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## Vague Naturalness as Ersatz Metaphysical Vagueness

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There is a certain argument schema that is popular in contemporary metaphysics. Instances of the schema are generated by arguing that the following claims are inconsistent:

- V1. Attributions of *F*-ness are vague: There is something such that it's indeterminate whether it's *F*.
- V2. *F*-ness is perfectly natural.
- V3. There is no metaphysical vagueness.

where '*F*' is replaced with a predicate. Call the above schema the Generalized Vagueness Argument Schema (GVAS). According to the GVAS, vague attributions of perfectly natural properties require metaphysical vagueness. The GVAS is applied to different types of properties and to different dialectical ends. Authors including Williams (2008c), Sider (2009b; 2011), Dorr and Hawthorne (2013), and, arguably, Parfit (1984),<sup>1</sup> Barnes (2014),<sup>2</sup> and others<sup>3</sup> apply the schema in debates over ethical properties, personal identity, consciousness, special science properties, unrestricted mereological composition, four dimensionalism, ontological realism, and beyond. Sometimes the

<sup>1</sup> Parfit constructs Sorites sequences that show that personal identity can be vague (V1). He is focused on semantic conceptions of vagueness (V3). And he takes (239) these two claims to support a *Reductionist View* (209) of personal identity over the *Further Fact View* (210). If we gloss the Further Fact View as the claim that being a person is perfectly natural, he is subscribing to an instance of the GVAS.

<sup>2</sup> Barnes argues that vagueness in various fundamental properties (morality and existence) implies metaphysical vagueness. If we gloss talk of 'fundamental properties' in terms of perfectly natural properties, she is subscribing to an instance of the GVAS. (See §4 for further discussion of Barnes (2014)).

<sup>3</sup> See, for instance, Dougherty (2013). Although Dougherty does not outright endorse the GVAS, many of his arguments assume something like it. See, for instance, his sec. 2 and sec. 3.2.

schema is used to argue that there is metaphysical vagueness (from (V1) and (V2)). Other times, it's deployed in order to establish that a property can't be perfectly natural (from (V1) and (V3)) or there is no vagueness in a given domain (from (V2) and (V3)). And sometimes it's used in a *reductio* against a position that is supposedly committed to all three theses.

The GVAS, if it works, ends up having significant upshots for our theorizing. That's because often each of the three theses (V1)–(V3) looks fairly compelling. In the case of ethical properties, for example, we might have good reason to acknowledge that our attributions of moral properties are indeterminate or vague (V1) while adopting robust moral realism, understood as the claim that moral properties are perfectly natural (V2)—all without having to accept spooky metaphysical vagueness (V3).

The prevalence of the GVAS has not been fully appreciated. That's in large part because authors often appeal to the GVAS with little explication. The first task of this paper is to document the prevalence of the GVAS and to make explicit the arguments for the incompatibility of (V1)–(V3) underlying these authors' appeals. This presentation alone is significant. It unifies a set of seemingly disparate arguments under one hidden schema and develops the strongest versions of that schema, which can then be extended to instances where exposition is lacking. With a clear presentation in hand, we are also well positioned to chart out the various possible strategies for resisting the GVAS.

The second task of this paper is to develop one such strategy that I find particularly fruitful. I propose that those attracted to (V1)–(V3) adopt a position that I call *ersatz metaphysical vagueness*. According to the ersatz, the term 'perfectly natural' is semantically vague. By taking the term 'perfectly natural' in (V2) to be semantically vague, (V1)–(V3) can be made consistent. Moreover, because GVAS arguments that go from (V1) and (V2) to the negation of (V3) are a popular way to motivate metaphysical vagueness, ersatz metaphysical vagueness gives us a non-objectionable alternative to genuine metaphysical vagueness.

## 1. THE PLAUSIBILITY OF (V1)–(V3)

The GVAS wouldn't be of much dialectical interest if one of the theses (V1)–(V3) were *obviously* false. But, for several substitution instances of the schema, each of the theses has *some* independent plausibility.

### 1.1. (V1)

Turn first to (V1), the schematic claim that some attributions of *F*-ness are vague, which we will treat more carefully as the claim that there is something

such that it's indeterminate whether it's  $F$ .<sup>4</sup> Focus on the instances of this schematic claim that we generate by substituting 'is permissible', 'is a person', 'is conscious', 'is uranium', 'compose', or 'exists'<sup>5</sup> for ' $F$ ' in the schema. There are two main avenues for generating the plausibility of these instances of (V1).

The first avenue is loosely inspired by the vagueness argument for composition given in Lewis (1986, 212). For instances of  $F$  like 'permissible', 'person', 'conscious', 'uranium', and 'composes', there is supposed to be some intuitive desideratum such that determinately something is  $F$  iff it satisfies that desideratum. It's then noted that any reasonable way of spelling out the desideratum will be vague: there will be something such that it's indeterminate whether it satisfies the desideratum. A more precise specification of the desideratum is supposed to be absurd. There is thus pressure to conclude that some attributions of  $F$ -ness are vague (V1): there is something such that it's indeterminate whether it is  $F$ .<sup>6</sup> Examples of substitution instances of ' $F$ ' and their corresponding vague desideratum include:<sup>7</sup>

- Normative properties and normatively relevant descriptive properties
- Personhood and psychological or bodily continuity
- Consciousness and patterns of neural firings
- Special science properties and microphysical properties
- Mereological composition and sufficient stuck-togetherness, etc.

<sup>4</sup> Throughout the paper, I will be a bit sloppy in my use of the terms 'indeterminate' and 'vague', treating them as synonymous. Vagueness might require more than indeterminacy, so, strictly speaking, (V1) is a claim about indeterminacy rather than vagueness. Thus, the focus of the paper, in the first instance, is indeterminacy not vagueness. Moreover, as I use the term 'indeterminate', it is neutral as to the source of the indeterminacy (what some (Williamson 1994) mean by the term 'indefinite'). For all I've said, the indeterminacy may be epistemic and the indeterminate claim may be true or false.

<sup>5</sup> We can treat 'compose' as a predicate of sets of objects, such that determinately the set composes iff there is something such that it has all of the members of the set as parts and every one of its parts overlaps some object in the set. We can follow Heim and Kratzer (1998) and Dorr (2005) who, in a development of the Fregean insight, treat existence as a property of properties. This allows us to treat arguments involving vague existence (like that in Sider (2009b; 2011)) as an instance of the more general GVAS.

<sup>6</sup> We can firm up the argument a bit by considering its form:  $\{\forall x \Delta(Fx \leftrightarrow \phi(x)), \exists x(\nabla(\phi(x)))\} \vdash \exists x(\nabla(Fx))$  where ' $\nabla(\chi)$ ' stands for 'indeterminately  $\chi$ ' or equivalently ' $(\neg \Delta(\chi)) \wedge (\neg \Delta(\neg \chi))$ ', where ' $\Delta(\chi)$ ' stands for 'determinately  $\chi$ '. The formula  $\phi(x)$  predicates the desideratum of  $x$ . I assume that the logic of vagueness retains classical rules of inference (contraposition, conditional proof, argument by cases, and *reductio ad absurdum*). On simple supervaluationist models, of the kinds discussed by Williamson (1994), these classical rules must be restricted. These rules need not be restricted for epistemicism and more sophisticated forms of supervaluationism (like those discussed in Field (1994); McGee and McLaughlin (1994); Williams (2008b)).

<sup>7</sup> Cf. Parfit (1984, 231–43), Dougherty (2013), and Goff (2014, 184–7).

The second avenue is closely related to the first. Instead of focusing on the unavoidable vagueness of the desideratum, we use a range of properties similar to the desideratum to construct a Sorites sequence for the instantiation of  $F$ . Consider, for instance, the GVAS as applied to normative properties. Presumably the instantiation of normative properties comes with some descriptive desideratum. As Miriam Schoenfield points out, by constructing a sequence of cases that includes properties similar to this descriptive desideratum, we can construct a Sorites sequence:

Darryl is watching his two-year-old daughter play in a city park. It is permissible to divert his attention from her for 1 second. It is not permissible to divert his attention from her for 5 minutes. Is it permissible to divert his attention for 30 seconds? 31? 32? Plausibly, we can create a Sorites series, admitting of borderline cases of permissibility, out of a series of diversions whose lengths differ by a second.

(Schoenfield 2016, 262)

The Darryl case draws our attention to a sort of tolerance principle that seems to hold for the normative term ‘permissible’ which undergirds a Sorites premise: if looking away for  $n$  seconds is permissible, then looking for  $n+1$  seconds is permissible. A Sorites sequence of hair-loss encourages the conclusion that some of the members of the sequence are such that it’s indeterminate whether they are bald. Similarly, the Darryl sequence encourages the conclusion that there is some action in the sequence such that it’s indeterminate whether it’s permissible. Similar Sorites sequences have been constructed for personal identity (Parfit 1984, 239), composition (Sider 2001b, 124), and consciousness (Goff 2014, 184–7). At some point in the constructed Sorites sequences, there is pressure to think that there is something such that it’s indeterminate whether it is a person, whether its members compose, or whether it’s conscious.

## 1.2. (V2)

The reasons to find instances of (V2) plausible vary from dialectic to dialectic. But the sorts of properties that the GVAS is typically applied to include normative properties, consciousness, special science properties, personal identity, and existence. And while there is no general argument that purports to establish the perfect naturalness of all of these properties, many theorists have found domain-specific reason to accept (V2) as applied to those properties. For instance, Dougherty (2013) and Schoenfield (2016) are sympathetic to moral realism, which they understand as the claim that moral properties are “part of the deep metaphysical structure of the world,” where this is glossed in terms of Lewisian naturalness. Zimmerman (2010)

understands dualist positions in the philosophy of mind in terms of perfectly natural qualia properties. Sider (2001b; 2009a; 2009b; 2011) finds good reason to accept ontological realism, which he understands as the claim that existence is perfectly natural (or in his terminology ‘structural’). Eklund (2004, 492) considers the thesis that *being a person* is a natural property. And Williams (2008c) understands ‘metaphysically primitive’ special science properties in terms of perfect naturalness.

### 1.3. (V3)

Finally, consider (V3), the claim that there is no metaphysical vagueness. Metaphysical vagueness is often stated in slogan form as:

(Guiding Slogan) The “world itself, independently of what we know about it or how we represent it, is metaphysically indeterminate” (Williams 2008a, 763); there is “vagueness in the world, vagueness in what there is as opposed to our descriptions or knowledge of what there is.” (Barnes 2010, 601)

It’s helpful to break (Guiding Slogan) into two distinct elements—a positive element saying where metaphysical vagueness *is* and a negative element saying where metaphysical vagueness *is not*. Metaphysical vagueness is supposed to be ‘in the world itself’. And metaphysical vagueness is contrasted with mundane semantic or epistemic vagueness; whereas semantic or epistemic vagueness is located ‘in our representations’, metaphysical vagueness is not.

According to Williamson (2003), the thesis that ‘the world itself is vague’ can be regimented as the claim that, for some state of affairs, it’s indeterminate whether that state of affairs obtains. In order to not reify states of affairs, Williamson offers a nominalization of states of affairs as an individual’s instantiation of a property. More carefully, he offers the following characterization of metaphysical vagueness:<sup>8</sup>

(MV) There is metaphysical vagueness iff there is some  $x$  and some property  $y$  such that it’s indeterminate whether or not  $x$  instantiates  $y$ .

(MV) precludes vagueness ‘in the world’. As Williamson points out, however, it does not preclude *non-metaphysical* vagueness ‘in our descriptions or knowledge’. Suppose Harry is borderline bald: of Harry, it’s indeterminate whether he is bald. Because, determinately, something is

<sup>8</sup> Williamson also uses higher-order quantification in order to avoid reifying properties. Here, I assume that properties exist.

bald just in case it instantiates *baldness*, we can restate the claim that Harry is borderline bald as: of Harry, it's indeterminate whether he instantiates the property *baldness*. This is entirely consistent with the claim that there is no metaphysical vagueness, as characterized by (MV). If there is no metaphysical vagueness, there are no 'vague' properties—no properties such that, of that property and some  $x$ , it's indeterminate whether  $x$  instantiates the property. With regard to Harry, while it's indeterminate whether he instantiates the property *baldness*, if there is no metaphysical vagueness, the quantified-out claim is false. It's not that there is some vague property such that, of Harry, it's indeterminate whether he instantiates it. Instead, there are some precise properties—properties like *having less 50,000 hairs*, *having less than 50,001 hairs*, etc.—and the indeterminacy in Harry's status as bald is due to indeterminacy in which of these precise properties is the property *baldness*. (Compare: It's contingent whether the number of planets is odd. But the quantified-out claim is false: it's not that there is some number that is contingently odd. Instead, it's contingent which number is the number of planets.)

(MV) is thus an intuitive regimentation of the positive element of (Guiding Slogan): if there is no metaphysical vagueness, the world is made up of 'precise' states of affairs in which individuals instantiate precise properties. And although (MV) regiments the positive element of our guiding slogan, it has implications for the negative element as well. That is, (MV) implies that any non-metaphysical vagueness is 'located' in our representations. More carefully, it implies:

(RV) If there is no metaphysical vagueness and there is something such that it's indeterminate whether it is  $F$  then: there is a range of properties  $p_1, p_2, \dots$  such that it's indeterminate which property in the range ' $F$ ' refers to (it's determinate that ' $F$ ' refers to some property in the range but for any property in the range, it's indeterminate whether ' $F$ ' refers to that property).

We can see that (MV) entails (RV) by considering Harry once more. Suppose Harry is such that it's indeterminate whether he is bald. That's just to say that it's indeterminate whether he instantiates *baldness*. Above, we explained that if there is no metaphysical vagueness, then there are some precise properties—properties like *having less than 50,000 hairs*—such that it's indeterminate which of the properties is the property *baldness*. But, because it's determinate that 'bald' refers to *baldness*, that entails that it's indeterminate which of those properties 'bald' refers to.<sup>9</sup> (RV) captures

<sup>9</sup> The more general result can be seen as follows. Suppose there is no metaphysical vagueness,  $\exists x \forall Fx$ , and (MV). Let ' $[F]$ ' abbreviate 'the property of F-ness'. Because  $\forall x \Delta(Fx \leftrightarrow x \text{ instantiates } [F])$ , from  $\exists x \forall Fx$  we have  $\exists x \forall (x \text{ instantiates } [F])$ . Consider

the highly intuitive idea that non-metaphysical vagueness is referential indeterminacy—indeterminacy in which ‘precise’ referents our terms refer to.

We can treat (MV) as a provisional regimentation of (Guiding Slogan). We will explore alternative understandings of metaphysical vagueness in §4. For now though, (MV) gives us a basis to begin to assess (V3). Without trying to present an airtight case in favor of (V3), I merely want to gesture at some reasons for thinking that (V3) is plausible in order to motivate interest in the GVAS.

There are several reasons to think that (V3) isn’t *obviously* false. First, vague states of affairs, as characterized by (MV), are incredible. Although I believe this is a good reason to reject metaphysical indeterminacy, incredulity arguments are, admittedly, of limited persuasiveness. A second reason appeals to simplicity and unification<sup>10</sup> considerations. Surely there are *some* precise states of affairs (that is, there is some object and some property such that it’s determinate that the object instantiates the property). And surely there is *some* non-metaphysical vagueness. The vagueness in the sentence “Harry is bald” is plausibly not metaphysical.<sup>11</sup> It’s not that there is some ‘vague property’—*baldness*—such that, of Harry, it’s indeterminate whether he instantiates that property. More plausibly, it’s unsettled which precise property of the scalp ‘bald’ refers to. If we’re confident that *some* states of affairs are precise, a theory that claims *all* states of affairs are precise simplifies the character of states of affairs. And if we’re confident that *some* vagueness is located in our representations, a theory that locates *all* vagueness in our representations unifies the sources of vagueness. Such a theory is therefore preferable to one that posits two sorts of states of affairs and two sources of vagueness.<sup>12</sup> Additional reasons to reject metaphysical vagueness

the range of properties  $p_1, p_2, \dots$  that are not determinately not identical to  $[F]$ . From (MV), we know  $\neg \exists y \Delta(y = [F])$ . So, there will be several properties in this range. Thus, we know that there is a range of properties  $p_1, p_2, \dots$  such that: it’s determinate that  $[F]$  is some property in the range, but for any property in the range, it’s indeterminate whether that property is  $[F]$ . Finally, because  $\Delta('F')$  refers to  $[F]$  and nothing else), the last conclusion entails: there is a range of properties  $p_1, p_2, \dots$  such that: it’s determinate that ‘ $F$ ’ refers to some property in the range, but for any property in the range, it’s indeterminate whether ‘ $F$ ’ refers to it.

<sup>10</sup> Cf. Eklund (2011).

<sup>11</sup> If the reader doesn’t find this example plausible, terms introduced with incomplete definitions are even more obvious candidates for being non-metaphysically vague.

<sup>12</sup> Unification and simplicity considerations can, of course, be overridden or undermined. For example, one might think that future states of affairs are ‘open’ in a way that present or past states of affairs are not. In this case, we’re looking for a theory that explains a difference in the future and past states of affairs, so a theory that offers a divided account is preferable. Such considerations, however, aren’t obviously at play in the GVAS. It’s not clear that states of affairs involving persons should be different in kind from state of affairs involving baldness—even if the property of *personhood* is perfectly natural.

come from the particular deficiencies of various specific accounts of metaphysical vagueness.<sup>13</sup>

Of course, the literature on metaphysical vagueness is large and camps are entrenched—there are no doubt some fans of metaphysical vagueness. But, reflecting on the considerations above, even fans should admit that the position isn't *obviously* true and thus have reason to be interested in the GVAS.<sup>14</sup>

## 2. THE TENSION BETWEEN (V1)–(V3)

For many substitution instances of '*F*', each of (V1)–(V3) has some plausibility. However, many authors argue that the three theses cannot be jointly held. Different proponents of the GVAS spell out the purported tension with varying degrees of explication. Consider, for instance, an appeal to the GVAS by Williams (2008c), in which he argues from (V1) and (V2) to the negation of (V3).<sup>15</sup>

Intuitively, it can be a vague matter at any given moment whether some cluster of particles is uranium . . . so for an *a* such that it is vague whether *a* is uranium, is this a matter of semantic vagueness? . . . if *being uranium* is primitive, this line of thought is blocked. . . . There seems no room to wriggle out of this by appeal to semantic phenomena. What goes for uranium, of course, goes also for other kinds in which we might take a metaphysical interest: *being a person*, *being water* or *being conscious*. . . . If *uranium*, or *water*, or *consciousness*, or *being a person*, are among the perfectly natural properties, in Lewis' sense, then to avoid ontic vagueness one would have to insist, counter-intuitively, that there are sharp boundaries to the application of such properties. . . . Such 'metaphysical brutalism' might still be consistent with an epistemic account of the vagueness . . . But unless brutalism is an option, there seems no way in appropriate cases to avoid regarding the vagueness of whether or not something is uranium as an instance of ontic vagueness. (Williams 2008c, 141–2)

Williams is plainly appealing to the GVAS. He first points out the plausibility of an instance of (V1) with the predicate 'uranium' in place of '*F*':

<sup>13</sup> For a sampling of such accounts, see Williams (2008c), Barnes (2010), and Wilson (2013).

<sup>14</sup> A variant to the GVAS can be constructed by replacing (V3) with the thesis that the *particular* property targeted by the GVAS (e.g. wrongness or consciousness) is not metaphysically vague and then claiming that this claim is inconsistent with (V1) and (V2). Anyone who doesn't take this more specific claim to be obvious should take an interest in the success of this variant of the GVAS and much of what I say in this paper applies to this variant.

<sup>15</sup> While Williams is attempting to use the purported tension between (V1)–(V3) as a way to motivate metaphysical vagueness, he officially remains neutral as to which of (V1)–(V3) to reject.



(V1-u) There is something such that it's indeterminate whether it's uranium.

He also asks us to assume (V2) as applied to the property *being uranium*:

(V2-u) *Being uranium* is perfectly natural.

He then concludes that there must be metaphysical vagueness—(V3) is false. While we may be able to offer a semantic explanation of borderline cases of baldness, Williams clearly thinks that the perfect naturalness of a property like *being uranium* prevents a similar semantic explanation of borderline cases of uranium. Unfortunately, much of his argument is left implicit.

Let's try to make that argument explicit. There are two strategies for arguing that (V1)–(V3) are incompatible.<sup>16</sup> I call those strategies the *Precise Naturalness Strategy* and the *Reference Magnetic Strategy* respectively and present them below. First, though, we must establish some preliminaries.

## 2.1. Preliminaries

In order to illustrate the two strategies, we can focus on Williams' application of the GVAS to the case of uranium. Both strategies for establishing the GVAS target two implications of (V1)–(V3), which we need to draw out.

Recall (RV) which told us that if there is no metaphysical vagueness, all vagueness is located in our descriptions. Applied to 'uranium', (RV) says:

(RV-u) If there is no metaphysical vagueness and there is something such that it's indeterminate whether it is uranium, then: there is a range of properties  $u_1, u_2 \dots$  such that it's indeterminate which property in the range 'uranium' refers to.

One consequence of (V1-u) and (V3), then, is that it's vague what 'uranium' refers to:

(Ind Ref) There is a range of properties  $u_1, u_2 \dots$  such that it's indeterminate which property in the range 'uranium' refers to.

The second consequence we need to draw out can be derived from (V2-u) and the following assumption:

(Assump) If *being uranium* is perfectly natural, then determinately *being uranium* is perfectly natural.

We can spot the proponent of the GVAS (Assump). Presumably, whatever reasons are marshaled in favor of the claim that *being uranium* (or

<sup>16</sup> Thanks to an anonymous referee for suggesting I delineate these two strategies.

*consciousness, personhood, permissibility, etc.*) is perfectly natural are also reasons in favor of the stronger claim that it's determinately the case that *being uranium* (or *consciousness, personhood, permissibility, etc.*) is perfectly natural. With (Assump), one consequence of (V2-u) is:

(V2-u+) Determinately *being uranium* is perfectly natural.

And because determinately the referent of 'uranium' is *being uranium*, we can put (V2-u+) in semantic terms as:

(Det Ref) Determinately 'uranium' refers to a perfectly natural property.

This brings us to the central claim underlying both strategies:

(Central Claim) If there is no metaphysical vagueness, (Ind Ref) and (Det Ref) are incompatible.

Of course, if (Ind Ref) and (Det Ref) are consequences of (V1-u), (V2-u), and (V3), the (Central Claim) implies that the GVAS is successful. Should we accept the (Central Claim)? Or can we make (Ind Ref) compatible with (Det Ref) without appealing to metaphysical vagueness?

One way, not requiring metaphysical vagueness, in which (Ind Ref) and (Det Ref) might be compatible is if all of the properties in the range  $u_1, u_2, \dots$  are perfectly natural. Although it's indeterminate which property in the range 'uranium' refers to, the term determinately refers to some one of those properties. So if *all* of the properties in the range are perfectly natural, then it doesn't matter which one the term refers to—determinately 'uranium' refers to a perfectly natural property.

Williams seems to think that we cannot 'wriggle out' of the GVAS in this way. Presumably he thinks such an abundance of perfectly natural properties is over-abundance: it violates considerations of parsimony. Ideally, the perfectly natural properties form a *minimal* supervenience basis—there are no brute necessary connections between perfectly natural properties. And, ideally, the perfectly natural properties form a *minimal* reductive basis—no proper subset of the perfectly natural properties adequately reduces (or metaphysically explains) all of the facts. Anyone who accepts (V2) is willing to accept *some* brute necessary connections between perfectly natural properties—at least for properties like *being uranium, personhood, or wrongness* that supervene on the microphysical perfectly natural properties. Presumably, they are willing to posit a brute necessary connection between the microphysical natural properties and, say, *wrongness* because of the countervailing reductive payoff of taking *wrongness* to be perfectly natural: they believe normative facts cannot be reduced to microphysical facts, in spite of supervening on them. But positing a whole range of perfectly natural properties to serve as potential referents for, say, 'wrong' would massively

multiply the number of brute necessary connections between perfectly natural properties.<sup>17</sup> And in this case, there is no substantial countervailing reductive payoff: we do not require the entire range of perfectly natural properties to reduce facts about normativity, personal identity, or the special sciences.<sup>18</sup> So, parsimony considerations support the claim:

(Parsimony) Determinately: If there is a range of properties  $u_1, u_2, \dots$  such that it's indeterminate which property in the range 'uranium' refers to, then at most one of those properties is perfectly natural.

## 2.2. The precise naturalness strategy

It might seem as though the incompatibility of (Ind Ref) and (Det Ref) follows from (Parsimony). Suppose (Ind Ref) and consider the range of properties  $u_1, u_2, \dots$  over which the reference of 'uranium' is supposed to be vague. By (Parsimony), it's indeterminate that exactly one of the properties in the range is perfectly natural.<sup>19</sup> But, if we also suppose (Det Ref), determinately 'uranium' refers to the perfectly natural property among the range. It's tempting to conclude on this basis that we have a contradiction with our supposition of (Ind Ref): it can't be indeterminate which property in the range 'uranium' refers to—'uranium' determinately refers to whichever unique property in the range is the perfectly natural one. More generally, the following reasoning is tempting:

- T1. Determinately: exactly one entity in a range of term  $t$ 's potential referents is  $F$ .
- T2. Determinately: term  $t$  refers to a  $F$  in that range.
- T3. Therefore: it's not indeterminate which entity in the range  $t$  refers to.

<sup>17</sup> The brute necessary connections required would include brute necessary connections between each of the properties in the range of potential referents and the microphysical. But it would also include brute necessary connections *among* the properties in the range. Suppose there is a range of perfectly natural properties—*wrongness*<sub>1</sub>, *wrongness*<sub>2</sub>, *wrongness*<sub>3</sub>, . . .—such that it's indeterminate which is the referent of 'wrong'. Presumably no two worlds share the same microphysical facts but differ with respect to the instantiation of *wrongness*<sub>3</sub>. Similarly, there is no possible world in which the more lax property *wrongness*<sub>1</sub> is instantiated, the more stringent *wrongness*<sub>3</sub> is also instantiated, but *wrongness*<sub>2</sub> is not.

<sup>18</sup> As the proponent of the GVAS will be quick to point out, this include facts like (V1), which may be reduced without taking the range of properties to be perfectly natural, so long as we reject (V3) and accept metaphysical vagueness.

<sup>19</sup> I set aside the case in which it's not determinate that at least one of the properties in the range is perfectly natural. If it's not determinate that at least one of the properties in the range is perfectly natural, it's hard to see how (Det Ref) can be sustained.

This tempting inference, however, is mistaken. This is clearest in Problem of the Many type cases. Consider a range of massively overlapping ‘precise’ hunks of rock that are candidate referents of ‘Mt. Kilimanjaro’:  $r_1, r_2, r_3, \dots$ . Suppose we have (T1): determinately exactly one of  $r_1, r_2, r_3, \dots$  is a mountain (there aren’t many mountains in the vicinity). And we have (T2): determinately ‘Mt. Kilimanjaro’ refers to a mountain in the range. It would be a mistake to conclude (T3): ‘Mt. Kilimanjaro’ is not vague.<sup>20</sup> For although exactly one of  $r_1, r_2, r_3, \dots$  is a mountain, it may be vague which hunk of rock is a mountain. If it’s vague which is a mountain, and ‘Mt. Kilimanjaro’ determinately refers to a mountain in the range of potential referents, it will be vague which hunk of rock ‘Mt. Kilimanjaro’ refers to.

Similarly in the case of ‘uranium’. In accordance with (Parsimony), we can suppose (T1): exactly one of  $u_1, u_2, \dots$  is perfectly natural. And we have (T2): determinately ‘uranium’ refers to a perfectly natural property in the range. But it would be a mistake to conclude (T3): ‘uranium’ is not vague. For, although exactly one of  $u_1, u_2, \dots$  is perfectly natural, it may be vague *which* property is perfectly natural. If it’s vague which is perfectly natural, and ‘uranium’ determinately refers to a perfectly natural property in the range of potential referents, it will be vague which property ‘uranium’ refers to.

The upshot is that if it’s vague which property in the range  $u_1, u_2, \dots$  is the unique perfectly natural one, (Det Ref) and (Ind Ref) are compatible. In order to derive the (Central Claim), then, we must supplement our argument from (Parsimony) with the following missing premise, ruling out non-metaphysically vague attributions of perfect naturalness:

(Precise Naturalness) If there is no metaphysical vagueness, then for all  $x$ , determinately  $x$  is perfectly natural or determinately  $x$  is not perfectly natural.

With (Precise Naturalness), we can derive the (Central Claim), and thus demonstrate the non-co-tenability of (V1)–(V3) of the GVAS.<sup>21</sup> Perhaps, Williams and other proponents of the (GVAS) are taking (Precise Naturalness) for granted. Admittedly, at first glance (Precise Naturalness) has a ring

<sup>20</sup> Cf. Lewis (1993).

<sup>21</sup> Proof: Suppose for reductio that (i) that there is no metaphysical vagueness, (ii) that for a range of properties, it is indeterminate which ‘uranium’ refers to (that is, for each property in the range, it’s indeterminate whether ‘uranium’ refers to that property, but it’s determinate that ‘uranium’ refers to one of the properties in the range), and (iii) it is determinate that ‘uranium’ refers to a perfectly natural property. Then, for any property in the range, that property is not determinately not perfectly natural. By (Precise Naturalness) that requires that for any property in the range, that property is determinately perfectly natural. By the *T*-axiom, any property in the range will be perfectly natural. But this violates (Parsimony).

of plausibility. If pressed for an argument, one might gesture at something like the following: The perfectly natural properties are fundamental (the ‘joints of nature’). So if it’s vague whether something is perfectly natural, then there is fundamental vagueness. But fundamental vagueness is metaphysical vagueness.

That argument, of course, needs to be made much more rigorous. To put my cards on the table: I don’t think that argument holds up to scrutiny. Indeed, I don’t think we should accept (Precise Naturalness). I’ll make that case in §§3–4. For now, simply note the thesis’s *prima facie* plausibility and its role in the GVAS. We turn next to a second strategy for establishing the non-co-tenability of (V1)–(V3).

### 2.3. The reference magnetic strategy

According to the meta-semantic theory known as *reference magnetism*, naturalness plays a key role in resolving indeterminacy in the meaning of our terms. It should therefore come as no surprise that some authors explicitly evoke reference magnetism in the course of appealing to the GVAS. Sider, for instance, leverages naturalness’ reference magnetic role in an instance of the GVAS aimed at showing that ‘existence’ cannot be vague. He writes: “[The thesis of] Indeterminacy says that ‘there exists’ in English is semantically indeterminate over various candidates; but if [perfectly natural] existence is a reference magnet, then ‘there exists’ determinately means [perfectly natural] existence” (2009b, 410).<sup>22,23</sup> Sider’s conclusion—that existence is not vague—is used to great effect in the vagueness arguments for unrestricted composition and four dimensionalism, and in order to respond to ontological deflationists that take ontological questions to be indeterminate. These appeals, however, lack detail. In this section, I will try to fill in the argument from reference magnetism to the non-co-tenability of (V1)–(V3).

The motivation for reference magnetism begins with a simple datum: reference isn’t *radically* indeterminate. The predicate ‘mountain’ has an extension that includes hunks of rock; it does not have an extension that includes abstract objects like numbers. However, as Putnam argues, if meaning is determined solely by our linguistic behavior, this datum cannot be explained. Our linguistic behavior determines a set of sentences (total theory) that we accept as true. But, it’s a simple model-theoretic fact that,

<sup>22</sup> See also Sider (2011, sec. 5).

<sup>23</sup> While Sider formulates his argument using a proprietary structure operator that attaches directly to the quantifier, we can follow Heim and Kratzer (1998) and Dorr (2005) in treating existential quantifiers as second-order properties, allowing us to treat Sider’s appeal as another instance of the GVAS.

so long as the total theory is consistent, there will be all sorts of bizarre assignments of words to extensions that preserve the truth of the total theory—including assignments that assign the word ‘mountain’ to an extension that contains numbers. So, if meaning is determined solely by our linguistic behavior—by assigning reference in a way that fits with our use of words—reference will be radically indeterminate.

If meaning is not radically indeterminate, reference must include some additional ingredient. In the course of outlining his theory of naturalness, Lewis suggests that naturalness can be that additional ingredient.<sup>24</sup> Sider summarizes the role naturalness plays in determining reference as follows:

The best response to Putnam, I think, is to say that when multiple candidates equally fit our meaning-determining behavior, meaning may yet be determinate if one candidate is, somehow, more *eligible* to serve as a meaning. One version of this response appeals . . . to natural kinds—“joints in nature”. The winning candidate is the natural kind, or the most natural kind, that fits our meaning-determining behavior. . . . For short, meaning is determined by *use plus eligibility*.

I will . . . interpret ‘eligibility’ as naturalness. Moreover, following David Lewis (1983; 1984), I will assume that both fit-with-use and eligibility come in degrees, and that the meaning of a term, *T*, is that candidate meaning that achieves the best combination of fit with use and eligibility. (Sider 2001a, 191)

Sider thus carves out the following role for naturalness to play in the fixing of reference:<sup>25</sup>

(R1) For any property *p*, determinately if *p* is the sole property that achieves the best combination of eligibility and fit with our usage for term *t*, then *t* refers to *p*.

<sup>24</sup> More carefully, Lewis offers *several* possible roles that naturalness might play in order to explain this data: *reference magnetism* is best thought of as a group of meta-semantic theories rather than a single theory. For example, he suggests that naturalness might fix facts about causation and causation might resolve radical indeterminacy. Or, he suggests that naturalness facts might figure in assigning mental content which can then be used to rebut radical indeterminacy of reference. In what follows, I will focus on just one of the suggested ways in which naturalness might play a role in fixing reference (although see the Appendix for a slightly more sophisticated account of reference magnetism). Although the view we focus on does not appear to be Lewis’s favored view, and is surely over-simplistic, it is the meta-semantic theory that is typically associated with reference-magnetism. For important discussions by Lewis, see his (1983; 1984; 1986; 1992; 1994). For various interpretations of Lewis’s discussion, see Sider (2001a), Williams (2007), Weatherson (2013), and Schwarz (2014).

<sup>25</sup> (R1) is an oversimplification of even the toy theory Lewis presents in his (1983; 1984). According to that theory, the balance of usage and eligibility is maximized for the global assignment of all referents to all words, not for each individual referent as (R1) claims. The simplification, however, is helpful for presentational purposes, so I follow Sider’s lead. See the Appendix for more.

(R1) does not explicitly mention vagueness. But, as Weatherson suggests, vagueness results when no unique property achieves the best combination of eligibility and fit with our usage:

Sometimes our verbal dispositions do not discriminate between several different contents, and no one of these is more natural than all the rest. In these cases there will be many unnatural contents not eliminated by our dispositions which naturalness does manage to eliminate, but there will still be many contents left uneliminated. . . . Hence there is no precise fact about what the phrase denotes. Hence it is vague.

(Weatherson 2003, 484)

We can summarize Weatherson's thought as:

(R2) Determinately: If there are several properties that each achieve the best combination of eligibility and fit with our usage of term  $t$ , then it's indeterminate which of those properties  $t$  refers to.

If indeterminate reference results from distinct 'best' properties, it might seem plausible that determinate reference results from a *single* 'best' property.<sup>26</sup>

(R3) Determinately: If exactly one property achieves the best balance of eligibility and fit with our usage for term  $t$ , then  $t$  *determinately* refers to that property.

With (R3), we can establish the (Central Claim). Again, (V1-u) and (V3) have as a consequence (Ind Ref): there is a range of properties  $u_1, u_2, \dots$  such that it's indeterminate which of those properties is the referent of 'uranium'. When we consider those properties, it's plausible that (i) our usage doesn't privilege any one of them and (ii) there is no property outside of that range that achieves a better balance of eligibility and fit with usage for 'uranium'. According to (Parsimony), at most one of those properties is perfectly natural—the rest of the properties are less than perfectly natural. If *none* of the properties are perfectly natural, then 'uranium' won't refer to a perfectly natural property and the consequence of (V2-u), (Det Ref), is false. If *one* of the properties is perfectly natural, then that property will achieve the best balance of eligibility and fit with our usage. By (R3), that property will act as a reference magnet, resolving any indeterminacy in the reference of the term 'uranium', contradicting our initial supposition of (Ind Ref).

To put my cards on the table once more: I think this argument is flawed. In particular, I don't think we should accept (R3). And while I think (R1) and (R2) are reasonable roles for naturalness to play in our meta-semantics, they are not sufficient to support the GVAS. I make that case in §5. For now, simply note the role the thesis plays in the GVAS.

<sup>26</sup> Thanks to an anonymous referee for discussion here.

### 3. VAGUE NATURALNESS AS ERSATZ METAPHYSICAL VAGUENESS

With the GVAS fully documented and interpreted, several strategies for resisting it become immediately obvious. For instance, we can dodge the reference magnetic version of the GVAS by simply giving up a reference magnetic meta-semantics. And we can deny (Precise Naturalness) by offering an epistemicist gloss of vague attributions of perfect naturalness, according to which there is a settled yet unknowable fact of the matter about which properties are the perfectly natural ones.<sup>27</sup> I, however, want to explore a more subtle strategy for resistance. That strategy takes the term ‘perfectly natural’ to be vague, where the vagueness is purely semantic.<sup>28</sup> In the material mode, the strategy claims that for some particular property, it’s semantically indeterminate whether that property is perfectly natural. I call this position *ersatz metaphysical vagueness* because of its ability to mimic genuine metaphysical vagueness.

I’ll show that the metaphysical vagueness ersatz (mv-ersatz) can rebut the GVAS in two steps. First, I’ll show how ‘perfectly natural’ can be purely semantically vague, thereby rebutting (Precise Naturalness) and undermining the Precise Naturalness Strategy of the GVAS. Second, I’ll show how this position undermines the Reference Magnetic Strategy of the GVAS.

\* \* \*

According to the mv-ersatz, the predicate ‘perfectly natural’ is vague, and the vagueness is purely semantic—there is no metaphysical vagueness. Thus the mv-ersatz rejects (Precise Naturalness), straightforwardly undermining

<sup>27</sup> The epistemicist can then accept that, determinately, ‘uranium’ refers to the unique perfectly natural property in the range  $u_1, u_2 \dots$  but that there is a settled yet unknowable fact of the matter about which property that is. This strategy faces two hurdles. First, we need to explain the unknowability of such facts (Wasserman 2012). Second: proponents of the GVAS complain that this strategy requires an objectionable ‘metaphysical brutalism’: there are pairs of worlds with extremely minor microphysical differences, but for which it’s a settled fact that a metaphysically distinguished property is instantiated in one but not the other. See Parfit (1984, 239), Sider (2001b, 124), Williams (2008c, 141–2), Dougherty (2013, 10–11), Goff (2014, 184–7), and Schoenfeld (2016) (although see Markosian (1998) and Nolan (2006)). I set aside the epistemicist strategy, but the strategy I sketch might be used by the epistemicist in order to overcome these two hurdles.

<sup>28</sup> The position is importantly different from the one advocated in Cameron (2010), according to which *relative* naturalness facts are *ontically* vague and they determine a *strict* ordering of properties in terms of naturalness. I, on the other hand, am claiming that the *perfect* naturalness facts are *semantically* vague, even if they only determine a *weak* ordering of properties in terms of naturalness. (Cameron does not discuss the GVAS argument schema.)



the Precise Naturalness Strategy of the GVAS. They claim that predicates like ‘uranium’ refer to the unique perfectly natural property in the range  $u_1, u_2, \dots$  yet it’s vague which of those properties is the unique perfectly natural property referred to.

I am not the first one to claim that the term ‘perfectly natural’ is semantically vague—or at least semantically indeterminate. Dorr and Hawthorne (2013) arrive at this conclusion, not by reflecting on the GVAS, but by considering perfectly natural asymmetric relations and their inverses. For instance: consider the set-theoretic relation *is a member of* borne by a member to the set that it is a member of. And consider the inverse relation *contains* borne by a set to one of its members. Which of the two relations *is a member of* or *contains* should be the perfectly natural relation? Given parsimony considerations, there is pressure to resist treating both relations as perfectly natural. Yet it seems objectionably arbitrary to take only one of the relations to be perfectly natural, as there doesn’t seem to be anything about perfect naturalness that could distinguish between the relation and its inverse. The only solution seems to be to treat ‘perfectly natural’ as indeterminate in reference. Although it’s determinate that exactly one of the two relations is perfectly natural, it’s indeterminate which.

Of course, the above argument at best shows that ‘perfectly natural’ is indeterminate in these very particular cases. But the case of asymmetric relations discussed by Dorr and Hawthorne is importantly analogous to the situation faced by anyone who wishes to retain (V1)–(V3). On the one hand, we are under pressure to think that one and only one of the various properties that are candidate referents for terms like ‘is conscious’, ‘is a person’, ‘is uranium’, etc. is perfectly natural, but for any such property, it’s arbitrary to think that it is privileged.

Let’s try to develop that proposal in more detail. If we are to show that ‘perfectly natural’ is semantically vague in the way required to rebut the GVAS, we need to explain the source of this semantic vagueness. ‘Perfectly natural’ is a theoretical term, introduced in a theory of naturalness proposed by Lewis (1983). Presumably the term ‘perfectly natural’ gets its meaning in the way other theoretical terms get their meanings: in virtue of certain core theoretical roles specified by the theory in which the term is introduced.<sup>29</sup>

At its heart, the idea that theoretical terms get their meaning from their theoretical role is simple. We propose a theory *T* that uses a new predicate ‘*F*’. By replacing that predicate with a variable, we get an open sentence that

<sup>29</sup> Cf. Lewis (1970). The insight to treat ‘natural’ in this framework is a key theme in Dorr and Hawthorne (2013).

doesn't include the new predicate. That open sentence defines the theoretical role of *F*-ness, giving us a natural way to specify the meaning of the new predicate. The predicate '*F*' refers to the property that plays the theoretical role of *F*-ness.

Sometimes, however, there is no property that perfectly plays the entirety of the theoretical role specified by the term-introducing theory. Nevertheless, we want to say that the term refers. The simple idea is in need of at least two refinements. First: a property can be closer or farther from perfectly satisfying a particular theoretical role. Second: certain theoretical roles are more or less *negotiable* than others (Lewis 1997, 334). We might, for instance, take naturalness's role in fixing reference to be a more provisional, less definitional part of the theory of naturalness, so a theorist can sensibly claim that some properties are natural but decline to endorse reference magnetism. The 'semantic gods' assign to the theoretical term that property which does best in terms of most closely satisfying the more definitional theoretical roles.<sup>30</sup>

What if there is no unique property that does best? In such cases, we should say that the theoretical terms are vague. Consider, for instance, Field's (1973) discussion of Newtonian mass. The theoretical role outlined for 'mass' in the laws of Newtonian mechanics is equally well satisfied by two properties posited by relativistic physical theories: rest-mass and inertial-mass (and no other property satisfies that role better). The natural thing to say in this case is that 'mass' in Newton's theory was indeterminate in reference between rest-mass and inertial-mass.

There is another, less discussed, way in which a theoretical term can be vague: the theoretical roles that the term is supposed to play may be specified in *vague* language. Consider a psychologist giving a theory that includes a new theoretical term, say, 'flow'. A theory of flow might include various vague terms like 'concentration' or 'interest'. When we replace 'flow' from the theory of flow with a variable, we are left with an open sentence that states the various theoretical roles in vague terms. Perhaps the theoretical role specified in vague terms is determinate enough to pick out a property that determinately is the unique property that satisfies the vague theoretical role. However, if the theoretical role is vague, it may be vague which unique

<sup>30</sup> Two caveats are important. First: In addition to considering how well various referents satisfy the definitional theoretical roles, the 'semantic gods' may also take into account the relative naturalness of the various possible referents. In other words: some possible referent might be a reference magnetic for the theoretical term. I consider the possibility that one candidate referent for 'perfectly natural' is especially magnetic in §7. Second: If no property does well enough, the term may fail to refer (in the way 'phlogiston' fails to refer).

property best satisfies that role. The situation thus parallels that of a vague definite description stated in vague language, like ‘the first bald person to walk in the room’. If the first person that walks in the room is determinately bald, the definite description determinately refers to that person. If, however, the first person who walks into the room is indeterminately bald and is followed by a determinately bald person, it’s indeterminate which person the definite description refers to.

In both cases of vague theoretical terms, there is no spooky metaphysical vagueness: the vagueness is of a mundane semantic sort resulting from underdetermination in the term-introducing theory. But are any of these stories of indeterminacy plausible for naturalness? Lewis introduced the term ‘perfectly natural’ via a theory in which naturalness was supposed to play a certain role with respect to resemblance, laws, reference, etc. But if our notions of resemblance, laws, and reference are vague, then the theoretical role of naturalness will be vague. In this case, there may be multiple properties of properties such that it’s indeterminate which best satisfies this role, and ‘perfectly natural’ will also be vague.<sup>31</sup>

Consider naturalness’s relation to resemblance. According to Lewis’s theory of naturalness: “Natural properties [are] the ones whose sharing makes for resemblance” (Lewis 1983, 13). Indeed, Lewis seems to treat the resemblance role as a more definitional, less negotiable theoretical role, suggesting a nominalist “define natural properties in terms of the mutual resemblance of their members and their non-members” (14). If our notion of resemblance is vague, there will be several properties of properties such that it’s indeterminate which makes for resemblance. And if the perfectly natural properties are defined as those properties the sharing of which makes for resemblance, ‘perfectly natural’ will be vague.<sup>32</sup>

And it’s very plausible that resemblance *is* vague. This is especially obvious if properties like *personhood*, *consciousness*, *permissibility*, etc. are perfectly natural and therefore make for resemblance.

Take the perspective of someone who thinks that *personhood* is perfectly natural. Consider a determinate person, Mary, and a Sorites sequence of candidate-persons—Bob<sub>1</sub>, Bob<sub>2</sub>, . . . , Bob<sub>100</sub>—such that Bob<sub>1</sub> is determinately a person and Bob<sub>100</sub> is determinately not a person. Now, suppose we

<sup>31</sup> In a footnote, Dorr and Hawthorne (2013, fn. 89) suggest that one set of properties might uniquely satisfy the theoretical role of naturalness but it might be indeterminate which; this can be seen as an attempt to vindicate that suggestion by claiming that the theoretical role is specified in vague language.

<sup>32</sup> I am ignoring one gap in the argument. If one of the candidates for ‘perfectly natural’ is particularly natural, it might act as a reference magnet, resolving any indeterminacy. Thus, relatively precise terminology may be introduced by means of theories stated in relatively vague terminology. I address this issue in §7.

ask, for each  $n$ : do Mary and  $\text{Bob}_n$  objectively resemble one another? From the perspective of someone who thinks that personhood is perfectly natural, plainly they will answer ‘yes’ for  $n=1$  (otherwise, personhood wouldn’t make for resemblance so personhood wouldn’t be perfectly natural). And, plainly the answer is ‘no’ for  $n=100$  (suppose Mary doesn’t share any natural properties besides personhood with any of the Bobs). At what point—at which Bob—does Mary stop sharing a feature of resemblance? One answer would posit a determinate cut-off at which Mary stops sharing a feature of resemblance. A more plausible response, however, acknowledges that ‘resemblance’ is vague: for some middle Bob (say  $n=50$ ) it’s vague whether Mary shares a feature of resemblance with that Bob. (And because, determinately, personhood makes for resemblance, ‘person’ is also vague.) Because naturalness is introduced in terms of resemblance, we should expect ‘perfectly natural’ to be vague and for the vagueness to match the vagueness in ‘resemblance’ and ‘person’.

On the proposal we’re sketching, the term ‘perfect naturalness’ is introduced in terms of resemblance. It’s determinately the case that personhood makes for resemblance although ‘person’ and ‘resembles’ are vague. In naturalness terms: it’s determinately the case that personhood is perfectly natural, although ‘person’ and ‘perfectly natural’ are vague.

Vagueness in resemblance is only one avenue through which vagueness can be introduced into the term ‘perfectly natural’, without the vagueness being metaphysical in any problematic sense: the other theoretical roles are also plausibly vague. Fundamental laws of nature are the axioms of the system stated in perfectly natural terms which best balances simplicity and strength. If we think that properties like *permissibility*, *consciousness*, *personhood*, *composition*, etc. figure in moral, phenomenal-physical, or metaphysical laws, we should admit that the notion of ‘law’ is vague. For example, it will be vague which of the following law-candidates is the metaphysical law of personhood:<sup>33</sup>

Law Candidate 1  $x$  is a person<sub>1</sub> iff  $\phi_1(x)$

Law Candidate 2  $x$  is a person<sub>2</sub> iff  $\phi_2(x)$

Law Candidate 3  $x$  is a person<sub>3</sub> iff  $\phi_3(x)$

where  $\phi_1(x)$ ,  $\phi_2(x)$ ,  $\dots$  state various criteria of bodily/psychological continuity in perfectly natural microphysical language. If our notion of lawhood is vague, and we define the perfectly natural properties as the properties that figure in the laws, then it’s no wonder that ‘perfectly natural’ is vague. More

<sup>33</sup> Sider (2011, sec. 12) acknowledges that metaphysical laws might be vague.

generally, if it's vague which of a range of precise properties (e.g. *personhood*<sub>1</sub>, *personhood*<sub>2</sub>, ...) is the property *personhood* and it's determinate that personhood (and no other property in the range) plays the theoretical role used to introduce the term 'perfectly natural', then that theoretical role is also vague, creating vagueness in which second-order property is picked out by the term 'perfectly natural'.

Let's recap. The mv-ersatzer claims that it's vague which of a range of properties 'person' refers to. She admits that one of those properties has the features associated with perfect naturalness—it makes for resemblance, laws, etc.—although it's vague which. Therefore, the theoretical role of naturalness is vague. And the vagueness in the theoretical role of naturalness creates vagueness in the term 'perfectly natural'. That is, there is something such that it's indeterminate whether it's perfectly natural. In other words, there is something such that it's indeterminate whether it instantiates the second-order property *being perfectly natural*. The property  $u_1$  that is a candidate referent for 'uranium' might be such a thing; of the property  $u_1$ , it's indeterminate whether it instantiates the second-order property *being perfectly natural*. But, that's because it's vague which 'precise' second-order property 'perfectly natural' refers to. The quantified-out claim is false: it's not that there is some second-order property and something such that it's indeterminate whether that thing instantiates the second-order property. Thus, there is no worldly vagueness—no violations of (MV).

#### 4. FUNDAMENTAL INDETERMINACY

It may be thought that, even if the mv-ersatzer doesn't violate (MV), she is positing a *different* sort of metaphysical vagueness—a sort not captured by (MV)—and therefore cannot reject (Precise Naturalness).

Return to the (Guiding Slogan): metaphysical vagueness is vagueness that is 'in the world' as opposed to our 'descriptions'. Perhaps, in addition to (MV), there is a second way indeterminacy can be 'in the world' as opposed to 'in our descriptions': indeterminacy might be fundamental. Indeed, both Sider (2011, sec. 7.12) and Barnes and Williams (2011, 104, fn. 4) characterize metaphysical vagueness as vagueness that is fundamental. So, we have a second sort of metaphysical vagueness, given by (IiF):

(IiF) Indeterminacy is fundamental.

Admittedly, (IiF) is stated in terribly obscure terms. That's partly because it's not clear how to understand claims of fundamentality. One way of regimenting the claim is to follow Sider (2011) in treating claims of fundamentality as

claims about what is perfectly natural (or in his terms ‘structural’).<sup>34</sup> Then, we can begin to regiment (IiF) as:

(IiF\*) Indeterminacy is perfectly natural.

(IiF\*) leaves open the question of what we mean to be picking out by the term ‘indeterminacy’. We might treat indeterminacy as a property of propositions and thus interpret (IiF\*) as the claim that this property of propositions is perfectly natural. Alternatively, we might modify the notion of perfect naturalness to be predicated of mentioned linguistic items of all types or express claims like (IiF) with an operator that can attach directly to the indeterminacy operator,<sup>35</sup> allowing us to regiment (IiF\*) as something like:

(IiF\*\*) The indeterminacy operator is perfectly natural.

For now, let’s remain neutral as to how (IiF\*) is best regimented and reflect on the claim in its present gloss. Spotting an opponent that (IiF\*) is a sort of metaphysical vagueness, it might seem as though the *mv*-ersatzer must accept (IiF\*) (and therefore a sort of metaphysical vagueness) because she accepts that it’s indeterminate which properties are perfectly natural.

Sider makes an argument of this sort when considering the possibility of indeterminate perfect naturalness (or, in his terms, indeterminate structure). Sider (2011, sec. 7.12) claims that we should reject (IiF\*), suggesting that (IiF\*) is a sufficient condition for metaphysical vagueness, which he rules out. (He writes: “no special purpose vocabulary that is distinctive of indeterminacy . . . such as the determinacy operator . . . carves at the joints”). But, in later arguments, he considers the reason Dorr and Hawthorne adduce for taking ‘natural’ to be indeterminate and rejects it as being committed to (IiF\*). (He writes: “one might try to avoid the [hard] choice by saying that, although it’s determinately the case that some logical connectives carve at the joints, it’s indeterminate which ones do. But [earlier discussion] argued against indeterminacy at the fundamental level” (217).)

Even without settling the thorny question of how best to regiment (IiF\*), we can see that Sider’s argument rests on a straightforward equivocation on ‘indeterminacy at the fundamental level’. Distinguish the claim that indeterminacy is fundamental (given by (IiF), (IiF\*), and (IiF\*\*)) from the claim that the fundamental is indeterminate, given by (FiI) and (FiI\*):

<sup>34</sup> Again, there are many other ways, but the objection I am considering here is premised on understanding fundamentality in terms of naturalness. See Bennett (2017, ch. 5) for alternative understandings of fundamentality. (Thanks to Karen Bennett for discussion here.)

<sup>35</sup> Sider (2009b) discusses both options and develops them later in his Sider (2011).

(FiI) There is something such that it's indeterminate whether it's fundamental.

(FiI\*) There is something such that it's indeterminate whether it's perfectly natural.

Even if we were to follow Sider and others in understanding claims of fundamentality in terms of perfect naturalness, the mv-ersatzer would be committed to (FiI) and (FiI\*) rather than (IiF). In picturesque terms: she is not committed to the claim captured by (IiF) that indeterminacy is a fundamental feature of the world.

I can imagine an opponent replying: perhaps (FiI) is a *third* sort of metaphysical vagueness, in addition to (MV) and (IiF). For instance, Barnes (2014, sec. 2) reflects on the distinction between (FiI) and (IiF) but takes both as sufficient for metaphysical vagueness.<sup>36</sup> Recall, however, the negative component of our (Guiding Slogan); metaphysical vagueness is not supposed to be located 'in our descriptions'. Barnes emphasizes this negative component of the (Guiding Slogan). In her (2010), she characterizes metaphysical vagueness as non-epistemic vagueness that would persist were representational content precisified. And in her (2014) discussion of instances of (FiI), she claims that "the indeterminacy doesn't arise from imprecision in language" (358). In treating (FiI) as a sort of metaphysical indeterminacy, then, Barnes seems to be assuming that indeterminacy in which things are fundamental cannot have a semantic explanation. But no argument is given for this claim. In §3, I argued that vagueness in 'perfectly natural' *can* be 'in our descriptions'. More carefully, I showed how the vagueness can result from semantic vagueness in the theoretical role outlined in the term-introducing theory. The suggested source of the vagueness in 'perfectly natural', then, is similar to the relatively mundane semantic vagueness of theoretical terms like 'mass', which my opponent will presumably admit aren't metaphysically vague. And, just like with other vague theoretical terms like 'mass', the vague theoretical term 'perfectly natural' could be replaced by more precise predicates.

If my opponent simply insists on using the term "metaphysical vagueness" to include (FiI), despite its failure to capture the (Guiding Slogan), I am happy to give her the term. The project of this paper can then be reinterpreted as (i) distinguishing between types of metaphysical vagueness, (ii) pointing out that (V1) and (V2) only requires (FiI) rather than the

<sup>36</sup> Although Barnes admits to being "tempted by the thought that a case for metaphysical indeterminacy—or at least an *interesting* case for metaphysical indeterminacy—requires a commitment to [(IiF)]" (347).

heavier-duty sorts of metaphysical vagueness given by (MV) and (IiF) and (iii) showing how (FiI) can have a semantic source.

## 5. THE REFERENCE MAGNETIC STRATEGY, REDUX

There is, of course, a serious gap in the mv-ersatzer's suggestion that 'perfectly natural' is semantically vague: we haven't yet discussed the theoretical role naturalness plays in fixing reference, given by (R1)–(R3). Even if reference magnetism isn't a definitional theoretical role for naturalness—even if the meaning of 'perfectly natural' doesn't come from naturalness's role in fixing reference—many have found reference magnetism to be a plausible theory of reference. It remains to show how the mv-ersatzer's position can accommodate the reference-fixing theoretical role of naturalness. I address that issue in this section.

Recall (R3):

(R3) Determinately: If exactly one property achieves the best balance of eligibility and fit with our usage for term  $t$ , then  $t$  *determinately* refers to that property.

As we pointed out above, if we accept (R3), then the GVAS is successful. According to (R3), if exactly one of the properties  $u_1, u_2, \dots$  is a reference magnet, then 'uranium' determinately refers to that property and is therefore not semantically vague. (R3), then, gives a necessary condition for vagueness—in order for a term to be vague, there must be multiple things that achieve the best combination of eligibility and fit. And that necessary condition is not met if exactly one of the properties  $u_1, u_2, \dots$  is a reference magnet.

Fortunately, we should not accept (R3): it is not part of the theoretical role of naturalness and does not give a necessary condition for vagueness. According to (R3), in order for a term to be vague, there can't be a single referent that achieves the best combination of eligibility and fit for that term. One implication of this necessary condition is the following: it cannot be vague which unique referent in a range achieves the best combination of eligibility and fit.<sup>37</sup> To see this, suppose that it's vague which of two properties achieves the best balance of eligibility and fit (the result can be generalized to  $n$  properties). More specifically: assume it's determinate that either  $p_1$  is best or  $p_2$  is best (but not both), but it's indeterminate whether  $p_1$  is best and it's indeterminate whether  $p_2$  is best. Then, according to

<sup>37</sup> Thanks to an anonymous referee for encouraging me to further develop this point.



(R3),  $t$  determinately refers to  $p_1$  or  $t$  determinately refers to  $p_2$ , but it's indeterminate whether it determinately refers to  $p_1$  and indeterminate whether it determinately refers to  $p_2$ . This result isn't merely awkward. It conflicts with the  $T$ -axiom for the logic of vagueness: if determinately  $\phi$  then  $\phi$ .<sup>38</sup> So, (R3) is logically inconsistent with it's being vague which single referent achieves the best combination of eligibility and fit.

But, in §3 I argued that it is possible for it to be vague which property achieves the best combination of eligibility and fit with usage for a given term. In particular, I sketched a way in which it could be vague which of the properties in the range  $u_1, u_2, \dots$  is the unique perfectly natural property. If (R3) rules out such possibilities, then we should reject (R3).

(R1), on the other hand, does not rule out such possibilities:

(R1) For any property  $p$ , determinately if  $p$  is the sole property that achieves the best combination of eligibility and fit with our usage for term  $t$ , then  $t$  refers to  $p$ .

If it's indeterminate which property in a range achieves the best combination of eligibility and fit with a term  $t$  then, according to (R1), we don't have a logical contradiction. Rather, we have referential vagueness: it's indeterminate which property in the range the term  $t$  refers to. (R1) predicts the semantic vagueness in terms like 'uranium' that the mv-ersatzer posited. If it's vague which one of the properties  $u_1, u_2, \dots$  is perfectly natural, then it's vague which one of those properties 'uranium' refers to. (R3) attempts to give a necessary condition for semantic vagueness: lack of a unique best referent. But (R1) points us towards a new path to semantic vagueness which (R3) ignores: vagueness in which unique referent is best. If perfectly natural properties are reference magnets that anchor our terms, and it's vague which property is the reference magnet, it will be vague which property our term is anchored to. And, of course, acceptance of (R1) is entirely consistent with accepting the sufficient condition of semantic vagueness given by (R2).

It might be thought that the conflict between (R3) and the mv-ersatzer's suggestion that 'perfectly natural' is vague merely demonstrates that there is

<sup>38</sup> Proof: Let 'possibly  $\phi$ ' stand for 'not determinately not  $\phi$ '. Suppose it's indeterminate whether  $t$  determinately refers to  $p_1$  and it's indeterminate whether  $t$  determinately refers to  $p_2$ . Then, by the definition of 'indeterminate',  $t$  possibly determinately refers to  $p_1$  and  $t$  possibly determinately refers to  $p_2$ . By the  $T$  axiom, this entails (\*)  $t$  possibly refers to  $p_1$  and  $t$  possibly refers to  $p_2$ . Because determinately if  $t$  refers to  $p_2$  it doesn't refer to  $p_1$ , the second conjunct of (\*) entails that it's not the case that  $t$  determinately refers to  $p_1$ . And because determinately if  $t$  refers to  $p_1$  it doesn't refer to  $p_2$ , the first conjunct of (\*) entails that it's not the case that  $t$  determinately refers to  $p_2$ . So, it's not the case that:  $t$  determinately refers to  $p_1$  or  $t$  determinately refers to  $p_2$ .

something wrong with the *mv-ersatzer's* suggestion. I have three responses. First: we should not foreclose the possibility sketched in §3 that we have failed to settle a precise meaning for the term 'perfectly natural'. Second: if rejecting (R3) allows us to hold onto (V1)–(V3), then anyone attracted to this package of theses has reason to reject (R3).

Third: the source of this problem with (R3) goes beyond potential vagueness in the term 'perfect naturalness'. Vagueness in which properties are perfectly natural is merely one way in which it can be vague which thing achieves the best combination of eligibility and fit for a term. But there are plenty of others. Indeed, in the course of giving his term-introducing theory of naturalness, Lewis himself rejects (R3) as providing a necessary condition for vagueness. After sketching his theory of reference magnetism, he writes: "The terms of trade [between truth of theory and eligibility] are vague; that will make for moderate indeterminacy of reference" (1984, 67). Here, Lewis is pointing to yet another way in which it might be vague which referent strikes the best balance between eligibility and truth of theory: we haven't settled how much of a gain in eligibility is required to compensate for a loss of truth of total theory. And Lewis thinks that the vagueness in which referent strikes the best balance of eligibility and fit will generate vagueness in reference.

It's easy to multiply similar cases which (R3) rules out, but for which (R1) delivers more intuitive results. Even if 'perfectly natural' is precise, many philosophers are open to the idea that *relative naturalness* is vague. It seems entirely possible that there is a pair of properties such that it's indeterminate which is more natural.<sup>39</sup> Again, we can imagine a pattern of language use for some term *t* that fits best with the properties in that pair, and fits them equally well. Such a possibility is inconsistent with (R3), while (R1) would predict that it's vague which of the properties in the class *t* refers to. Similarly, many philosophers are open to the idea that playing a certain causal role confers eligibility to a referent—that one way for a potential referent to be more eligible is for it to be causally related in some particular way to an initial tokening of the term. But it might be vague which object stands in the right causal relation to my tokening. For instance, suppose there is only one object—Mt. Kilimanjaro—that stands in the right causal relation to my tokening of the name 'Mt. Kilimanjaro', although it's vague which particular hunk of rock that one object is. Then, modulo certain other assumptions, it will be vague which object achieves the best combination of eligibility and fit. According to (R3), such a scenario is ruled out, while (R1) would predict that in such a situation it's vague which particular

<sup>39</sup> Cf. Cameron (2010).

hunk of rock the name refers to. We can construct similar scenarios by exploiting vagueness in what constitutes fit with use—which set of sentences counts as ‘total theory’.<sup>40</sup>

Summing up: (R3) is logically inconsistent with it’s being vague which single referent achieves the best combination of eligibility and fit. But, due to potential vagueness in perfect naturalness, relative naturalness, causation, or the terms of the trade between fit and eligibility, it may be vague which single referent achieves the best combination of eligibility and fit. Indeed, those attracted to (V1)–(V3) should think that it is *actually* the case that it is vague which single referent is best. So, we should reject (R3) and instead follow (R1) in treating vagueness in which single referent is best as a case of semantic vagueness.

## 6. NO RADICAL INDETERMINACY

There is one remaining reason we might hesitate to follow the mv-ersatzer in giving up (R3) or (Precise Naturalness). Reference magnetism was motivated by the datum that reference is not radically indeterminate. If reference is determined entirely by fit with usage, then that data cannot be explained: we cannot rule out interpretations of our language that assign the word ‘mountain’ to a gerrymandered property of numbers. It might be thought that the mv-ersatzer cannot explain the data. In other words, it might be thought that, on the mv-ersatzer’s picture, reference is radically indeterminate.<sup>41</sup>

<sup>40</sup> (R1) and (R2) also generates neat predictions of higher-order vagueness. It follows from (R1) that we have determinate reference for term *t* when:

- (1) There is one property such that, determinately, that property is the unique best referent for *t*.

It follows from (R1) and (R2) that we have indeterminate reference for *t* when:

- (2) *Either* it’s determinate that one property is best for *t*, but it’s indeterminate which one property that is *or* there are multiple properties that are best for *t*.

So, if it’s indeterminate which of (1) or (2) is the case, we have higher-order vagueness: it’s indeterminate whether we have indeterminate reference. One way this might occur is if it’s determinate that there is a property that is uniquely best for *t*, but it’s indeterminate whether there is one property such that determinately that property is uniquely best for *t*. (Note that if it’s indeterminate whether there are multiple properties that are best for *t* we do not necessarily have higher-order vagueness, for even if it’s indeterminate whether the second disjunct of (2) is satisfied, it may still be determinate that (2) is satisfied.)

<sup>41</sup> Thanks to an anonymous referee and Karen Bennett for helpful discussion here.

This worry is misplaced. The data to be explained is not perfect determinacy. Rather the data to be explained is that our language is not *radically* indeterminate. As Lewis puts it: “the sensible realist won’t demand perfect determinacy” (1984, 67). But some minor vagueness in the *at least as natural as* relation allows us to explain this data.

It may be vague which of a limited range of properties is the most natural, but that doesn’t mean that naturalness cannot draw *any* determinate distinctions between properties. The mv-ersatzer only posits moderate indeterminacy in the naturalness ordering. Thus, for terms like ‘uranium’ and ‘mountain’, there will still be some properties that determinately fail to achieve the best balance of eligibility and fit with usage. By (R1), those terms will determinately not refer to those properties. Similarly, for all the mv-ersatzer has said, there is some property that is such that determinately it alone achieves the best balance of eligibility and fit with usage with a given term *t*. Then, by (R1), *t* will not be vague—it will determinately refer to that property.

## 7. NATURALNESS IS NATURAL

When suggesting that ‘natural’ is vague, I am often met with the following reaction:

Naturalness doesn’t seem like the sort of thing that can be vague. Properties like baldness or tallness—properties that aren’t metaphysically deep—can be vague. But some properties, like negative charge, are too metaphysically deep to be vague. And naturalness, like negative charge, is also metaphysically deep—it’s a fundamental feature of reality. So, it cannot be vague.

We can translate the above reaction into a more rigorous objection. Treating a fundamental property as a natural property, the objector seems to be claiming that perfect naturalness is perfectly natural. There are technical complications with making sense of talk about the naturalness of naturalness. But let’s grant the advocate of this objection such talk.

My opponent seems to be constructing the following argument:

- A1. If ‘perfectly natural’ is vague, then perfect naturalness is not perfectly natural.
- A2. Perfect naturalness is perfectly natural.
- A3. So: ‘perfectly natural’ is not vague.

Before we examine this argument, it will be helpful to note a related argument, discussed in the extant literature, that may also be used to object

to my proposal. According to my proposal, ‘perfectly natural’ is only *slightly* vague—there are enough clear cases and its theoretical role is sufficiently rich to imbue the term with meaning. However, there is an argument against the hypothesis that ‘natural’ is only *slightly* vague which is inspired by Sider (2011) and is discussed by Dorr and Hawthorne (2013).

- B1. If ‘perfectly natural’ is vague, then perfect naturalness is not perfectly natural.
- B2. If so, the simplest definitions of perfect naturalness in terms of the perfectly natural properties will consist of long lists of the perfectly natural properties, of the form ‘is identical to  $P_1$  or is identical to  $P_2$  or is identical to  $P_3$  or . . .’.
- B3. If so, perfect naturalness is extremely unnatural.
- B4. If so, ‘perfectly natural’ is horribly vague.

As I mentioned above, Dorr and Hawthorne also think that ‘perfectly natural’ is indeterminate, which is why they are concerned to respond to the above argument. They end up accepting premise (B1) (and A1) and instead focus on denying the steps from premises (B2) to (B4). Moreover, they are comfortable denying (A2) that perfect naturalness is perfectly natural.

Note, however, that *even if* we accept (A2) and the move from (B2) to (B4), the arguments fail for an *additional* reason: we do not need to accept premise (A1)/(B1). The reason that Dorr and Hawthorne adduce for that premise is the following: if perfect naturalness is perfectly natural, then it is highly magnetic, which makes it precise (unless there is metaphysical vagueness). But this argument is simply an instance of the reference magnetic GVAS. And it can be rebutted in exactly the same way that we rebutted other instances of the GVAS. There can be several candidates  $N_1, N_2, \dots$  for the referent of ‘perfectly natural’ even though perfect naturalness is perfectly natural, so long as each of the candidates applies to itself:  $N_1$  is  $N_1$  and  $N_2$  is  $N_2$ , etc. And vagueness in which of  $N_1, N_2, \dots$  is *perfect naturalness* makes it vague which of  $N_1, N_2, \dots$  achieves the best balance of eligibility and fit for ‘perfectly natural’. On one way of specifying what we mean by ‘eligibility’,  $N_1$  maximizes the balance between eligibility and fit for ‘perfectly natural’. On another specification,  $N_2$  maximizes the balance between eligibility and fit for ‘perfectly natural’. It’s vague which property is best for the term ‘perfectly natural’, so by (R1) the term ‘perfectly natural’ is vague.

The previous paragraph was merely meant to show that it’s *consistent* to accept that ‘perfectly natural’ is vague while simultaneously accepting that perfect naturalness is perfectly natural. No doubt, it’s *also* consistent to accept that ‘perfectly natural’ is precise while simultaneously accepting that

perfect naturalness is perfectly natural.<sup>42</sup> And those that are willing to give up one of (V1)–(V3) need not follow the mv-ersatzer in accepting that ‘perfectly natural’ is vague. But those that find (V1)–(V3) an attractive package of views should follow the mv-ersatzer. The point of the previous paragraph is that both camps can accept that perfect naturalness is perfectly natural.

## 8. CONCLUSION

This paper has sought to accomplish two goals. The first goal is to unify various arguments under a single argument schema—the GVAS—and develop the most plausible versions of that schema. Instances of the schema were discovered in a variety of philosophical disputes including debates over personal identity, consciousness, special science properties, ethics, composition, persistence, ontological realism, naturalness, and metaphysical vagueness. And the instances were used to establish significant conclusions. The second goal of the paper is to develop a highly general strategy for avoiding the GVAS. That strategy was ersatz metaphysical vagueness. We demonstrated that, by taking the term ‘perfectly natural’ to be semantically vague, we can mimic genuine metaphysical indeterminacy in a way that allows us to avoid the GVAS. Because the GVAS is a popular way to motivate genuine metaphysical vagueness, ersatz metaphysical vagueness provides us with an unmysterious alternative to objectionable metaphysical indeterminacy.<sup>43</sup>

## 9. APPENDIX: SOPHISTICATED REFERENCE MAGNETISM

For ease of presentation, the main text followed authors like Sider and Weatherson in treating reference magnetism as a theory according to which an individual word is assigned to the individual referent that best balances fit with usage and eligibility. As these authors are well aware, this is an oversimplification of the view of reference that Lewis outlines in his

<sup>42</sup> Thanks to an anonymous referee for pressing me on this point.

<sup>43</sup> Thanks to Karen Bennett, Mercedes Corredor, Daniel Drucker, David Manley, Eric Swanson, J.R.G. Williams, and an anonymous referee. Thanks also to audiences at Michigan for helpful questions. Special thanks to Ted Sider for several early meetings and comments on this essay, Brian Weatherson for extensive feedback throughout the development of this essay, and an anonymous referee for detailed and illuminating suggestions during the review process.

(1983; 1984). According to that view, fit with usage and eligibility tradeoff at the level of interpretations—functions from individual words in a language to referents—in order to determine the correct interpretations for our language. The purpose of this brief appendix is to show that the arguments given in the main text can be extended to this view.

Lewis carves out a role for naturalness to play in determining correctness for an interpretation and uses that reference-fixing role to explain the fact that reference isn't radically indeterminate. On Lewis's view:

Only an elite minority [of possible referents] are carved at the joints. . . . Only these elite things and classes are eligible to serve as referents. . . . *Ceteris paribus*, an eligible interpretation is one that maximises the eligibility of referents overall . . . overall eligibility of referents is a matter of degree, making total theory come true is a matter of degree, the two desiderata trade off. The correct, 'intended' interpretations are the ones that strike the best balance. (Lewis 1984, 66)

Referents are more or less eligible insofar as they are natural. And interpretations are eligible insofar as they assign eligible referents to terms. Interpretations fit with use insofar as they make total theory (some privileged set of sentences we accept) true. We can summarize Lewis's remarks as:

(R1) Determinately: If the interpretations  $i_1, i_2, i_3, \dots$  that achieve the best balance of eligibility and fit with usage agree with respect to the referent of  $t$ , then  $t$  refers to the referent assigned by those interpretations.

Notice that, unlike (R1), reference is determined by the relative eligibility and fit of interpretations—the eligibility of individual referents is only relevant to reference because it fixes the overall eligibility of interpretations. Following Lewis's lead, we can state Weatherson's sufficient condition for vagueness (R2) in terms of divergent best interpretations rather than in terms of multiple distinct best referents:

(R2) Determinately: If the interpretations  $i_1, i_2, i_3, \dots$  that achieve the best balance of eligibility and fit with usage disagree with respect to which referent in a range  $p_1, p_2, p_n$  is assigned to term  $t$ , then it's indeterminate which of  $p_1, p_2, p_n, \dots$  term  $t$  refers to.

And, if divergence among the best interpretations makes for vagueness, it might be thought that agreement among the best interpretations makes for determinacy:

(R3I) Determinately: If the interpretations  $i_1, i_2, i_3, \dots$  that achieve the best balance of eligibility and fit with usage agree with respect to the referent  $r$  of  $t$ , then  $t$  determinately refers to that referent  $r$ .

In the main text, it was shown that (R3) supports the GVAS. An analogous argument can be made from (R3I) to the GVAS. Suppose (V1-u) and (V3). Then, there is a range of ‘precise’ properties  $u_1, u_2, \dots$  such that it’s indeterminate which of those properties is the referent of ‘uranium’. Presumably, there is a range of interpretations  $i_1, i_2, i_3, \dots$  such that (i) when restricted to terms other than ‘uranium’, the interpretations are equally eligible; (ii) when extended to include assignments to the term ‘uranium’, the interpretations fit equally well with usage; and (iii) there is no interpretation outside that range that achieves as good of a balance of eligibility and fit with usage. According to (Parsimony), at most one of the properties  $u_1, u_2, \dots$  is perfectly natural—the rest of the properties are less than perfectly natural. If *none* of the properties are perfectly natural, then ‘uranium’ won’t refer to a perfectly natural property and (V2-u) is false. If exactly one of the properties is perfectly natural, then the interpretations in the range that assign ‘uranium’ to that property will be more eligible than the rest of the interpretations in the range. Thus only those interpretations will achieve the best balance of eligibility and fit. By (R3I), ‘uranium’ will determinately refer to that property, contradicting our supposition that (V1-u) and (V3).

The case against (R3) given in the main text can be extended to (R3I). The claim (R3I) is logically inconsistent with its being indeterminate which unique referent in a range all of the best interpretations assign to term  $t$ .<sup>44</sup> But we shouldn’t foreclose the possibility that facts about perfect naturalness, relative naturalness, causation, and (as Lewis himself notes) the ‘terms of the trade’ between fit and eligibility are vague in a way that generates cases that are inconsistent with (R3I). (R1I) delivers the more intuitive verdicts in such cases—and has the advantage of not committing us to the GVAS. If it is vague which unique referent in the range  $u_1, u_2, \dots$  all of the best interpretations assign to the term ‘uranium’, we should say that it is vague which unique property in that range is the referent of ‘uranium’. That is the verdict delivered by (R1I).

Lastly, note that (R1I) is sufficient to rebut the threat of radical indeterminacy of reference. Even if there is slight vagueness as to which of a limited

<sup>44</sup> Suppose it’s determinate that all of the best interpretations assign  $t$  to  $p_1$  or all of the best interpretations assign  $t$  to  $p_2$ , but it’s indeterminate whether all of the best interpretations assign  $t$  to  $p_1$  and it’s indeterminate whether all of the best interpretations assign  $t$  to  $p_2$ . Then, according to (R3I),  $t$  determinately refers to  $p_1$  or  $t$  determinately refers to  $p_2$ , but it’s indeterminate whether it determinately refers to  $p_1$  and indeterminate whether it determinately refers to  $p_2$ . But in the main text, we showed that this is logically inconsistent with the  $T$ -axiom.



range of properties is the most natural, some determinately gruesome properties may be such that interpretations that assign terms to that property will determinately fail to achieve the best balance of eligibility and fit. Indeed, for all the mv-ersatzer has said, there are term-referent pairs such that determinately all of the best interpretations assign the terms to the referents in the pair. Then, by (R1I), the term will not be vague—it will determinately refer to that referent in the pair.

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