clear that grounding is hyperintensionalGRND, the interesting question is whether it is hyperintensionalTRAD. We argue that given well-accepted constraints on the logical form of grounding, to wit, that grounding is irreflexive and asymmetric, grounding is hyperintensionalTRAD only if one endorses a sentential operator view of grounding. We argue that proponents of the sentential operator view will need to distinguish two importantly different kinds of hyperintensionalityTRAD—weak and strong—and we offer them a way to do so.

**1. Introduction**

Two topics that have received a lot of attention in recent years are hyperintensionality and grounding. In this paper we explore the relation between them. It is often said that grounding is hyperintensional; but there are a number of ways to understand this claim. We argue that whether it is true depends both on what view of grounding one endorses and also on what one means by ‘hyperintensional’.

 The paper has 7 sections. In the first section (section 2) we distinguish two different phenomena that have gone under the name ‘hyperintensionality’—hyperintensionalityGRND and hyperintensionalityTRAD—and note their features. This terminological double-up has the potential to lead to confusion. Thus, our first aim is to clearly differentiate these phenomena and say something about how they are connected. With these concepts clarified we then investigate, in section 3, whether or not grounding is hyperintensional in our preferred sense of the term: hyperintensionalTRAD. One common view, which we call the *predicate-fact view* of grounding, is that grounding claims consist of a relational predicate like ‘is grounded in’ flanked by the names of facts (e.g., Audi, 2012; Raven, 2012). This is typically expressed in the following form: ‘[A] grounds [B]’, where ‘[A]’ is the name for a fact, as is ‘[B]’. Further, we call the *standard predicate-fact* *view* the view that grounding, thus conceived, is irreflexive and asymmetric. We argue that defenders of the standard predicate-fact view of grounding should hold that in sentences (solely) about what grounds what, i.e. sentences of the form ‘x grounds y’, we can substitute the expression in either position in that sentence (x or y) with an intensionally equivalent expression without risk of a change in truth-value. By contrast, defenders of both non-standard predicate-fact views, and sentential operator views (on which grounding claims consist of a sentential operator - ‘*because’* -flanked by two sentences) should deny that intensionally equivalent expressions are always substitutable without change of truth-value in such sentences. Thus we argue that grounding, conceived according to the standard predicate-fact view, is not hyperintensionalTRAD. By contrast, grounding, as it is conceived by the non-standard predicate-fact view, (as we shall soon see) is both hyperintensionalTRAD and hyperintensionalGRND.Equally, if grounding is best expressed in terms of an operator flanked by sentences—i.e., the sentential operator view is true—then grounding claims are sometimes hyperintensionalTRAD.

In section 4 we argue that there are two forms of hyperintensionalityTRAD: *weak* and *strong hyperintensionality*. Strong hyperintensional distinctions track genuinely worldly distinctions. If you like, strong hyperintensional distinctions are those that God needs in order to think about the way the world is (and could be), on the assumption that God is omniscient and ideally rational. Weak hyperintensional distinctions, by contrast, are those we need in order to individuate the mental states of agents who are ignorant or non-ideally rational in certain ways. God has need of weak hyperintensional distinctions only insofar as he/she is inclined to represent the mental states of ignorant or non-ideally rational beings. Weak hyperintensional distinctions do not track any genuinely worldly distinctions, but are entirely the product of our representational systems. We introduce each of these hyperintensionalTRAD distinctions, and explain why defenders of both non-standard predicate-fact views, and sentential operator views ought to draw said distinctions.

As we argue in section 5, however, there are difficulties in giving a single account of both weak and strong hyperintensionality: in effect, they pull in opposite directions. Nevertheless, these challenges are not insurmountable. They can be overcome by embracing a *heterogeneous* account of hyperintensionality: one that models weak and strong hyperintensionality differently. We outline just such an account in section 5, and offer it to those who suppose grounding to be hyperintensionalTRAD.We then use this view to develop an account of when we can substitute one expression for another in a sentence about what grounds what, on the assumption that grounding claims are hyperintensionalTRAD.

 Finally, in section 6 we examine the state of play regarding grounding and hyperintensionalityTRAD. Here, we consider whether the fact that the standard predicate-fact view does *not* commit one to hyperintensionalityTRAD could be marshalled in an argument for that view over either the non-standard predicate-fact view or the sentential operator view. We suggest that the defender of the standard predicate-fact view can marshal such an argument, but *only if* she can show that (a) the problem of fine-graining facts, and of knowing which different names are names for the same fact, is easier to solve than the problem of providing an account of when intensionally equivalent terms are substitutable and (b) there is no independent motivation for distinguishing weak and strong hyperintensionsTRAD. In fact, as we note in section 6, we do not think that either (a) or (b) is true, but we nevertheless think that these are interesting so-far unexplored avenues that the defender of the standard predicate-fact view may wish to explore.

**2. Grounding and Two Notions of Hyperintensionality**

In what follows we use [square brackets] to pick out facts, <angle brackets> to pick out propositions, and ‘single quotes’ to mention sentences, predicates, names, and other expressions.

Within standard possible world semantics the meaning of an expression is its *intension*, which is a function from possible worlds to extensions. The intension of a *singular name* tells us which object (if any) is the referent of that name at any given possible world. The intension of a *predicate* tells us which objects (if any) satisfy that predicate at any given possible world. And the intension of a *sentence* tells us which possible worlds (if any) the sentence is true at.

 Some claim that intensions are not sufficiently fine-grained to capture the meanings of all expressions. For instance, the sentences ‘2 + 2 = 4’ and ‘there are infinitely many primes’ have the same intension on this account, yet seem to differ in meaning. Because of this, many think that the meanings of some expressions are not captured by their intensions. And this has prompted some to suggest that meanings are captured by *hyper*intensions (e.g., Nolan, 2013), which, on some accounts,[[1]](#footnote-1) are functions from possible *and impossible* worlds to extensions,and on other accounts are structured propositions, distinguished both in terms of what parts or constituents they have, as well as how those parts or constituents are arranged. According to the former, hyperintensions are functions from possible *and impossible* worlds, to extensions. So the hyperintension of a name specifies the individual the name picks out at every possible or impossible world; the hyperintension of a predicate specifies the objects which satisfy the predicate at every possible or impossible world; and the hyperintension of a sentence specifies its truth-value at every possible or impossible world.[[2]](#footnote-2) According to the latter, hyperintensions are structured entities—entities structured (often in such a way that their structure in some way reflects the structure of the relevant expression). Structured propositions are, then, structured arrangements of objects, properties, and relations. According to the simplest version of that view, a hyperintension of a name is its referent; the hyperintension of a predicate is a property, and the hyperintension of a sentence is some structured arrangement of simpler hyperintensions. Sentences express a different structured proposition if either the structure, or the structured entities, differ.[[3]](#footnote-3)

 Historically, the move from taking the meaning of an expression to be its extension, to taking the meaning of an expression to be its intension, followed the same pattern. When the extension of an expression is sufficient to capture its meaning, the context in which the expression appears is said to be an *extensional context*. When the intension of an expression is sufficient to capture its meaning, but its extension is not, the context in which the expression appears is said to be an *intensional context*. Thus, it is natural to say that a *hyperintensional context* is one in which neither the extension of some expression, nor its intension, is sufficient to capture its meaning, and that only the hyperintension of the expression can do so.

 Alternatively, we can talk of hyperintensional *positions* within sentences (see Nolan, 2013, p. 366, and Nolan, 2014, p. 151), where a position in a sentence is hyperintensional if and only if replacing the expression which occupies that position with an expression with the same intension may change the truth-value of the sentence. We take it that this amounts to much the same thing, with one important difference. If an expression occupies a hyperintensional position, then it occurs within a hyperintensional context. But if an expression occurs within a hyperintensional (sentential) context, it might not occupy a hyperintensional position within the sentence. For the context may be hyperintensional in virtue of the fact that the sentence contains a different expression which occupies a hyperintensional position. We will typically follow Nolan in talking about positions rather than contexts.

 Unfortunately, (as we will see) this is often not how the term ‘hyperintensionality’ is used, especially in the context of grounding. To avoid confusion we will call the above conception of hyperintensionality, *hyperintensionalityTRAD*.

**HyperintensionalityTRAD** A position in a sentence is hyperintensionalTRAD iff replacing the expression occupying that position with an expression with the same intension may change the truth-value of the sentence.

With this definition in hand, we can also make sense of talk of hyperintensional *phenomena*. Following Nolan (2014) we will say that a phenomenon is hyperintensional if and only if hyperintensional language—e.g., sentences which contain hyperintensional positions—is needed to properly describe that phenomenon. Thus, when a phenomenon can be described without hyperintensional language, we will say that it is not hyperintensional. As we will see very shortly, this is important in the case of grounding.

One common way of thinking about grounding has it that grounding is a primitive, non-causal, determination relation. Defenders of this view typically suppose that grounding bestows ontological structure to the world, providing the metaphysical ‘glue’ that allows the fundamental entities to give rise to the derivative entities. Putative examples include wholes being grounded by their parts, sets by their members, moral properties by natural properties, and truths by their truthmakers. While the logical features of grounding are controversial,[[4]](#footnote-4) the relation is standardly thought to be transitive, asymmetric and irreflexive,[[5]](#footnote-5) and thus to impose a partial ordering on the world. Hence, we will say that those who endorse these features hold the *standard* view. We will later consider the *non-standard* view according to which grounding sometimes obtains reflexively, for this view has different implications for the hyperintensionality of grounding. Notably, defenders of both standard and non-standard views contend that grounding is hyperintensional.

 In the literatures on truthmaking and grounding the term ‘hyperintensional’ has enjoyed a somewhat different use. When proponents of grounding claim that grounding is a hyperintensional phenomenon, typically what they mean is that modal notions such as logical entailment (as commonly understood in terms of possible worlds) and supervenience are too coarse-grained to capture it (Schaffer, 2009).[[6]](#footnote-6) On this view, the claim that something is a hyperintensional phenomenon amounts to the claim that the phenomenon in question cannot be accounted for using purely modal notions. In contrast, Jenkins (2011) articulates a non-standard predicate-fact view that is hyperintensionalTRAD. As both Schaffer’s and Jenkins’ views are described using the same term, there is a need for the disambiguation we provide here.

 Put in terms of language, the claim made by those who defend the standard predicate-fact view is that the names of entities which appear in ‘hyperintensional’ contexts cannot be substituted with names of entities which exist in all of the same possible worlds, if we want to guarantee that the truth-value of the sentence will not change. Thus, for instance, the position occupied by the final ‘Socrates’ in,

 ‘Socrates exists’ is made true by Socrates,

is hyperintensional in this sense, because we cannot replace ‘Socrates’ with ‘{Socrates}’ (the name of the singleton set which has Socrates as a member) without changing the truth-value of the sentence. (Here we assume that Socrates and {Socrates} exist in all of the same possible worlds.) If we do so, we get,

 ‘Socrates exists’ is made true by {Socrates},

which appears to be false, despite the fact that ‘Socrates’ and ‘{Socrates}’ refer to objects which (supposedly) exist in all of the same possible worlds.

 Let us call this notion of hyperintensionality, *hyperintensionalityGRND*. We can then define it as follows:

**HyperintensionalityGRND** A position in a sentence is hyperintensionalGRND iff replacing the expression occupying that position with an expression which applies in all of the same possible worlds may change the truth-value of the sentence.[[7]](#footnote-7) [[8]](#footnote-8)

 We will say that individuals I and I\* modally co-vary just in case I and I\* exist in all of the same possible worlds. We will say that properties P and P\* modally co-vary just in case P and P\* exist in all the same possible worlds. We will say that sub-sentential expressions E and E\* modally co-vary just in case, if E and E\* take an extension at any possible world, then they take the same extension at every possible world.[[9]](#footnote-9) [[10]](#footnote-10) (Thus ‘Socrates’ and ‘{Socrates}’ are modally co-varying expressions.) Then a position in a sentence is hyperintensionalGRND just in case substituting into that position one modally co-varying expression for another does not guarantee preservation of truth.

 There is a risk of conflating this notion with hyperintensionalityTRAD, given that terms like ‘intensionally equivalent’, ‘necessarily equivalent’, and ‘necessarily co-extensive’ are sometimes used to mean ‘have the same intension’, and are sometimes used to mean ‘refer to entities which exist at all of the same possible worlds’. It is not, however, safe to assume that *having* the same intension, and referring to entities which exist at all of the same possible worldsare the same. These notions come apart, and, accordingly, the notions of hyperintensionalityTRAD and hyperintensionalityGRND come apart.

 To see this, consider that there may be modally co-varying expressions which nonetheless do not have the same intension (as we earlier defined that notion). Thus, these expressions will occupy hyperintensionalGRND (but not hyperintensionalTRAD) positions in sentences. For example, ‘Socrates’ and ‘{Socrates}’ refer to entities that many take to exist at precisely the same possible worlds, and yet these terms have different intensions. Indeed, they even have different *extensions*, with the former referring to a man and the latter to a set. So, modal co-variance does not entail intensional equivalence. Similarly, two predicates might pick out or ascribe properties that modally co-vary, as they exist in all the same worlds, but are distinct in virtue of being instantiated by different objects in those worlds. For example, it might be that a possible world has objects that instantiate *charge* just in case it has objects that instantiate *spin*. Then, sentences including the expression ‘charge’ are hyperintensionalGRND (for ‘charge’ and ‘spin’ modally co-vary, yet have different extensions). Hence, for instance in the sentence ‘Bert has charge’ we cannot substitute ‘spin’ for ‘charge’ without changing the truth-value of the sentence, on the assumption that Bert does not instantiate spin. (And there is no guarantee that Bert instantiates spin, since the modal co-variation between ‘spin’ and ‘charge’ only entails that the former applies in any world in which the latter does; it does not entail that ‘spin’ can be predicated of some object O, if ‘charge’ can.) Equally, that sentence does not contain hyperintensionalTRAD positions since ‘charge’ and ‘spin’ are not intensionally equivalent on the assumption that each picks out a different property. Finally, consider ‘S’, which is the name for [Socrates exists], and ‘S\*’, which is the name for [{Socrates} exists]. The expressions ‘S’ and ‘S\*’ refer to entities (facts) which modally co-vary, but they are not intensionally equivalent since the facts to which they refer, are distinct. Thus, it is a mistake (or at least quite misleading) to say that these expressions are ‘intensionally equivalent’, ‘necessarily equivalent’, ‘necessarily co-extensive’, and so on, as many seem prone to do.[[11]](#footnote-11) This will be important when we discuss predicate-fact views of grounding, where sentences expressing truths about grounding typically contain names of facts, which, in some cases, modally co-vary.

 For now, we can notice that using the same term, ‘hyperintensionality’, to pick out both notions can potentially lead to confusion. So, for example, Trogdon (2013: 109) writes:

Many also agree that the grounding locution is *hyperintensional* (see, e.g., Jenkins (2011) and Schaffer (2009)). It is easiest to make sense of this claim on the [sentential operator] view of the logical form of grounding statements. Consider the sentences ‘Socrates exists’ and ‘{Socrates} exists’. Even though they are intensionally equivalent, substituting one for the other turns the true grounding statement ‘{Socrates} exists because Socrates exists’ into ‘Socrates exists because Socrates exists’, which is false.

Trogdon seems to be talking about hyperintensionalityTRAD. Our contention is that it is ‘easiest to make sense of this claim’ assuming the sentential operator view because, given the truth of the standard predicate-fact view, the claim is not true. Trogdon goes on to claim that ‘This hyperintensionality lends strong support to the claim that the grounding locution is not analysable purely in terms of supervenience, modal entailment, and the like, for the latter are intensional in nature’ (109). Here, we think, Trogdon may well be talking about the hyperintensionalityGRND of grounding, which *does* lend support to grounding being unanalysable in terms of supervenience and other modal relations. At the very least, one surely could not infer, from the presence of hyperintensionalityTRAD, in claims of the form ‘x *because* y’ that we ought to posit synchronic dependence relations (namely, relations that give rise to hyperintensionalityGRND) that outstrip the modal relations of supervenience, entailment and necessitation.

More generally, one can see how it would be very easy to equivocate on which sense of hyperintensionality is at issue, and thus to advance unsound arguments. For instance, it is typically said in the introduction to many texts on grounding that grounding is hyperintensional. It is also often said in the introduction to texts on content and meaning that in order to make sense of hyperintensionality one ought either to posit impossible worlds or structured propositions. One might, then, naturally conclude that in order to make sense of grounding, one ought to posit impossible worlds or structured propositions. That, however, does not follow. As we will see shortly, defenders of standard predicate-fact views of grounding have no need to posit such entities; or at least no need to posit them *in virtue of having posited grounding relations*. Another way in which confusion can be engendered is by reasoning as follows. One might begin with the thought that there *is* no genuine hyperintensionality: intensional distinctions are all the distinctions there are.[[12]](#footnote-12) But, if grounding is indeed a hyperintensional phenomenon, that is, if grounding requires appeals to hyperintensions, then we ought to be suspicious of grounding on the assumption that there are no hyperintensions to which to appeal. Therefore, we ought to be suspicious of grounding. This argument is potentially unsound, equivocating between the two uses of ‘hyperintension’. Finally, there are those who think that the only hyperintensionality there is issues from the representational systems of ignorant or non-ideally rational agents. The fact that we can represent distinctions that are more fine-grained than intensional distinctions (or than A-intensional differences, for those attracted to two-dimensional semantics) issues entirely from the fact that we can represent distinctions that do not (even possibly) obtain. But if grounding is a hyperintensional phenomenon, surely its hyperintensionality does *not* issue from ignorance or non-ideal rationality. Therefore, we should be suspicious of posting grounding, since it commits us to ‘worldly’ hyperintensionality, rather than hyperintensionality that issues only from the representational systems of cognitive non-ideal agent. Again however, the reasoning here is the result of an equivocation between the two meanings of ‘hyperintensional’. In all of these cases one could be led astray by the potential to move seamlessly between the two senses of hyperintensionality that we have distinguished here.

 It is clear that the two kinds of hyperintensionality we have just outlined come apart. Yet they are not entirely unrelated. If a position in a sentence is hyperintensionalTRAD, then intensionally equivalent terms cannot be substituted while guaranteeing that the truth-value of the sentence will remain the same. It follows from this that merely modally co-varying terms cannot be substituted either; for intensionally equivalent terms are also modally co-varying terms. In contrast, if a position in a sentence is merely hyperintensionalGRND—that is, if modally co-varying terms cannot, in general, be safely substituted for one another—it may still be that intensionally equivalent terms can. Thus, hyperintensionalityTRAD implies hyperintensionalityGRND but not *vice versa.*

As well as there being potential for confusion between two distinct notions, we think it is misleading to call the latter—hyperintensionalityGRND—‘hyperintensionality’. It is not hyperintensionality because there is no sense in which ‘Socrates’ and ‘{Socrates}’ have the same intension. The notion of hyperintensionality was introduced because there seem to be differences in meaning that cannot be accounted for by appealing to intensions. But the difference in meaning between ‘Socrates’ and ‘{Socrates}’ *can* be accounted for by appealing to intensions. ‘Socrates’ picks out a particular person at various possible worlds. ‘{Socrates}’ picks out a particular *set* at various possible worlds. The mere fact that these possible worlds are the same—because Socrates and {Socrates} exist at the same possible worlds—gives us no reason to think that we should be able to substitute ‘Socrates’ and ‘{Socrates}’ without changing the truth-value of any sentence that contains them. After all, different things are true of Socrates and {Socrates}. Socrates is concrete, whereas {Socrates} is abstract, for example. Thus, it is not possible to replace ‘Socrates’ with ‘{Socrates}’ in the sentence ‘Socrates is concrete’ and, indeed, it is not clear why anyone would ever suppose otherwise.

While we don’t think that, strictly speaking, hyperintensionalityGRND is a kind of hyperintensionality, we agree that it is characteristic of grounding. If [A] grounds [B], and if [C] obtains at all the same worlds as [A] there is no guarantee that [C] grounds [B]. Facts that modally co-vary can play different grounding roles. Furthermore, Schaffer (2009) and others are right to point out that this feature distinguishes grounding from the ‘merely modal’ notions of supervenience and necessitation. [Socrates exists] and [{Socrates} exists] mutually necessitate and supervene upon one another. Thus these relations are not apt for capturing an asymmetric relation of dependence between these two facts in the way that grounding can.[[13]](#footnote-13)

Certainly, then, if one thinks, as friends of grounding do, that there are asymmetric dependence relations that obtain between modally co-varying facts, then one will need to introduce some new relation that is neither necessitation nor supervenience to capture that dependence. Supervenience and necessitation are, in this sense, too coarse-grained to answer to the job description. Once grounding is posited, however, there is no reason to suppose that *that* relation is hyperintensionalTRAD (though of course, it might be). Nevertheless, for now we will continue to use the terms ‘hyperintensionalTRAD’ and ‘hyperintensionalGRND’ to pick out these two phenomena, since the use of ‘hyperintensional’ in the context of grounding is already so entrenched.

While the literature has focussed almost entirely (with the exception of Jenkins 2011) on the claim that grounding is hyperintensionalGRND,this paper focuses principally on the relationship between hyperintensionalityTRAD and grounding. That is not to say that we do not see important connections between these two ‘kinds’ of hyperintensional phenomena. We have noted that on a plausible account of facts, standard predicate-fact views of grounding will hold that [Socrates exists] and [{Socrates} exists] are distinct facts, despite it being the case that these facts modally co-vary. However, there is the danger that without a sufficiently fine-grained account of facts, hyperintensionalityGRND will collapse into hyperintensionalityTRAD because names for facts such as ‘[Socrates exists]’ and ‘[{Socrates} exists]’ will be intensionally equivalent if these expressions turn out to refer to the same fact. This means that facts themselves will need to be individuated in a fairly fine-grained manner.

We can, then, see the project associated with hyperintensionalityTRAD and the project associated with hyperintensionalityGRND as connected in the following way: just as hyperintensionalityTRAD motivates us to find a way to fine-grain propositions beyond what is afforded by a simple possible worlds account of meaning, so too hyperintensionalityGRND motivates us to develop a sufficiently fine-grained account of facts that allows us to distinguish facts that modally co-vary. We return to this issue in section 6.

 There is one more connection that will be relevant to the remainder of this paper. With respect to both hyperintensionalityTRAD and hyperintensionalityGRND there arises the question of when expressions within sentences can be substituted with other expressions. Sentences about what grounds what are hyperintensionalGRND because it is not always (and indeed, not often) the case that modally co-varying expressions can be substituted without a change in truth-value. Sentences about what grounds what are hyperintensionalTRAD (if they are) because it is not always the case that intensionally equivalent expressions can be substituted without a change in truth-value. Sometimes, intensionally equivalent expressions can, however, be substituted without a change in truth-value. And since intensionally equivalent expressions are, *ipso facto,* modally co-varying expressions (though the reverse is not always the case) it follows that modally co-varying expressions can sometimes be substituted into sentences about what grounds what, without a change in truth-value. In what follows we will almost exclusively focus on hyperintensionalityTRAD and the problems raised by this phenomenon. But one of the aims of this paper is to offer (in section 5) an account of when it is permissible to substitute into sentences about what grounds what, one intensionally equivalent expression for another. Any such account will also provide an answer to the question of when it is permissible to substitute into sentences about what grounds what, modally co-varying expressions.

**3. Is Grounding Hyperintensional?**

With the two notions of hyperintensionality thus disambiguated, we can move on to consider whether sentences about grounding are hyperintensional. We think it is clear that grounding is hyperintensionalGRND,so in what follows we will be principally interested in asking whether it is also hyperintensionalTRAD. For that reason, henceforth, unless we say otherwise, by ‘hyperintensional’ we intend ‘hyperintensionalTRAD’.

 In the literature on grounding it remains contentious whether grounding is a relation, with some preferring to remain neutral on this question (e.g., Correia, 2010; Fine, 2012). This has led to two different views about how grounding claims should be expressed. The first view, which we already touched on in section 2, is that grounding claims should be expressed using a two-place *predicate* such as ‘grounds’, ‘is grounded by’, or ‘is grounded in’. Most often, the predicate is flanked by names for *facts*. For example, many proponents of grounding think that the following is a true, and appropriate, grounding claim.

 [{Socrates} exists] is grounded by [Socrates exists].

The second view is that grounding claims should be expressed using a sentential operator. The English ‘because’ comes close in some contexts: e.g.,

 {Socrates} exists *because* Socrates exists.

On this view, grounding claims consist of this sentential operator flanked by two sentences: in this case ‘{Socrates} exists’, and ‘Socrates exists’.[[14]](#footnote-14) To distinguish the special use of ‘because’ for grounding claims from other uses (such as those indicating causal dependence) we will use italics.

In what follows we show that, given a standard predicate-fact view about grounding, truths about what grounds what *are not* hyperintensional (assuming that a sufficiently fine-grained account of facts is adopted; see section 2). That is not the case if one adopts a non-standard predicate-fact view of the kind developed by Jenkins (2011). Nor it is true if truths about what grounds what are properly expressed in terms of a pair of sentences flanking a sentential operator. In sum, grounding is only hyperintensional if one endorses either the sentential operator view or the non-standard predicate-fact view. Let us see why this is so.

Let us first consider the predicate-fact view. According to by far the most common version of this view, grounding is an irreflexive and asymmetric relation. This is the standard predicate-fact view of grounding. Given the standard predicate-fact view, it is a simple matter to show why, given a sufficiently fine-grained account of facts, sentences expressing truths about grounding will not contain hyperintensional positions.[[15]](#footnote-15) On that view, pure grounding claims express truths (or falsities) about grounding relations between facts, and nothing more. Thus, a sentence of the form ‘[X] grounds [Y]’ will be true if and only if the fact picked out by the name ‘[X]’ grounds the fact picked out by the name ‘[Y]’. Substituting either ‘[X]’ or ‘[Y]’ for an intensionally equivalent term cannot change the truth-value of the sentence. This is because the only expressions which are intensionally equivalent to a name of a fact are other names for the same fact. And substituting one name for another cannot change what the sentence says about the world. For example, if the sentence, ‘[A] grounds [B]’ is true, and if ‘[C]’ refers to the same fact as ‘[A]’, then the sentence ‘[C] grounds [B]’ is also true, because both sentences have the same truth-conditions. Both sentences are true if and only if the fact picked out by ‘[A]’ and by ‘[C]’ grounds the fact picked out by ‘[B]’.[[16]](#footnote-16)

As alluded to earlier, however, Jenkins (2011) has recently put forward a non-standard predicate-fact view according to which grounding, even viewed as a relation between facts, is hyperintensional. Such cases arise because, unlike standard views of grounding, Jenkins’ view countenances reflexive instances of grounding. Suppose, as Jenkins does, that the fact that there is some brain state, B (call this fact ‘[B]’) grounds the fact that there is mental state M (call that fact ‘[M]’). Then ‘[B] grounds [M]’ is true. Suppose, further, that the mind-brain identity theory is true, so that ‘[B]’ and ‘[M]’ are names for one and the same fact. Then these are intensionally equivalent expressions. Yet we cannot (so argues Jenkins) substitute one for the other because ‘[B] grounds [B]’ and ‘[M] grounds [M]’ are both false due to what Jenkins calls ‘quasi-irreflexivity’. If grounding is not irreflexive, but is quasi-irreflexive in this way, then sentences expressing *reflexive* grounding claims will have hyperintensional positions. That’s because the sentences expressing reflexive grounding claims can only be true if hyperintensionally distinct (yet intensionally equivalent) names for the same fact appear on either side of ‘grounds*’*.

 Suppose, instead, one holds that grounding claims are best expressed using a sentential operator. On this view, grounding is hyperintensional just in case there are true sentences of the form ‘B *because* A’, where ‘A’ and ‘B’ name sentences, and where substituting an intensionally equivalent expression for ‘A’ or ‘B’ can sometimes yield a false sentence. So grounding is hyperintensional if there is a sentence, C, which is true at all the same worlds as A, but ‘B *because* C’ is false (or a sentence, D, which is true at all the same worlds as B, but ‘D *because* A’ is false). There are such sentences. Consider once again that according to defenders of grounding, ‘{Socrates} exists *because* Socrates exists’ is true. Furthermore, the sentence ‘Socrates exists’ is true at precisely the worlds at which ‘{Socrates} exists’ is true. Thus these two sentences have the same intension. However, if we substitute ‘Socrates exists’ for ‘{Socrates} exists’, we end up with the sentence, ‘Socrates exists *because* Socrates exists.’ Even if grounding is only quasi-irreflexive, as Jenkins argues, no one wants to allow that that sentence is true. Thus as the substitution of an intensionally equivalent expression changes the truth-value of the sentence, sentences expressing grounding claims are, on the sentential operator view, hyperintensional.

While sentences about grounding are hyperintensional according to the sentential operator view, recall that the view is motivated by neutrality about what in the world accounts for the truth of grounding claims. Thus, those committed to such a view need not hold that grounding is itself a hyperintensional *phenomenon*. It could be that those who espouse the sentential operator view would, upon encountering some convincing argument in favour of thinking of the relata of grounding as facts, come to conclude that truths about grounding can adequately be expressed in terms of a two-place predicate flanked by names for facts. Since according to the standard predicate-fact view, grounding claims, expressed that way, are not hyperintensional, it would follow that grounding itself is not hyperintensional (though some ways of expressing truths about it are). However, not all those who defend the sentential operator view may make any such concession. Those who hold that the only adequate way to express grounding claims is in terms of a sentential operator are committed to concluding that grounding is a hyperintensional phenomenon (that is, remember, hyperintensionalTRAD not merely hyperintensionalGRND).[[17]](#footnote-17) Regardless of which view the defender of the sentential operator approach has in mind, however, in the meantime her preferred way to express grounding claims will generate hyperintensional contexts, as, indeed, will non-standard predicate-fact views such as that put forward by Jenkins. If sentences expressing grounding claims are, indeed, hyperintensional then, we think, some account needs to be given of when we can substitute in ‘x’ for ‘y’ in ‘x *grounds* y’ (in the case of non-standard predicate-fact views) or ‘x *because* y’ (in the case of sentential operator views) where ‘x’ and ‘y’ are intensionally equivalent. It is to this issue that we will shortly turn.[[18]](#footnote-18)First, however, it is necessary to take a step back and think about the phenomenon of hyperintensionalityTRAD more carefully.

**4. Strong and Weak Hyperintensionality**

The most widely cited examples of sentences with hyperintensional positions are those that fall within the scope of a psychological operator such as ‘believes that’, ‘hopes that’, ‘fears that’, and so forth. Suppose the sentence ‘Bob believes that Jim is 200cm tall’ is true. ‘Jim is 200cm tall’ is intensionally equivalent to ‘Jim is 2m tall’. Nevertheless, the sentence ‘Bob believes that Jim is 2m tall’ might be false.

The sort of hyperintensionality that arises in contexts such as these is what we will call *weak hyperintensionality.* Weak hyperintensionality arises solely as a result of features of our representational systems. By this we mean that it arises because we are able to represent the very same state of the world in different ways, R and R\*, such that we can bear different psychological attitudes towards R than we do towards R\*. In this regard weak hyperintensionality is plausibly the result of ignorance or non-ideal rationality on the part of agents. Why is someone able to bear different attitudes towards R than they do towards R\*? Because that someone is ignorant of the fact that R and R\* are just two ways of representing the very same state of the world. How is it that Bob can believe that Jim is 200 cm tall but not believe that Jim is 2m tall? He can do so because Bob is ignorant of some fact (that 200cm is the same length as 2m), or because while Bob knows how to translate between centimetres and metres, he makes a mistake in doing so on this occasion. How is it that Bob can believe that Superman can fly, but not believe that Clark Kent can fly? He can do so because Bob is ignorant of the fact that Superman is Clark Kent.

We will say that sentences that have hyperintensional positions *only* because they report that an individual has a psychological attitude towards some proposition are *weakly* *hyperintensional*. We will say that a sentence contains a psychological attitude construction if it contains both a psychological operator, such as ‘believes that’, ‘desires that’ and so forth, in conjunction with a name of some individual to whom that attitude is ascribed. Thus, typical psychological attitude constructions will be expressions such as ‘Bob believes that’ or ‘Jenny desires that’, though they can take other grammatical forms such as ‘it is believed by Bob that’ or ‘that…is believed by Bob’. A sentence will count as having a hyperintensional position *only* because it contains a psychological attitude construction just in case in the absence of that attitude construction, the sentence that remains has no hyperintensional positions. Roughly, then, the idea is that a sentence S is weakly hyperintensional if S contains some psychological attitude construction, Nφ, (where N names an individual and φ a psychological operator) and when we remove Nφ from S, we are left with a sentence that contains no hyperintensional positions.

To be more precise, let us call a sentence that consists only of a psychological attitude construction and an expression falling under its scope a *saturated psychological attitude construction*. Saturated psychological attitude constructions have the form Nφ(E), where E is an expression falling under the scope of Nφ: e.g., ‘Bob believes that (grass is green).’ We can then define weak hyperintensionality as follows:

**Weak Hyperintensionality**: A sentence, S, is weakly hyperintensional just in case (a) it contains (or is identical to) at least one saturated psychological attitude construction of the form Nφ(E) which has a hyperintensional position, and (b) for any expression E\* contained in (or identical to) S, if E\* has a hyperintensional position, then E\* is identical to a saturated psychological attitude construction contained in (or identical to) S.

In the example above S is the sentence ‘Bob believes that Jim is 200cm tall’. φ is the ‘believes that’ operator and N is the name ‘Bob’. Thus Nφ is the psychological attitude construction ‘Bob believes that’, and the entire sentence S is a saturated psychological attitude construction, where E is the expression ‘Jim is 200cm tall’. This is the simplest case, for here S contains—or, rather, is identical to—just one saturated psychological attitude construction. Thus, if S is weakly hyperintensional then S contains no expression E\* distinct from S which has a hyperintensional position. If, for example, ‘Jim is 200cm tall’ were hyperintensional, then S would not be weakly hyperintensional. After all, it would not contain hyperintensional positions *only* in virtue of the fact that a psychological attitude is being reported.

 In this case ‘Jim is 200cm tall’ does not contain hyperintensional positions. We can replace ‘Jim’ with ‘Bert’ if these are both names for the very same man, and we can replace ‘200cm’ with ‘2m’ if these name the same length. And since ‘Bob believes that Jim is 200cm tall’ does contain hyperintensional positions, sentence S is, therefore, weakly hyperintensional.

 There are, of course, more complex sentences, such as those that contain more than one saturated psychological attitude construction, or those that contain a psychological attitude construction and an expression that does not fall within the scope of any psychological attitude construction. An example of the latter is the sentence ‘Snow is white, and Bob believes that horses fly’. That sentence, S\*, contains an expression, E, that falls within the scope of a psychological attitude construction. E is ‘horses fly’ and E\* is ‘Bob believes that horses fly’. E\* contains a hyperintensional position. E, however, does not. So any expression contained in S that has a hyperintensional position is one such that, when we remove the psychological operator that falls within its scope, it no longer contains hyperintensional positions. Thus, ‘snow is white, and Bob believes that horses fly’ is weakly hyperintensional. An example of the former is the sentence ‘Bob believes that horses fly, and Jenny believes that horses do not fly’. This sentence is weakly hyperintensional because the only two expressions with hyperintensional positions are also saturated psychological attitude constructions—namely: ‘Bob believes that horses fly’ and ‘Jenny believes that horses do not fly’.

We find it plausible that sentences that describe psychological attitudes are hyperintensional because of features of the representational systems of cognitively limited agents such as ourselves. In the case of S, the hyperintensionality results from the fact that Bob is neither omniscient nor ideally rational. If we are right, then weakly hyperintensional sentences are those that, in the absence of ignorance or non-ideal rationality, would fail to generate hyperintensional positions. Were Bob omniscient and ideally rational then sentence S would not have hyperintensional positions. But given that actual agents are neither omniscient nor ideally rational, sentences with psychological attitude constructions within them will be weakly hyperintensional since, given that we don’t know what kinds of irrationality an agent might exhibit, there is *never* a guarantee that substitution of intensionally equivalent expressions will retain the truth-value of the original sentence.

One could say that the weak hyperintensionality associated with the representational systems of cognitively limited agents makes distinctions where there are no *real* distinctions in the world. ‘200cm’ and ‘2m’ might have differing cognitive significance for Bob, but there is no distinction in the world answering to that difference.

Weak hyperintensionality can be contrasted with what we will call *strong hyperintensionality.* Strong hyperintensionality, in contrast to weak hyperintensionality, does not exist because of limitations to our cognitive systems, but rather because there are real distinctions in the world that are missed at the purely intensional level.[[19]](#footnote-19) To capture this idea let us say that a sentence, S, is strongly hyperintensional just in case either S contains hyperintensional positions but no psychological attitude constructions, or, if S contains psychological attitude constructions, then the sentence that remains after removing those constructions still contains hyperintensional positions.

**Strong Hyperintensionality**: A sentence, S, is strongly hyperintensional just in case S contains a hyperintensional position and either (a) S contains no psychological attitude constructions, or (b) S contains an expression, E, which does not fall under the scope of a psychological attitude construction, and E contains hyperintensional positions or (c) S contains psychological attitude constructions and either (i) these constructions, when saturated, do not have hyperintensional positions, or (ii) there are expressions within the scope of these psychological attitude constructions which, when they do not fall under the scope of that operator, have a hyperintensional position.

One might, of course, hold that all hyperintensionality is weak. Then one would deny the existence of strong hyperintensionality. There are, however, reasons not to do so. To see why, let us briefly consider two examples. For simplicity, let us assume that T is a metaphysical theory (i.e., a theory in metaphysics) and that T consists of a set of sentences that are jointly either true, or false, at a world. Now suppose that T is necessarily true. Then the intension of ‘T’ (a truth-value at every world) and the intension of ‘2 + 2 = 4’ is the same (they have the same extension at every world, namely, true). Yet, we might think, these expressions do not mean the same thing. It is not merely that they have a different cognitive significance for us: they would have a different cognitive significance for an epistemically ideal agent. In that case, it seems, we need strong hyperintensions to capture this difference. Or, to put it another way, there will be sentences that lack any psychological attitude constructions, but in which we cannot substitute for ‘T’, ‘2 + 2 4’: thus there will be sentences with strong hyperintensions.

Second, suppose that there is a theory, T\*, that consists of a set of sentences which are jointly *false* at every possible world. T\* is necessarily false. Now consider another necessarily false theory, T\*\*. Both T\* and T\*\* are intensionally equivalentYet there are, plausibly, sentences that fail to contain psychological attitude constructions in which we cannot substitute for ‘T\*’, ‘T\*\*’. Indeed, this will be the case as long as T\* and T\*\* are not metaphysically equivalent theories. And there surely are metaphysically *inequivalent* theories that are necessarily false. In such cases it is tempting to say that even epistemically ideal agents will want to utter sentences whose content distinguishes these intensionally equivalent theories. This, again, suggests that there are strongly hyperintensional sentences.

On the assumption, then, that there is both weak and strong hyperintensionality, we can distinguish two ways in which sentences can be hyperintensionally distinct or hyperintensionally equivalent. We can say that S and S\* are weakly hyperintensionally equivalent iff S and S\* have the same weak hyperintension, and that S and S\* are weakly hyperintensionally distinct iff they have different weak hyperintensions. And we can say that S and S\* are strongly hyperintensionally equivalent iff S and S\* share the same strong hyperintension, while S and S\* are strongly hyperintensionally distinct iff S and S\* have different strong hyperintensions. The question then becomes how to offer an analysis of sameness (and difference) of weak hyperintension and sameness (and difference) of strong hyperintension. We will turn to this task in the following section. For now, however, it will be enough to note some features of these relations.

If any two sentences S and S\*, or expressions E and E\*, are hyperintensionally equivalent (either strongly or weakly) then they are intensionally equivalent. If E and E\* are strongly hyperintensionally equivalent then we can replace one with the other and preserve the truth-value of any sentence *as long as neither E nor E\* falls under the scope of a psychological attitude construction.* If E and E\* are strongly hyperintensionally equivalent then this tells us something about the world: it tells us that there is no real distinction that is being expressed by E and E\*. Sentences that are strongly hyperintensionally distinct, on the other hand, track real distinctions.

Weak hyperintensional equivalence is a very strong equivalence indeed. If two sentences S and S\* (or expressions E and E\*) are weakly hyperintensionally equivalent then S and S\* are both intensionally equivalent and strongly hyperintensionally equivalent. Moreover, E can be substituted for E\* in all contexts, including within the scope of a psychological attitude construction, and the truth-value of the sentence will be preserved. Weakly hyperintensionally distinct sentences are ones where the sentences play some different functional role, or have some different cognitive significance, to cognitively non-ideal agents. Their distinctness does not track any genuine differences.

With this in mind, let us return to consider the case of grounding. The defender of grounding is interested in sentences that express claims about grounding where the sentence expressing those claims *does not* fall within the scope of a psychological attitude construction. So let us, first, consider the sentential operator view. According to most advocates of such a view, grounding is asymmetric and irreflexive. Then if we consider only sentences that express truths about grounding and which do not fall within the scope of a psychological attitude construction, it seems plausible that such sentences ought to be sensitive only to strong hyperintensional differences. Consider the claim ‘Someone is 200cm tall *because* Jim is 200cm tall’. If that claim is true, then so ought the following: ‘Someone is 200cm tall *because* Jim is 2m tall’. Supposing that ‘A *because* B’ is the general form of a sentence expressing a truth about grounding, then it should be that we can substitute for ‘A’ any expression that is strongly hyperintensionally equivalent to ‘A’, and *mutatis mutandis* for ‘B’. On the other hand, there is no guarantee that we are able to substitute for ‘A’ an expression that is merely intensionally equivalent to ‘A’, but is not strongly hyperintensionally equivalent (or indeed, an expression that is merely modally co-variant with ‘A’ but is not strongly hyperintensionally equivalent). For instance, while ‘Socrates exists’ and ‘{Socrates} exists’ are intensionally equivalent sentences, it is plausible that they are strongly hyperintensionally distinct. Likewise, although ‘God approves of X’ and ‘X is good’ are intensionally equivalent sentences (given God’s necessary existence and approval of good things), it seems plausible that the sentences are strongly hyperintensionally distinct.

These distinctions allow us to express, once again, the difference between the standard predicate-fact view and the sentential operator view of grounding. In the former case, due to the fine-grained nature of facts, intensional equivalence aligns with strong hyperintensional equivalence when it comes to sentences expressing claims about grounding.[[20]](#footnote-20) Thus, as we can substitute strongly hyperintensionally equivalent terms, so too can we substitute intensionally equivalent terms. In the latter case, however, intensional equivalence fails to align with strong hyperintensional equivalence due to the coarse-grained nature of the intensions of sentences. Thus, intensionally equivalent terms can only be safely substituted when they are also strongly hyperintensionally equivalent.[[21]](#footnote-21)

This brings us to the non-standard predicate-fact view. On that view, it is not even the case that we can substitute strongly hyperintensionally equivalent expressions into sentences that express grounding claims where these claims lack any psychological operator construction. Consider again ‘[B] grounds [M]’, where ‘[B]’ and ‘[M]’ are names for the very same fact. Recall that according to Jenkins, we cannot substitute one for the other, since ‘[B] grounds [B]’ is false. Yet the two expressions ‘[B]’ and ‘[M]’ are strongly hyperintensionally equivalent: after all, they are meant to be names for *the very same fact.* So the non-standard predicate-fact view must deny what the sentential operator view holds to be true: that we can substitute into sentences about what grounds what, strongly hyperintensionally equivalent expressions. While there are some options available to the defender of the non-standard predicate-fact view, here is one suggestion about truth-preserving substitutions: that in sentences of the form ‘x grounds y’, we can substitute ‘x’ for any strongly hyperintensionally equivalent expression, so long as that expression is weakly hyperintensionally distinct from ‘y’. That would allow us to substitute ‘[X]’ for ‘[B]’ in ‘[B] grounds [M]’ so long as [X]’ and ‘[B]’ are strongly hyperintensionally equivalent, and so long as ‘[X]’ and ‘[M]’ are weakly hyperintensionally distinct. This would prevent us illicitly substituting in ‘[B]’ for ‘[M]’ yielding ‘[B] grounds [B]’, since presumably ‘[B]’ is not weakly hyperintensionally distinct from ‘[B]’. In this way, quasi-irreflexivity is maintained. Given all this, we can offer the following three principles of substitution for each of the three views.

Standard Predicate-Fact Substitution Principle: in true sentences of the form ‘x grounds y’ where there are no psychological attitude constructions, for any ‘z’, ‘z’ can be substituted for ‘x’ (or ‘y’) whilst preserving truth, if and only if ‘z’ and ‘x’ (or ‘y’) are intensionally equivalent.

Sentential Operator Substitution Principle: in true sentences of the form ‘x *because* y’ where there are no psychological attitude constructions, for any ‘z’, ‘z’ can be substituted for ‘x’ (or for ‘y’) whilst preserving truth, if and only if ‘z’ and ‘x’ (or ‘y’) are strongly hyperintensionally equivalent.

Non-standard Predicate-Fact Substitution Principle: in true sentences of the form ‘x grounds y’ where there are no psychological attitude constructions, for any ‘z’ ‘z’ can be substituted for ‘x’, whilst preserving truth, if and only if (a) ‘z’ and ‘x’ are strongly hyperintensionally equivalent and (b) ‘y’ and ‘z’ are weakly hyperintensionally distinct. *Mutatis mutandis,* for substituting ‘z’ for ‘y’.[[22]](#footnote-22)

Given these three principles, it follows that both the sentential operator view and the non-standard predicate-fact view require that we be able to distinguish strong from weak hyperintensions. (We return, in section 6, to consider whether the fact that the standard predicate-fact view does not, on account of its account of grounding, require such a distinction might be seen as an advantage of that view). In what follows we outline one way in which to distinguish strong from weak hyperintensions on behalf of both the sentential operator view and the non-standard predicate-fact view.

**5. Models of Hyperintensionality**

In this section we consider some extant models of hyperintensionality and see whether they can model the distinction between weak and strong hyperintensions.

Before proceeding, it is worth noting that the primary motivation for modelling hyperintensionality has been to show how we can have what seem to be distinct psychological attitudes towards intensionally equivalent sentences. Thus such models have typically been formulated to model weak hyperintensionality. Let us call a model of weak hyperintensionality a *super* *fine-grained model*. Such models are super fine-grained because, *inter alia*, they need to draw very fine-grained distinctions. Indeed, they need to draw distinctions where there are none in the world. Imagine that Anthony believes that presentism is true and also believes that eternalism is false, despite the fact that (suppose for present purposes) presentism and eternalism are metaphysically equivalent: i.e., *they say the very same thing* (and are necessarily true). Suppose, further, that Sue believes that presentism is false and believes that eternalism is true. On the assumption that ‘presentism is true’ has a truth-value as an extension, and that it has the value ‘true’ if and only if the conjunction of the sentences that compose that theory is true, then ‘presentism is true’ and ‘eternalism is true’ are intensionally equivalent. Insofar as we want to be able to model both of Sue and Anthony’s pairs of beliefs, then, it is natural to suggest that these sentences are hyperintensionally distinct. That is why Anthony can bear a psychological attitude (belief) towards ‘presentism is true’ that he does not bear towards ‘eternalism is true’.

Given that we have distinguished weak from strong hyperintensionality we ought to hold that those sentences are strongly hyperintensionally equivalent—after all, by stipulation they are metaphysically equivalent—but weakly hyperintensionally distinct. They are weakly hyperintensionally distinct because cognitively non-ideal agents can represent that one is true and the other false; those sentences play different cognitive roles in the mental economy of Anthony and of Sue. Yet they are strongly hyperintensionally equivalent, since there is no distinction to be drawn between the two theories: they say the very same thing.

There are various super fine-grained models, ranging from those that deploy impossible worlds, to those that deploy structured propositions, through to those that deploy a 3-dimensional matrix that represents three different intensions of sentences. For our purposes, however, what matters is that any model that is sufficiently fine-grained to allow one to model weak hyperintensionality will, arguably, be *too* fine-grained to allow it to model strong hyperintensionality. We don’t really need to know the details of the model to see why this is so, but things might be a little clearer if we use an example.

Suppose one models weak hyperintensionality by positing impossible worlds. Then one will hold that just as intensions are functions from possible worlds to extensions, hyperintensions are functions from possible and impossible worlds to extensions. Thus the hyperintension of a sentence is a function from possible and impossible worlds to truth-values. The hyperintension of a name is a function from possible and impossible worlds to individuals, and the hyperintension of a predicate is a function from possible and impossible worlds to properties. It will then be natural to say that sentences S and S\* are weakly hyperintensionally equivalent iff the set of possible and impossible worlds that is the extension of S is identical to the set of possible and impossible worlds that is the extension of S\*. More generally, it will be natural to say that:

**(WE) Weak Hyperintensional Equivalence**: Expressions E and E\* are weakly hyperintensionally equivalent iff the extension of E at all the possible and impossible worlds is identical to the extension of E\* at all the possible and impossible worlds.

**(WD) Weak Hyperintensional Distinctness**: Expressions E and E\* are weakly hyperintensionally distinct iff the extension of E at all the possible and impossible worlds is distinct from the extension of E\* at all the possible and impossible worlds.

Notice that we need to posit a rich sphere of impossible worlds; for we need there to be some impossible world in which not only is presentism false (despite being necessarily true) but also in which eternalism is true (despite the fact that these theories are metaphysically equivalent) in order that ‘presentism is true’ and ‘eternalism is true’ are weakly hyperintensionally distinct. Likewise, we want to be able to model the fact that Bob believes that [A] grounds [B]’ is true but that ‘Bob believes that [C] grounds [B]’ is false, even though ‘[C]’ and ‘[A]’ are names for the same fact. Thus we want the sentences ‘[A] grounds [B]’ and ‘[C] grounds [B]’ to have different weak hyperintensions. If we model weak hyperintensionality in terms of functions from worlds to extensions, then we need there to be an impossible world in which [A] grounds [B] but [C] does not ground [B] (bearing in mind that ‘[A]’ and ‘[C]’ are names for the same fact).

The problem is that any model that is sufficiently fine-grained to model weak hyperintensionality will, arguably, be too fine-grained to model strong hyperintensionality. Strong hyperintensions are those that make distinctions more fine*-*grained that those at the intensional level, but make only those distinctions that are *real*.

If we wanted to model strong hyperintensionality in terms of impossible worlds we would naturally do so by positing a less rich sphere of impossible worlds. In particular, we would allow that there exist only those impossible worlds that represent genuinely distinct ways things cannot be. For instance, while we will hold that there exists a world in which some necessary truth is false—and thus a world in which presentism is false—we will reject the claim that there exists any world in which ‘presentism is true’ and ‘eternalism is true’ take different truth-values. If presentism and eternalism are metaphysically equivalent then they say the very same thing. There are impossible worlds that represent impossible states of affairs such that, in those worlds, presentism is false. But whichever way those impossible worlds are will be a way that makes ‘eternalism is true’ false. There will be no impossible world in which presentism is true and eternalism is false (or *vice versa*) since that is not a genuine impossibility.

With that view about the sphere of impossible worlds it will be natural to say that sentences S and S\* are strongly hyperintensionally equivalent iff the set of possible and impossible worlds that is the extension of S is identical to the set of possible and impossible worlds that is the extension of S\*. More generally, it will be natural to define *strong hyperintensional equivalence* and *strong hyperintensional distinctness* in just the same way as we defined weak hyperintensional equivalence and distinctness, except that the sphere of impossible worlds included in the semantic model of weak hyperintensions will be different (i.e., larger) than the sphere of impossible worlds included in the semantic model of strong hyperintensions. We use the phrase ‘genuinely impossible’ to refer to the sphere of impossible worlds that represent the genuine impossibilities. We then get the following pair of definitions:

 **(SE) Strong Hyperintensional Equivalence:** Expressions E and E\* are strongly hyperintensionally equivalent iff the extension of E at all the possible and ‘genuinely’ impossible worlds is identical to the extension of E\* at all the possible and impossible worlds.

**(SD) Strong Hyperintensional Distinctness:** Expressions E and E\* are strongly hyperintensionally distinct iff the extension of E at all the possible and ‘genuinely’ impossible worlds is distinct from the extension of E\* at all the possible and impossible worlds.

Defining weak hyperintensionality in terms of (WD) and (WE) is perfectly good, and modelling strong hyperintensionality in terms of (SD) and (SE) is perfectly good, as long as there is some way to cash out the difference between the impossible worlds that are genuine, and those that are not. One could, for instance, distinguish between the ‘genuinely’ impossible worlds and the not ‘genuinely’ impossible worlds by saying that the former are the impossible worlds that represent genuinely distinct ways things cannot be; the latter represent ways we think things couldn’t be, but ways they in fact couldn’t, couldn’t be. We could then define an accessibility relation, A, between the possible and the genuinely impossible worlds that does not extend to the not genuinely impossible worlds. We could then say that sentences S and S\* are strongly hyperintensionally equivalent iff the set of worlds A-accessible from the actual world is such that the extension of S in those worlds is the same as the extension of S\* in those worlds. Sentences S and S\* are strongly hyperintensionally distinct iff the set of worlds A-accessible from the actual world is such that the extension of S in those worlds is different to the extension of S\* in those worlds. We would then define weak hyperintensional equivalence in terms of the set of all possible and impossible worlds.

 We, however, are not sanguine about the prospects of such an account, although we do not rule it out. This is for two reasons. First, if worlds were, for instance, made from a world-making language that is Lagadonian then it seems as though the only sphere of impossible worlds would be those needed to model strong hyperintensionality. After all, worlds would be described, in the Lagadonian language, in terms of the distribution of individuals, properties, and relations. Impossible worlds would contain impossible individuals with impossible properties and relations.[[23]](#footnote-23) But however an impossible world is, thus described, would be such that, if it makes true ‘presentism is false’, it will also make true ‘eternalism is false’. So the sphere of worlds simply will not be rich enough to model weak hyperintensionality.

On the other hand, if one’s world-making language is sufficiently rich that the English language sentence ‘eternalism is false’ and the sentence ‘presentism is false’ each correspond to a distinct world-making sentence, then one’s sphere of impossible worlds will be rich. There will be a world in which eternalism is true and presentism is false. But if the world-making language functions like that, so that for any two distinct English sentences there are distinct world-making sentences that correspond to those sentences, then the question arises as to how to distinguish the genuine from the not genuine impossible worlds. There doesn’t seem to be any principled way to do this. In the impossible world in which eternalism is true and presentism is false, the world in question is made up of sentences, one of which says that eternalism is true and another of which says that presentism is false. The world *itself* is no less genuine than any of the other impossible worlds. And that world says of itself that eternalism is true and presentism is false just as other impossible worlds say of themselves that presentism and eternalism are both false. Since all the worlds are made of sentences in the very same world-making language, and all are ontologically on a par, it’s hard to see what distinguishes the genuine from the not genuine.

One can simply stipulate that there is such an accessibility relation that tracks the difference between weak hyperintensionality and strong hyperintensionality and then proceed to model those phenomena as we previously suggested. But since there are any number of accessibility relations, and no principled difference between the two sets of impossible worlds, this model will model hyperintensional differences but won’t say anything metaphysically heavyweight. It is a mere semantic model; nothing within the model tells us why some worlds are genuine and others not. We find that unsatisfactory.[[24]](#footnote-24)

A final option would be to include different kinds of impossible worlds in one’s model. Impossible worlds made of Lagadonian sentences would correspond to the worlds over which we define strong hyperintensional equivalence and distinctness, while impossible worlds made of sentences in some other language (one that is sufficiently rich) would correspond to the worlds over which we define weak hyperintensional equivalence and distinctness (call these ‘mere ersatz’ impossible worlds). We would then need a translation manual between the mere ersatz worlds, and the Lagadonian worlds. After all, every Lagadonian world would map onto a merely ersatz world that represents the same impossible state of affairs. That is, every Lagadonian world that represents a way things genuinely cannot be, would be such that there is a mere ersatz world that represents that very same way things genuinely cannot be. It is just that there would, in addition, be mere ersatz worlds that do not correspond to any Lagadonian world—namely the mere ersatz worlds that represent ways things cannot be, where these are not ways things genuinely cannot be. These worlds are, in effect, the ones that are relevant for defining the weak hyperintensions of sentences. We do not rule out that such an account is possible. But it is hardly more uniform than the heterogeneous account that we will subsequently offer. After all, it has two sets of impossible worlds, defined up in different ways, and it must provide a translation manual linking the two sets of worlds since for any ersatz impossible world we need to know whether there is a Lagadonian counterpart that represents the same state of affairs. None of this seems straightforward.

 Notice that there is nothing special about the use of impossible worlds that generates this problem. In general, any account that is fine-grained enough to model weak hyperintensionality will have difficulty modelling strong hyperintensionality in the following sense: there will be a difficulty, from within the model itself, in distinguishing the weakly from the strongly hyperintensional in a manner which supports the robust metaphysical distinction between the two. In effect, then, one might say that such models fail to model strong hyperintensionality. By contrast, accounts that are not fine-grained will be adept at modelling strong hyperintensionality, but will be unable to model weak hyperintensionality at all*.*[[25]](#footnote-25)

 With these difficulties in mind, we are inclined to suggest that those who take grounding to be hyperintensional ought to endorse what we call a *heterogeneous* account of hyperintensionality.[[26]](#footnote-26) This is an account that models strong and weak hyperintensionality differently. There are various ways one might go about this, any one of which would allow the modelling of both the strong hyperintensionality of claims about grounding and the weak hyperintensionality of claims about non-ideal agents. But the version we are most attracted to is one that models strong hyperintensions as functions from possible and impossible worlds to extensions, and models weak hyperintensionality differently.

On this heterogeneous approach, the sphere of impossible worlds is not rich: each impossible world represents a genuinely distinct way things could not be.[[27]](#footnote-27) We can therefore define strong hyperintensional equivalence and distinctness as described above in (SE) and (SD) but without the need for the use of the modifier ‘genuinely’.

**(SE) Strong Hyperintensional Equivalence:** Expressions E and E\* are strongly hyperintensionally equivalent iff the extension of E at all the possible and impossible worlds is identical to the extension of E\* at all the possible and impossible worlds.

**(SD) Strong Hyperintensional Distinctness:** Expressions E and E\* are strongly hyperintensionally distinct iff the extension of E at all the possible and impossible worlds is distinct from the extension of E\* at all the possible and impossible worlds.

The difficulty then lies in distinguishing strong from weak hyperintensionality and in defining notions of weak hyperintensional distinctness and equivalence.

 Our suggestion is that weak hyperintensions are modelled as 3-intensions.[[28]](#footnote-28) This proposal builds directly on the work of two-dimensional semantics, extending it to a three-dimensional semantics. The core idea behind two-dimensional semantics is that which intension a sentence expresses depends on what the actual world is like. If, for instance, the watery stuff around here is H2O then ‘water is H2O’ is true and necessarily so. But if it should turn out that the watery stuff around here is XYZ then it turns out that ‘water is H2O’ is false, and necessarily so, while ‘water is XYZ’ is true and necessarily so. Thus sentences have two intensions.[[29]](#footnote-29) The first—typically known as a secondary or C-intension—is a function from worlds to extensions. The second—typically known as a primary, or A-intension—is a function from worlds to intensions. This two-dimensional picture can be represented by a two-dimensional matrix in which each row represents the intension of a sentence conditional on a particular world being actual. As it is sometimes put, A-intensions are functions from *possible* *worlds* *considered as actual,* to intensions. Or, if you prefer, A-intensions are functions from the different possible ways we *think* the actual world might be, to intensions.

The 3-dimensional approach introduces a third intension: a 3-intension. The idea is that just as we might not know which world is actual, among the worlds that are possible, so too we might not know which worlds are possible. 3-intensions can be represented by a three-dimensional matrix that stacks different two-dimensional matrices. Each two-dimensional matrix in the three-dimensional stack represents the A-intension of a sentence on a different supposition about which worlds are possible. However, rather than thinking of 3-intensions as functions from possible and impossible worlds to A-intensions, instead this approach replaces impossible worlds with descriptions of our dispositions to behave were we to come to believe that some sentence, S, is true, to A-intensions.[[30]](#footnote-30) This view of 3-intensions builds on functional role semantics according to which the meanings of expressions are given by their functional role: the kinds of communicative, linguistic, mental and other behaviours that are liable to cause their tokening and the kinds of communicative, linguistic, mental and other behaviours their tokening is disposed to cause. We can then see A-intensions as individuated in terms of what functional role an expression would have, were the actual world to be a certain way.

3-intensions, by contrast, individuate expressions in terms of the functional role of those expressions, were some non-ideally rational, ignorant, agent to come to believe that certain (as it turns out impossible) discoveries are actual. This lack of ideal rationality means that an agent can come to believe that something that is impossible obtains, and then rather than being disposed to come to reject that belief (as an ideally rational being would) that agent is typically disposed to engage in various behaviours. So, for instance, suppose we (the authors) each came to believe that the four-colour theorem is false.[[31]](#footnote-31) The omniscient being would not come to believe any such thing. The ideally rational being would, after due consideration, come to reject the belief that the four-colour theorem is false. We, however, would be disposed to go and buy extra paint were we to be in the map-making business. By contrast, if we came to believe that 2 + 2 = 5 we would not go out and buy more paint were we to be making maps, or otherwise. Instead, we would be inclined to go about saying that 2 + 3 = 6, and if we had two sets of 2 friends and had to divide a cake equally amongst them, we would cut the cake into 5 pieces, and so on. Thus even though ‘2 + 2 = 5’ and ‘the four-colour theorem is false’ are A-intensionally equivalent, they are not 3-intensionally equivalent. For the 3-intension tracks the different behaviours we would engage in, were we to come to believe that each of those expressions is true; and we would engage in quite different behaviours.

 On our view weak hyperintensions are 3-intensions. These are exhausted by what non-ideal agents would be disposed to do were they to come to believe that certain sentences are true (or false). We can therefore define weak hyperintensional equivalence and distinctness as follows:

**(WD\*) Weak Hyperintensional Distinctness:** Relative to some agent, A, sentences S and S\* are weakly hyperintensionally distinct iff were A to come believe that S obtains, A would be disposed to behave in way W, and were A to come to believe that S\* obtains, A would be disposed to behave in way W\*, and W\* is not identical to W.

**(WE\*) Weak Hyperintensional Equivalence:** Relative to some agent, A, sentences S and S\* are weakly hyperintensionally equivalent iff were A to come believe that S obtains, A would be disposed to behave in way W, and were A to come to believe that S\* obtains, A would be disposed to behave in way W\*, and W\* is identical to W.

So, for example, as long as Anthony is disposed to behave differently on coming to believe that presentism is false then he would on coming to believe that eternalism is false, it follows that for Anthony, ‘presentism is true’ and ‘eternalism is true’ are weakly hyperintensionally distinct.

This framework, we contend, allows us to distinguish strong from weak hyperintensions. It therefore allows us to make sense of our earlier principles which set out the conditions under which the sentential operator view and the non-standard predicate-fact view will allow us to substitute one intensionally equivalent expression for another, into a sentence that expresses a truth about grounding, without changing the truth-value of that sentence.

In what follows we briefly consider whether the differences between the standard predicate-fact view, according to which grounding is not hyperintensional (not hyperintensionalTRAD that is) and the other views according to which it is, might be marshalled into an argument in favour of the former over the latter.

**6. In Favour of the Standard Predicate-Fact View?**

We have already noted that those who endorse the standard predicate-fact view, and thus think that grounding is hyperintensionalGRND but *not* hyperintensionalTRAD, need not appeal to a heterogeneous account of hyperintensionality in order to adequately account for sentences about what grounds what. Rather, it is possible, on such a view, to simply identify hyperintensionalityTRAD with weak hyperintensionality. For, on this view, the only contexts in which sentences expressing truths about grounding are hyperintensionalTRAD are ones in which ‘[X] grounds [Y]’ falls inside the scope of a psychological operator. In all cases in which ‘[X] grounds [Y]’ does not fall inside the scope of such an operator, it will be possible to substitute ‘[Z]’ for ‘[X]’ if ‘[X]’ and ‘[Z]’ are intensionally equivalent.

On the face of it, then, the standard predicate-fact view has an advantage over the sentential operator view and the non-standard predicate-fact view. The need to posit a heterogeneous account of hyperintensionality detracts from the simplicity and elegance of the latter views. Does this give us reason to prefer the predicate-fact view to its competitors? We do not think so, but we do think this is terrain worth exploring. We do not think so, first, because we think the there are independent reasons (independent from considerations arising from expressing claims about grounding) to distinguish weak from strong hyperintensions; reasons we adumbrated earlier in the paper. If, regardless of one’s view on grounding, one ultimately must draw upon the resources of a heterogeneous account of hyperintensionality, then that the sentential operator view and non-standard predicate-fact view require these resources in the grounding context is no extra cost. Nevertheless, were one, unlike us, not independently motivated by the desire to distinguish strong from weak hyperintensions, then what we have said here would provide reason to prefer the standard predicate-fact view to its competitors.

A second argument the defender of the standard predicate-fact view might try to marshal against her competitors would be to suggest that her view is simpler and more elegant because she has a very straightforward account of when we can substitute into sentences about what ground what, intensionally equivalent expressions (without changing the truth-value of said sentences). We think this is an avenue worth exploring. But, we think, it is not obvious that the standard predicate-fact view really has any advantage of the sentential operator view here. For one might think that the very same problem arises in both contexts, but in slightly different guises.[[32]](#footnote-32) In the case of the sentential operator view, it arises in attempting to spell out the conditions under which one can substitute into a sentence about what grounds what, one intensionally equivalent expression for another. In the context of the standard predicate-fact view, however, it arises in needing to spell out exactly how fine-grained facts are, and hence which facts there are, and which facts are distinct from which other facts. The fine-grainedness of the world, on the predicate-fact view, is pushed into the fine-grainedness of meanings or contents, on the sentential operator view. But, one might think, the same essential difficulty is faced by both views.[[33]](#footnote-33) We think this is likely right, though if one thought that the problem of fine-graining facts was more tractable than the problem of specifying under what conditions intensionally equivalent expressions are substitutable *salva veritate,* then one would have a reason to embrace the standard predicate-fact view over its rivals. Having said all that, we do think there are reasons to prefer either the standard predicate-face view or the sentential operator view to the non-standard predicate-fact view (though of course said reasons are *pro tanto* and defeasible). For the non-standard predicate-fact view requires both the fine-graining of facts, as well as the fine-graining of meanings: it requires both that we can distinguish strong from weak hyperintensions as well as that we can fine-grain the facts that are the relata of the grounding relation. Perhaps there are independent reasons to do both of these things, but at least, on the face of it, this is reason to find that view less elegant.

**7. Conclusion**

The aims of this paper have been three-fold. First, we have distinguished between two importantly different uses of the word ‘hyperintensionality’. Second, we have shown that grounding claims (that do not fall under a psychological operator) are hyperintensional only under the sentential operator and non-standard predicate-fact views. Thirdly, we have argued that if grounding is hyperintensional, a *heterogeneous* account of hyperintensionality will be required, and we have offered just such an account. We have then investigated whether these considerations might militate in favour of the standard predicate-fact view over its rivals. While we have suggested that they do not, we leave open that someone who is not independently motivated to distinguish strong from weak hyperintensions, or someone who thinks that fine-graining facts is easier than fine-graining meanings, will have (defeasible) reason to prefer the standard predicate-fact view to its competitors We have also suggested that there are reasons to prefer either of the standard views—predicate-fact or sentential operator—to the non-standard predicate-fact view. We hope, therefore, to have made some headway on these issues, and to have opened up some avenues of potential investigation.

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1. See for instance Nolan (1997), Jago (2014) and Ripley (2012). [↑](#footnote-ref-1)
2. Exactly what impossible worlds are is a further issue which we will not explore here. [↑](#footnote-ref-2)
3. See Soames (1987), Cresswell, (1985) and King (1995; 1996; 2007). [↑](#footnote-ref-3)
4. For instance, there are controversies regarding the relata and adicity of grounding, whether chains of grounding must be well-founded, and the modal scope of grounding. Trogdon (2013) provides a useful overview of these disputes. While we remain neutral in most cases, we assume in what follows that necessitarianism about grounding is true (i.e. that if A grounds B, then A necessitates B). While this view is generally accepted, interesting putative counterexamples have been proposed by Leuenberger (2014) and Skiles (2015). [↑](#footnote-ref-4)
5. While these features are the orthodoxy, Schaffer (2012) proposes counterexamples to transitivity, Barnes (2014) to asymmetry, Jenkins (2011) to irreflexivity and Rodriguez-Pereyra (2015) to all three. [↑](#footnote-ref-5)
6. Schaffer (2009: 364), for example, claims that ‘supervenience is an intensional relational [sic] while grounding is hyperintensional. For instance, there are substantive grounding questions for necessary entities (like numbers), but supervenience claims go vacuous for necessary entities.’ [↑](#footnote-ref-6)
7. Here we do not mean to include logical connectives (like ‘and’ and ‘or’). All of these connectives, by not referring to anything, trivially refer in all of the same possible worlds. [↑](#footnote-ref-7)
8. See Correia and Schnieder (2012: 14) for a slightly different formulation, which, we think, amounts to the same thing. [↑](#footnote-ref-8)
9. If E and E\* do not take an extension at any possible world, then they do not modally co-vary. [↑](#footnote-ref-9)
10. Of course, expressions do not, strictly speaking, modally co-vary (in the way that objects and properties can), but we think it important to use an expression which is not ambiguous between ‘applies in all of the same possible worlds’ and ‘intensionally equivalent’. (The commonly used ‘necessarily co-extensive’ seems to be ambiguous in this way.) [↑](#footnote-ref-10)
11. See, for example, Bliss and Trogdon (2015), section 4. [↑](#footnote-ref-11)
12. Intensionalists suppose this to be so. [↑](#footnote-ref-12)
13. Schaffer, for instance notes that ‘any metaphysical possibility in which Socrates exists is a possibility in which <Socrates exists> is true, and vice versa. So it seems that merely intensional notions like supervenience cannot make sense of the direction of dependence.’ (2016: footnote 1). [↑](#footnote-ref-13)
14. Fine, for example, says, ‘My preferred view is that the notion of ground should be expressed by means of a sentential operator, connecting the sentences that state the ground to the sentence that states what is grounded’ (2012, p. 12). [↑](#footnote-ref-14)
15. We have in mind pure grounding claims here. Sentences which purport to express truths about grounding *and* other matters may have hyperintensional positions (e.g., ‘The fact that A grounds the fact that B, and Lois Lane believes that Clark Kent is human’). [↑](#footnote-ref-15)
16. It is worth noting that if expressions of the form ‘[X]’ are taken to be shorthand for complex expressions of the form ‘the fact that X’, where X is a sentence, then pure grounding claims do contain hyperintensional positions. Specifically, the positions occupied by the sentences attached to the operator ‘the fact that’ will be hyperintensional, for the reasons outlined below in our discussion of the sentential operator view. (The expression ‘the fact that’ cannot occupy a hyperintensional position since it has no intension.) Thanks to an anonymous referee for drawing our attention to this issue. As we understand it, ‘[X]’ is a name for a fact, and not shorthand for a complex expression. (Although ‘[X]’ can be read as ‘the fact that X’, we take this expression to function as a proper name, despite its syntactic structure.) Hence, we conclude that pure grounding claims do not have hyperintensional positions under the standard predicate-fact view. [↑](#footnote-ref-16)
17. This is assuming that they hold that the extensions of sentences are truth-values. A defender of the sentential operator view might instead think that the extensions of sentences are states of affairs, understood roughly as facts. In this case, claims like ‘{Socrates} exists *because* Socrates exists’ would no longer have hyperintensional positions as the sentence ‘{Socrates} exists’ would have a different extension to ‘Socrates exists’ and thus would have a different intension. This position seems to us to collapse into the predicate-fact view or something very close to it. The interesting difference between the sentential operator view and the predicate-fact is that the former allows one to stay neutral on the issue of what grounding claims are about, and even on the issue of whether there are such things as properties or facts (Bliss and Trogdon, 2014, section 3). Perhaps this version of the sentential operator view retains its neutrality on the issue of whether grounding is a relation between facts (though this is far from clear), but it certainly does not stay neutral on the other issues. It seems then that the cost of avoiding hyperintensionality is a loss of neutrality. [↑](#footnote-ref-17)
18. One might wonder if it is reasonable to expect an answer to this question. Defenders of grounding (in any of its guises) typically take it to be a primitive. But if the notion is not analysable in terms of any others, then one might resist the idea that we can provide any account of when expressions in sentences of the form ‘x *because* y’ or ‘x grounds y’ are substitutable. (Thanks to an anonymous referee for suggesting this response.) We do not, however, think that just because grounding is a primitive, there is good reason to think that no account can be forthcoming (or ought to be demanded) regarding when expressions are substitutable. After all, many take the notion of parthood to be a primitive. But nobody thinks it follows from that that sentences of the form ‘P is part of O’ are such that we cannot have any account of when we can substitute for ‘P’ or ‘O’ intensionally equivalent terms. At the very least, if defenders of the view that grounding is hyperintensional want to resist our call for an account of substitution, the burden is on them to make this argument. [↑](#footnote-ref-18)
19. Note that there appear to be hyperintensional positions that are neither weakly nor strongly hyperintensional. For instance, the position occupied by ‘Giorgione’ in Quine’s (1961) ‘Giorgione was so-called because of his size’ is hyperintensional in virtue of the fact that ‘Barbarelli’—another name for Giorgione—cannot be substituted into it without changing the truth-value of the sentence. (‘Barbarelli was so-called because of his size’ is false.) Yet this does not seem to be a case of strong hyperintensionality, and the sentence contains no psychological operator (unless one thinks that ‘was-so-called’ is a disguised psychological operator).

 We will not discuss such cases of hyperintensionality here because we do not think that a special account of hyperintensionality is needed to deal with them. After all, this kind of hyperintensionality can be eliminated by appealing to the following paraphrases: ‘Giorgione was called “Giorgione” because of his size’, and, ‘Barbarelli was called “Barbarelli” because of his size’. The names ‘Giorgione’ and ‘Barbarelli’ (occupying the position at the beginning of each sentence) can then be freely substituted for one another. (The latter “Giorgione” is the name of the name ‘Giorgione’ and so cannot be replaced by “Barbarelli” which is name of the name ‘Barbarelli’.) On the other hand, the hyperintensionality in ‘Bob believes that Jim is 200cm tall’ and ‘{Socrates} exists *because* Socrates exists’ does not seem to be so easily eliminated. [↑](#footnote-ref-19)
20. That need not be the case for all sentences. [↑](#footnote-ref-20)
21. There is an exception to this general rule. Sometimes we are licensed to substitute one expression for another because of the formal properties of grounding. Grounding is typically thought to be transitive. So consider the following: ‘A *because* B’, and ‘B *because* C’. It follows that ‘A *because* C’. So it follows that we can substitute ‘B’ for ‘A’ in ‘B *because* C.’ These are cases in which we can do so, even when ‘B’ and ‘C’ are strongly hyperintensionally distinct. Now consider the following case: ‘{Socrates} exists *because* Socrates exists.’ Here, ‘{{Socrates}} exists’ can be substituted for ‘{Socrates} exists’ while retaining truth-value (to yield ‘{{Socrates}} exists *because* Socrates exists.’) That is because ‘{{Socrates}} exists *because* {Socrates} exists’ is true. In this case, though, ‘{{Socrates}} exists’ and ‘{Socrates} exists’ are strongly hyperintensionally distinct, but intensionally equivalent. Thus an exception to the rule that says that we can only substitute strongly hyperintensionally equivalent expressions into sentences that express claims about grounding, says that we can substitute an expression, ‘A’, for ‘B’ in ‘B *because* C’, if ‘A *because* B’. [↑](#footnote-ref-21)
22. If one wants to substitute in ‘z’ for ‘x’ and ‘v’ for ‘y’ in the same substitutional act (as it were) then one will need to check both that ‘z’ and ‘x’ are strongly hyperintensionally equivalent, and that ‘v’ and ‘y’ are strongly hyperintensionally equivalent, *and* that ‘v’ and ‘z’ are weakly hyperintensionally distinct. (Otherwise one might substitute ‘B’ for ‘x’ and ‘B’ for ‘y’, which would not preserve truth). [↑](#footnote-ref-22)
23. It is controversial how one ought to model impossible worlds using a Lagadonian language. It might be that appealing to negative facts, or negative properties that actually exist, as names for themselves, would provide a rich enough language to represent the genuine impossibilities (where impossible individuals would then be ones that instantiate incompatible properties). At any rate, this problem is not ours. [↑](#footnote-ref-23)
24. Note that we are not claiming that there is no heavyweight distinction between the two sets of impossible worlds. Rather, we are claiming that there seems to be nothing *in the model* to make such a distinction. [↑](#footnote-ref-24)
25. For a more detailed defence of this claim see Miller (forthcoming). [↑](#footnote-ref-25)
26. See Miller (forthcoming). [↑](#footnote-ref-26)
27. On the approach we prefer, impossible worlds may be non-maximal sets of world-making sentences, but they will be closed under the logical consequence of some non-classical logic. Moreover, we assume that the world-making language is something like a Lagadonian language. [↑](#footnote-ref-27)
28. Something like this view is defended by Braddon-Mitchell (2009) and (forthcoming). [↑](#footnote-ref-28)
29. For a defence of these views see Chalmers (2004) and Jackson (2004), and for a different take on two-dimensional semantics see Stalnaker (2004). [↑](#footnote-ref-29)
30. Braddon-Mitchell (forthcoming) defends such a view. [↑](#footnote-ref-30)
31. The four-colour theorem says that given any separation of a plane into contiguous regions, one needs no more than four colours in order to colour the regions so that no two adjacent regions are the same colour. [↑](#footnote-ref-31)
32. One might also wonder why a defender of grounding should be expected to provide an account of when intensionally equivalent sentences can be substituted *salva veritate*. Thanks to an anonymous referee for pointing this out. [↑](#footnote-ref-32)
33. We are grateful to an anonymous referee for suggesting this response. [↑](#footnote-ref-33)