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# Reference by Proxy*

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**Abstract**

Formal semantic theories are generally thought to make contact with pre-theoretic semantic notions of aboutness and reference. The nature of that contact is, however, not always straightforward. This paper addresses two debates where that issue assumes a significant role. I begin with Simchen's recent argument that Lewisian Interpretationism succumbs to referential indeterminacy. I develop a proposal about the relationship between the theoretical notion of a term's semantic value and the pre-theoretic notion of reference, and argue that the indeterminacy Simchen identifies does not constitute a form of referential indeterminacy. In the second part, I apply these resources to the debate between singularist and pluralist approaches to the semantics of plural terms, arguing that a certain form of singularism that emerges from the dialectic ends up agreeing with the pluralist at the level of reference, if not semantic value. The paper concludes with some remarks on what a properly referential style of singularism might look like.

**Keywords:** reference, semantic value, indeterminacy, plurals

Formal semantic theories are generally thought to make contact with pre-theoretic semantic notions, like aboutness and reference. In their classic textbook, Dowty et al. (1981, p. 5) for example write that "a fundamental characteristic of natural language is that it can be used [ . . . ] to communicate about things in the world [ . . . The ] proper business of semantics is to specify how language connects with the world — in other words, to explicate the inherent 'aboutness' of language." One is, for instance, pre-theoretically inclined to say that the sentence 'Alice is wise' is *about* Alice, a certain individual, or that the term 'Alice'

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*refers to* her, and one might expect a formal semantic theory to reflect this. The question of how these pre-theoretic notions of term-reference and aboutness hook up with the technical machinery of a formal semantic theory is, however, not always straightforward. I here consider two debates where the nature of that connection assumes a significant role.[1]

The first is a recent argument offered by Simchen (2017a,b) against the metasemantic position of *Lewisian Interpretationism*. Simchen argues that the Lewisian view doesn't have the resources to adjudicate between rival semantic theories that differ wildly in their assignment of values to singular terms, and therefore leaves the door open to radical referential indeterminacy. There can, for example, be no fact to the matter for the Lewisian whether the subject term in an utterance of 'this is a nice piece of fruit' refers to the apple in front of the speaker, or to some distant star, as per some wildly scrambled semantics.

A second place where issues of aboutness and reference take center stage is in the debate between singularist and pluralist approaches to the semantics of plural terms. Pluralists maintain that plural terms like 'Alice and Béla' or 'the cheerios' denote many things, whereas singularists hold that a plural term instead denotes some single thing, a "plural entity" that somehow "collects together" the things that the pluralist regards the term as denoting. One prominent variety of singularism treats plural terms as denoting sets, e.g. the plural term 'Alice and Béla' is held to denote the set {Alice, Béla}. An immediate worry about singularism is that if plural terms are held to denote sets, plural sentences will be misrepresented making claims about sets. The sentence 'Alice and Béla wrote a book', for example, threatens to come out as saying of the set {Alice, Béla} that it wrote a book. Boolos (1984) for instance pressed this worry in his remark that "it is haywire to think that when you have some Cheerios, you are eating a *set* — what you're doing is: eating the Cheerios."[2]

I will consider the two debates in turn, and suggest that a response to the first carries a lesson for the second. I will begin, in section 1, by reviewing Simchen's argument against Lewisian Interpretationism, and argue that a proper assessment of it requires us to look closely at the relationship between the theoretical notion of a term's semantic value in a given theory, and the pre-theoretic notion of what a term refers to, or sentences containing

[1] Let me flag that the question at issue here — concerning what a term refers to, and what sentences containing it are about — is more restricted than the one involved in other discussions of aboutness, such as the more expansive notion of a sentence's overall *subject matter* discussed by e.g. Yablo (2014).

[2] Similarly, Link (1984) quips that "if my kids turn the living room into a mess I find it hard to believe that a set has been at work, and my reaction is not likely to be that of a singleton set." Link's second remark, about singleton sets, anticipates the treatment of singular terms discussed below.

it are about. In section 2, I develop a proposal about how to delineate that relationship in the context of Lewisian Interpretationism, and argue that the indeterminacy Simchen identifies does not constitute a form of referential indeterminacy. Simchen's scrambled semantics differs from its non-scrambled counterpart in what semantic values it assigns terms, but not in what it represents those terms as referring to. It exhibits what I will call *reference by proxy*. In the second part of the paper, I then apply these resources to the debate between singularist and pluralist approaches to the semantics of plural terms, and argue that a similar lesson applies. Section 3 lays out a singularist reply to the objection about the subject of predication mentioned above, along with another objection that it draws in its wake. In section 4, I argue that the singularist view that emerges from this dialectic again involves a form of reference by proxy, and ends up agreeing with the pluralist about the reference, if not the semantic value, of plural terms. I conclude by briefly sketching what kind of thesis a singularist would have to put forward to engage pluralism at the level of reference.

# 1 Lewisian Interpretationism

Simchen's argument is aimed at the metasemantic position of *interpretationism*, according to which the semantic significance of expressions is determined by "their interpretability so as to engender a good explanation of the speakers' rationality in thought and talk given their worldly surroundings" (Simchen, 2017b, p. 8). Simchen specifically targets a form of interpretationism that is supplemented with a Lewisian naturalness constraint, so that a meaning-determining interpretation must not only fit use-facts but also "optimize the naturalness of semantic values assigned to the predicates" (Simchen, 2017b, p. 8).

Lewis (1983, 1984) introduced his naturalness constraint in response to an indeterminacy argument due to Putnam (1980, 1977). Putnam sought to show that a certain kind of realism, according to which a theory that is epistemically ideal could nevertheless turn out to be false, can't be maintained. For let $T$ be some epistemically ideal first-order theory. Since $T$ is epistemically ideal, it is presumably at least syntactically consistent, meaning that (by the completeness theorem) it has a model on which all of its sentences are true. Putnam then argues that under further minimal assumptions, $T$ will have a model whose domain contains the same number of objects as does the actual world, meaning there is a bijection between the domain of the model and the objects in the actual world. We can then use that bijection to transform the model into one that assigns semantic values composed of the corresponding objects in the actual world and continues to render the theory true.

The theory thus comes out *true of the actual world*, pretty much no matter what that world is like, and the realist's distinction between epistemic ideality and truth collapses.[3]

Lewis (1984) termed this *Putnam's incredible thesis*, and regarded it as a *reductio* of the idea that the only constraint on an eligible interpretation is that it render the theory true. The interpretation delivered by Putnam's construction is one that will likely assign extremely gerrymandered extensions to predicates. Yes, the sentences of the theory may come out true, but only at the expense of rendering the claims they make utterly uninteresting — to the effect that various random objects are members of various utterly heterogenous classes. Lewis' solution is that an interpretation is only eligible if the semantic values it assigns to predicates are reasonably *natural*, carving at objective joints in the world. So Lewisian Interpretationism, as Simchen understands it, is then the metasemantic view that the meanings of expressions are determined by the best interpretation of the language, where being best not only requires that the sentences speakers accept come out for the most part true, but also *inter alia* that the semantic values assigned to predicates correspond to reasonably natural properties.[4]

Simchen's charge against Lewisian Interpretationism is that although it avoids Putnam's indeterminacy argument, it succumbs to an indeterminacy problem of its own, about what singular terms refer to. Take the sentence 'this is a piece of fruit' uttered in front of an apple display. Let's suppose that the interpretation of the predicate is fixed on grounds of naturalness to be the set of pieces of fruit, rather than some gerrymandered alternative. Suppose also that the truth conditions of the sentence are fixed: it is true iff *a* is a piece of fruit, where *a* is a certain apple in the display. We now consider two rival interpretations: interpretation $[\![.]\!]_1$ assigns the apple *a* to 'this', and another "bent" interpretation $[\![.]\!]_2$ assigns, say, Proxima Centauri to 'this'. One might think that the bent interpretation $[\![.]\!]_2$ can be ruled out on the grounds that it delivers the wrong truth conditions for the sentence, making it true iff Proxima Centauri is a piece of fruit.

Not so, notes Simchen. If we assume that the truth conditions for monadic predicational sentences are determined via the following standard clause:

**Standard Atomic Composition:** $\vDash \varphi(t)$ iff $[\![t]\!] \in [\![\varphi]\!]$

[3]Compare Simchen (2017b, p. 9) and Putnam (1977, p. 485). Putnam gave a family of related "model theoretic arguments," see Taylor (2006, Ch. 3) for an overview. The argument here is a version of what Taylor calls the Argument from Completeness.

[4]The metasemantic views of the historical Lewis were of course more complex, but I'll follow Simchen in working with this simplified version.

then the "bent" interpretation will indeed deliver the wrong truth conditions. But suppose we use a different compositional clause involving a *scrambler function* $\sigma$:

**Scrambled Atomic Composition:** $\vDash_\sigma \ \varphi(t)$ iff $\sigma([\![t]\!]) \in [\![\varphi]\!]$

The scrambler function $\sigma$ is just some permutation on the domain. The truth of an atomic sentence now doesn't require that the object assigned to the term fall in the predicate's extension, but rather that this object's *image under the scrambler* fall in the predicate's extension. So, relative to a scrambler $\sigma_2$ that maps Proxima Centauri to our apple $a$, the sentence 'this is a piece of fruit' will come out true iff the image of Proxima Centauri under $\sigma_2$, i.e. our apple $a$, is a piece of fruit.

More generally: given any interpretation acceptable to the Lewisian Interpretationist, we can construct countless "bent" interpretations that permute the assignment of semantic values to singular terms (while leaving the semantic values of predicates as they are). We can, however, still deliver the same truth conditions for whole sentences by using scrambled composition together with an appropriate scrambler that "unbends" the bent interpretation. The claim, then, is that the Lewisian Interpretationist does not have the resources to block the appeal to scrambled composition, nor, therefore, to rule out any of the bent interpretations. That is: since compositional indeterminacy opens the door to referential indeterminacy, and the Lewisian can't rule out compositional indeterminacy, the Lewisian is stuck with radical referential indeterminacy. For the Lewisian Interpretationist, there just is no fact to the matter about whether 'this' refers to the apple in front of the speaker or to Proxima Centauri.

One might at this point question whether the Lewisian Interpretationist indeed lacks the resources to block the indeterminacy result.[5] I want to ask a different question, however, namely whether there is a need to, that is, whether the indeterminacy at issue is really troubling in the way Simchen suggests. Notice that it is quite different from the indeterminacy that emerges from Putnam's argument. That argument involves indeterminacy in truth conditions: the threat is that our favored theory will come out true pretty much *no matter what the world is like*. Simchen's indeterminacy, by contrast, leaves the truth conditions of

[5]For example, Sider (2011) suggests that naturalness be extended "beyond the predicate" and understood as having to do with *worldly structure* in general, allowing us to speak of more or less natural meanings for connectives, quantifiers, and so on. One might go further and apply the notion not only to the meanings of words, but also to the operations via which they are composed, arguing that standard composition better reflects some aspect of worldly structure (perhaps a predicational structure) than the scrambled alternative. Or one might take a cue from Williams (2007) and maintain that general standards of theoretical simplicity (analyzed in terms of naturalness) will rule out scrambled semantics.

sentences untouched: 'this is a piece of fruit' comes out true, on *either* semantics, iff the world is such that a certain apple $a$ is a piece of fruit. The indeterminacy is entirely at the level of the internal machinery of the semantics, specifically the semantic values assigned to singular terms and the compositional operations that determine truth conditions. It is not obvious that such indeterminacy is equally problematic.[6]

The reason Simchen regards it as problematic is that he takes it to conflict with pre-theoretic judgments concerning reference and aboutness. It is simply a Moorean fact that singular terms refer to certain things and not others, and any metasemantic view that conflicts with this should be rejected on these grounds alone. Thus he for example writes that "singular reference is important *pre-theoretically* ... we seem to care deeply about what *in particular* we think and talk about in our thought and talk" (Simchen, 2017b, p. 44). What I want to consider is whether the indeterminacy Simchen identifies really conflicts with pre-theoretic judgments regarding reference and aboutness, and whether it is therefore properly characterized as *referential* indeterminacy.

## 2 Reference and Semantic Value

Let me pause to make some preliminary remarks. First, the indeterminacy Simchen identifies concerns the semantic values assigned to expressions by the interpretation function, and the operations which then compose those semantic values to determine truth-conditions. These are decidedly theoretical notions. The semantic value of an expressions is just an entity that a theory assigns to an expression, and which then compositionally combines with the semantic values of other expressions to determine truth-conditions for sentences. It is a significant question how the theoretical notion of semantic value, or denotation (as I'll also call it), relates to pre-theoretic notions like reference and aboutness. I will offer an illustration of the way reference and semantic value can come apart at the hand of a particular semantic theory momentarily. Second, and in light of this, we therefore need to say something about the character of these ordinary notions, about their conceptual anchors, so that we may then use that to guide us in answering the question of how to relate the ordi-

[6]Putnam did also offer indeterminacy arguments involving domain permutations that leave truth conditions unchanged, most explicitly in the Appendix of Putnam (1981). As Taylor (2006) notes, however, it is Putnam's Argument from Completeness rather than the Argument from Permutation that poses a direct challenge to realism, and Lewis (1983, 1984) seems primarily concerned to answer Putnam's argument against realism. At any rate, the point I wish to make is just that if we're going to worry about indeterminacy below the level of truth conditions we ought to be explicit about the reasons for that worry and make sure those reasons apply in the case at hand.

nary notions of reference and aboutness to the technical machinery of a semantic theory. Third, it should be noted that "talking about" things is a speech act, something speakers do. We can also describe it as the act of speakers' referring to things. These speech-act notions are distinct from the more properly semantic notions of what words refer to, or sentences containing them are about, so I will set them aside.

What, then, can we say by way of elucidating the ordinary notion of term reference and sentential aboutness? As a starting point, I take it that both concepts bear a close relation to truth. The sentence 'Alice is wise' is, intuitively speaking, *about* Alice in the sense that its truth turns on how things are with her — it is she who must be wise for the sentence to be true. Similarly, to say that the term 'Alice' *refers* to Alice is to say that simple predicational sentences containing this term are about her, that is, that such sentences have truth conditions that concern how things are with Alice. This suggests the following as a way of identifying what object a formal semantic theory represents as the reference (in the intuitive sense) of a term:

> REFERENCE V1: the reference of a term $t$ according to a theory $T$ is that object $o$ which is systematically involved in the specification of truth conditions delivered by $T$ for predicational sentences $\varphi(t)$ containing $t$.

Given this proposal, any semantic theory according to which 'Alice is wise' is true iff Alice is wise, and more generally specifies truth conditions concerning Alice for predicational sentences containing the name 'Alice', will count as representing her as the referent of the name. Importantly, this will be so independently of the internal machinery the theory uses to determine those truth conditions, and in particular, of what semantic value it assigns to the name. Let me give an example by way of illustration, one that I will return to as we continue.

Take Lewis' (1970) 'General Semantics'. On this theory, call it GS, sentences denote functions from "indices" to truth values, singular terms denote functions from indices to individuals, and predicates denote functions from term denotations to sentence denotations of the just-described kind. In the context of a simple first-order language we can let the index just consist of an assignment function. The term 'Alice' and the predicate 'is wise', for example, will then receive the following semantic values in GS (with $\kappa$ a variable over assignment functions, and $\nu$ a variable over term denotations):

$[\![\text{Alice}]\!] = (\lambda\kappa.\ \text{Alice})$

$[\![\text{is wise}]\!] = (\lambda\nu.\lambda\kappa.\ \nu(\kappa)\ \text{is wise})$

So ‘Alice’ denotes a function that takes any assignment $\kappa$ and returns Alice, and ‘wise’ denotes a function that takes a term denotation $\nu$ and an assignment $\kappa$ and returns the value 1 (or truth) iff $\nu(\kappa)$ is wise. The truth conditions for atomic predicational sentences are determined by applying the predicate denotation to the term denotation, and applying the result of that to a contextually provided assignment $g$:

**GS Atomic Composition:** $\models^g \varphi(t)$ iff $([\![\varphi]\!]([\![\mathrm{t}]\!]))(g) = 1$

Crunching through the various functional applications we get the result that ‘Alice is wise’ is true (relative to any assignment $g$) iff Alice is wise:

$\models^g$ ‘Alice is wise’ iff
$((\lambda\nu.\lambda\kappa.\ \nu(\kappa)\text{ is wise})(\lambda\kappa'.\ \text{Alice}))(g) = 1$ iff
$(\lambda\kappa.\ (\lambda\kappa'.\ \text{Alice})(\kappa)\text{ is wise})(g) = 1$ iff
$(\lambda\kappa'.\ \text{Alice})(g)$ is wise iff
Alice is wise

The GS theory has some attractive features. It offers a robustly compositional account of quantification and variable binding, for example.[7] But its treatment of singular terms is initially counterintuitive. The name ‘Alice’ does not denote Alice, the person, but rather an abstract function, one that takes other equally abstract functions as its arguments. Is GS therefore another example of a semantic theory that operates with a “bent” interpretation function and that the Lewisian Interpretationist must rule out as ineligible?

Surely not. GS is an acceptable framework for natural language semantics, we just have to recognize that the notion of denotation or semantic value that it traffics in is a technical one, not to be confused with the pre-theoretic notion of reference. To repeat the earlier point: the denotation of an expression is an entity — perhaps abstract, perhaps not — that compositionally interacts with the denotations of other expressions to determine truth conditions for sentences. The intuitive, pre-theoretic notion of reference is not one in terms of which the theory is directly formulated. We can, however, read that notion back into the theory along the lines suggested above. Since GS systematically specifies truth conditions concerning Alice for sentences containing the name ‘Alice’, it does represent Alice, the individual, as the referent of the name, even if she isn’t what the name denotes or has as its semantic value in that theory. We could call this a form of mediated reference, or *reference*

[7] On this point see e.g. Rabern (2013), Yli-Vakkuri (2013), and Janssen (1997, §2.4).

*by proxy*: the term 'Alice' refers to Alice, but it does so by way of denoting a semantic proxy, one that bears a certain relation to Alice the individual.[8]

The general point is that how the theoretical, and theory-dependent, notion of semantic value relates to the pre-theoretic notion of reference is a delicate matter, and can differ from one theory to another. On the GS theory, the relationship is indirect, involving a form of reference by proxy: what the term denotes is a certain function, but what it refers to is the value of that function. In the non-scrambled semantics Simchen considers, the relationship is more straightforward: here the referent of a term $t$ can just be identified with the semantic value $[\![t]\!]$ that the interpretation function assigns to it. But on the scrambled semantics, so the suggestion runs, we are again dealing with a form of reference by proxy. Here the referent of $t$ isn't its semantic value $[\![t]\!]$, but rather $\sigma([\![t]\!])$, the semantic value's image under the scrambler. Simchen's competing semantic theories differ is in what semantic values they assign to terms, and what compositional operations they apply to those semantic values; but they don't differ in what truth conditions they assign to sentences, nor therefore in what they represent terms as referring to. We may have indeterminacy of semantic value, but not indeterminacy of reference.[9]

Our proposal about reference needs to be refined, however. We've been going with the thought that the referent of a term according to a given theory is whatever object is systematically involved in the specification of truth conditions the theory delivers for predicational sentences containing that term. But this is too loose. Take the GS theory again. As the derivation above shows, it does tell us that 'Alice is wise' is true just in case Alice is wise. But it also tells us that this sentence is true just in case

$$((\lambda\nu.\lambda\kappa.\ \nu(\kappa) \text{ is wise})(\lambda\kappa'.\ \text{Alice}))(g) = 1$$

[8]Other semantic proposals that could be agued to exhibit a distinction between reference and semantic value include views on which terms denote second order properties, as in Montague (1973), individual concepts, as in e.g. Aloni (2005), or sets, as in e.g. Evans (1982) or (I shall suggest) the singularist semantics below. Indeed, Evans (1982, p. 32) explicitly notes that his proposal involving sets as term denotations illustrates that "the equation between semantic value and referent is by no means mandatory." Thanks to an anonymous referee for reminding me of Evans' discussion. I have previously addressed this kind of distinction in Rieppel (2018).

[9]I hasten to note that Simchen (2017a) is alive to issues in this vicinity, concerning the contrast between the technical notions of semantics and pre-theoretic semantic concepts. He focuses on the semantic values of verbs and quantifier phrases; what I am suggesting is that similar complications arise even in the case of singular terms. A closely related distinction at the sentential level — between compositional semantic value and assertoric content, or "what is said" — has been a recent focus of attention in e.g. Ninan (2010), Rabern (2012), and Yli-Vakkuri (2013), drawing on Dummett (1973) and Lewis (1980).

that is, just in case the result of applying the function $(\lambda\nu.\lambda\kappa.\ \nu(\kappa)$ is wise) to $(\lambda\kappa'.$ Alice) returns the value 1 (at the contextual assignment $g$). So if we regard GS as offering this specification of truth conditions, the function $(\lambda\kappa'.$ Alice) is systematically involved, and thus counts as what GS represents as the name's referent. Similarly in the case of Simchen's scrambled semantics. It does tell us that 'this is a piece of fruit' is true just in case the apple $a$ is a piece of fruit, and in that sense represents the apple as the term's referent. But it also tells us that this sentence is true just in case Proxima Centauri is such that its image under the scrambler is a piece of fruit. So by our current proposal, the star and the apple could equally be regarded as what the scrambled semantics represents as the referent of the term, depending on which way of specifying the truth conditions we focus on.

Can we do any better? It appears that we need to be more precise about the particular way an entity must be involved in the specification of truth conditions to count as the referent of a term according to a given theory. I earlier suggested that the sentence 'Alice is wise' is, in the intuitive sense, about Alice — and that the name intuitively refers to her — because this sentence's truth turns on how things are with her, specifically, on whether she *is wise*. Turning again to the GS theory, we see that it of course also represents Alice, rather than the abstract function, as what needs to be wise for this sentence to be true. It therefore looks like predication should be given a role in pinning down reference: the referent of a term is the object that the predicate must apply to for a sentence containing the term to be true. As it happens, Lewisian Interpretationism offers a hospitable environment in which to develop this thought.

Recall that the Lewisian Interpretationist insists that an eligible semantic theory will associate each predicate with a reasonably natural property, one an object must have for the predicate to apply to it. The natural property a predicate is associated with again need not be the predicate's semantic value, however. In GS, the predicate 'wise' denotes the higher-order function $(\lambda\nu.\lambda\kappa.\ \nu(\kappa)$ is wise$)$. The property of being wise, which I'll represent as $(\hat{x}.\ x$ is wise$)$, makes no explicit appearance in GS. It is, however, clear where it would fit in: in the specification of the conditions under which the function denoted by the predicate returns the value 1, or truth. We could thus make the role of natural properties explicit by representing predicate semantic values in GS according to the template $(\lambda\nu.\lambda\kappa.\ \nu(\kappa) \sqsubset (\hat{x}.\varphi))$, using $\sqsubset$ for property instantiation. The semantic value of 'wise' in GS would then be represented as $(\lambda\nu.\lambda\kappa.\ \nu(\kappa) \sqsubset (\hat{x}.\ x$ is wise$))$: a function that returns truth just in case the value of $\nu$ under $\kappa$ instantiates the property of being wise. Similarly, in a theory like Simchen's scrambled semantics where predicates are assigned sets as their semantic values,

the role of natural properties could be made explicit by specifying the set denoted by e.g. 'wise' as $\{x \mid x \sqsubset (\hat{x}.\ x \text{ is wise})\}$. And in still other theories the predicate might just be taken to have the property $(\hat{x}.\ x \text{ is wise})$ itself as its semantic value.[10]

In general, the Lewisian Interpretationist will maintain that an eligible semantic theory, whatever particular shape it may take, must either directly or indirectly associate each predicate with some reasonably natural property, instantiation of which is required for atomic sentences containing that predicate to be true. Call this the property *expressed by* the predicate. Given this notion of property expression, the Lewisian can then pin down reference as follows:

> REFERENCE V2: the referent of a term $t$ according to a Lewisian theory $T$ is the object $o$ which must, according to $T$, instantiate the property expressed by $\varphi$ for a predicational sentence $\varphi(t)$ containing $t$ to be true.

So in the case of GS, Alice is the referent of the name 'Alice' because it is she, rather than the function $(\lambda k.\ \text{Alice})$, which must instantiate the property expressed by $\varphi$ in order for sentences of the form $\varphi(\text{Alice})$ to be true. And in the case of $\sigma_2$-scrambled semantics, $\sigma_2(\llbracket t \rrbracket)$ will be the referent of a term $t$ because it is it, and not the semantic value $\llbracket t \rrbracket$, that must instantiate the property expressed by $\varphi$ in order for $\varphi(t)$ to be true. E.g. it is the apple, rather than Proxima Centauri, that must instantiate the property of being a piece of fruit for 'this is a piece of fruit' to be true.[11]

Let me review. I have been concerned to emphasize the distinction between the semantic value that a given theory assigns to a term, and what the theory represents the term as referring to. I suggested that one way to understand what a theory represents as the referent of a term is in terms of what object is systematically involved in the specification of truth

[10] Compare Dummett's (1973) notion of specifying an expression's *Bedeutung* in a way that "shows" its sense, and the application of that idea to predicate semantic values in Heim and Kratzer (1998, Ch. 2). Similarly, the idea here is that predicate semantic values can be specified in a way that explicitly appeals to the natural property the Lewisian Interpretationist takes the predicate to express. Let me flag that this way of conceiving of the role of natural properties in eligible semantic theories differs from the proposal in Williams (2007). Williams suggests the role of naturalness is to provide an analysis of the general notion of theoretical simplicity in non-subjective terms, and that an eligible semantics is then one that scores high against its competitors on the scale of theoretical simplicity. This approach could be developed into an alternative reply to Simchen, as mentioned in footnote 5 above. Thanks to an anonymous referee for flagging this.

[11] As Simchen (2020) points out, one can construct not just a *scrambled* semantics, but also a *jumbled* semantics, one that uses a *jumbler function* to permute the properties denoted by predicates in the language. On such a semantics, the truth of $\varphi(t)$ doesn't require that $\llbracket t \rrbracket$ instantiate $\llbracket \varphi \rrbracket$, but rather that it instantiate $\rho(\llbracket \varphi \rrbracket)$, the image of $\varphi$'s denotation under the jumbler $\rho$. On such a semantics, however, the property *expressed by* the predicate, in the sense explained above, would then be $\rho(\llbracket \varphi \rrbracket)$ rather than $\llbracket \varphi \rrbracket$, since it is the instantiation of $\rho(\llbracket \varphi \rrbracket)$ rather than $\llbracket \varphi \rrbracket$ that is required for the truth of atomic sentences containing $\varphi$.

conditions the theory delivers for predicational sentences containing the term, and that this mode of involvement can be further pinned down via the natural property the predicate expresses according to the theory. Given this proposal about reference, Simchen's argument doesn't show the Lewisian Interpretationist to be committed to referential indeterminacy, but merely indeterminacy in semantic value. Let me emphasize that it is not my aim to defend Lewisian Interpretationism as a metasemantic view, nor to show it to be immune to any possible indeterminacy arguments. My claim is just that the possibility of giving a scrambled semantics doesn't show Lewisian Interpretationism to be committed to *referential* indeterminacy. I next want to apply some of this background to the debate between singularist and pluralist approaches to plural terms and suggest that a similar lesson applies.

# 3 A Singularist Semantics for Plurals

Again, by *singularism* I mean the view that a plural term denotes some single thing, a "plural entity" that "collects together" the many individual things that the term would be held to denote on the pluralist approach. I will here focus on varieties of singularism that treat plural terms as denoting sets. So the term 'Alice and Béla', for example, might be held to denote the set $\{x \mid x = \text{Alice} \vee x = \text{Béla}\}$, and 'the cheerios' the set $\{x \mid x \text{ is a cheerio}\}$. Another, related form of singularism instead treats plural terms as denoting properties, e.g. the property $(\hat{x}.\ x = \text{Alice} \vee x = \text{Béla})$ or $(\hat{x}.\ x \text{ is a cheerio})$.[12] A potential advantage of the property-based approach is that properties could be construed as entities of a higher logical type. This may allow property-based singularists to evade Cantorian diagonal arguments designed to show that singularism cannot allow for absolutely unrestricted first-order quantification.[13] Since these cardinality issues are orthogonal to the points I want to consider, I will here focus on the set-based variety of singularism, though I will occasionally

[12]Pluralist proposals include Boolos (1984), Yi (2005, 2006), McKay (2006), and Oliver and Smiley (2016a). Set-based approaches have been proposed Scha (1981) and Schwarzschild (1996), and broadly property-based approaches include Higginbotham and Schein (1989) and Florio (2014). Another variety of singularism, which I shall not consider here, takes 'Alice and Béla' to denote the *sum* of Alice and Béla, an entity that has each of them as its *parts*. This view, associated with Link (1983), faces difficulties if sums are construed in standard mereological fashion: pairs like 'the cards in the two decks' and 'the two decks of cards' will denote the same thing, since the two decks, and the multitude of cards, compose the same mereological whole. To avoid this, the sums in question need to be given a more set-like structure. For a recent discussion and defense, see Florio and Nicolas (2021).

[13]For discussions of cardinality problems of this stripe, see e.g. Boolos (1984), Rayo (2002), Oliver and Smiley (2016a), and Florio (2014).

comment how the points I make relate to the property-based approach.[14]

One further clarification: I will, as indicated, understand singularism as a semantic thesis, to the effect that plural terms denote single entities of a certain kind. This needs to be distinguished from another view that has been discussed in the literature — call it *regimentation singularism* — according to which sentences containing plurals can be *paraphrased* or *regimented* in a language from which all plural locutions have been eliminated. Singularism as I will understand it is not committed to the possibility of such paraphrase or the eliminability of plural locutions. Again, it is just the view that plural terms denote single entities, specifically sets (or properties) of individuals.[15]

As mentioned, singularism appears to face a problem with aboutness, which arises as follows. First, the singularist will propose denotations of the following sort for plural terms:

$$[\![\text{Alice and Béla}]\!] = \{\text{Alice, Béla}\}$$

Next, one might propose that the predicate 'wrote a book', say, denotes the property of having written a book:

$$[\![\text{wrote a book}]\!] = (\hat{x}.\ x \text{ wrote a book})$$

Finally, given the following compositional clause (again, using $\sqsubset$ for instantiation):

**Plural Predication:** $\vDash \varphi(tt)$ iff $[\![tt]\!] \sqsubset [\![\varphi]\!]$

we get the objectionable result that 'Alice and Béla wrote a book' is true just in case the set $\{\text{Alice, Béla}\}$ has the property $(\hat{x}.\ x \text{ wrote a book})$, that is, just in case the set wrote a book, which it presumably did not. Following Linnebo (2017), I'll call this the *incorrect predication* objection.

As this setup makes clear, however, the singularist is only stuck with this result given auxiliary assumptions beyond the set-based semantics for plural terms. The singularist can avoid the problem about the subject of predication by "changing the predicate," as Oliver

[14]Though set-based singularists sometimes also present their proposals in type-theoretic terms. Scha (1981), for example, explains that he is working within a type system where "every semantic type has a set of entities as its domain" and "the denotation of an expression is necessarily an element of the domain of its type" (Scha, 1981, p. 485). Thus he begins with a type *individual*, and then introduces a derived type $S(\mathit{individual})$, whose domain is to consist of sets of individuals, to serve as the denotations of plural terms (as well as singular terms, for the reasons discussed below).

[15]The importance of distinguishing semantic singularism from regimentation singularism has been emphasized by Florio (2014) and Yi (2005, 2006).

and Smiley (2001) put it.[16] Rather than treat the predicate as denoting the property of having written a book, the singularist can instead hold that it denotes a property of sets, one that holds of a given set just in case *the members of* that set wrote a book. I will use $u(.)$ to represent the operation I've informally expressed as "the members of ( . )" which, applied to a set, returns its members. For example, $u(\{\text{Alice, Béla}\}) =$ Alice and Béla, the members of $\{$Alice, Béla$\}$.[17] The proposed denotation for the predicate would thus be:

$[\![\text{wrote a book}]\!] = (\hat{s}.\ u(s)$ wrote a book$)$

Together with our earlier compositional clause the singularist now delivers truth conditions that get the subject of predication right:

$\models$ 'Alice and Béla wrote a book' iff
$\{$Alice, Béla$\} \sqsubset (\hat{s}.\ u(s)$ wrote a book$)$ iff
$u(\{$Alice, Béla$\})$ wrote a book iff
Alice and Béla wrote a book

What is said to have written a book is not a set, but just Alice and Béla.

A second problem remains, however. We've said that when the predicate 'wrote a book' combines with a plural subject, it denotes a property of sets. But the predicate must, it seems, still denote the ordinary property of having written a book when it combines with singular terms, since those just denotes ordinary objects. And of course there are many such *mixed predicates*, as Link (1998) calls them, which freely combine with both singular and plural subjects. So it looks like the singularist has to postulate an ambiguity for all mixed predicates between their occurrences with singular and plural subjects.

This is implausible, however. As Link (1998) observes, a question like:

(1) Who wrote that book?

can be equally well answered by the plural 'Alice and Béla' or the singular 'Carol'. Second, as pointed out by Oliver and Smiley (2016a,b), a predicate occurring with a plural subject can later be elided in combination with a singular subject, as in:

[16] This reply on behalf of singularism is also discussed by McKay (2006), Oliver and Smiley (2016a), and Linnebo (2017). Another option would be to change the compositional clause, as I discuss below.

[17] This operation would be an example of what Oliver and Smiley (2016a, Ch. 9) call a multi-valued function: one that, applied to a given argument (a set in this case) returns potentially many values. For the property-based singularist, the suggestion would be that the predicate 'wrote a book' denotes the second-order property $(\hat{p}.u(p)$ wrote a book$)$, which holds of a property $p$ just in case the *things that instantiate p* wrote a book.

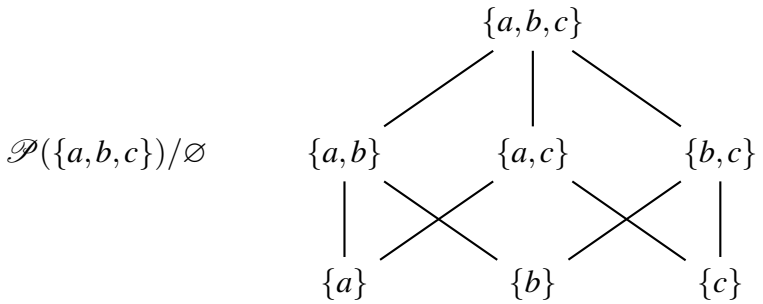
(2) Alice and Béla wrote a book, and Carol did too.

And lastly, as Florio (2014) and Oliver and Smiley (2016b) note, we can quantify into predicate position with both singular and plural subjects at once. The following, for example, is entailed by (2):

(3) Alice and Béla did something that Carol did too (namely, write a book).

This suggests that mixed predicates like 'wrote a book' are univocal across their occurrence with singular and plural subjects. Following Oliver and Smiley (2016b), I'll call this the *equivocity objection*.

The singularist can respond to this objection as well, however, by just treating singular terms as likewise denoting sets. Specifically, singular terms can be treated as denoting singleton sets.[18] By letting 'Carol' denote the singleton $\{\text{Carol}\}$, the singularist can allow a mixed predicate like 'wrote a book' to univocally denote the same property of sets in the context of both singular and plural predications in examples like those above. The view that emerges is one on which a domain of three individuals $a, b$ and $c$, for example, generates a domain of term denotations that has the structure of the powerset of the original domain (excluding the empty set):[19]




At the bottom level are the singleton sets, serving as denotations for singular terms. Plural terms, by contrast, have all elements in the structure, both singletons and non-singletons, in their range of potential denotation.[20] The lines in the diagram represent the subset relation $\subseteq$, which partially orders the domain.

[18] This approach to singular terms is largely the norm among set-based singularists. See e.g. Scha (1981), Schwarzschild (1996), and the set-based semantics in McKay (2006).

[19] Although one could perhaps follow Evans (1982) and include the empty set as the semantic value assigned to empty (i.e. non-referring) terms. Cf. footnote 8.

[20] Allowing plural terms to denote single things (singleton sets in the present context, or singleton properties on the property-based variant) is again quite standard. As Yi (2005) points out, for example, 'Cicero and Tully', though syntactically plural, denotes just one thing (or, here, a singleton). And Boolos (1984) proposed

This conception of the domain of term denotations is attractive in that it structurally models some central notions of plural logic. First, term conjunction, as it occurs in 'Alice and Béla' or 'Alice, Béla, and Carol', could be modeled via the union operation: $[\![\alpha \text{ and } \beta]\!] = [\![\alpha]\!] \cup [\![\beta]\!]$. Second, the 'is/are among' predicate, as in 'Alice and Béla are among Alice, Béla, and Carol', can be modeled via the subset relation: $\ulcorner \alpha$ are among $\beta \urcorner$, or $\ulcorner \alpha \preceq \beta \urcorner$, is true when $[\![\alpha]\!] \subseteq [\![\beta]\!]$. Given the 'is/are among' relation, one can then define the notion of being an "atomic" entity as follows:

$$Atom(\alpha) \equiv_{\text{df}} \forall yy(yy \preceq \alpha \rightarrow \alpha \preceq yy)$$

This corresponds to the fact that among the elements in the structure $\mathscr{P}(\{a,b,c\})/\varnothing$, the singletons are exactly those elements that are subsets of all of their subsets. And lastly, the 'is one of' relation, or '$\prec$', as in 'Alice is one of Alice, Béla, and Carol', can be defined in terms of 'is/are among' and atomicity:

$$\alpha \prec \beta \equiv_{\text{df}} Atom(\alpha) \wedge \alpha \preceq \beta$$

So $\ulcorner \alpha$ is one of $\beta \urcorner$ will be true just when $[\![\alpha]\!]$ is a singleton and $[\![\alpha]\!] \subseteq [\![\beta]\!]$.[21]

# 4 Reference to Pluralities

Singularism can thus respond to both the incorrect predication objection and the equivocity objection by making suitable adjustments to the denotations of predicates and singular terms respectively. The back-and-forth of objection and reply could of course continue, but I won't pursue the dialectic further.[22] Instead, I want to return to themes from our earlier

that the plurally quantified 'there are some Fs' should not be understood to require the existence of more than one $F$. As Schwarzschild (1996, p.5) notes, there is good reason to go this route, since we want 'no students passed' to come out false (and therefore 'some students passed' true) even if just one student passed.

[21] The general picture is not peculiar to set-based singularists. Singularists that appeal to sums generally make use of a structurally isomorphic domain populated by sums instead of sets, see e e.g. Link (1998, Ch. 2) and Nouwen (2016). Property-based singularism will generate a similar structure, since the instantiation relation $\sqsubset$ generates a partial order $\sqsubseteq$ similar to the way membership does for sets: $p_1 \sqsubseteq p_2 \equiv_{df} \forall x(x \sqsubset p_1 \rightarrow x \sqsubset p_2)$. Atomicity for properties could then be defined as above. One disanalogy is that if properties are construed non-extensionally, there may not be an analogue of the union operation (since there can be more than one property $p_3$ instantiated by all and only those things that instantiate both $p_1$ and $p_2$), so the treatment of term-conjunction may have to differ.

[22] There is, as mentioned, a significant worry, going back to Boolos (1984), that singularism cannot allow for unrestricted first-order quantification. For an overview of this debate, see Rayo and Uzquiano (2006). Florio (2014) offers a version of typed property-based singularism designed to address this.

discussion and ask whether, or in what sense, the singularist view that has emerged is a competitor to the pluralist alternative.

The two proposals do of course differ in what they treat plural terms like 'Alice and Béla' as denoting: the two things, Alice and Béla, according to the pluralist, and the one set {Alice, Béla} according to the singularist. However, thanks to the involvement of the set-unpacking operation $u(.)$ in the specification of predicate denotations, the singularist delivers truth conditions on which 'Alice and Béla wrote a book' is true just in case Alice and Béla wrote a book, as the pluralist likewise claims. In this sense the singularist proposal systematically represents predicational sentences containing this term as making claims *about* Alice and Béla, the two individuals. By our earlier proposal REFERENCE V1, singularism can thus be regarded as representing the term as *referring to* the two of them, even if they are not what it denotes. The singularist semantics, that is to say, appears to exhibit a form of reference by proxy, similar to the GS theory and Simchen's scrambled semantics: terms may have sets as their semantic values, but the *referent(s)* of a term $\alpha$ (whether singular or plural) is not its denotation $[\![\alpha]\!]$, but rather $u([\![\alpha]\!])$, the members of the set denoted by $\alpha$. Singularism and pluralism thus end up agreeing at the level of reference.

As in the case of the GS theory, however, an alternative view is possible. After all, by the lights of singularism, for a predicational sentence to be true, the set denoted by the subject term needs to instantiate the property (of sets) denoted by the predicate. Viewed in this way, the truth conditions specified for such sentences do systematically involve a certain set, so the set could also be viewed as what the term refers to. I earlier proposed that REFERENCE V1 be refined via REFERENCE V2 by looking at how natural properties could be given an explicit role in the semantics of predicates. So let's consider how that suggestion plays out in the present case.

Recall that the problem of incorrect predication only arises for the singularist given auxiliary assumptions about predicate denotation and the process of semantic composition. As we've seen, the problem can be evaded by adjusting predicate denotations. But an alternative strategy is available too: reformulate the compositional clause. The singularist could in other words hold on to the idea that the predicate 'wrote a book' simply denotes the ordinary property of having written a book, $(\hat{x}x.\ xx$ wrote a book$)$, just as the pluralist maintains, but deploy the following alternative compositional clause:

**Plural Predication Redux:** $\vDash \varphi(tt)$ iff $u([\![tt]\!]) \sqsubset [\![\varphi]\!]$

The unpacking operation $u(.)$ is now deployed not in the specification of predicate denota-

tions, but as part of the compositional clause, in a manner similar to Simchen's scrambler function. Given this clause, the truth of 'Alice and Béla wrote a book' doesn't require that the set ⟦Alice and Béla⟧ instantiate the property denoted by the predicate, but rather that its members $u(⟦\text{Alice and Béla}⟧)$ do. Applying our earlier suggestion REFERENCE V2 (adjusted to the plural case), what the term refers to then isn't the set it denotes, but the individuals Alice and Béla, since they are the ones that need to instantiate the property.

The only difference between this version of singularism and the one developed in the previous section is that the unpacking operation has been displaced from the specification of predicate denotations to the compositional clause. This seems like a merely notational difference. Furthermore, the ordinary property of having written a book can of course also be given an explicit role in the singularist semantics from the previous section, by specifying the semantic value of the predicate as $\hat{s}(u(s) \sqsubset (\hat{xx}.\ xx \text{ wrote a book}))$. This parallels the earlier suggestion that the way to make the role of natural properties explicit in the GS theory is to specify the function denoted by the predicate 'wise' as $(\lambda\nu.\lambda\kappa.\ \nu(\kappa) \sqsubset (\hat{x}.\ x \text{ is wise}))$. So to the extent that the ordinary property of having written a book has a better claim to being the natural property *expressed by* the predicate than the property of sets that the predicate (on this view) denotes, this will again reveal the individual Alice and Béla, rather than the set {Alice, Béla}, as the referents of the term.

As with Simchen's challenge to Lewisian Interpretationism, drawing the distinction between reference and denotation will impact the success of arguments leveled against singularism. Take the following argument offered by Yi (2005) to show that singularism "conflicts directly with basic logical relations that pertain to plurals":

> "Consider 'Russell and Whitehead' ... Suppose that there is an object ... that the plural term refers to, and let 'Genie' be a singular term that refers to that object (one may take 'Genie' to abbreviate 'the set {Russell, Whitehead}' ... or the like). Then the following sentences, (4) and (5), must have the same truth value, because (4) results from replacing 'Genie' in (5) with 'Russell and Whitehead':
>
> (4) Genie is one of Whitehead and Russell.
>
> (5) Genie is one of Genie
>
> But they do not have the same truth value. (5) is true (for Genie is Genie); (4)

is false, because ... Genie is neither Russell nor Whitehead.[23]

The singularist could respond by pointing out that two-membered sets like {Russell, Whitehead} are, on the proposed semantics, only available as semantic values for plural terms. Singular terms must denote *singleton* sets within the structure of term denotations. So we cannot introduce a singular term 'Genie' that denotes the two-membered set {Russell, Whitehead}. Yi might complain that such a restriction is implausible, on the grounds that one should be able to introduce a singular term for any object one likes. And to this the singularist can now respond by drawing the distinction I've been emphasizing.

What is up to our stipulation is *reference*: we can introduce a singular term to *refer to*, and formulate sentences *about*, any object we like. But it is not up to stipulation what a term denotes, or has as its semantic value, in the context of a given semantic framework. Consider again the GS theory. We can certainly introduce a singular term 'Genie' to refer to the set {Russell, Whitehead}; but what that term will *denote* on the GS theory is not this set, but rather the function $(\lambda\kappa.\ \{\text{Russell, Whitehead}\})$. Similarly, the singularist can insist that we can perhaps introduce a singular term 'Genie' to *refer to* the set {Russell, Whitehead}, but what that term will *denote* in the singularist framework is the singleton set $\{\{\text{Russell, Whitehead}\}\}$.[24] Thus (5) still comes out true, but (4) comes out false, as desired: the truth of (4) would require that $[\![\text{Genie}]\!] \subseteq [\![\text{Russell and Whitehead}]\!]$, but the singleton set $\{\{\text{Russell, Whitehead}\}\}$ is not a subset of the two-membered set {Russell, Whitehead}.

# 5 Conclusion

The kind of singularism that emerges in response to the incorrect predication objection and the equivocity objection, I've argued, is best understood as involving a form of reference by

[23] Yi (2005, p. 471). I've adjusted the numbering. The argument is repeated in Yi (2006, p. 249)

[24] The response to Yi's argument might be different for the property-based singularist. She might reply that doubly-instantiated properties like $\hat{x}(x = \text{Russell} \vee x = \text{Whitehead})$ can only be denoted by plural terms. In response to the objection that one should be able to introduce a singular term for any object one likes, the property-based singularist has at least two options. One move, paralleling the set-based singularist's response, would be to grant that we can introduce a term 'Genie' to *refer to* the property in question, but that what this term will *denote* is the singly-instantiated property $\hat{y}(y = \hat{x}(x = \text{Russell} \vee x = \text{Whitehead}))$. Alternatively, the singularist could go type-theoretic and insist, in a Fregean vein, that $\hat{x}(x = \text{Russell} \vee x = \text{Whitehead})$ is not an object but an entity of a genuinely higher logical type, and that singular terms not only don't denote such entities, but also cannot refer to them, since only objects can ever be referred to. (Though care will need to be taken in articulating this second reply, since the previous sentence on the face of it involves reference to the relevant property in the course of denying that very possibility. I have discussed this kind of difficulty in Rieppel (2018).)

proxy. Although the singularist and pluralist assign different semantic values to plural (and singular) terms, the two positions agree at the level of reference, about what those terms refer to. The singularist proposal is, in a sense, just a scrambled version of the pluralist alternative.

By way of conclusion, we may ask whether singularism must end up in this position vis-à-vis pluralism, or if there isn't yet room for singularism to distinguish itself at the level of reference. Note that the distinction between what plural terms denote and what they refer to arises in the context of the singularist semantics thanks to the involvement of the unpacking operation $u(.)$ which was employed to avoid the incorrect predication objection. So singularism could potentially distinguish itself from pluralism at the level of reference if a different reply were given to that objection. The problem, again, was that if plural terms (or singular ones) denote sets, then sentences like 'Alice and Béla wrote a book' or 'Alice is wise' threaten to require for their truth that a certain set wrote a book, or is wise. This was taken to be a problem because sets aren't wise and don't write books, whereas the two sentences could well be true.

The singularist might, however, insist that the set {Alice, Béla} *did* write a book, or that the singleton set {Alice} *is* wise. Indeed, singularists have occasionally suggested going just that route. Schwarzschild (1996), for example, treats singular terms as denoting singleton sets, but proposes to supplement this with a "mildly non-standard set-theory" on which "individuals are identified with their singleton sets" (Schwarzschild, 1996, p. 1).[25] On this view, the singleton set {Alice} *can* be wise, because that set is nothing other than Alice herself. Views similar in spirit have also been proposed for multi-membered sets. In the course of considering the incorrect predication objection, for example, Cresswell (1985) suggests that sets need not be understood as abstract entities, but might be as concrete as their members — a point favorably repeated by both Landman (1989) and Lasersohn (1995). So insofar as the incorrect predication objection is motivated by the thought that the set {Alice, Béla} can't have written a book because only concrete things can write books, this strategy would avoid the objection. Such a proposal might be extended by furthermore maintaining that the set can write a book because the individuals Alice and Béla just *are* (collectively) the set {Alice, Béla}, much like Alice is identical to the singleton {Alice}. This move would then incur a commitment to the view that many things can collectively

[25]This style of set theory was proposed by Quine (1969). By identifying urelements with their singletons, Quine aimed to allow for an unrestricted formulation of the axiom of extensionality $\forall x(x \in y \equiv x \in z) \rightarrow y = z$ on which it holds quite generally, for sets and urelements alike. Socrates and Plato won't be ruled identical by the axiom, because Socrates *qua* {Socrates} has Socrates as a member, but Plato does not.

be identical to one thing.

It is not my purpose to develop these proposals, let alone defend them. They do, however, serve to illustrate that in light of our discussion there is an important distinction to be drawn between different forms a singularist view might take. On the one hand, there is *denotational singularism*, which commits itself to singularism at the level of semantic values, but may, as we've seen, simply amount to a scrambled version of pluralism. A more ambitious form of singularism would be *referential singularism*, which seeks to treat plural terms as not simply denoting but referring to sets. What we've seen is that making good on that ambition may well require embracing controversial metaphysical commitments about the nature of those sets, and perhaps about identity as well. Referential singularism will, in any case, have go beyond the thesis that plural terms have single entities as their semantic values, since those semantic values need not be what the theory represents terms as referring to.

# References


Aloni, M. (2005). Individual Concepts in Modal Predicate Logic. *Journal of Philosophical Logic*, 34(1):1–64.

Boolos, G. (1984). To Be is to Be a Value of a Variable (or to Be Some Values of Some Variables). *The Journal of Philosophy*, 81(8):430–449.

Cresswell, M. (1985). Review of Landman and Veltman (eds.), 1984, Varieties of Formal Semantics. *Linguistics*, 23.

Dowty, D. R., Wall, R. E., and Peters, S. (1981). *Introduction to Montague Semantics*. D. Reidel Publishing Company.

Dummett, M. (1973). *Frege: Philosophy of Language*. Harvard University Press, Cambridge, MA.

Evans, G. (1982). *The Varieties of Reference*. Oxford University Press, Oxford.

Florio, S. (2014). Semantics and the Plural Conception of Reality. *Philosophers' Imprint*, 14(22):1–20.

Florio, S. and Nicolas, D. (2021). Plurals and Mereology. *Journal of Philosophical Logic*, 50:415–445.

Heim, I. and Kratzer, A. (1998). *Semantics in Generative Grammar*. Blackwell, Malden, MA.

Higginbotham, J. and Schein, B. (1989). Plurals. *Proceedings of the North Eastern Linguistics Society*, 19:161–175.

Janssen, T. M. (1997). Compositionality. In van Benthem, J. and ter Meulen, A., editors, *Handbook of Logic and Language*, pages 417–473. Elsevier, Amsterdam.

Landman, F. (1989). Groups, I. *Linguistics and Philosophy*, 12(5):559–605.

Lasersohn, P. (1995). *Plurality, Conjunction, and Events*. Kluwer Academic Publishers, Dordrecht.

Lewis, D. (1970). General Semantics. *Synthese*, 22:18–67.

Lewis, D. (1980). Index, Context, Content. In Kanger, S. and Öhman, S., editors, *Philosophy and Grammar*, pages 79–100. D. Reidel Publishing Company.

Lewis, D. (1983). New Work for a Theory of Universals. *Australasian Journal of Philosophy*, 61(4):343–377.

Lewis, D. (1984). Putnam's Paradox. *Australasian Journal of Philosophy*, 62(3):221–36.

Link, G. (1983). The Logical Analysis of Plural and Mass Terms: a Lattice Theoretic Approach. In Bäuerle, R., Schwarze, C., and von Stechow, A., editors, *Meaning, Use and Interpretation of Language*, pages 302–323. Walter de Gruyter, Berlin.

Link, G. (1984). Hydras: On the logic of relative constructions with multiple heads. In Landman, F. and Veltman, F., editors, *Varieties of Formal Semantics. Proceedings of the Fourth Amsterdam Colloquium*. Foris, Dordrecht.

Link, G. (1998). *Algebraic Semantics in Language and Philosophy*. CSLI Publications.

Linnebo, O. (2017). Plural Quantification. *The Stanford Encyclopedia of Philosophy*.

McKay, T. (2006). *Plural Predication*. Oxford University Press.

Montague, R. (1973). The Proper Treatment of Quantification in Ordinary English. In Hintikka, K., Moravcsik, J., and Suppes, P., editors, *Approaches to Natural Language*, pages 221–242. D. Reidel Publishing Company, Dordrecht.

Ninan, D. (2010). Semantics and the Objects of Assertion. *Linguistics and Philosophy*, 33:355–380.

Nouwen, R. (2016). Plurality. In Aloni, M. and Dekker, P., editors, *The Cambridge Handbook of Formal Semantics*, pages 267–284. Cambridge University Press, Cambridge.

Oliver, A. and Smiley, T. (2001). Strategies for a Logic of Plurals. *The Philosophical Quarterly*, 51(204):289–306.

Oliver, A. and Smiley, T. (2016a). *Plural Logic*. Oxford University Press, Oxford, 2nd edition.

Oliver, A. and Smiley, T. (2016b). Singularist predicative analyses and boolos's second order pluralism. In *Unity and Plurality: Logic, Philosophy, and Linguistics*, pages 33–54. Oxford University Press.

Putnam, H. (1977). Realism and Reason. *Proceedings and Addresses of the American Philosophical Association*, 50(6):483–498.

Putnam, H. (1980). Models and Reality. *The Journal of Symbolic Logic*, 45(3):464–482.

Putnam, H. (1981). *Reason, Truth and History*. Cambridge University Press.

Quine, W. V. O. (1969). *Set Theory and Its Logic*. Harvard University Press, Cambridge, MA.

Rabern, B. (2012). Against the Identification of Assertoric Content with Compositional Value. *Synthese*, 189(1):75–96.

Rabern, B. (2013). Monsters in Kaplan's Logic of Demonstratives. *Philosophical Studies*, 164(2):393–404.

Rayo, A. (2002). Word and Objects. *Noûs*, 36(3):436–464.

Rayo, A. and Uzquiano, G., editors (2006). *Absolute Generality*. Oxford University Press, Oxford.

Rieppel, M. (2018). Denoting and Disquoting. *Australasian Journal of Philosophy*, 96(3):548–561.

Scha, R. (1981). Distributive, Collective, and Cummulative Quantification. In Groenendijk, J., Janssen, T., and Stokhof, M., editors, *Formal Methods in the Study of Language, Part 2*. Mathematisch Centrum, Amsterdam.

Schwarzschild, R. (1996). *Pluralities*. Kluwer Academic Publishers.

Sider, T. (2011). *Writing the Book of the World*. Oxford University Press.

Simchen, O. (2017a). Metasemantics and Singular Reference. *Noûs*, 51(1):175–195.

Simchen, O. (2017b). *Semantics, Metasemantics, Aboutness*. Oxford University Press.

Simchen, O. (2020). Modeling Truth for Semantics. *Analytic Philosophy*, 61(1):28–36.

Taylor, B. (2006). *Models, Truth, and Realism*. Oxford University Press.

Williams, R. G. (2007). Eligibility and Inscrutability. *The Philosophical Review*, 116(3):361–399.

Yablo, S. (2014). *Aboutness*. Princeton University Press, Princeton NJ.

Yi, B.-U. (2005). The Logic and Meaning of Plurals, Part 1. *Journal of Philosophical Logic*, 34(5/6):459–506.

Yi, B.-U. (2006). The Logic and Meaning of Plurals, Part 2. *Journal of Philosophical Logic*, 35:239–288.

Yli-Vakkuri, J. (2013). Propositions and Compositionality. *Philosophical Perspectives*, 27:526–563.