Essays on Semantic Content and Context-Sensitivity

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Abstract

The thesis comprises three foundational studies on the topics named in its title, together with an introduction.

Ch. 1 argues against a popular combination of views in the philosophy of language: Propositionality, which says that the semantic values of natural language sentences (relative to contexts) are the propositions they express (in those contexts) and Compositionality, which says that the semantic value of a complex expression of a natural language (in a context) is determined by the semantic values its immediate constituents have (in that same context) together with their syntactic mode of combination. Ch. 1 argues that the Naïve Picture is inconsistent with the presence of variable-binding in natural languages.

Ch. 2 criticizes the strategy of using "operator arguments" to establish relativist conclusions such as: that the truth values of propositions vary with time (Time Relativism) or that they vary with location (Location Relativism). Operator arguments purport to derive the conclusion that propositions vary in truth value along some parameter *P* from the premise that there are, in some language, sentential operators that operate on or "shift" the *P* parameter. I identify two forms of operator argument, offer a reconstruction of each, and I argue that both they rely on an implausible, coarse-grained conception of propositions.

Ch. 3 is an assessment of the prospects for semantic internalism. It argues, first, that to accommodate Putnam's famous Twin Earth examples, an internalist must maintain that narrow semantic content determines different extensions relative to agents and times. Second, that the most thoroughly worked out version of semantic internalism – the epistemic two-dimensionalism (E2D) of David Chalmers – can accommodate the original Twin Earth thought experiments but is refuted by similar thought experiments that involve temporally or spatially symmetric agents.

Contents

Acknowledgements

I am, of course, above all indebted to my supervisors: (in alphabetical order) Cian Dorr and John Hawthorne. (Alphabetical order because neither of them is a primary supervisor, and because I am not aware that either of them spent more time supervising me than the other.) Both have been model supervisors: extraordinarily generous with their time, always supportive, and never short on excellent suggestions. Tim Williamson also deserves thanks for delivering a set of comments containing characteristically excellent suggestions on an early draft of ch. 1. I am fairly confident that, with detailed comments from John, Cian, and Tim, and many hours spent discussing the material and poring over drafts with John and Cian, I received the best PhD supervision in philosophy that was available on Earth in 2009-2012. This makes the many shortcomings of the present thesis all the less forgiveable.

Tim deserves additional thanks for the extensive comments and corrections he delivered on the penultimate draft of this thesis in his capacity as my internal examiner, along with Jason Turner as my external.

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0
Introduction

This thesis comprises three studies on *semantic content* – in actual natural languages, in merely possible natural languages, and merely possible non-natural languages. (Most of the examples in the thesis, however, are taken from an actual natural or quasi-natural language: what I call *Philosophers' English*, which is English embellished with some logico-mathematical symbols commonly used by philosophers.) 'Semantic content' is, of course, not my term. It is a term with wide currency in the philosophy of language literature – perhaps originating in Kaplan's introduction of the term 'Content' (capital 'C') for (some of) the things that are *said* by an assertoric utterance of a declarative sentence.[1] (The word 'sentence' hereafter will refer only to declarative sentences.) The only things that I take to be certain about semantic content are the following: the semantic content of a sentence is a *proposition*; sentences – at least, sentences of natural languages – typically are capable of having different semantic contents in different contexts (without a change in the meaning of the sentence), i.e., are *context-sensitive*; semantics (by which I mean semantics in the truth-conditional tradition[2]) is, in some way, directly or indirectly, about semantic content.

[1] This is pure speculation, based on nothing other than my ignorance of uses of the term 'content' to mean something like *semantic content* in published work prior to 1977, when a draft of Kaplan (1989a) began to circulate in mimeograph. The notion of semantic content was perhaps first made reasonably clear in Kripke (1977) (although Kripke did not use the term 'content'), building on earlier work by Grice.

[2] Some paradigms: Montague (1974, chs. 6, 7, 8), Lewis (1970), Kaplan (1989a), and Heim and Kratzer (1998).

The first chapter argues against a certain naïve picture – which I have named the *Naïve Picture* – of semantic content. The Naïve Picture comprises two claims: first, that the *semantic value* of a sentence of a natural language (in a context) is its semantic content, a proposition (I call this claim *Propositionality*). Second, that the semantic value assignment for any natural language is (in a sense to be made precise in ch. 1, §1) compositional (I call this claim *Compositionality*). The Naïve Picture is a view specifically about natural languages – presumably no one thinks that it is metaphysically necessary that every language is such that the semantic values of its sentences in contexts are propositions, and its semantic value assignment is compositional. And it is a popular view about natural languages, at least among philosophers. Yet it is false.

Ch. 1 argues at length against the Naïve Picture, but says hardly anything about what might be thought to be attractive about the Naïve Picture, so let me say a few things about that now.

I said that by "semantics" I mean semantics in the truth-theoretic tradition – the broadly speaking Tarski-inspired tradition, which is, even more broadly, Frege-derived. In this tradition (as reconstructed in Lewis 1980[3]), the goal of semantic theorizing about some language is to construct a theory that specifies the truth conditions of all of the sentences of the language, holding the meanings of the words of the language fixed. (Of course, on model-theoretic approaches, such as those of Montague (1974) and Kaplan (1989a), the meanings of nonlogical words are not held fixed, but a theory of truth conditions in the usual sense can be obtained from a model-theoretic semantics by

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[3] In fact, Lewis's (1980) story of what semantics is about is not presented as a reconstruction of a tradition, but I think it could well serve that purpose, and I will make it serve that purpose. A very similar story motivating their approach to semantics is found in a chapter titled "Executing the Frege Program" in Heim and Kratzer's natural language semantics textbook (Heim and Kratzer 1998: ch. 2).

adding to it a specification of the intended model.) The truth values of sentences depend on the semantic properties of their parts, some of which may be other sentences. A natural way to represent this dependence is to assign objects – *semantic values* – to whole sentences and their parts. For a very simple fragment E_0 of English that contains only proper names, non-context-sensitive intransitive verbs, and 'and' and 'it is not the case that' as sentential operators, it would be sufficient to let the semantic values of sentences be their truth values, of names be the objects they refer to, and of intransitive verbs the sets of objects they apply to. Such a semantic value assignment is compositional, and it enables us to characterize truth for E_0 by specifying the obvious compositional rules for how the semantic values of complex expressions depend on the semantic values of their parts, and by adding: a sentence *S* of E_0 is true iff the semantic value of *S* is Truth.

Call the language that results from adding to E_0 the sentential operator 'it is necessary that' "E_1". Clearly, if we continue to insist that the semantic values of sentences be their truth values, the semantic value assignment for E_1 will fail to be compositional because there are pairs of sentences *S*, *S′* in E_1 such that *S* and *S′* have the same truth value but ⌜ It is necessary that *S* ⌝ and ⌜ It is necessary that *S′* ⌝ differ in truth value. To restore compositionality, we must find more fine-grained semantic values for E_1-sentences (and verbs) – sets of metaphysically possible worlds would do.

As we keep adding sentential operators and other expressions to E_0, obtaining languages that come ever closer to the expressive power of English, maintaining compositionality will require ever more fine-grained semantic values for sentences. For example, using the further semantic assumptions discussed in ch. 2, §1, we can argue (as in ch. 2, §1.1.2) that the semantic values of sentences in the language that results from adding 'now' and 'always' to E_1 must be sets of world-time pairs (or equivalently,

functions from worlds and times to truth values). Adding propositional attitude operators requires semantic values for sentences that are even more fine-grained than sets of world-time pairs – propositions, presumably, are suitably fine-grained for this purpose. Perhaps, one might think, propositions are so fine-grained that they are fine-grained enough for *any* purpose – that is, even if we add to E_0 all of the rest of English, we can still both have a compositional semantic value assignment and regard propositions as the semantic values of sentences (in contexts; provided that we come up with suitable semantic values for subsentential expressions).

This, then, is one kind of reason someone might be attracted to the Naïve Picture: one wants to have a compositional semantic value assignment that determines the truth conditions of sentences (in contexts), one realizes that a language as complicated as English requires very fine-grained semantic values for sentences (in contexts), and one thinks that propositions are very fine grained. Given this, it is reasonable to suppose – in the absence of apparent counterexamples – that English, and any natural language, can have a compositional semantic value assignment that assigns propositions to sentences in contexts.

But apparent counterexamples have been presented – among others, by Lewis (1980), who argued that certain "shifty phenomena" require the semantic values of sentences (if compositionality is to be maintained) to be entities more fine-grained than propositions, but which nevertheless determine propositions in contexts. The counterexamples seem convincing, so why should anyone remain attracted to the Naïve Picture? Jeff King comments on Lewis (1980) as follows:

> Friends of propositions will not be happy to see propositions demoted in this way nor to see their motivation threatened. But if we go this far with Lewis, much more radical and unhappy conclusions threaten to follow. ... [If Lewis is right, then] assigning sentences propositions relative to contexts won't in the

> general case capture the contribution sentences make to the semantic values relative to contexts of larger sentences in which they occur (King 2007: 167)

It is not very clear from King's discussion what he finds "radical and unhappy" about Lewis's position, but here is a conjecture about why someone might say the things King is saying here in response to Lewis (I do not claim that this is King's reason for saying these things): one might think that propositions have a special explanatory role in semantics, such that if they weren't accorded that role in a theory calling itself a "semantics", it would no longer be clear if that theory was a semantic theory (in the truth-conditional tradition) at all. One such role might be that the truth of propositions explains all other truth: nothing could be true, or have a truth condition, except in virtue of being associated with a proposition that is true, or has a matching truth condition.[4] One might worry that this explanatory role is somehow imperiled by a semantic theory in which a sentence contributes something other than a proposition to the truth conditions of larger sentences in which it occurs as a part.

However that may be, the Naïve Picture is false. When it comes to natural languages (or, indeed, first-order logic), we have a choice between compositionality and propositions as the semantic values of sentences in contexts – we cannot have both. If this amounts to the "demotion" of propositions to second-class status, it could also be thought to represent the promotion of *meanings* (as I note in ch. 2, §4) to first class, so "friends of meanings", if there are any, should be happy. If sentence-meanings are, as I suggest in, 2, §4, functions from contexts to propositions, the promoter of meanings and demoter of propositions can still have a central explanatory role for propositions in semantics: the fact that a sentence has, in a context, a particular truth condition or truth

[4] See, e.g., Soames (1999, ch. 4) and Cappelen and Hawthorne (2009).

value is explained by the fact that the sentence's meaning assigns to that context a proposition with that truth condition or truth value.

Ch. 2 takes up the question of the parameter-relativity of the truth values determined by the semantic contents of sentences. It is commonly thought propositions have different truth values at different metaphysically possible worlds, but the claim that the truth value of a proposition can vary with additional parameters, such as time and location, is controversial. This claim has sometimes been called "relativism".[5] I call, for any parameter π, the claim that propositions (can) have different truth values with respect to different πs "π-Relativism". Some philosophers – most notably Kaplan (1989a) – have thought that, for any π, π-Relativism must be true if some language (presumably, this need not be a natural language, nor even an actual language) has sentential operators that "shift" π – i.e., roughly, operators that could be paraphrased by means of explicit quantifiers binding π-variables, in the way that ⌜ It is necessary that *S* ⌝ can be paraphrased as ⌜ For all worlds *w*, in *w*, *S* ⌝. This thought has been labelled "the operator argument", but, in fact, there are at least two operator arguments. One is derived from Lewis's (1980) argument against the Naïve Picture: Lewis's argument against the Naïve Picture was supposed to show that, if our semantics is compositional, then the semantic values of English sentences in contexts are functions from world-time-location triples to truth values, and in particular ones that vary with both world and time when we fix the other two arguments. Because Lewis rejected Time Relativism and Location Relativism, he concluded that the semantic values of (English) sentences in contexts could not be propositions, but an advocate of Time Relativism and Location Relativism could reject Lewis's conclusion, transforming his argument against the

[5] E.g., Zimmerman (2007) defines relativism as the position that propositions can vary in truth value with parameters other than world.

Naïve Picture into an argument for Time Relativism and Location Relativism. This is one form of operator argument. Another form of operator argument is derived from Kaplan's remarks about tense (or time-shifting) operators: Kaplan claimed that, if Time Relativism were false, then all tense operators would be vacuous, and, on the grounds that English has tense operators (that are not vacuous), he accepted Time Relativism. Similarly (Kaplan claimed), one could argue from the non-vacuity of a π-shifting operator, for any π, to π-Relativism. This is another form of operator argument. What I call the Standard Reply to the operator arguments follows King (2003) in claiming that (whenever π-Relativism is found to be offensive) the apparent π-shifting operators are in fact quantifiers that bind π-variables.

I argue that the Standard Reply is misguided: First, the operator arguments rely on a coarse-grained conception of propositions, and this is enough to make them suspect. Second, insofar as the advocates of the Standard Reply do not challenge the other premises of the operator arguments, they have no way of blocking a Lewis-style operator argument for a kind of relativism that everyone presumably rejects: Variable-Assignment Relativism. However, if the Naïve Picture is false, then the Lewis-style argument for Variable-Assignment Relativism is unsound – good news, since I already conclude in ch. 1 that the Naïve Picture is false.

Ch. 3 takes up the question of the *broadness* of semantic content, and relates it to certain relativist theses. In ch. 3, I drop the assumption, which was implicit in chs. 1-2, that a sentence has at most one semantic content in a context. Hilary Putnam's famous Twin Earth thought experiments are widely agreed to show that some sentences in some contexts have semantic contents that are *broad* (i.e., that are not determined by the intrinsic, qualitative properties of the speaker of the context). But they are also

widely thought *not* to have shown that sentences in contexts (sentence-utterances)[6] that express broad semantic contents do not also express *narrow* (i.e., not broad) semantic contents. According to *ecumenical semantic internalism*, there are two kinds of semantic content: broad and narrow. The main contention of ch. 3 can be summarized thus: the prospects for ecumenical semantic internalism are rather dim.

Ch. 3 comprises two largely independent parts:

Part I argues that Putnam's Twin Earth thought experiments show more than is commonly thought (*viz.*, that some semantic content is broad): they also show that, if sentences have narrow semantic contents in addition to their broad semantic contents, then their narrow semantic contents are ones capable of determining different truth values with respect to different times and agents within a single world.

Part II is an examination of the most carefully worked-out ecumenical internalist view on offer, which, perhaps not coincidentally, also endorses the time and agent-relativity of the narrow contents of sentences: the epistemic two-dimensionalism (E2D) of David Chalmers. Here I argue, using Twin-Earth-like examples involving spatially or temporally symmetric agents, that E2D's relativization of the truth values determined by the putative narrow contents ("1-intensions") of sentences to agents and times in addition to worlds is insufficient – further parameters are needed. However, I argue, the further parameters that are required are ones to which it is implausible to think the truth values of propositions are relative.

Some of the problems the symmetric agent cases discussed in Part II of ch. 3 pose for E2D as a theory of narrow content are specific to E2D, and can be defused by giving up some epistemic two-dimensionalist commitments that need not be

[6] The notion of "context" familiar from chs. 1-2 is not used in ch. 3. In ch. 3, sentences are evaluated for semantic content with respect to what I call "cases", which are world-utterance pairs. I see no harm in their conflation, however, for the purposes of this introduction.

commitments of all ecumenical internalists. However, the symmetric agent cases also impose (what I regard as) onerous constraints on any account of narrow semantic content: they conclusively show that the relativization of the truth values determined by the putative narrow semantic contents of sentences to worlds, agents, and times is not sufficient, and that even relativization to worlds, agents, times, and locations is not sufficient. Relativization to functions from expressions that have broad semantic contents to extensions (in effect, relativization to variable assignments), however, is sufficient, but this should be rejected for the same reasons why Variable Assignment Relativism was rejected in ch. 2. The relativization of the truth values determined by the narrow contents of sentences to utterances would also solve the problem posed by the symmetric cases, but while we may be able to make sense (say, for reasons invoked by Lewis 1979) of propositions being true or false with respect to a certain perspective within a world determined by an utterance (such as the perspective represented by the utterance's agent and time), it is extremely unclear what it could mean for a proposition to be true or false with respect to an utterance. The narrow semantic contents of sentences, if there are such things, are very unlike the propositions we are used to.

1

Propositions and Compositionality

1. Preliminaries

Here is a popular picture – call it the *Naïve Picture* – of the place of propositions in (natural language) semantics.

Sentences express propositions relative to (or in) contexts of utterance. While acknowledging that a sentence may be used to express many propositions in a context, the Naïve Picture holds that exactly one of the propositions expressed by a sentence *S* in a context *c* is of interest to semantics – I will call this the *proposition semantically expressed by S in c*, and write '$\langle S \rangle_c$' for the (possibly partial) function which assigns to each sentence *S* and each context *c* the proposition *S* semantically expresses in *c*. Since the only propositions of interest in this chapter are those which are semantically expressed by sentences in contexts, I will henceforth refer to $\langle S \rangle_c$ simply as the *proposition expressed* by *S* in *c*.

The Naïve Picture is, further, committed to the *primacy* of the proposition in semantics: according to it, what a semantics for a language $\mathcal{L}$ is *really, fundamentally* about is the function $\langle S \rangle_c$ whose domain is the set of pairs of $\mathcal{L}$-sentences and contexts.

This claim can be cashed out in various ways, of which the Naïve Picture endorses the following.

According to the Naïve Picture, a semantic theory for $\mathcal{L}$ defines an assignment $[\![X]\!]_c$ of *semantic values* to $\mathcal{L}$-expressions relative to contexts. The semantic value of a sentence in a context is the proposition it expresses in that context, i.e.

Propositionality

$\forall S\ \forall c\ [\![S]\!]_c = \langle S \rangle_c$,

where 'S' ranges over $\mathcal{L}$-sentences and 'c' over contexts.

Furthermore, the semantic value function obeys a principle of *Compositionality*, which is usually glossed along the following lines: *the semantic value of a complex $\mathcal{L}$-expression X in a context c is determined by the semantic values X's immediate constituents have in c, together with the way in which the constituents are combined*.

Such is the Naïve Picture. If the Naïve Picture is correct, then *Propositionality* and *Compositionality* are true. However, *Propositionality* and *Compositionality* are inconsistent with certain fairly uncontroversial facts about natural language and about the nature of propositions. We should, therefore reject the Naïve Picture by rejecting either *Propositionality* or *Compositionality*. This, to abstract from various details, is the main argument of the present chapter.

Before going on to make trouble for the Naïve Picture, we must get a bit clearer on just what it is committed to. *Propositionality* is, I take it, clear enough to anyone who makes use of the ideology of propositions in philosophy. The imprecision of the standard formulations of *Compositionality*, however, has been widely recognized and lamented, so something further must be said about it. Fortunately, I need not take any

position on which of the various ways of making *Compositionality* precise is the correct one; it suffices for my purposes to identify a way of making *Compositionality* precise which is weak enough that most other proposals for making it precise entail it while being strong enough to enable the derivation of my conclusions. And there is such a way of making *Compositionality* precise, which is:

> *Compositionality*
>
> ($\forall O$: O is an n-ary syntactic operation) ($\exists f$: f *is an* n-ary function) ($\forall X_1$, ..., X_n: $\exists Y$: $Y = O(X_1, ..., X_n)$) ($\forall c$) $[\![O(X_1, ..., X_n)]\!]_c = f([\![X_1]\!]_c, ..., [\![X_n]\!]_c)$.[7]

By "n-ary syntactic operation" I mean an operation that takes a list X_1, ..., X_n of expressions (which may include repetitions) and outputs an expression of which X_1, ..., X_n are immediate constituents. 'O' ranges over syntactic operations at the level of $\mathcal{L}$-syntax which, to give it the linguistics jargon, "interfaces" with semantics. Thus, *Compositionality* is not the principle of "direct compositionality";[8] *Compositionality* is consistent with sentences having "surface" forms which are different from their logical forms (LFs) and for which no principle of compositionality holds. Direct

[7] As I have written it, this principle does not allow the semantic composition function to vary with context – that is, "($\exists f$: f is an n-ary function)" has scope over "$\forall c$". However, a more liberal principle of compositionality in which these scopes are inverted appears to be endorsed by advocates of "unarticulated constituents" (e.g., Recanati 2004). This latter principle – *Context-Sensitive Compositionality*, to give it a name – would serve my purposes equally well, as nothing in the arguments of §2 turns on the assumption that the semantic composition function is context-invariant. However, as I point out in ch. 2, §1.1.2, *Compositionality* is inconsistent with the usual syncategorematic treatment of all modal and tense operators (as in Kaplan 1989a), because on a syncategorematic treatment *Compositionality* requires, e.g., that there be a function that takes, for every context c, $[\![S]\!]_c$ to $[\![\ulcorner$ Actually $S \urcorner]\!]_c$, and there is no such function. *Context-Sensitive Compositionality*, on the other hand, is consistent with the syncategorematic treatment of all modal and tense operators.

[8] See Barker and Jacobson (2007).

compositionality entails *Compositionality*, as according to direct compositionality there is only one level of syntax, but *Compositionality* does not entail direct compositionality.

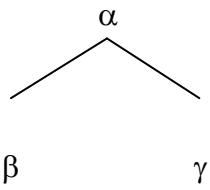
Three further remarks about *Compositionality* are in order.

First, according to the *letter* of mainstream syntax – by which I mean the syntax one finds in textbooks in the Chomskian tradition,[9] and which I presuppose throughout this chapter with the exception of §3.4 – there are syntactic operations of "movement". Movement operations take a constituent from the position in which it is heard in the pronounced constituent order of a sentence (its PF or Phonological Form) and move it to the position it must be in for semantic interpretation to proceed. An example is the operation of Quantifier Raising, which takes a quantifier phrase from the position in which it is heard and moves it to the front of a sentence, leaving behind a coindexed "trace" (in effect, a bound variable).[10] The LFs of sentences are said to be "derived" from their PFs by movement operations.[11] If we take such talk at face value, it will be unclear what *Compositionality* is committed to, as it will be unclear if there are any syntactic operations *at* LF – perhaps the only syntactic operations are those that compose a PF and move its constituents to produce an LF. And if there are no syntactic operations at LF, *Compositionality*, in the intended sense, is vacuously true – a disappointing vindication for the advocate of the Naïve Picture. However, this way of talking is not mandatory. The products of movement are trees (Heim and Kratzer 1998: §7.3), from which the syntactic operations of LF can be recovered: a tree

[9] Such as May (1985), Hornstein, (1995), and Radford (1997: 70).

[10] See May (1985: 5f) and Heim and Kratzer (1998: §7.3).

[11] Cf. the use of 'derived' in May (1985: 5) and Radford (1997: 70) and 'derivation' in Heim and Kratzer (1998: 185).



can be understood as representing α as the result of applying a syntactic operation to β and γ, in that order. This way of talking about LFs is adopted in the discussion to follow.

Second, in *Compositionality*, the "determines" of the standard, imprecise formulations is understood simply as asserting the existence of a *function* – one for each syntactic operation – that takes the semantic values of the immediate constituents of a complex expression to its semantic value. This is quite a modest requirement, in that no assumptions are made about what this function must be like; many semantic value assignments that are not humanly learnable thus count as "compositional" according to *Compositionality*. (E.g., it is sufficient for the truth of *Compositionality* that, for all distinct expressions *X* and *Y*, for all contexts *c*, $[\![X]\!]_c \neq [\![Y]\!]_c$ and, for all distinct contexts *c* and *c′*, for all expressions *X*, $[\![X]\!]_c \neq [\![X]\!]_{c'}$.) For this reason, it is sometimes said that *Compositionality* does not adequately capture the intended meaning of the standard inexact formulation (see Szabó 2000). This standard criticism does not undermine my use of *Compositionality*, as the critics do not reject *Compositionality*; their complaint is only that *Compositionality* is too weak to capture the intended meaning of the inexact formulation.

Third, in one respect *Compositionality* is stronger than my purposes require: the requirement that the semantic value of a complex expression in a context be determined by the semantic values of its *immediate* – as opposed to, say, ultimate – constituents in that context does no work at all in the arguments of this chapter. However, I use

Compositionality because it is the standard way of making the inexact formulation precise which one finds in the literature.[12] It is also clearly the principle called "compositionality" in Lewis (1980), to which the literature I will engage with in this paper is responding. According to Lewis:

> [T]he semantic value of any expression is determined by the semantic values of the (immediate) constituents from which it is built, together with the way in which it is built from them (*ibid*. p. 25).

Trouble promptly follows for the Naïve Picture if we make an additional, quite innocent assumption, which concerns so-called "shifty phenomena" in natural languages.

Some definitions are needed first. An *(alethic) parameter* is a set of entities with respect to which sentences can be evaluated as true or false: the set of worlds *W*, the set of times *T*, and the set of locations *L*, perhaps among others. A *context* is a sequence *c* of members of parameters (perhaps meeting some further conditions) which supplies as many of them as are needed to determine the truth value of a sentence: thus (perhaps), at least $c = \langle w_c, t_c, l_c \rangle$, where w_c is called the *world of c*, t_c the *time of c*, and l_c the *location of c*. I write "$|S|_c$" for the truth value *S* has in context *c*. If defined, $|S|_c$ is either Truth or Falsehood. The *modal profile* of a sentence *S* in a context *c*, which will be denoted by "$\{\!|S|\!\}_c$", is the set of worlds in which $\langle S \rangle_c$ is true.

Some sentential environments (linguistic environments in which sentences occur) are *shifty*, i.e. *shift* parameters; an environment is said to be *shifty for* π just in case it shifts the parameter π, and *shifty only for* π just in case it shifts π and shifts no other parameter. Unfortunately, there is no definition of this notion of *shifting* in the

[12] See Lewis (1980: 25), Szabó (1995) and (2000), Janssen (1997), and Hodges (2001).

literature except in terms of other technical-yet-undefined terms (as in the quotation from Lewis below, if it is intended as a definition). Instead of a definition, I will offer three ideas about what it is for an environment to be shifty for π. The first thought applies to the case of only-modal shiftiness (shiftiness only for the world parameter). The latter two are rough-and-ready glosses of the notion that may not be extensionally correct but, so I hope, will deliver the right results on the paradigm cases that are to be discussed in this chapter.

The first part of the first idea, which is common to all three, is that non-truth-functionality is a necessary condition of shiftiness; that is,

$$\ulcorner \ldots S \ldots \urcorner \text{ is shifty} \rightarrow \neg\exists f\, \forall S'\, \forall c\, |\ulcorner \ldots S' \ldots \urcorner|_c = f(|S|_c)).$$

The second part of the first idea is that, for environments that are *only-modally shifty*, necessary *and* sufficient conditions can be given. (I do not have necessary and sufficient conditions to offer for modal shiftiness, but that is just as well – the distinction between only-modally shifty environments and other kinds of shifty environments is the interesting one in the discussion to follow.) The necessary and sufficient conditions are:

$$\ulcorner \ldots S \ldots \urcorner \text{ is only-modally shifty} \leftrightarrow (i)\ \neg\exists f\, \forall S'\, \forall c\, |\ulcorner \ldots S' \ldots \urcorner|_c = f(|S|_c), \text{ and}$$

$$(ii)\ \exists f\, \forall S'\, \forall c\, |\ulcorner \ldots S' \ldots \urcorner|_c = f(\{\!|S|\!\}_c)$$

In other words, an only-modally shifty environment is one that is not truth-functional but is modal-profile functional. (This has the consequence that ⌜ Actually *S* ⌝ is not only-modally shifty – which seems correct: although 'actually' is a world operator, it is not a world *shifting* operator at all; rather, it is a world *fixing* or *rigidifying* operator.)

The second idea is Lewis's: we can gesture at what shiftiness amounts to in the following words.[13] An environment ⌜ ...*S*... ⌝ shifty for a parameter π is non-truth-

[13] One might think that a general definition of shiftiness-only-for-π could be given in terms of a generalized notion of π-profile, defined as follows.

(π-profile) For any parameter π, the π-profile of *S* in *c* is the set of members *i* of π such that *S* is true at the context that differs from *c* at most in that the π of *c* has been replaced by *i*.

The corresponding definition of only-π shiftiness would be:

(π-shifting) For all π, ⌜ ...*S*... ⌝ is shifty only for π if and only if ⌜ ...*S*... ⌝ is not truth-functional but is π-profile-functional.

However, (π-profile) and (π-shifting), together with reasonable assumptions about the kinds of sentential operators natural languages contain, entail that *no* operator is shifty only for time or only for worlds. The problem is that, according to the *new* notion of "world profile" supplied by (π-profile), for any context *c*, and any sentence *S*, the world profile of ⌜ Actually *S* ⌝ in *c* = the world profile of *S* in *c*. Similarly, given (π-profile), the time profile of ⌜ Now *S* ⌝ in *c* = the time profile of *S* in *c*. Yet, given (π-profile), the world profile of ⌜ Necessarily actually *S* ⌝ in *c* ≠ the world profile of ⌜ Necessarily *S* ⌝ in *c*, and the time profile of ⌜ Sometimes it is the case that now *S* ⌝ in *c* ≠ the time profile of ⌜ Sometimes it is the case that *S* ⌝ in *c*. The semantic machinery of *double-indexing* would be required for a satisfactory definition of shiftiness-only-for-π, but that machinery brings with it unwanted theoretical baggage: we must speak of a sentence having a truth value with respect to a pair of a context and something much like – perhaps exactly like – a context, an "index" (Lewis) or a "circumstance of evaluation" (Kaplan). In the picture that goes along with the machinery of double-indexing, the semantic value is determined by context, and the index/circumstance is an entity with respect to which the semantic value is evaluated for truth. In this picture, the existence of an operator that shifts a parameter π requires the semantic values sentences have at contexts to vary in truth value along π; this picture, therefore, unnecessarily embroils the defender and the critic of the Naïve Picture in the question of which parameters the truth of a proposition is relative to – the question of Relativism (discussed in ch. 2) is prematurely implicated.

A further disadvantage of the double-indexing picture is that it forces us to confront the question of whether a given operator, so to speak, "operates on" indices or contexts; operators that do the latter are (thanks to Kaplan) conventionally known as "monsters". Viewed through a Kaplanian lens, the arguments of §2 show that quantifiers (and variable-binding sentential operators generally) are monsters – a fact independently discovered by Rabern (2012). I prefer not to muddy the waters at this early stage with digressions into Kaplanology. The case for why variable assignments must be a feature of context rather than index/circumstance (and, therefore, why §2 shows quantifiers to be monstrous) is made in ch. 2: the alternative is an implausibly orthographic conception of propositions.

functional, but is such that the truth value of ⌜ ...*S*... ⌝ in *c* depends on the truth values *S* has with respect to πs other than the π provided by *c*; or, as Lewis puts it:

> Often the truth (-in-English) of a sentence in a context depends on the truth of some related sentence when some feature of the original context is shifted. 'There have been dogs.' is true now iff 'There are dogs.' is true at some time before now. 'Somewhere the sun is shining.' is true here iff 'The sun is shining.' is true somewhere. 'Aunts must be women.' is true at our world iff 'Aunts are women.' is true at all worlds (Lewis 1980: 27).

I will not attempt to make precise the meaning of "shifting a feature of context" here (see note 13 for a discussion of some of the difficulties of the project). The notion of the truth value of a sentence in one context depending on values of a parameter other than that provided by the context has a technical ring to it and cries out for a definition in non-technical terms. Unfortunately, none is provided by Lewis, and I cannot think of one myself.

The third thought, which I have not encountered elsewhere in the literature, but which seems to me to be getting at very nearly the same notion as Lewis's gloss, is this. ⌜ ...*S*... ⌝ is shifty for π iff ⌜ ...*S*... ⌝ is non-truth-functional and is logically equivalent to some sentence of the form ⌜ (*Qv*$_\pi$: *S′*) in/at *v*$_\pi$, *S* ⌝, where *Q* is a quantifier and *v*$_\pi$ a π-variable. (Of course, if ⌜ ...*S*... ⌝ is equivalent to ⌜ *Qv*$_\pi$*S* ⌝, with an unrestricted ⌜ *Qv*$_\pi$ ⌝, then ⌜ ...*S*... ⌝ is also equivalent to ⌜ (*Qv*$_\pi$: *S′*) in/at *v*$_\pi$, *S* ⌝, for some *S′* – e.g., for *S′* = ⌜ *v*$_\pi$ = *v*$_\pi$ ⌝.) Thus, ⌜ Possibly, *S* ⌝ is shifty for worlds because it is non-truth-functional and is logically equivalent to ⌜ ∃*w* in *w*, *S* ⌝; ⌜ It will be the case that *S* ⌝ is shifty for time because it is non-truth-functional and is logically equivalent to ⌜ (∃*t*: *t* > now) at *t*, *S* ⌝; ⌜ Somewhere, *S* ⌝ is shifty for location because it is non-truth-functional and is logically equivalent to ⌜ ∃*l* in *l*, *S* ⌝. ⌜ In *w*, *S* ⌝ itself is shifty for worlds, because it is

logically equivalent to ⌜ (∃*w′*: *w′* = *w*) in *w′*, *S* ⌝, and similarly for ⌜ At *t*, *S* ⌝, and ⌜ In *l*, *S* ⌝. (This criterion, on the other hand, too, rules 'actually' non-shifty because it is truth-functional, despite the fact that, if we allow ourselves a logical constant singular term '@' that, in each context, refers to the world of the context ⌜ Actually *S* ⌝, is logically equivalent to ⌜ (∃*w*: *w* = @) in *w*, *S* ⌝. It also rules 'now' and 'here' non-shifty, like the second idea; yet it rules (e.g.) 'yesterday', 'tomorrow', 'over there', 'in 1879', and 'in Australia' shifty because they are non-truth-functional, in spite of their being rigidifiers.)

Finally, the promised assumption:

Shiftiness

At least one natural language has at least one environment that is shifty but not only-modally shifty.

Shiftiness is hardly in contention, although the exact syntactic and semantic mechanisms by which it comes about that certain environments are shifty but not only-modally shifty are. However, Lewis's argument against the Naïve Picture made use, in addition to *Shiftiness*, of the contentious assumption that

Modal Coarseness

$\exists f \, \forall S \, \forall c \, \langle S \rangle_c = f(\{\!|S|\!\}_c)$.

Modal Coarseness says that the modal profile a sentence has in a context determines the proposition it expresses in the context, *viz*. that propositions (or, in any case, those expressed by sentences) are no more finely individuated than their truth conditions.

What Lewis showed (presumably; his argument is highly compressed and difficult to interpret) was that if *Modal Coarseness* and *Shiftiness* are true then *Propositionality* and *Compositionality* cannot both be true. In ch. 2, §1.1.2, we shall see that Lewis was right (if this is what he meant), but this can hardly be regarded as a decisive refutation of the Naïve Picture, as the advocate of the Naïve Picture has a simple, cost-free reply to Lewis's argument: reject *Modal Coarseness,* as most philosophers do anyway.

It is surprising, then, that this has not been the reply of the Naïve Picture's advocates. Since King (2003), a new consensus on Lewis (1980) has emerged which apparently takes Lewis to be trying to establish something more ambitious. I will call it *the Consensus*.[14] According to the Consensus, the dubious assumption in Lewis's attempted refutation of Naïve Picture is not *Coarseness* but a certain syntactic assumption which is not made explicit by Lewis. Let us say that ⌜ ...*S*... ⌝ is a *binding* environment just in case there is a sentence *S′* and a variable *v* such that *v* occurs free in *S′* but is bound in ⌜ ... *S′*... ⌝. According to the Consensus, Lewis's argument against the Naïve Picture rested on the following assumption.

> *Nonbinding*
>
> There is at least one natural language with at least one shifty but not only-modally shifty environment which is not a binding environment.[15], [16]

[14] See, *inter alia*, King (2003, 2007: ch. 3), Cappelen and Hawthorne (2009: ch. 3), Glanzberg (2011), and Ninan (2011). Most recently, echoing much other literature, Brogaard (forthcoming) sums up the Consensus by stating that "one obvious way to refute the argument for them would be to maintain that the tenses are quantifiers and not [non-variable-binding] operators (see King 2003)". Here Brogaard is referring to the use of the premises of Lewis's argument, against *Propositionality* (except for *Coarseness*) as an argument for Time Relativism (in the sense of ch. 2), but obviously this reply, if any good, is equally good against either application of the argument.

[15] I am ignoring the possibility that a language might have both π-shifting operators and π-variables. Nothing in the arguments below is affected by this.

The Consensus maintains that *Nonbinding* is false, and that instead:

> *Binding*
>
> There is at least one natural language with at least one shifty but not only-modally shifty environment, *and* any shifty but not only-modally shifty environment in any natural language is a binding environment.

The idea is that, if *Binding* is true, then (e.g.) ⌜ Somewhere *S* ⌝ will have an LF something like ⌜ $\exists l$ *S*(*l*) ⌝, where ⌜ *S*(*l*) ⌝ = *S* and *l* is a location variable free in ⌜ *S*(*l*) ⌝. Any sentential environment that appears to be shifty for a non-world parameter π is in fact the result of applying a quantifier to a sentence with a free occurrence of a π-variable. So says the Consensus.

Superficially, is difficult to see what discussions of whether *Binding* or *Nonbinding* is correct have to do with replying to Lewis (1980). On the most charitable interpretation, the Consensus has seen that the combination of *Propositionality* and *Compositionality* is problematic independently of *Coarseness*, as indeed it is (although there is no explicit acknowledgement of this fact in the pro-Consensus literature). However, the Consensus has misdiagnosed the problem. The two main tenets of the Consensus are that:

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[16] The Consensus prefers to say that its opponents think that nonmodal shiftiness is the result of applying "operators" to sentences: "operators" are contrasted with "quantifiers" in, e.g., King (2003 and 2007: ch. 3), Cappelen and Hawthorne (2009: ch. 3). The label "Sententiality" is used for (their version of) *Nonbinding* in Cappelen and Hawthorne (2009: 70), and in Glanzberg (2011). However, this is a misconceived way of putting the dichotomy: many expressions – e.g., 'for all *x*' – are both sentential operators and quantifiers.

(*i*) *Binding* is compatible with *Compositionality* and *Propositionality*.

(*ii*) (Lewis is right to the extent that) *Nonbinding* is incompatible with *Compositionality* and *Propositionality*.

What I mean here by "compatibility" is not mere logical consistency, as under that interpretation (*i*) is trivially true and (*ii*) trivially false. Rather, (*i*) means that there is no good argument (one using only noncontentious additional premises) from *Binding*, *Compositionality*, and *Propositionality* to an absurd conclusion; and (*ii*) means that there is a good argument from *Nonbinding*, *Compositionality*, and *Propositionality* to an absurd conclusion.

The main contention of the present chapter is that tenet (*i*) of the Consensus is false. In fact, if *Binding* is true, then either *Compositionality* or *Propositionality* is false. Tenet (*ii*) also false, although there is an interesting truth in the vicinity of (*ii*): that *Coarseness* is incompatible with *Compositionality*, and *Propositionality*, as we shall see in ch. 2, §1.1.2. Insofar as the advocates of the Naïve Picture advocate *Binding*, they must give up their advocacy of the Naïve Picture; insofar as *Binding* is plausible, the Naïve Picture is implausible. I find *Binding* plausible, but my case against the Naïve Picture will not rest on its plausibility. Once we see why (*i*) is false, it will become evident that an assumption much weaker than *Binding* will suffice for refuting (*i*) – the assumption that some natural language has both free and bound occurrences of pronouns will do.

In §2 of this chapter, I make the case against (*i*), and thereby against the Naïve Picture. In §3, I anticipate and reply to various objections to the argument of §2. In §4, I

ask how we should respond to the collapse of the Naïve Picture – by giving up *Propositionality* or *Compositionality*? – and I argue that the choice is not as consequential as it may seem, and is accountable at best to aesthetic and pedagogical considerations. The complications surrounding tenet (*ii*) of the Consensus are discussed in ch. 2.

2. Against the Naïve Picture

In this section, I present three arguments against tenet (*i*) of the Consensus, and thereby – as will be seen in §2.4 – against the Naïve Picture. The first argument, which I call the *Crude Argument*, is a mere warm-up – it uses a questionable assumption about tense. But it is, I think, useful to get this argument on the table first, as it enables a swift derivation of a contradiction from *Binding*, *Compositionality*, and *Propositionality*, together with assumptions that are (setting the questionable idealization aside) completely trifling. The next two arguments, the *Russellian Argument* and the *Fregean Argument*, exploit the structure of the Crude Argument but use weaker assumptions for *reductios* of *Binding*, *Compositionality*, and *Propositionality*, in which a contradiction is arrived at less swiftly. After presenting the three arguments, I argue that they warrant a conclusion considerably stronger than the negation of (*i*), one which enables us to refute the Naïve Picture from extraordinarily weak premises.

For definiteness, I will use the case of temporal shiftiness in all of the arguments, although any other variety of nonmodal shiftiness would have served just as well (in fact, as we will see in §2.4, even modal shiftiness would do). Temporal shiftiness in natural language is achieved primarily through the use of tenses and certain adverbs of quantification (e.g., 'always', 'sometimes'). There are various ways in which

the syntax of temporal shiftiness could work out if *Binding* is true, but for now I will assume that a temporally shifty sentence is of the form ⌜ *QtS*(*t*) ⌝, where ⌜ *Qt* ⌝ is a (possibly restricted) quantifier which binds all free occurrences of the time variable *t* in its scope, and *t* is free in ⌜ *S*(*t*) ⌝. (Other possibilities are considered in §3.) ⌜ *Qt* ⌝ may itself contain a free occurrence of a second time variable, as in the putative LF of 'Mary will be happy' (see §3.3.1):

$(\exists t_1\colon t_1 > t_2)$ *happy*(*Mary*, t_1),

Whenever a variable occurs free in a sentence, as t_2 does above, I will assume that its semantic value is supplied by context – a standard assumption in semantics as done by linguists.[17] To simplify matters further, I will not discuss tense at all and will use the examples

Sometimes, Mary is happy

Mary is happy

and assume that they have, respectively, the LFs

$\exists t_1$ *happy*(*Mary*, t_1)

happy(*Mary*, t_1)

[17] See, e.g., May (1985: 21), Heim and Kratzer (1998: 242). This is also the approach adopted in Cresswell (1990: 19) and in Stanley (2000).

It is standard practice in semantics to assign indices to variables, as above[18] – the representation of multiple generality obviously requires some equivalent device. (Perhaps ⌜ *happy*(Mary, t_1) ⌝ conceals some logical structure, as 'Mary is happy' is in the present tense, but this is an irrelevant detail; hidden structure or no, 'Sometimes, Mary is happy' must contain a time variable bound in it but free in its embedded sentence, if *Binding* is true.)

2.1. The Crude Argument

The Crude Argument makes use of the assumption

T-Var

$\forall v$ (v's domain = $T \rightarrow \forall c\ [\![v]\!]_c = t_c$),

where 'v' ranges over variables, *viz*. that, in each context, the semantic value of a time variable is the time of the context. *T-Var* says, in other words, that the semantic value of a time variable in a context is the time of the context. *T-Var* is close enough to true: an unpronounced free time variable is typically assigned the time of utterance, which is represented by t_c. Let us suppose for the moment that *T-Var* is true.

Together with the following trifling assumptions, *T-Var* enables a *reductio* of the Naïve Picture.

M-Uniqueness

$\exists f\ \forall S\ \forall c\ \{\!|S|\!\}_c = f(\langle S \rangle_c)$

T-Uniqueness

$\forall c\ \exists f\ \forall S\ |S|_c = f(\{\!|S|\!\}_c)$

[18] See, e.g., May (1985: ch 1), Heim and Kratzer (1998: 111f).

Equivalence

$\forall S\ \forall S'$(*S* is logically equivalent to $S' \rightarrow \forall c\ \{\!|S|\!\}_c = \{\!|S'|\!\}_c$)

M-Uniqueness says that the proposition a sentence expresses in a context determines its modal profile in that context; *T-Uniqueness* says that the modal profile (truth condition) of a sentence in a context determines its truth value in that context; *Equivalence* says that logically equivalent sentences have the same modal profile in every context.

Given that 'Sometimes, Mary is happy' and 'Mary is happy', respectively, have LFs of the form $\ulcorner\ \exists t_1 S(t_1)\ \urcorner$ and $\ulcorner\ S(t_1)\ \urcorner$, we can argue as follows.

First we make the trifling assumption that there is some context in which 'Sometimes, Mary is happy' and 'Mary is happy' have different truth values: that is:

(Trifle) $\quad \exists c\ |\!|\ulcorner\ \exists t_1 S(t_1)\ \urcorner|\!|_c \neq |\!|\ulcorner\ S(t_1)\ \urcorner|\!|_c$

(Trifle) does not, of course, follow from the assumption that 'sometimes' is shifty for time, but it does follow from that assumption that there is *some* sentence *S* such that there is some context *c* such that $\ulcorner$ Sometimes *S* $\urcorner$ and *S* differ in truth value in *c*. We may as well suppose that 'Mary is happy' is such an *S* – if it is not, some other sentence can serve in its place in the argument.

Next, we note that the following is an immediate corollary of *Compositionality*:

Substitution

If X and Y are immediate constituents of ⌜ ...X... ⌝ and ⌜ ...Y... ⌝, and ⌜ ...X... ⌝ and ⌜ ...Y... ⌝ are formed, respectively, by applying the same syntactic operation to X and Y, then: if $[\![X]\!]_c = [\![Y]\!]_c$ then $[\![$⌜ ...Y... ⌝$]\!]_c = [\![$⌜ ...Y... ⌝$]\!]_c$.

Then we consider any time variable distinct from t_1 – say, t_2 – and proceed:

(1)	$[\![t_1]\!]_c = [\![t_2]\!]_c$	(by T-*Var*)
(2)	$[\![$⌜ $S(t_1)$ ⌝$]\!]_c = [\![$⌜ $S(t_2)$ ⌝$]\!]_c$	(from (1) by *Substitution*)
(3)	$[\![$⌜ $\exists t_1 S(t_1)$ ⌝$]\!]_c = [\![$⌜ $\exists t_1 S(t_2)$ ⌝$]\!]_c$	(from (2) by *Substitution*)
(4)	$\langle$⌜ $\exists t_1 S(t_1)$ ⌝$\rangle_c = \langle$⌜ $\exists t_1 S(t_2)$ ⌝$\rangle_c$	(from (3) by *Propositionality*)
(5)	$\langle$⌜ $S(t_1)$ ⌝$\rangle_c = \langle$⌜ $S(t_2)$ ⌝$\rangle_c$	(from (2) by *Propositionality*)
(6)	$\{\!\{$⌜ $\exists t_1 S(t_1)$ ⌝$\}\!\}_c = \{\!\{$⌜ $\exists t_1 S(t_2)$ ⌝$\}\!\}_c$	(from (4) by *M-Uniqueness*)
(7)	$\{\!\{$⌜ $\exists t_1 S(t_2)$ ⌝$\}\!\}_c = \{\!\{$⌜ $S(t_2)$ ⌝$\}\!\}_c$	(by *Equivalence*)
(8)	$\{\!\{$⌜ $S(t_1)$ ⌝$\}\!\}_c = \{\!\{$⌜ $S(t_2)$ ⌝$\}\!\}_c$	(from (5) by *M-Uniqueness*)
(9)	$\{\!\{$⌜ $\exists t_1 S(t_1)$ ⌝$\}\!\}_c = \{\!\{$⌜ $S(t_1)$ ⌝$\}\!\}_c$	(from (6), (7), (8))
(10)	$\lvert$⌜ $\exists t_1 S(t_1)$ ⌝$\rvert_c = \lvert$⌜ $S(t_1)$ ⌝$\rvert_c$	(from (9) by *T-Uniqueness*)
(11)	$\forall c \lvert$⌜ $\exists t_1 S(t_1)$ ⌝$\rvert_c = \lvert$⌜ $S(t_1)$ ⌝$\rvert_c$	(because c was arbitrary)

(11) contradicts (Trifle).

This concludes the Crude Argument. *Compositionality*, *Propositionality*, and *Binding* together with three logico-semantic platitudes and the innocent assumption that 'Mary is happy' witnesses the non-truth-functionality of 'sometimes' entail – together with *T-Var* – a contradiction. That (*i*) is false is at least as certain as *T-Var*.

2.2. The Russellian Argument

The Crude Argument was so-called because the sole non-platitudinous assumption used in it, *T-Var*, is false. *T-Var* entails that, in every context, every time variable has the same semantic value, but the interpretation of some sentences requires context to supply different semantic values for free occurrences of different time variables: e.g., because utterances take time, a sentence like 'It is raining and... [*imagine a long pause in the utterance*] it is not raining' must be capable of being true in some contexts. In other words, a context must supply, among other things, a variable assignment. [19] (This is even more obvious when we consider non-time variables: there is no upper bound to how many distinct persons distinctly indexed occurrences of 'he' can refer to in one sentence.) Writing 'A_c' for the variable assignment provided by context *c*, the following seems a plausible principle.

Direct Reference for Variables (DRV)

$\forall v \, \forall c \, [\![v]\!]_c = A_c(v)$,

The variable-as-interpreted-under-an-assignment is the very paradigm of direct reference: under an assignment *g*, a variable *v* contributes $g(v)$ – and nothing else – to propositions expressed (under *g*) by sentences in which it occurs.[20] If this is correct, then there is no alternative to DRV, because, by *Propositionality* and *Compositionality*,

[19] This is a standard assumption in natural language semantics. Kaplan (1989a) is notable for excluding variable assignments from what he calls "contexts" (world-agent-time-location quadruples) – however, in his "Afterthoughts" to (1989a), Kaplan instructs us to think of contexts as incorporating a variable assignment coordinate (Kaplan 1989b: §III).

[20] See, e.g., Kaplan (1989b: 571f), Soames (2002: ch. 2), and Schiffer (2003: ch. 1).

an expression's propositional contribution is its semantic value.[21] Of course, there are philosophers who find the idea of direct reference incoherent or abhorrent (the next section is written for them), but I presume that those who find it neither incoherent nor abhorrent will agree with me that variables-under-assignment are directly referential – even if no other expressions are – and accordingly accept DRV.

Now, for the argument against (*i*), we consider a context *c* such that $A_c(t_1) = A_c(t_2)$, and we argue:

(0)	$A_c(t_1) = A_c(t_2)$	(assumption)
(1)	$[\![t_1]\!]_c = [\![t_2]\!]_c$	(from (0) by DRV)
(2)	$[\![\ulcorner S(t_1) \urcorner]\!]_c = [\![\ulcorner S(t_2) \urcorner]\!]_c$	(from (1) by *Substitution*)
(3)	$[\![\ulcorner \exists t_1 S(t_1) \urcorner]\!]_c = [\![\ulcorner \exists t_1 S(t_2) \urcorner]\!]_c$	(from (2) by *Substitution*)
(4)	$\langle\!\langle \ulcorner \exists t_1 S(t_1) \urcorner \rangle\!\rangle_c = \langle\!\langle \ulcorner \exists t_1 S(t_2) \urcorner \rangle\!\rangle_c$	(from (3) by *Propositionality*)

Again, at step (4), we have reached an absurd conclusion: that $\ulcorner \exists t_1 S(t_1) \urcorner$ and the vacuously quantified $\ulcorner \exists t_1 S(t_2) \urcorner$ express the same proposition in *c*. As before, 'sometimes' is semantically vacuous in *c*.

Also as before, we can continue the argument:

(6)	$\{\!\{\ulcorner \exists t_1 S(t_1) \urcorner\}\!\}_c = \{\!\{\ulcorner \exists t_1 S(t_2) \urcorner\}\!\}_c$	(from (4) by *M-Uniqueness*)
(7)	$\{\!\{\ulcorner \exists t_1 S(t_2) \urcorner\}\!\}_c = \{\!\{\ulcorner S(t_2) \urcorner\}\!\}_c$	(by *Equivalence*)

[21] This is why the variable under an assignment was the paradigm by means of which Kaplan (1989b: 571f) introduced the notion of direct reference. The primitive notion, for Kaplan and myself, is that of a sentence with a free variable expressing a proposition under an assignment; the notion of direct reference *for a variable* is, as it were, abstracted from that notion.

(8) $\{\!\{\ulcorner S(t_1) \urcorner\}\!\}_c = \{\!\{\ulcorner S(t_2) \urcorner\}\!\}_c$ (from (5) by *M-Uniqueness*)

(9) $\{\!\{\ulcorner \exists t_1 S(t_1) \urcorner\}\!\}_c = \{\!\{\ulcorner S(t_1) \urcorner\}\!\}_c$ (from (6), (7), (8))

(10) $|\ulcorner \exists t_1 S(t_1) \urcorner|_c = |\ulcorner S(t_1) \urcorner|_c$ (from (9) by *T-Uniqueness*)

This time, however, we cannot derive a contradiction as swiftly as in the Crude Argument, because *c* was not entirely arbitrarily chosen. We made an assumption about *c*: that $A_c(t_1) = A_c(t_2)$, so we can only draw the following conclusions

($\forall$4) $\forall c\, \forall S\, \forall j\, \forall k\, [(j \neq k \wedge A_c(t_j) = A_c(t_k)) \rightarrow \langle\ulcorner \exists t_j S(t_j) \urcorner\rangle_c = \langle\ulcorner \exists t_j S(t_k) \urcorner\rangle]$ [22]

($\forall$9) $\forall c\, \forall S\, \forall j\, \forall k\, [(j \neq k \wedge A_c(t_j) = A_c(t_k)) \rightarrow \{\!\{\ulcorner \exists t_j S(t_j) \urcorner\}\!\}_c = \{\!\{\ulcorner S(t_j) \urcorner\}\!\}_c]$

($\forall$10) $\forall c\, \forall S\, \forall j\, \forall k\, [(j \neq k \wedge A_c(t_j) = A_c(t_k)) \rightarrow |\ulcorner \exists t_1 S(t_j) \urcorner|_c = |\ulcorner S(t_j) \urcorner|_c]$,

where '*k*' and '*j*' range over variable indices. While not yet contradictions, ($\forall$4)-($\forall$10) are certainly absurd. What they tell us is that is that, in any context whose variable assignment assigns the same object to any two distinct time variables, any existential quantification of either variable will be semantically vacuous: according to ($\forall$4), the quantification will express the same proposition as a vacuous quantification using the same variable; according to ($\forall$9), the quantified sentence will have the same modal profile as its matrix; and, according to ($\forall$10), will have the same truth value. Thus, for example, $\ulcorner \exists t_1$ *happy*(*Mary*, t_1) $\urcorner$ has the same truth condition and truth value as $\ulcorner$ *happy*(*Mary*, t_1) $\urcorner$ in *c* if there is a time variable t_i ($i \neq 1$) such that $A_c(t_1) = A_c(t_i)$.

But, of course, nothing in the argument turned on t_j and t_k being *time* variables – so we can universally generalize on the '*t*'s in ($\forall$4)- ($\forall$10), and conclude that:

[22] Here 'v_i' denotes the function that takes *i* to the π-variable with index *i*.

($\forall\forall$4) $\forall v\ \forall c\ \forall S\ \forall j\ \forall k\ [(j \neq k\ \wedge A_c(v_j) = A_c(v_k)) \rightarrow \langle \ulcorner\ \exists v_j S(v_j)\ \urcorner \rangle_c =$

$\langle \ulcorner\ \exists v_j S(v_k)\ \urcorner \rangle]$[23]

($\forall\forall$9) $\forall v\ \forall c\ \forall S\ \forall j\ \forall k\ [(j \neq k \wedge A_c(v_j) = A_c(v_k)) \rightarrow \{\!\{\ulcorner\ \exists v_j S(v_j)\ \urcorner\}\!\}_c = \{\!\{\ulcorner\ S(v_j)\ \urcorner\}\!\}_c]$

($\forall\forall$10) $\forall v\ \forall c\ \forall S\ \forall j\ \forall k\ [(j \neq k \wedge A_c(v_j) = A_c(v_k)) \rightarrow |\ulcorner\ \exists v_1 S(v_j)\ \urcorner|_c = |\ulcorner\ S(v_j)\ \urcorner|_c]$,

To finally obtain a contradiction, consider a sentence of the form

($\geq$2) $\exists v_j\, \exists v_k\, (v_j = v_k \wedge \exists v_j\, v_j \neq v_k)$,

with $j \neq k$. By elementary logic, ($\geq$2) is true in any domain of at least two objects. Consider, then, ($\geq$2) with respect to a context c whose domain has at least two members. Of course, ($\geq$2) is true in c iff $\ulcorner\ v_j = v_k \wedge \exists v_j\, v_j \neq v_k\ \urcorner$ is true in some c' such that $A_{c'}$ and A_c differ at most in what they assign to the jth and kth variables. Let c* be such a c'. $\ulcorner\ v_j = v_k \wedge \exists v_j\, v_j \neq v_k\ \urcorner$ is true c* only if $\ulcorner\ v_j = v_k\ \urcorner$ is true in c*, which is the case only if $A_{c*}(v_j) = A_{c*}(v_k)$; so $A_{c*}(v_j) = A_{c*}(v_k)$. Because $A_{c*}(v_j) = A_{c*}(v_k)$, by ($\forall\forall$10), $\ulcorner\ \exists v_j\, v_j \neq v_k\ \urcorner$ is true in c* iff $\ulcorner\ v_j \neq v_k\ \urcorner$ is true in c*, which is the case iff $A_{c*}(v_j) \neq A_{c*}(v_k)$. So, both $A_{c*}(v_j) \neq A_{c*}(v_k)$ and $A_{c*}(v_j) = A_{c*}(v_k)$ – a contradiction. Again, the conclusion is that (*i*) is false.

[23] Here 'v' is a second-order variable ranging over functions (which assign the same type of variable to each index) from indices to first-order variables.

2.3. The Fregean Argument

The Russellian Argument was so-called because it made use of DRV, a highly plausible but not entirely uncontroversial view. Some die-hard Fregeans will have no truck with direct reference, even for variables. For example, they may deny that any open sentence expresses a proposition under a variable assignment, or they may claim that the semantic value of a variable v under a variable assignment g is not $g(v)$ but $\langle \sigma, g(v) \rangle$, where σ is a contextually provided sense which determines $g(v)$ at the world of the context.[24] Whatever their preferred way of evading DRV is, there is a version of the argument against (*i*) that should be palatable even to such stalwarts – indeed, that should be palatable to any philosopher who takes the ideology of propositions seriously.

Presumably any friend of propositions, Fregean or not, will agree that two distinct free variables or pronouns (I am assuming, with the mainstream, that bindable pronouns are variables) can *sometimes* be used to express the same semantic content (propositional contribution). That is, there must be at least one pair of distinct variables v_j, v_k, and at least one context c, such that v_j and v_k express the same semantic content in c; and therefore, given *Propositionality*:

Anti-Orthography

$\exists c \, \exists j \, \exists k \, (j \neq k \wedge [\![v_j]\!]_c = [\![v_k]\!]_c)$

No matter what one thinks variables contribute to propositions, presumably one thinks that the index of a variable cannot be part of the contribution, and that in effect, is what

[24] A similar idea is implemented in recent unpublished work by Cian Dorr, although in Dorr's version, σ is not a Fregean sense but a condition on ways of thinking of objects.

Anti-Orthography says. To think otherwise would be to embrace an absurdly fine-grained, orthographic conception of propositions.[25] Semantic contents may include senses in addition to, or instead of, referents, but they do not include variable indices.

With *Anti-Orthography* in place, the argument against (*ii*) proceeds much as before, except in that step (1) of the argument is justified by an existential instantiation on *Anti-Orthography*. The steps (which I will not repeat) are the same as before, up to and including step (10), whereafter we conclude:

$(\exists\forall)$ $\exists c\ \exists j\ \exists k\ \forall S\ (j \neq k \wedge \langle\ulcorner \exists v_j S(v_j) \urcorner\rangle_c = \langle\ulcorner \exists v_j S(v_k) \urcorner\rangle \wedge \{\!|\ulcorner \exists v_j S(v_j) \urcorner|\!\}_c = \{\!|\ulcorner S(v_j) \urcorner|\!\}_c \wedge |\ulcorner \exists v_1 S(v_j) \urcorner|_c = |\ulcorner S(v_j) \urcorner|_c)$,

This conclusion is bizarre enough. On the assumption that propositions have structure, it is absurd to suggest that there could be a context in which (syntactically) vacuously and non-vacuously existentially quantified sentences express the same proposition, and while a (syntactically) non-vacuously existentially quantified sentence may on occasion share the modal profile and truth value of its matrix, it is no less absurd to suggest that there is a context in which this happens to *every* (syntactically) non-vacuously existentially quantified sentence using one or another of a particular pair of variables –

[25] While the rejection of *Anti-Orthography* by itself does not logically compel one to think that the substitution of one free variable for another never preserves the proposition expressed by a sentence in a context, a Fregean who rejects *Anti-Orthography* must embrace an orthographic conception of propositions in order to block arguments of the form used in the previous two sections and in the present one. In order to block an argument that begins at what has been labelled (2) above ($[\![\ulcorner S(v_j) \urcorner]\!]_c = [\![\ulcorner S(v_k) \urcorner]\!]_c$), the Fregean must deny that there is any context in which the substitution of a free variable's index for another preserves the semantic content of – i.e., proposition expressed by – a sentence. To do so is to embrace an orthographic conception of propositions which (almost) anyone who takes propositions seriously presumably rejects. (The only exception I know of is Larson and Ludlow (1993), who claim that the objects of belief – although they don't call them "propositions" – are at least as finely individuated as the words used to express them.)

but this is just what (∃∀) says. It is fairly clear that there is no context of the sort posited by (∃∀).

This should suffice for a *reductio* of *Compositionality*, *Propositionality*, and *Binding*, and thereby for a refutation of (*i*). But, as before, we can do better. There is a contradiction to be had.

To obtain the contradiction, we return to the example we have been using to illustrate the absurdity of (*i*): quantification over times. On the intended interpretation, the domain contains at least two times. Further, we make the observation that, in the Fregean picture, *sense determines reference*, so, whether the semantic value of a variable in a context is a sense or a sense paired with a value (referent), the following will hold.

Determination

$\forall c\, \exists f\, \forall v\, A_c(v) = f([\![v]\!]_c)$

The derivation of the contradiction proceeds as follows.

(F1) $[\![t_j]\!]_c = [\![t_k]\!]_c$ (by *Anti-Orthography*)

(F2) $A_c(t_j) = A_c(t_k)$ (from (F1) by *Determination*)

(F3) $[\![\ulcorner \exists t_j\, t_j \neq t_k \urcorner]\!]_c = [\![\ulcorner\, t_j \neq t_k \urcorner]\!]_c$ (from (F1) by reasoning familiar from §§2.1 and 2.2)

(F4) $|\ulcorner \exists t_j\, t_j \neq t_k \urcorner|_c = |\ulcorner\, t_j \neq t_k \urcorner|_c$ (from (F3) by *Propositionality*, *W-Determination* and *T-Determination*)

(F5) $|\ulcorner\, t_j = t_k \wedge \exists t_j\, t_j \neq t_k \urcorner|_c = \mathrm{T}$ (from (F2) and the fact that the domain has at least two elements)

(F6) $\lceil\!\lceil\ulcorner\ t_j = t_k \wedge \exists t_j\, t_j \neq t_k \urcorner\rceil\!\rceil_c = \lceil\!\lceil\ulcorner\ t_j = t_k \wedge t_j \neq t_k \urcorner\rceil\!\rceil_c$ (from (F4))

(F7) $\lceil\!\lceil\ulcorner\ t_j = t_k \wedge t_j \neq t_k \urcorner\rceil\!\rceil_c = \mathrm{T}$ (from (F5), (F6))

(F8) $\lceil\!\lceil\ulcorner\ t_j = t_k \wedge t_j \neq t_k \urcorner\rceil\!\rceil_c \neq \mathrm{T}$ (by logic),

which contradicts (F7).

2.4. The generality of the results of this section

The conclusion is that (*i*) is false: *Binding* is not compatible with the conjunction of *Compositionality* and *Propositionality*. Insofar as *Binding* is plausible, the Naïve Picture is not.

We are, however, in a position to assert something much stronger on the basis of the arguments of the previous two sections. I already noted that nothing in the arguments turned on which parameter the variables being considered ranged over. The reader may have noted that nothing in the arguments even turned on whether the variables considered in them ranged over an alethic parameter at all. We could have considered quantification over persons, numbers, or indeed anything, and drawn the same conclusions. Consider the claim that

> *Minimal Binding*
>
> Some natural language makes use of quantifiers which, in some contexts, (semantically non-vacuously) bind variables for some kind of entity.

What the arguments show is that:

T1. If *Minimal Binding* is true, then *Propositionality* and *Compositionality* are not both true.

And *Minimal Binding* presumably is true, so the Naïve Picture is incorrect. (In fact, an even weaker assumption can be substituted for *Minimal Binding* in T1: as we shall see in §3.1, "quantifiers" in *Minimal Binding* could be replaced with "operators".)

Because T1 has been entirely missed in the literature responding to Lewis (1980), I will give it some emphasis.

What has been missed, in particular, is that quantifiers create shifty environments. Obviously, ⌜ *Qv*Φ ⌝ is a non-truth-functional environment unless ⌜ *Qv* ⌝ is semantically vacuous in every context: the truth value of ⌜ *Qv*Φ ⌝ in a context *c* is not determined by the truth value of Φ in *c*. As a first approximation, we might say that a sentence quantifying over people shifts the *person* parameter; over times, the *time* parameter; and so on; but expressions of multiple generality force us instead to recognize a single *variable assignment* parameter. This is what a quantifier shifts. The truth value of ⌜ *Qv*Φ ⌝ in *c* depends on the truth values Φ has with respect to contexts obtained by shifting *c*'s variable assignment. If *Binding* is true, then all nonmodal shiftiness is shiftiness with respect to a single parameter: the variable assignment. But the refutation of the Naïve Picture by no means requires *Binding* to be true. *Minimal Binding* will do, and *Minimal Binding* is true.

The refutation of the Naïve Picture, then, can proceed from assumptions which are far more minimal than those debated in the literature responding to Lewis (1980). Since this is so, it is a bit puzzling that that literature has focused on the semantics of exotica like the massively complex tense structure of English, evidently under the misapprehension that the question of *Propositionality* and *Compositionality* can only be

settled once we get the semantics of the exotica right. Progress might have been faster had the discussion focused on simpler examples, such as 'Someone loves his mother' (ignoring the tense and event structure, if any).

Another odd feature of the literature responding to Lewis (1980) has been its focus on *nonmodally* shifty operators. As T1 makes clear, it makes no difference whether the shiftiness that is achieved by quantification is modal or not: if modal shiftiness is achieved by quantificational means, that is enough to refute the Naïve Picture. (However, some delicate issues arise with respect to modal shiftiness if it is achieved by quantification; I address them in §3.3.2).

3. Objections and replies

3.1. Separating quantification from binding

Objection: "You're getting the syntax wrong. In natural language, quantifiers combine with complex predicates, not other sentences, to form sentences, so they are not sentential operators; but the arguments of §2 assume that quantifiers are sentential operators."

Reply: The thought is that, despite appearances, (e.g.)

(3.1.a) Somewhere it is raining

is not the result of combining 'somewhere' with

(3.1.b) It is raining.

Rather, something unpronounced – a *binder* (λ) – must first be applied to (3.1.b) before the application of 'somewhere'.[26] The result is a predicate, and 'somewhere' is of type ⟨⟨**e**,**t**⟩**t**⟩ rather than ⟨**t**,**t**⟩. Let us suppose that the objector is right, and that the LFs of (3.1.a) and (3.1.b) are the following (ignoring tense).

(λ1) (*somewhere*) $\lambda l_1.rain(l_1)$

(λ2) $rain(l_1)$

Since (λ2) occurs in (λ1) as a constituent, we can make the argument against (*i*) by considering (λ1), (λ2), (λ1′), and (λ2′) under an assignment *g* for which $g(l_1) = g(l_2)$.

(λ1′) (*somewhere*) $\lambda l_1.rain(l_2)$

(λ2′) $rain(l_2)$

In this case, the binder in (1λ′) is vacuous. This version of the argument simply requires one more application of *Substitution* than the arguments of §2.

[26] This view is favored by some semanticists: e.g., Heim and Kratzer (1998: §7.4.1), Keenan and Moss (2002). The objection is derived from Cappelen and Hawthorne (2009, p. 34, n. 31).

3.2. A prohibition on vacuous quantification?

Objection: "You're still getting the syntax wrong. Your argument makes use of vacuous quantification (or vacuous binding), but there is no vacuous quantification (binding) in natural language."

Reply: This objection has an impressive pedigree: according to Noam Chomsky, "Formal systems [which allow vacuous quantification] are designed for ease of description and of computation, but the design of human language is different", adhering to the principle that "there can be no superfluous symbols in representations"; one "consequence of this is that vacuous quantification should be forbidden" (Chomsky 1995: 151).

I have two things to say about this.

The first is that Chomsky's claim is false. While the human language faculty may be incapable of assigning a vacuous reading to 'Sometimes, Mary is happy', there are unambiguous English sentences involving vacuous quantification:

(3.2.a) It will always be the case that I am now writing

(3.2.b) Everywhere I go, it is raining in Oxford

(3.2.c) Every philosopher is such that it is sunny today in Los Angeles

The second remark is that, while the arguments of §2 made use of vacuous quantification, the availability of vacuous quantification is not required for the refutation of the Naïve Picture. All that is required is that the language allow for the possibility of bound and free occurrences of pronouns. Consider:

(3.2.d) [Every philosopher]$_1$ believes that she$_1$ is an elegant writer

(3.2.e) [Every philosopher]$_1$ believes that she$_2$ is an elegant writer

with respect to a context *c** in which 'she$_1$' and 'she$_2$' have the same semantic value (presumably there are such contexts). In *c**, (3.2.d) and (3.2.e) express distinct propositions, contradicting *Compositionality* and *Propositionality*. So, in addition to T1, we have:

T2. If some natural language allows both bound and free occurrences of pronouns, then it is not the case that *Compositionality* and *Propositionality* are both true.

3.3. The schmentencite strategy

Objection: "You're still getting the syntax wrong! 'Mary is happy' doesn't occur in 'Sometimes, Mary is happy' at all – not even adorned by a binder."

Reply: This is what Lewis (1980: 32) calls the "schmentencite" strategy: deny that sentences ever occur as constituents in the putative shifty environments. The constituents that look and sound like sentences in the problematic environments are in fact something else – call them *schmentences*. The schmentencite strategy amounts to denying that there are any shifty environments in natural language.

There are many ways of implementing the schmentencite strategy, but one of the simplest is Lewis's suggestion (1980: 33): distinguish sentences from schmentences by beginning each sentence with a capital letter and ending it with a period, ensure that

sentences never occur as constituents of other sentences, and assign something other than propositions as semantic values to schmentences – say, the "complex but constant" semantic values discussed in §4 below (functions from contexts to propositions), being careful to ensure that the substitution of one free variable for another in schmentence never preserves the semantic value of the whole in order to block the application of §2-style arguments to schmentences. We may suppose, for example, that this is done by letting the semantic value of each variable v_n in each context be the function from contexts to individuals that takes each context c to whatever the variable assignment of c assigns to v_n. Let us call this proposal *Periodism*.

Periodism involves some syntactic revisionism, but not of a very drastic kind. It keeps all the old syntactic operations and only adds one new one: the operation of capitalization-and-punctuation (*CaPunc*), which turns a schmentence into a sentence. It is natural to interpret CaPunc with the semantic operation – call it *Saturation* – which takes a function from contexts to propositions and applies it to a context. Assuming that the semantic values of schmentences can be made to conform to *Compositionality* – and no doubt they can – the pairing of CaPunc with Saturation ensures that the semantic values of sentences also conform to *Compositionality*. We have both *Compositionality* and *Propositionality* – the Naïve Picture has been saved!

Notice, however, how Periodism saves the Naïve Picture: Periodism conforms to the letter, but not the spirit, of *Compositionality*, because the way in which it satisfies *Compositionality* in the case of sentences is *vacuous*. The outputs of CaPunk are syntactically inert – no further syntactic operations can be applied to them – so it is vacuously true that for *every* syntactic operation O at least one of whose inputs is a sentence is such that there is an f such that, for all X_1, ..., X_n and for all c, such that $O(X_1, ..., X_n)$ is defined, $[\![O(X_1, ..., X_n)]\!]_c = f([\![X_1]\!]_c, ..., [\![X_n]\!]_c)$. The semantic values of

sentences obey *Compositionality* only because they *never compose*. Here I have nothing to add to Lewis, who conceded victory to the Periodist, adding: "His victory is both cheap and pointless. I propose to ignore it" (p. 33).

Might there be forms of the schmentencite strategy that are less disappointing than Periodism, and perhaps even motivated as something other than a desperate attempt to rescue the Naïve Picture? Some have thought so. I will consider the only two proposals found in the literature: King (2007, ch. 6 and Appendix) and Ninan (2011).

3.3.1. King's schmentencism

King's suggestion – echoing much other literature, and echoed in Glanzberg's (2011) remarks on Lewis (1980) – is that natural language tenses should be treated as restricted quantifiers containing a context-sensitive element t^*, as follows.

CLAUSE	LOGICAL FORM
Maggie be happy	$happy(Maggie, t)$
Maggie is happy	$(\exists t: t = t^*)\ happy(Maggie, t)$
Maggie was happy	$(\exists t: t < t^*)\ happy(Maggie, t)$
Maggie will be happy	$(\exists t: t > t^*)\ happy(Maggie, t)$

Bare clauses like 'Maggie be happy' never occur on their own, but only as constituents of sentences; tense is obligatory; and no sentence contains free time variables. The semantic value of t^* is provided by context, and – King does not mention this, but presumably this is part of the idea – t^* can never be bound; it is a context-sensitive singular constant rather than a variable. In King's schmentencism (KS), the distinction

between sentences and schmentences is the distinction between clauses containing no free occurrences of variables (sentences) and clauses containing free occurrences of variables (schmentences). KS notably differs from Periodism in allowing sentences to occur as constituents in both other schmentences and sentences. As such, KS offers the advocate of the Naïve Picture the hope of non-vacuously satisfying *Compositionality*. However, KS fails to satisfy *Compositionality* even vacuously.

Before seeing why KS fails to satisfy *Compositionality*, it is worth noting some complications King himself overlooks in his discussion of logical form (King 2003 and 2007: ch. 6). As we saw in §2, the problem for the Naïve Picture has nothing in particular to do with temporal shiftiness. In order to save the Naïve Picture, King cannot allow any free variables – no matter what their domain – to occur in sentences. This means, in particular, that pronouns cannot have both bound and free (deictic) occurrences. Rather, each expression we naïvely think of as a pronoun capable of both bound and free occurrences must be treated as a pair of homonyms one of which is bindable and occurs free only in schmentences, the other of which cannot be bound and occurs in both sentences and schmentences. As with *t**, we must also have 'he_1*', 'she_1*', 'it_1*', 'he_2*', 'she_2*', 'it_2*', and so on. It is not the case, for example, that the *sentence*

He_1 is an elegant writer

occurs as a constituent in the sentence

$[Every\ philosopher]_1$ thinks that he_1 is an elegant writer

The former is not a sentence at all, but a schmentence incapable of deictic use, which we confuse with the deictic

He_1* is an elegant writer

The amount of violence that KS must do to standard syntax far exceeds that inflicted by Periodism. Since everyone presumably rejects Periodism on the grounds of its syntactic strangeness, everyone should reject KS on the same grounds.

But let us for the moment grant King his eccentric syntax, as there is an important semantic point to be made.

In the Appendix to King (2007), the semantic story of KS is told: the semantic values of sentences are (structured) propositions, and the semantic values of schmentences are – as they must be if the Naïve Picture is to be sustained – something other than propositions. *Propositionality* is satisfied, but *Compositionality* is violated. To see why *Compositionality* is violated by KS, it will suffice to consider two syntactic operations in KS: *Predication*, the operation of concatenating an *n*-place predicate Π with *n* singular terms (names or variables) a_1, ..., a_n into a *formula* [Πa_1, ..., a_n];[27] and *Conjunction*, the operation of combining two *formulae* Φ, Ψ with & into a *formula* [Φ&Ψ]. ('Formula' is King's term for the syntactic category that is the union of the sentences and the schmentences.)

In the semantics of KS, when Φ is a formula, ⟦Φ⟧ is a *propositional frame*, an entity otherwise like a structured proposition except in that some nodes may be empty, i.e. contain no propositional constituent; when Φ is a sentence (a formula with no free variables), ⟦Φ⟧ is a (structured) proposition. (King ignores the contribution of context,

[27] In King's notation, formulae, including atomic ones, are enclosed in brackets.

so I have dropped the "*c*" subscript from "⟦Φ⟧".) According to the semantic clause corresponding to Predication:

(P) The propositional frame expressed by [Πa_1, ..., a_n] [i.e., ⟦Πa_1, ..., a_n⟧] is [Π*$\underline{a_1}$*, ..., $\underline{a_n}$*], where Π* is the *n*-place relation expressed by Π; a_i* ($1 \leq i \leq n$) is the bearer of a_i if a_i is a name, and an empty argument position otherwise; and $\underline{a_1}$*, ..., $\underline{a_n}$* in [Π*$\underline{a_1}$*, ..., $\underline{a_n}$*] are the argument positions of [Πa_1, ..., a_n], where any two (empty) argument positions of [Π*$\underline{a_1}$*, ..., $\underline{a_n}$*] that correspond to argument positions of [Πa_1, ..., a_n] that are occupied by the same variable are *linked* (King 2007: 219-220, italics in the original).

Linking is a primitive notion in King's semantics. It is a symmetric and transitive relation which King represents using diagrams, in the following manner.

(3.3.1.a) ⟦*Pxx*⟧ = [⟦*P*⟧ __ __]

(3.3.1.b) ⟦*Pxy*⟧ = [⟦*P*⟧ __ __]

In (3.3.1.a), the empty argument positions in ⟦*Pxy*⟧ corresponding to the argument positions occupied by '*x*' and '*y*' in [*Pxy*] are linked in accordance with (P); in (3.3.1.a) they are not.

According to the semantic clause corresponding to Conjunction:

(C) The propositional frame expressed by [Φ&Ψ] is [Φ′&*Ψ′], where &* is the truth function expressed by &, and Φ′, Ψ′ are the propositional frames expressed by Σ, Ψ, respectively, and any empty argument positions of Φ′ and Ψ′ that are not linked in them to quantificational argument positions and that correspond to argument positions of [Σ&Ψ] that are occupied by the same variable in [Φ&Ψ] are linked in [Φ′&*Ψ′].[28]

To be *linked to a quantificational argument position* is simply to have a link to an empty argument position occurring in the semantic value contributed by a higher quantifier.

To see why King's semantics is not compositional, consider the formulae [*Px*], [*Py*]. By (P), ⟦*Px*⟧ = ⟦*Py*⟧. By (C), ⟦*Px* & *Py*⟧ ≠ ⟦*Px* & *Px*⟧, because

⟦*Px* & *Py*⟧ = [[⟦*P*⟧ __] ⟦& ⟧ [⟦*P*⟧ __]]

⟦*Px* & *Px*⟧ = [[⟦*P*⟧ __] ⟦& ⟧ [⟦*P*⟧ __]],

which contradicts *Compositionality*.

It is not the case that a non-compositional semantics is forced on a King-style schmentencism. There are ways of respecting *Compositionality* and *Propositionality*

[28] This is essentially a quotation of the part of clause 2 which pertains to conjunction in King (2007: 220). I have simply removed the parts of clause 2 pertaining to negation, leaving out ellipses and brackets to avoid clutter, and substituting a "Φ" for a "Σ".

while positing the rampant homonymy between 'he' and 'he*', 'it' and 'it*', and so on – but they are not pretty ways. One could assign propositions as semantic values to King's sentences, and functions from variable assignments to propositions – again, Lewis's complex but constant semantic values – to his schmentences, but this would require positing four different lexical entries for conjunction (and for each other two-place connective; a one-place connective would require two lexical entries). For one has to consider what happens when one conjoins a sentence with a sentence (case 1), a schmentence with a schmentence (case 2), a sentence with a schmentence (case 3), and a schmentence with a sentence (case 4). Each of these ways of combining two clauses with 'and' would have to be treated as a separate syntactic operation requiring a separate semantic clause. The amount of hitherto unnoticed homonymy King would have to posit to keep his semantics compositional suffices to rule out his style of schmentencism.

3.3.2. Ninan's modal schmentencism

There is considerable evidence that *modal* shiftiness in natural language is achieved by variable-binding.[29] This has been used to motivate a kind of *modal schmentencism*, the view that world variables never occur free in (unembedded) sentences. The common worry about free occurrences of world variables in sentences (see King 2003: 228) is that if, e.g., 'It is raining' at LF contains a free world variable '*w*' which gets bound in 'Possibly, it is raining', and the value of '*w*' is assigned by context, then, in any context *c*, 'It is raining' expresses the proposition that it is raining at *W*(*c*). But this proposition is necessarily equivalent to the proposition expressed by 'Actually, it is raining' in *c*,

[29] See Cresswell (1990) and Schlenker (2005).

whose truth value does not vary with the world of evaluation, so, in any context, 'It is raining' expresses either a necessary truth or a necessary falsehood, and similarly for other sentences to which modal operators can be non-vacuously applied.

Few philosophers are willing to bite this bullet (I believe Schaffer (2007) is alone in doing so). The natural solution is to deny that there are any unembedded sentences with free world variables, an option recently explored in Ninan (2010). What I will consider here is not exactly Ninan's proposal, but a close relative of it – call it *Ninan** – which differs syntactically from Ninan's proposal but retains the core idea of requiring that all occurrences of world variables in sentences be bound by lambdas.[30]

Ninan* parallels the approach to tenses discussed in Glanzberg (2011) and King (2003, 2007: ch. 6). The idea is that modals, like tenses, are obligatory, with bare clauses never occurring on their own. To form a sentence from a bare clause like ⌜ *rain*(*w*) ⌝, we must first form a complex predicate ⌜ λ*w*.*rain*(*w*) ⌝, and then apply a modal operator. Thus we have, e.g.,

	LOGICAL FORM	SURFACE FORM
(3.3.2.a)	(POS) λ*w*.*rain*(*w*)	It is possibly raining
(3.3.2.b)	(NEC) λ*w*.*rain*(*w*)	It is necessarily raining
(3.3.2.c)	(NEUT) λ*w*.*rain*(*w*)	It is raining

where ⌜ (POS)λ*w*.*rain*(*w*) ⌝ is true at a world *v* iff ⌜ λ*w*.*rain*(*w*) ⌝ is true of some world *u* accessible from *v*; ⌜ (NEC)λ*w*.*rain*(*w*) ⌝ is true at *v* iff ⌜ λ*w*.*rain*(*w*) ⌝ is true of every world *u* accessible from *v*; and ⌜ (NEUT)λ*w*.*rain*(*w*) ⌝ is true at *v* iff ⌜ λ*w*.*rain*(*w*) ⌝ is

[30] The proposal of Ninan (2011) is that some *sentences* are λ-expressions at LF. In contrast, Ninan* proposes that all sentences are formed out of λ-expressions, which are predicates which embed open sentences, by the addition of modal operators.

true of *v*. (NEUT) is analogous to the present tense in that, on the surface, (3.3.2.c) looks like a modal-free sentence, whereas at the level of LF it is formed by applying a modal operator to a complex predicate formed out of a bare clause by λ-abstraction; it is disanalogous to the present tense in that the unpronounced modal does not refer to the world of the context – this being the saving grace of the approach.

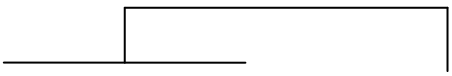
We might add to Ninan* the stipulation that the sentence-like structures like ⌜ *rain*(*w*) ⌝, with which binders and modal operators combine to form sentences like (3.3.2.a)- (3.3.2.c), are not to be called 'sentences', but 'schmentences'. Ninan* gives us, in effect, the beginnings of a schmentencite strategy applied to modal shiftiness, but Ninan*'s form of schmentencism is well motivated: it is not an *ad hoc* move to save the Naïve Picture, but a move to avoid the absurd conclusion that no English sentence is capable of expressing a contingent proposition.

So supplemented, Ninan* enables us to block the use of modal shiftiness in a §2-style argument against the Naïve Picture. But if this is a victory for the advocate of the Naïve Picture, it is a partial and pyrrhic one. It is pyrrhic because, it as we have seen, the Naïve Picture is refuted anyway by the presence of non-world variables for which schmentencism is unmotivated. It is partial because, even if there were no non-world variables, the most natural semantics for a language correctly described by Ninan* would be noncompositional (Ninan's own semantics is: it assigns coarse-grained propositions to schmentences/open sentences relative to variable assignments, enabling the moves that destroyed the Naïve Picture in §2, though with schmentences in place of sentences). An alternative that respects both *Propositionality* and *Compositionality* is always available, but it involves either the vacuously compositional schmentencism considered and dismissed by Lewis or the rampant homonymy implicit in King's proposal.

3.4. Variable-free semantics

Objection: "Your arguments in §2 assume that there are variables in natural languages, but there aren't!"

Reply: Any philosopher who both claims that there are no variables in natural languages and attempts to use this claim to rescue the Naïve Picture has a serious explanatory duty to discharge. Although I do not know of any philosophers who combine these characteristics, it may be useful to set out the challenge pre-emptively. Such philosophers – *Naïve Variable-Free Semanticists*, to give them a label – must provide a plausible semantics for binding phenomena which satisfies both *Compositionality* and *Propositionality*. As we saw in §3.2, the phenomena that make trouble for the Naïve Picture are visible at the surface of natural language, and we do not need to use the theoretical apparatus of variable-binding to explain why they make trouble for the Naïve Picture. Consider the sentences:



(3.4.a) [Every philosopher] believes that she is an elegant writer

(3.4.b) Every philosopher believes that she is an elegant writer

(3.4.c) She is an elegant writer,

where, in (3.4.a), the link between 'every philosopher' and 'she' represents the fact that the former is semantically bound by the latter – however the syntax may work out exactly – and the absence of such a link in (3.4.b) represents a deictic reading for 'she'. Because (3.4.a) and (3.4.b) express distinct propositions in every context, the trio

(3.4.a-c) is a *prima facie* counterexample to the combination of *Propositionality* and *Compositionality*. The task of the Naïve Variable-Free Semanticist is to give a semantics for English in which the (3.4) trio is not a counterexample to the combination of *Propositionality* and *Compositionality*. So far, no one has done so. *Prima facie*, there are only two options for a variable-free treatment of the (3.4) trio:

Option 1: Deny that (3.4.c) occurs as a constituent in both (3.4.a) and (3.4.b).

Option 2: Reject *Propositionality*.

In fact, these are the only two ways of treating binding that one finds in the variable-free semantics literature. Slabolcsi (1992) chooses Option 1 and endorses the rampant homonymy thesis that King is implicitly committed to. This form of the schmentencite strategy we have already discussed. Jacobson (forthcoming) rejects Slabolcsi's proposal on the same grounds on which I rejected King's, and pursues Option 2 – Jacobson explicitly rejects *Propositionality*.[31] Such is the state of the art in variable-free semantics. Naïve Variable-Free Semanticists have their work cut out for them.

[31] To quote:

> Consider, for example, the case of a sentence with an unbound pronoun, such as
>
> (7) He lost
>
> Under the system here ... its meaning [semantic value] is of type ⟨**e**, **t**⟩ rather than of type **t** [i.e., the type of a function from individuals to propositions rather than the type *proposition*]. But we can assume that in order to extract propositional information from this, a listener will apply this function to some contextually salient individual ...
>
> The important point is that we do not need to posit any kind of lexical ambiguity between free and bound pronouns – a happy result since the full set of such pronouns are morphologically identical, and it would be suspicious to treat free and bound pronouns as accidental cases of homonymy (Jacobson, forthcoming).

4. After the Naïve Picture?

We must reject the Naïve Picture by rejecting either *Propositionality* or *Compositionality*. The choice between the two is not as consequential as it may seem. To see why, consider an analogous problem that arises for an Extensionalist. The Extensionalist thinks that what semantics is really, fundamentally about are the extensions (truth values) sentences have relative to variable assignments. The Extensionalist therefore is tempted to affirm:

> *Truthiness*
>
> The semantic value of a sentence *S* under an assignment *g* is the truth value of *S* under *g*.

To simplify matters further, let us suppose that the Extensionalist is only concerned with the language $\mathcal{L}_A$ of first-order arithmetic. If the Extensionalist also affirms *Compositionality*, then she cannot give $\mathcal{L}_A$ the standard Tarski-style semantics (henceforth *Tarski 1*) we learn in Introductory Logic. For consider the sentences

(4.a) $x > 0$

(4.b) $x > x$

(4.c) $\exists x\, x > 0$

(4.d) $\exists x\, x > x$

under a variable assignment *g* which assigns 0 to '*x*'. *Truthiness* together with Tarski 1 and arithmetic tells us that $[\![(4.a)]\!]_g = [\![(4.b)]\!]_g$ and $[\![(4.c)]\!]_g \neq [\![(4.d)]\!]_g$, contradicting *Compositionality*. The Extensionalist has three options. First, she can rewrite the syntax of $\mathcal{L}_A$, so that either (4.a) and (4.b) are not called "sentences", or they are called "sentences" but they do not occur in (4.c) and (4.d) – either way, she becomes a schmentencite. Unsurprisingly, schmentencism is not within the mainstream of approaches to the semantics of first-order logic.[32] Non-mainstream, substitutional approaches aside, the Extensionalist is left with a choice between rejecting *Compositionality* and rejecting *Truthiness*. Logic textbooks, of course, reject *Compositionality*.[33] If we reject *Truthiness* (and thereby Tarski 1) and keep *Compositionality*, we can (e.g.) take the semantic values of $\mathcal{L}_A$-sentences to be sets of variable assignments, so that

$$[\![S]\!]_g = \{h \mid \text{according to Tarski 1, } [\![S]\!]_h = \text{T}\}.$$

On the latter option – call it *Tarski 2* – the semantic value of a sentence does not vary with variable assignment, so we can simply speak of the semantic value $[\![S]\!]$ which *S*

[32] See Janssen (1997) for a review of the literature. Of course, logic textbooks recognize a distinction between closed and open sentences, where the former are sometimes called "sentences" and the latter (mere) "formulae", and there are nontrivial metatheorems about this distinction. The important point, however, is that in no logic textbook (that I know of) is this distinction used in the *syntax* (the definition of a wff) or in the *semantics* (the definition of truth-in-model-$\mathfrak{A}$-under-variable-assignment-*g*).

There are, to be sure, non-mainstream, substitutional approaches to the semantics of first-order logic which treat open and closed sentences differently in that they assign no semantic values at all to open sentences (e.g., Leblanc 1976) – this is a form of schmentencism.

[33] Those logic textbooks that use a semantic value assignment for sentences, that is; of course, some make do with the relation of being true in a model under a variable assignment.

has absolutely. The choice between Tarski 1 and Tarski 2 is not particularly consequential. There is an obvious "translation" between the two semantics: a bijection taking each Tarski 2-semantic value $[\![S]\!]$ to the function $[\![S]\!]_g$ from variable assignments to Tarski 1-semantic values. There might be an aesthetic reason for preferring one semantics to the other (Tarski 1 seems simpler to state) as well as a pedagogical one (if logic textbooks are any indication, Tarski 1 is easier to learn), but there is no serious question about which is the *real* semantics. Both accomplish what the Extensionalist regards as the fundamental task of semantics – specifying an assignment of truth values to sentences relative to variable assignments, whether or not this assignment is called the "semantic value assignment" – so the Extensionalist, *qua* extensionalist, should be equally happy with both.[34]

In Lewis's terms, Tarski 1 assigns to sentences semantic values that are *simple but variable* (values that vary with variable assignment), while Tarski 2 assigns them values that are *complex but constant*.[35] Complex but constant semantic values are the cost of keeping *Compositionality*; simple but variable ones are the reward for rejecting it.

The Proposition Lover, who advocates the primacy of the proposition, is faced with a similar, and similarly inconsequential, choice. It is not difficult to see what the constant but complex semantic values might be that are the cost to him of keeping

[34] The issues with respect to extensional semantics for first-order logic are well known, at least among logicians: see Janssen (1997). For a discussion of the issues written for philosophers, see Salmon (2006).

[35] My "simple but variable" option does not exactly correspond to Lewis's (1980: 35): for Lewis, semantic values obey the principle of compositionality *by definition*; truth values and modal profiles do not. Lewis's own "simple but variable" option for natural language has sets of indices (sequences of values of shiftable parameters) serve as the semantic values of sentences in contexts; therefore Lewis's "simple but variable" semantic values obey the principle of compositionality.

Compositionality, or the simple but variable ones that are the reward for rejecting it. The simple but variable semantic values, obviously, are propositions. For simplicity's sake, I assume *Coarseness*, and assume that context only contributes a variable assignment, but the same points could be made, less briefly, without these assumptions. A noncompositional assignment of coarse-grained propositions to a first-order language is defined, at least implicitly, in any textbook on quantified modal logic:[36] if $\mathfrak{A}$ is the intended model, then the proposition expressed by *S* under *g* is

$$[\![S]\!]_g = \{w: |S|^{\mathfrak{A},w,g} = \mathrm{T}\}.$$

Vacuously quantified sentences can be used to show that this semantic value assignment is not compositional. A compositional assignment of constant but complex semantic values can be fashioned out of the same model-theoretic materials: the constant but complex semantic value of *S* is $[\![S]\!] = \lambda g\{w: |S|^{\mathfrak{A},w,g} = \mathrm{T}\}$, a function from variable assignments (contexts) to propositions. There is an obvious "translation" between the two styles of semantics, because

$$[\![S]\!]_g = [\![S]\!](g)$$

and

$$[\![S]\!] = \lambda g[\![S]\!]_g.$$

Both styles of semantics achieve what the Proposition Lover regards as the basic task of semantics: they associate sentences with propositions relative to contexts (represented by variable assignments), though only in one style of theory are these called "semantic

[36] E.g., Hughes and Cresswell (1996).

values", so the Proposition Lover, *qua* Proposition Lover, should be equally happy with both. Only aesthetic and pedagogical reasons could favour the use of one theory over the other.

There are, to be sure, ways of rejecting the Naïve Picture which involve more radical departures from the textbook way of doing semantics. One alternative is to keep *Propositionality* and reject *Compositionality* by allowing different occurrences of the same expression to have different semantic values, as in the *occurrence-based semantics* of Salmon (2006) and Parsons (1995). Another is to reject both *Propositionality* and *Compositionality* by denying that expressions have semantic values and embracing a variety of *semantic relationism*, as in Fine (2007) and Pinillos (2011). But it is unclear, on the one hand, how substantial the disagreement of each of these approaches to semantics with the more traditional ones is, and, on the other, how substantial their disagreement with each other is. Occurrence-based semanticists and semantic relationists presumably do not deny that the functions called the "semantic value assignment" in the more conventional simple-but-variable or complex-but-constant options exist. Rather (if they believe in propositions at all[37]), occurrence-based semanticists and semantic relationists primarily disagree with traditional semanticists about how revealing their own styles of semantic theorizing are as to the natures of certain semantic phenomena. In particular, occurrence-based semanticists[38] and semantic relationists believe that their approaches are more revealing than the textbook

[37] No propositions get associated with sentences either in Salmon's (2006) or Fine's (2007) semantics. Of course, Salmon has elsewhere advocated a Russellian conception of propositions. Fine (2007: 121), on the other hand, thinks that Kripke's (1979) and Frege's puzzles cast doubt on the coherence of the notion of a proposition. In any case, it is not difficult to imagine semantic theories which assign propositions to sentences at contexts either within an occurrence-based or a relationist framework.

[38] Or at least Salmon. Even though Parsons (1995) is a study of the semantics of shiftiness, it does not (ch. 6) treat quantificational environments as shifty environments.

approach as to the nature of variable-binding or (in the case of semantic relationism) coordination among variables, of which binding is a species. On this, I am inclined to agree with them.

Finally, in light of the foregoing, it bears asking: why did philosophers ever think that *Compositionality* and *Propositionality* were a good combination of views? What is supposed to be attractive about that combination? Apart from the brute authority of Kaplan, whose prohibition on "monsters" (Kaplan 1989a: §VII) is presumably derived from the more general (but unstated) requirement that the assignment of propositions (Kaplan's "Contents") to sentences in contexts must be compositional, I can think of only one reason why philosophers might have found the combination attractive: it is thought to explain the learnability of natural languages, and the ability of human speakers to "make infinite use of finite means" (by producing and understanding sentences they have never before encountered) of which introductory linguistics textbooks, following Chomsky, like to remind us.[39] But as soon as this motivation becomes salient, it also becomes clear that it is not a motivation for the combination of *Propositionality* and *Compositionality*, but for a principle of compositionality for *meanings*. The meanings of sentences are not the propositions they express: a context-sensitive sentence like 'It is raining here' expresses infinitely many propositions in different contexts, but it has one meaning, and its meaning is what determines the proposition it expresses in each context. What the textbook considerations motivate (at best) is not the Naïve Picture but the following principle.

[39] The phrase "infinite use of finite means", which is frequently quoted by Chomsky (e.g. 1970: 405), is from Wilhelm von Humboldt.

Compositionality of Meaning

($\forall O$: O is an n-ary syntactic operation) ($\exists f$: f is an n-ary function) ($\forall X_1$, ..., X_n: $\exists Y$: $Y = O(X_1, ..., X_n)$) the meaning of $O(X_1, ..., X_n) = f$(the meaning of X_1, ..., the meaning of X_n).

If meanings are, as I am inclined to think, Kaplanian "characters" – functions from contexts to propositions and their constituents – and contexts include, as it is customary to think, a variable assignment coordinate, then variable-binding is not a counterexample to *Compositionality of Meaning*.

While the choice of *Propositionality* or *Compositionality* is as close as one can get to a merely verbal dispute in philosophy,[40] there is a substantive issue right around the corner, which is whether *Compositionality of Meaning* true.

[40] I should say that I do not wish to be read as endorsing the view that it *is* a merely verbal dispute. For all I have said, and for all I know, it may be that some kind of Lewisian naturalness-maximizing metasemantics is correct (cf. Lewis 1984 and Sider 2011), and there may be a uniquely most natural candidate – a "reference magnet" – for the function denoted by the semantic value brackets. However, even if this is so, the issue is likely to be non-substantive in the sense of Sider (2011: ch. 4): that is, in the sense that slight changes in the way we use technical semantic vocabulary could have made some other function, or none, the uniquely most natural candidate for the function denoted by the semantic value brackets.

2

Relativism and Shiftiness

Here are some interesting theses about truth, modality, and time: *Alethic Necessitarianism* is the thesis that, (metaphysically) necessarily, for all propositions *p*, *p* is true if and only if, necessarily, *p* is true. *Alethic Contigentism* is the negation of Alethic Necessitarianism. *Alethic Eternalism* is the thesis that, always, for all propositions *p*, *p* is true if and only if, always, *p* is true. *Alethic Temporalism* is the negation of Alethic Eternalism.

Alethic Necessitarianism is equivalent to a thesis expressed by means of quantification over (metaphysically possible) worlds: that (for all worlds *w*)(for all propositions *p*)(*p* is true in *w* if and only if (for all worlds *v*) *p* is true in *v*). Similarly, Alethic Eternalism is equivalent to a thesis expressed by means of quantification over times: that (for all times *t*)(for all propositions *p*)(*p* is true at *t* if and only if (for all times *t'*) *p* is true at *t'*). Because the quantificational sentences that express Alethic Necessitarianism and Alethic Eternalism contain no context-sensitive elements,[41] each is true in every context or none. Let us say that a sentential operator ○ is *truth-*

[41] Of course, 'all' and other quantifier words typically occur in determiner phrases, which are context-sensitive (although there is no consensus on the locus of the context-sensitivity of determiner phrases). However, the quasi-formal 'for all *v*', a structure only used in philosophical or mathematical contexts, is presumably not context sensitive – and in any case we can stipulate that, in this chapter, it is not context-sensitive.

functional for a set of sentences *X* iff, for some function *f* and for all contexts *c*, for each *S* in *X*, $|\ulcorner \bigcirc S \urcorner|_c = f(|S|_c)$. (As in Ch. 1, '$|X|_c$' designates the extension *X* has in *c* – in the case of a sentence, a truth value.) If Alethic Necessitarianism is true, then all (metaphysical) modal operators and quantifiers with world variables are truth-functional for sentences of the form ⌜ *p* is true ⌝, where '*p*' is a proposition variable. Similarly, if Alethic Eternalism is true, then all tense operators and quantifiers with time variables are truth functional for sentences of the form ⌜ *p* is true ⌝, where '*p*' is a proposition variable.

The Alethic Necessitarianism vs. Alethic Contingentism and Alethic Eternalism vs. Alethic Temporalism issues share a structure that can be discerned across a range of topics: there is a question of alethic constancy versus variability that can be raised using sentential operators that do not bind any (explicit, pronounced) variables or, equivalently, by using universal quantifiers that bind *explicit* variables for a putative alethic parameter. Operators of the latter kind are called *shifty*, and they are said to *shift* a particular alethic parameter. We need the notion of shiftiness to describe the shared structure.

As in Ch. 1, I will not use any particular definition for 'shifty' or for the idiom '○ shifts π' – an idiom that has been used in the literature without an explicit definition since Lewis (1980) (see ch. 1, §1). However, I will assume the following rough-and-ready criterion of shiftiness: ○ is *shifts π*, or is a *π-shifter*, just in case (*i*) it is not the case that ○ is truth-functional for all sentences – i.e., ○ is not truth-functional (*simpliciter*)[42] – and (*ii*) there is a π-variable v_π, a quantifier word *Q*, and a restricted

[42] I am calling an operator "truth-functional" just in case it is truth-functional for all sentences. This is not a standard use of the term, but there is no standard way to apply the term, as far as I know, to sentences-in-contexts. Within the Lewisian-Kaplanian double-indexing framework, we can say that what I am calling a truth-functional operator ○ is such that the truth value of ⌜ ○*S* ⌝ at a context *c* and at the index i_c of the

quantifier ⌜ (Qv_π: S) ⌝ such that ⌜ $\bigcirc S'$ ⌝ is logically equivalent to ⌜ (Qv_π: S) in/at v_π, S' ⌝.[43] (If ⌜ $\bigcirc S'$ ⌝ is equivalent to ⌜ $Qv_\pi S'$ ⌝, with an unrestricted ⌜ Qv_π ⌝, then, of course, ⌜ $\bigcirc S'$ ⌝ is also equivalent to ⌜ (Qv_π: S) in/at v_π, S' ⌝, for some S – e.g., for S = ⌜ $v_\pi = v_\pi$ ⌝.)[44],[45] This criterion is, as I said, only rough and ready – I do not claim that it captures exactly the phenomenon philosophers have in mind when they use the idiom '$\bigcirc$ shifts π' (if there is a single phenomenon they have in mind when they do), but it will do for the purposes of this chapter, because it classifies the range of (sentential) operators I will discuss as ones that shift a parameter: namely world-shifting operators like 'possibly', time-shifting operators like 'sometimes', and location-shifting operators like 'somewhere'.

Given a π-shifting operator $\bigcirc_\forall$ such that ⌜ $\bigcirc_\forall S$ ⌝ is logically equivalent to ⌜ $\forall v_\pi$ (in/at v_π, S) ⌝, we can raise the question of π-*Relativism* either by asking whether

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contex is determined by the truth value of S at c and i_c. According to this usage, 'now' and 'actually' are truth-functional. Given the double-indexing framework, one could also define a truth-functional operator as an operator $\bigcirc$ such that the truth value of ⌜ $\bigcirc S$ ⌝ at an arbitrary context-index pair is determined by the truth value of S at that pair. Under this usage 'now' and 'actually' are not truth-functional.

[43] If the reader finds the use of the notion of logical equivalence here problematic, he or she may substitute 'logically equivalent' with 'necessarily equivalent', which is defined as follows: S and S' are necessarily equivalent just in case ⌜ Necessarily (S if and only S') ⌝ is true in every context.

[44] What language am I speaking? Ordinary English does not come equipped with (explicit) variables for each putative alethic parameter, so I cannot be speaking ordinary English. The answer is: Philosopher's English, which is English enriched with the usual logico-mathematical symbols one finds in philosophical prose, plus special variables for (at least) the following types of entities: worlds, times, and locations.

[45] What do I mean by 'operator' here? It is not obvious that all of the things I will be calling 'operators' below are even *expressions*. For example, as noted in ch. 1, §3.1, it may be that 'Sometimes, Mary is happy' is the result of applying a lambda binding a time-variable t to a sentence with a free t, and then applying 'sometimes' to the resulting complex predicate. If this is what the syntactic structure of 'Sometimes, Mary is happy' is like, then 'sometimes' is not a sentential operator, but 'Sometimes, Mary is happy' nevertheless contains an occurrence of the sentence 'Mary is happy' and we can think of the linguistic environment embedding this sentence as a sentential operator.

OR: $\bigcirc_{\forall}\ \forall p$ (p is true $\leftrightarrow \bigcirc_{\forall}(p$ is true)),

or by asking whether

QR: $\forall v_{\pi}\ \forall p$ (in/at v_{π}, p is true $\leftrightarrow \forall v'_{\pi}$ (in/at v'_{π}, p is true)).

The position that answers 'No' to both questions I call *π-Relativism*.[46] I call the negation of *π-Relativism* *π-Absolutism*. For any π, π-Relativism is *a relativism*, and π-Absolutism *an absolutism*. *π-Absolutism* entails the truth-functionality of all π-shifting sentential operators for sentences of the form ⌜ *p* is true ⌝, and the truth-functionality of all quantifiers binding π-variables for sentences of the form ⌜ *p* is true in/at v_{π} ⌝.

Questions concerning the truth of various relativisms and absolutisms are of considerable interest in philosophy. World Relativism – A.K.A. Alethic Contingentism – is a shared commitment of nearly all philosophers, although Jonathan Schaffer is a notable dissenter.[47] Time Absolutism – A.K.A. Alethic Eternalism – is controversial, and so is Location Absolutism.

[46] Therefore, for example, the (apparently correct) view that some propositions are true in some stories but not true in others is not Story Relativism, because there is no non-variable-binding (or superficially non-variable-binding) sentential operator by means of which the view can be stated. MacFarlane (2009: 245) has famously argued that propositions can have π-relative truth values even if the language we speak lacks π-shifting sentential operators – that may be right, depending on what is meant by "π-relative", but, as a matter of (my) definition, π-Relativism cannot be true unless there are (in the language I am now speaking, i.e., Philosophers' English) π-shifting sentential operators.

[47] See Schaffer (2007). Strictly speaking, Schaffer does not endorse World Absolutism as I have proposed to understand it, although he would endorse it if its quantifiers were understood as restricted to propositions expressible in English.

The theses I call "relativisms" are logically independent of the question of whether truth is a monadic property of propositions, as Cappelen and Hawthorne (2009) contend, or not. There is no inconsistency in holding that, say, Time Relativism is true and that truth is a monadic property of propositions – after all, Time Relativism is expressed by means of an apparently monadic truth predicate whose arguments are variables that take propositions as values. Presumably, however, anyone who is a "relativist" in the sense of Cappelen and Hawthorne also endorses a π-Relativism for at least one π.

The theses I call "relativisms" also lack two features of MacFarlane's (2009) "relativism". One is that I require π-Relativism to give an affirmative answer to both OR and QR, whereas MacFarlane (2009: 245) says that propositions could have different truth values with respect to different πs even if we had no π-shifting operators with which to express this claim. This seems correct, and MacFarlane and I are not disagreeing over substance here – I have simply stipulated that a position that affirms something of the form QR but nothing of the form OR is not to be called a "relativism", and MacFarlane has not.

Another difference, which is not of substance, is that MacFarlane's "relativist" is someone who affirms that propositions vary in truth value along some π and denies that any value of π is, in some objective way, correct, real, or special. In contrast, in my sense of "relativism", one can be (say) a World Relativist while thinking that the actual world is objectively special in that it is the only real world there is, and one can be a Time Absolutist while thinking that there is nothing objectively special about the present. Each of these is a common view, and so is their combination (as Schaffer 2007 notes, this combination seems to be the received view among philosophers).

Any yes-or-no question can be reframed, by semantic ascent, as an extensionally (and perhaps *a priori*) equivalent semantic question, but such reframing is typically not fruitful. Some have thought that the question of π-Relativism, for at any π, can be reframed, in a fruitful way, as a semantic question: the question then is (or should be) replaced by one concerning the truth-functionality of certain π-shifting operators or quantifiers for certain sentences. (In fact, in the literature, the question is replaced by one concerning the *vacuity* of certain π-shifting operators – a mistake, as we shall see below.) A family of arguments for various relativisms that take the semantic ascent approach – *operator arguments*, as they have come to be called[48] – has received considerable attention in recent years. In broad outline, and schematically, an operator argument typically begins with the empirical claim that there are, in some natural language, sentential operators that shift π. Next the argument invokes (or should invoke) what I call the *Truth-Functionality Lemma*: if π-Absolutism is true, then all π-shifting operators are truth-functional for all sentences, viz. truth functional (*simpliciter*), which, given the criterion of π-shifting I have adopted, entails that there are no π-shifting operators – a contradiction. The conclusion is that π-Relativism is true. An alternative form of operator argument makes use of what I call the *Noncompositionality Lemma*: if π-Absolutism is true, then any language with π-shifting operators is a counterexample to the conjunction of *Propositionality* (the claim that the semantic values of sentences in contexts are truth values) and *Compositionality* (the claim that the semantic value assignment of every language is compositional).

[48] For recent operator arguments, see Kölbel (2009: 384) and MacFarlane (2007: §2); see Cappelen and Hawthorne (2009: ch. 3) for other references. The term "operator argument" seems to originate in Cappelen and Hawthorne.

In the extant versions of the arguments, the first premise is the empirical claim that some natural language contains π-shifting operators. However, it is not clear that it is essential to the arguments that the language containing π-shifting operators be a natural language or that it even be an actual language. In my view, this should not be regarded as essential to the arguments. Presumably, if operator arguments are any good, then it is *necessary* that, if there is a π-shifting operator in some language, then π-Relativism is true; and the truth or falsity of π-Relativism is presumably a noncontingent matter; so, if operator arguments are any good, then π-Relativism is a necessary consequence of the mere possibility that there is a π-shifting operator in some language.

What I call the *Standard Reply* to an operator argument takes its inspiration from King (2003): according to the Standard Reply, the putative π-shifting operators are, in fact, quantifiers that bind unpronounced π-variables, and the existence of such quantifiers is compatible with the truth of π-Absolutism. If I am right, however, that it is inessential to an operator arguments whether the first premise concerns a natural or even actual language, then those committed to the Standard Reply must be committed to more than denying that there are, in some natural language, π-shifting operators that do not bind π-variables – they must be committed to denying that there *could be* a language with π-shifting operators that do not bind π-variables.

In this chapter, I argue for three claims: first, that the Standard Reply is *unnecessary*, because the operator arguments assume implausible *coarse-grained* conception of propositions as functions from *indices* (sequences of values of alethic parameters) to truth values (or, equivalently, of propositions as sets of indices); it would have been sufficient to point this out in response to any operator argument. Second, that the Standard Reply is *self-defeating*: the Standard Reply in fact supplies a premise for

an operator argument for a relativism that is, I presume, universally rejected: Variable-Assignment Relativism. Third, that, although we should reject the *Truth-Functionality Lemma* and the *Noncompositionality Lemma*, doing so is not helpful to the opponent of operator arguments: more fundamental commitments shared by the advocate and opponent of the operator arguments must also be rejected: what must go is either the assumption that the semantic value of a sentence in a context is a proposition (*Propositionality*) or the assumption that the semantic value assignment is compositional (*Compositionality*). Because the case against the *Propositionality/Compositionality* combination was already made in detail in Ch. 1, the discussion of it at the end of the present chapter will be rather cursory. I begin with exposition on operator arguments and their origins in Kaplan (1989a) and Lewis (1980).

1. Operator arguments, Kaplan, and Lewis

The first occurrence of an operator argument (in order of circulation, if not of publication[49]) is in Kaplan (1989a), which contains an operator argument for Time Relativism. The two other classic sources are Lewis (1980) and King (2003). Lewis appears to accept all of Kaplan's premises *except* for the assumption that the semantic values of sentences in contexts are propositions, and, instead of Kaplan's *modus ponens*, performs a *modus tollens* from the negation of Time Relativism to the conclusion that the semantic values of sentences are not propositions. King appears to accept all of Kaplan's premises *except* for the assumption that there are, in natural languages, time-shifting operators, and, instead of Kaplan's *modus ponens*, performs a *modus tollens* from the negation of Time Relativism to the conclusion that there are no

[49] Kaplan's manuscript *Demonstratives* was privately circulated in mimeograph starting in 1977. It was published, with added footnotes, as Kaplan (1989a).

time-shifting operators in any natural language. Both Lewis and King are committed to World Relativism but reject all other relativisms, and both are, apparently committed to the view that, for any π, if there were π-shifting operators in some language, then, by considerations analogous to those invoked by Kaplan for time, it would follow that either π-Relativism is true or the semantic values of sentences in contexts are not propositions. But what are the considerations invoked by Kaplan for the case of time?

Unfortunately, both Kaplan's and Lewis's arguments are highly compressed and difficult to interpret, and King's expositions of them, although longer, are no easier to interpret. Kaplan, in "Demonstratives", writes:

> If we built the time of evaluation into the contents [of sentences in contexts, i.e., propositions, which are also presumed to be the semantic values of sentences in contexts] (thus removing time from the circumstances [i.e., what Lewis calls indices – see below] leaving only, say, a possible world history, and making contents specific as to time), it would make no sense to have temporal operators. To put the point another way, if what is said is thought of as incorporating reference to a specific time ... it is otiose to ask whether what is said would have been true at another time... Temporal operators applied to eternal sentences (those whose contents incorporate a specific time of evaluation) are redundant (Kaplan 1989a: 503).

In a footnote to the above passage, Kaplan says that the "notion of redundancy involved [in the passage] could be made precise", and offers this:

> Technically, we must note that intensional operators [which Kaplan takes tense operators to be] must, if they are not to be *vacuous*, operate on contents which are neutral with respect to the feature of circumstance the operator is interested in. Thus, for example, if we take the content of ['I am writing'] to be [the proposition that David Kaplan is writing at 10 A.M. on 3/26/77], the application of a temporal operator to such a content would have no effect; the operator would be *vacuous*. ... A content [proposition] must be the *kind* of entity that is subject to modification in the feature relevant to the operator (Kaplan 1989a: 503-504, n. 28, first two emphases mine).

The above quoted material is immediately followed by the parenthetical remark that "[t]he textual material to which this note is appended is too cryptic and should be rewritten" (*ibid.*), which is clearly true. The footnote is less cryptic, insofar as the term 'vacuous' has a standard meaning that is quite clear: the (initial) *occurrence* of an operator ○ in ⌜ ○*S* ⌝ is vacuous iff $|\ulcorner \bigcirc S \urcorner|_c = |S|_c$, for all c – thus, for example, the occurrence of '$\forall x$' in '$\forall x\ 0 = 0$' is vacuous – and an *operator* ○ is vacuous iff all of its occurrences are vacuous. In the quoted passages, Kaplan claims that, if the truth values of propositions do not vary over time – that is, if Time Absolutism is true – then all time-shifting operators are vacuous. This is presented as following from three further facts: (*i*) that the semantic values of sentences in contexts are propositions ("contents"),[50] (*ii*) that propositions are intensions, and (*iii*) that tense operators "operate on" intensions – which I take to be a corollary of the principle of compositionality of semantic values taken together with (*i*) and (*ii*). Furthermore, Kaplan indicates in the footnote quoted above that the same considerations apply to any parameter π that is shifted by some operator. Thus, Kaplan is committed to each instance of the schema:

The Vacuity Lemma

[50] Kaplan does not unambiguously commit himself to the identification of what he calls "propositions" with what he calls "contents" (of sentences in contexts):

> [T]he truth of a proposition is not usually thought of as dependent on a time as well as a possible world. The time is thought of as fixed by the context. If ϕ is a sentence, the more usual notion of the proposition expressed by ϕ-in-*c* is what is called here the Content of Nϕ [in effect, "Now ϕ"] in *c* (Kaplan 1989a: 546).

However, Kaplan does unambiguously commit himself to the identification of what he calls "contents" to what he calls "what is said" (see the second quoted passage above). Because I take the things that are said – the objects of assertion – to be propositions by definition, I take Kaplan to be arguing for Time Relativism in the quoted passages, his hesitation in applying the term 'proposition' to the objects of assertion notwithstanding.

If π-Absolutism is true, then all π-shifting operators are vacuous.

The Vacuity Lemma is – or so it would appear – presented as following from the following claims, where "$\langle S \rangle_c$" denotes, as in ch. 1, the proposition sentence *S* expresses in context *c*, and "$[\![S]\!]_c$" denotes the semantic value of *S* in *c*.

Propositionality

$\forall S\ \forall c\ [\![S]\!]_c = \langle S \rangle_c$.

Intensionality

$\forall S\ \forall c\ [\![S]\!]_c$ is an intension.

Compositionality

$(\forall O$: *O* is an *n*-ary syntactic operation$)(\exists f$: *f is an n*-ary function$)(\forall X_1, ..., X_n$: $\exists Y$: $Y = O(X_1, ..., X_n)(\forall c)\ [\![O(X_1, ..., X_n)]\!]_c = f([\![X_1]\!]_c, ..., [\![X_n]\!]_c)$.

Kaplan never endorses *Compositionality* explicitly, but the requirement that, in the semantics, each sentential operator correspond to an operation on intensions is difficult to motivate as anything other than a consequence of the more fundamental assumptions of *Compositionality* and *Intensionality*. (In fact, the assumption that each sentential operator correspond to an operation on intensions is not, strictly speaking, a consequence of *Compositionality* and *Intensionality*, but of *Compositionality* and *Intensionality* together with the standard syncategorematic treatment of sentential operators – a matter to which I will return at the end of §1.1.2 below.)

Lewis, for his part, does explicitly endorse *Compositionality*:

> [T]he semantic value of any expression [in context] is determined by the semantic values [in the same context] of the (immediate) constituents from which it is built, together with the way in which it is built from them (Lewis 1980, p. 25).

However, he uses *Compositionality* together with *Intensionality* to argue against *Propositionality*. First, Lewis proposes that "the semantic values of sentences are variable but simple":[51]

> A value for a sentence is a function, perhaps partial, from indices [what Kaplan calls *circumstances*] to truth values. (Alternatively, it is a set of indices.) However, a sentence may have different semantic values in different contexts, and the grammar must tell us how value depends on context (Lewis 1980: 34).
>
> It would be a convenience, nothing more, if we could take the propositional content of a sentence in context as its semantic value. But we cannot. The propositional contents of sentences do not obey the compositional principle, therefore they are not semantic values. Such are the ways of shiftiness that the propositional content of 'Somewhere the sun is shining.' in context *c* is not determined by the content in *c* of the constituent sentence 'The sun is shining'. ... World is not the only shiftable feature (Lewis 1980: 39).

According to Lewis, a proposition is "a function from possible worlds to truth values" (p. 36), and it is rather clear that Lewis takes this conception of propositions to allow propositions to vary in truth value across worlds – i.e., to be consistent with World Relativism – but not across any other parameters – i.e., to be inconsistent with all other relativisms.[52] Like Kaplan, Lewis is committed to the general principle that, if a

[51] This is, in fact, one of two "options" Lewis presents at pp. 34-35: the other is "constant but complicated" semantic values for sentences, which are functions from context-index pairs to truth values. For Lewis it is a matter of indifference which option the semantic theorist chooses, so there is no essential misrepresentation in my attribution of the first option to Lewis – he would not reject it.

[52] See the second paragraph of Lewis (1980, p. 39), which is enclosed in parentheses, for evidence.

language has π-shifting operators, and *Propositionality*, *Compositionality*, and *Intensionality* are true, then π-Relativism is true. Lewis, however, never uses the term 'vacuous' in (1980). Instead of Kaplan's *Vacuity Lemma*, Lewis appears to endorse:

> *The Noncompositionality Lemma*
>
> If π-Absolutism is true and there are π-shifting operators, then either *Compositionality* or *Propositionality* is false.

Lewis accepted World Relativism but rejects all other relativisms.[53] Accordingly, because he thought that there were, in English, operators that shift parameters other than *world*, and he regarded *Compositionality* as true by definition[54] he rejected the conjunction of *Compositionality* and *Propositionality* – by rejecting *Propositionality*.

King (1980) contains an exposition of Lewis's argument against *Propositionality*, which runs together Kaplan's talk of "vacuity" with Lewis's talk of "compositionality":

> Put in the most general terms, the issue Lewis has raised is how to assign propositions to sentences relative to contexts, when your language contains tense operators. ... Lewis makes two essential points. First, if the semantic values you assign to sentences relative to contexts are propositions, the assignment will have to be noncompositional. For the proposition assigned to a sentence like 'Sometimes, Doug is happy' relative to a context cannot be determined in part by the proposition assigned to 'Doug is happy' relative to the context. The latter cannot vary in truth-value over time, whereas the "tense operator" 'Sometimes' must operate on something that varies its truth-value over time. ... So the proposition assigned to the whole is not a function of the proposition assigned to the embedded part. That is *non-compositional* (King 2003, p. 206, emphasis mine.).

[53] In 1980, although not later: see the second paragraph of p. 39 in Lewis (1980), which was added in 1996 according to the footnote on the same page.

[54] See p. 39, fourth paragraph.

Earlier in the same paper:

> For if e.g. a location operator such as 'In Carnelian Bay' operates on propositions and is *not vacuous*, then the truth value of a sentence containing it (in a context) must depend on the truth value of the proposition expressed by the sentence it embeds (in that context) *at Carnelian Bay*. In particular, whether a sentence like:
>
> 3. In Carnelian Bay there is a boat launching ramp.
>
> is true or false (relative to a context) depends on whether 'there is a boat launching ramp' expresses a proposition (in that context) that is true or false relative to or at Carnelian Bay. If 'there is a boat launching ramp' expressed a proposition (relative to that context) that didn't vary its truth-value over locations, the location operator 'In Carnelian Bay' would be *vacuous*, and the sentence would ''feel'' like 'In Carnelian Bay arithmetic is incomplete.' But it doesn't! In an exactly similar way, if tense and modal operators operate on propositions and are not *vacuous*, propositions must vary their truth values across times and worlds
>
> ....if the relevant tense, location and modal operators operate on propositions and are *non-vacuous*, propositions must vary in truth-value across times, locations and worlds. (p. 196, last three emphases mine).

King, apparently, endorses both the *Vacuity Lemma* and the *Noncompositionality Lemma*. But he insists on *Compositionality* and *Propositionality*. Accordingly, for all parameters π for which King thinks π-Relativism is false, he rejects the claim that there are (in natural languages) π-shifting operators.

1.1. Operator arguments reconstructed

What is going on in the passages from Lewis, Kaplan, and King? It seems to me that at least two schematic operator arguments for π-Relativism can be extracted from them. I offer reconstructions below.

1.1.1 Operator Argument I: Kaplan

Let us assume, for the moment, the (double) index-theoretic, intensional framework for semantic theorizing that is shared by Lewis (1980) and Kaplan (1989) – I will call it *Lewis-Kaplan semantics*. In Lewis-Kaplan semantics, *Intensionality* is assumed: the semantic values expressions have in contexts are *intensions*, which are functions from *indices*, to use Lewis's term, or *circumstances*, to use Kaplan's, to extensions of the appropriate type. I will use Lewis's term below. An *index* is an *n*-tuple of alethic parameters of the sort that are supplied by contexts. Contexts are *n*-tuples of alethic parameters that contain at least the same parameters as indices – possibly more – and conform to some further constraints such as (perhaps) that there be a speaker present in the world of the context at the time and location of the context. For each context c, there is a unique index $i_c = \langle w_c, t_c, l_c \rangle$, called the *index of c*, such that w_c is the world of c, t_c the time of c, and l_c the location of c. Expressions are assigned an extension $|X|_{c,i}$ with respect to a context c and an index i, and the extension of X in c *simpliciter* ($|X|_c$) is identified with $|X|_{c,i_c}$. The semantic value of X in c is its intension in c: $\lambda i|X|_{c,i}$, a function from world-time-location triples to truth values.

This view of the semantic values of sentences, even in conjunction with *Propositionality*, does not yet commit us to the view that propositions vary in truth value with any of the parameters included in indices. It is consistent with what has been said, for example, that

$\forall S\ \forall c\ \forall w\ \forall t\ \forall l\ ([\![S]\!]_c(\langle w, t, l\rangle) = \text{Truth} \rightarrow \forall t'\ \forall l'\ [\![S]\!]_c(\langle w, t', l'\rangle) = \text{Truth})$,

which would be equivalent, in Lewis-Kaplan semantics, given *Propositionality*, to the conjunction of World Relativism with Time Absolutism and Location Absolutism.

In the Lewis-Kaplan semantics, the truth conditions of sentences with π-shifting operators are given using metalanguage quantifiers that bind π-variables, e.g.,

$$\forall S\ \forall c\ \forall i\ (\ulcorner \bigcirc_{\forall} S \urcorner|_{c,i} = \mathrm{T} \leftrightarrow \forall v_{\pi}\ [\![S]\!]_c(i(v_{\pi})) = \mathrm{Truth}),$$

from which it follows that

(1) $$\forall S\ \forall c\ (\ulcorner \bigcirc_{\forall} S \urcorner|_{c} = \mathrm{T} \leftrightarrow \forall v_{\pi}\ [\![S]\!]_c(i_c(v_{\pi})) = \mathrm{Truth}),$$

where '$i(v_{\pi})$' designates the index that is exactly like i except at most in that its π-coordinate is v_{π} – or, to use the popular jargon: '$i(v_{\pi})$' designates the result of *shifting* the π-coordinate of i to v_{π}. If we are to speak of semantic values of sentences being true or false at πs, then the following seems a natural definition:

(2) $[\![S]\!]_c$ is true at $v_{\pi} =_{df} [\![S]\!]_c(i_c(v_{\pi})) = \mathrm{T}$.

Propositionality, and (1), and (2) entail:

(3) $\forall c\ (\ulcorner \bigcirc_{\forall} S \urcorner|_{c} = \mathrm{T} \leftrightarrow \forall v_{\pi}\ \langle S \rangle_c$ is true at $v_{\pi})$.

Now suppose that π-Absolutism is true; it follows that both:

(Abs∀) $\forall v_{\pi}\ \forall p$ (p is true in/at $v_{\pi} \leftrightarrow \forall v'_{\pi}$ (p is true in/at v'_{π}))

and

(Abs$\bigcirc_\forall$) $\bigcirc_\forall \forall p$ (p is true $\leftrightarrow \bigcirc_\forall$ (p is true)).

I will assume all instances of

($\bigcirc_\forall$-Factivity) $\bigcirc_\forall(S) \rightarrow S$

By $\bigcirc_\forall$-*Factivity* and the equivalence of ⌜ $\bigcirc_\forall S$ ⌝ to ⌜ $\forall v_\pi$ in/at v_π, S ⌝, (Abs$\forall$) and (Abs$\bigcirc_\forall$) entail:

$\forall p \; \forall v_\pi$ (p is true in/at $v_\pi \leftrightarrow p$ is true),

and therefore, in particular:

(4) $\forall S \; \forall c \; \forall v_\pi$($\langle S \rangle_c$ is true at $v_\pi \leftrightarrow \langle S \rangle_c$ is true).

But of course

(5) $\forall S \; \forall c$ ($|S|_c$ = T $\leftrightarrow \langle S \rangle_c$ is true),

and (3), (4), and (5) (plus bivalence) entail:

(5) $\forall c \; |$⌜ $\bigcirc_\forall S$ ⌝$|_c = |S|_c$,

which says that $\bigcirc_{\forall}$ is vacuous.

We have seen that, in Lewis-Kaplan semantics, π-Absolutism entails the vacuity of the π-shifter $\bigcirc_{\forall}$, which corresponds, in the metalanguage, to universal quantification over πs. *Vacuity Lemma* vindicated?

Not quite. In fact, Kaplan's *Vacuity Lemma* is a mistake. For suppose that Time Absolutism is true and consider the apparent time-shifters 'always' and 'never'. Applying the above schematic argument to 'always', we get the conclusion that 'always' is vacuous, and so, by the semantic clause corresponding to (1) for 'always', we get the conclusion that:

(∀Truth) $\forall S\ \forall c\ \forall t\ \forall t'([\![S]\!]_c(i_c(t)) = \mathrm{T} \leftrightarrow [\![S]\!]_c(i_c(t')) = \mathrm{T})$.

But the semantic clause for 'never' will be

(Never) $\forall S\ \forall c\ (\ulcorner \text{Never}, S \urcorner|_c = \mathrm{T} \leftrightarrow \neg\exists t\ [\![S]\!]_c(i_c(t)) = \mathrm{T})$,

and (∀Truth) and (Never) entail, not that 'never' is vacuous, but that it is a truth-functional connective (it has the truth table of negation). Analogous arguments can be used to show that all apparent time-shifters are truth-functional. What Kaplan should have endorsed, instead of the *Vacuity Lemma*, is this:

The Truth-Functionality Lemma

If π-Absolutism is false, then all π-shifting operators are truth-functional,

which does follow, as we have seen, from the assumptions of Lewis-Kaplan semantics.

Operator Argument I is the schemantic argument which proceeds, in the manner just illustrated, to deduce the *Truth-Functionality Lemma* from the assumption of Lewis-Kaplan semantics (plus *Propositionality*, which Lewis rejects), and then adds the premise that there are π-shifting operators in order to deduce π-Relativism.

1.1.2. Operator Argument II: Lewis

The operator argument suggested by Lewis's pithy remarks clearly makes use of the following:

> *The Noncompositionality Lemma*
>
> If π-Absolutism is true and there are π-shifting operators that are not truth-functional for all sentences, then either *Compositionality* or *Propositionality* false.

It is unclear how Lewis arrived at the *Noncompositionality Lemma*, but it is clear that the *Noncompositionality Lemma* can be at least partially vindicated within Lewis-Kaplan semantics – given some rather weak assumptions about the expressive power of the object language. I will illustrate with an example, and then draw a more general moral.

Consider the operators 'now' and 'it is always the case that', and suppose, as Lewis did, that Time Absolutism and Location Absolutism are true but World Absolutism is false. Then we can – as Lewis did – represent propositions simply as functions from worlds to truth values, or *possible worlds intensions*. Of course, for all *S*

and *c*, the sentence ⌜ Now *S* ⌝ is associated with the same possible worlds intension as *S* in *c*, so, by *Intensionality* and *Propositionality*,

(No-Now) $\forall S \forall c \, [\![\ulcorner \text{ Now } S \urcorner]\!]_c = [\![S]\!]_c$.

But, of course, we know that there are sentences *S* and contexts *c* such that |⌜ It is always the case that now *S* ⌝|$_c$ ≠ |⌜ It is always the case that *S* ⌝|$_c$: for example, because the sun is now shining, the context *c** in which I am now speaking, is such that 'It is always the case that the sun is now shining' is true in *c** but 'It is always the case that the sun is shining' is false in *c**. Because the sentences have different truth values in *c**, they express different propositions in *c**, so, by *Propositionality*, $[\![\ulcorner$ It is always the case that *S* ⌝$]\!]_{c^*} \neq [\![\ulcorner$ It is always the case that *S* ⌝$]\!]_{c^*}$, but by (No-Now), $[\![\ulcorner$ Now *S* ⌝$]\!]_{c^*} = [\![S]\!]_{c^*}$ – a counterexample to *Compositionality*.

The above argument, of course, depends essentially on assumptions about the kinds of time-shifting operators that are present in the object language. If the object language is sufficiently simple, it is unclear if the assumption of Time Absolutism together with the assumption that semantic values are possible-worlds intensions and *Propositionality* allows us to derive the existence of counterexamples to *Compositionality* from the assumption that the language has a time-shifting operator. For example, if 'it is always the case that' is the only time-shifting operator and 'now' and other temporally rigidifying operators (and other devices of reference to time) are not present, it is unclear how any counterexamples to *Compositionality* could arise: why should there not be a function *f* such that, for all *S* and *c*, $[\![\ulcorner$ It is always the case that *S* ⌝$]\!]_c = f([\![$'it is always the case that'$]\!]_c, [\![S]\!]_c)$, in the case of a language with such an impoverished tense system, even if $[\![\ulcorner$ It is always the case that *S* ⌝$]\!]_c$ and $[\![S]\!]_c$ are

functions from possible worlds to truth values? It is one thing to claim that we do not know how to define such a function in English – as I presume, we do not – but quite another to claim that there is no such function. I will leave this an open question.

The considerations which showed the presence of time-shifting operators – given that there is also a time-rigidifying operator – to be inconsistent with Time Absolutism in Lewis-Kaplan semantics, *Propositionality*, and *Compositionality*, generalize to operators that shift other parameters. An analogous argument concerning locations can be given using 'Everywhere' and 'here', and for worlds, using 'necessarily' and 'actually'.

As I said, this was to be a *partial* vindication of the *Noncomopositionality Lemma*. I propose replacing that lemma with the more cautious:

> *The Noncompositionality* Lemma*
>
> If π-Absolutism is true and there is, in the same language, at least one π-shifting operator and at least one π-rigidifier, then either *Compositionality* or *Propositionality* false.

Operator Argument II is the schematic argument that derives the *Noncomopositionality* Lemma* in the manner exemplified above, and adds the premise that there is, in some language, both a π-shifting operator and a π-rigidifier, along with *Propositionality* and *Compositionality*, to derive π-Relativism.

An aside: even if both Time Relativism and World Relativism are true, 'actually' and 'now' will be counterexamples to the combination of *Compositionality* and *Propositionality* in Lewis-Kaplan semantics if they are treated syncategorematically, as they are in Kaplan (1989a). Technically, 'actually' and 'now'

are "monsters" in Kaplan's LD.[55] To ensure that there are no counterexamples to the *Compositionality*/*Propositionality* combination in the propositional sublogic of LD, 'actually' and 'now' must be assigned intensions that vary with context. (Exorcising monsters from full quantificational LD requires implausibly drastic measures – as the reader can extrapolate from the arguments of ch 1. In his "Afterthoughts", Kaplan appears to endorse a schmentencite solution (Kaplan 1989b: 572, 592).)

[55] Below is an argument in the semantics of Kaplan's LD that the *A* ("actually") operator is a monster. I assume, like Rabern (2012), that a monster is a sentential operator that is a counterexample to *Compositionality* on the assumption that the semantic value of a sentence in a context is what Kaplan calls its "Content". Rabern, apparently, has not noticed, or in any case does not mention in his (2012), that the modal and temporal rigidifiers of LD are monsters according to LD semantics.

For simplicity, pretend that the contexts in LD-structures are time-world pairs, and ignore agents and locations. Consider an LD-structure $\mathfrak{A}$ where $T_{\mathfrak{A}} = \{0\}$, $W_{\mathfrak{A}} = \{1, 2\}$, and let ϕ be a 0-0-place predicate (sentence constant) such that $\vDash^{\mathfrak{A}}_{c,0,1} \phi$ and $\nvDash^{\mathfrak{A}}_{c',0,2} \phi$, where $c = \langle 0, 1\rangle$ and $c' = \langle 0, 2\rangle$. By clause 10(ii) of the definition of truth-in-a-structure (Kaplan 1989a: 545),

$\vDash^{\mathfrak{A}}_{c,0,1} A\phi$,
$\vDash^{\mathfrak{A}}_{c,0,2} A\phi$,
$\nvDash^{\mathfrak{A}}_{c',0,1} A\phi$, and
$\nvDash^{\mathfrak{A}}_{c',0,2} A\phi$,

so, by Kaplan's definition of Content (Kaplan 1989a: 546), $\{A\phi\}^{\mathfrak{A}}_{c}$ (the Content of $A\phi$ in $\mathfrak{A}$, c) = $\{\langle 0, 1\rangle, \langle 0, 2\rangle\}$ and $\{A\phi\}^{\mathfrak{A}}_{c'} = \varnothing$, but, because 0-0-place predicates have the same Content in every context of a given structure, $\{\phi\}^{\mathfrak{A}}_{c} = \{\phi\}^{\mathfrak{A}}_{c'}$. Since $\{\phi\}^{\mathfrak{A}}_{c} = \{\phi\}^{\mathfrak{A}}_{c'}$ and $\{A\phi\}^{\mathfrak{A}}_{c} \neq \{A\phi\}^{\mathfrak{A}}_{c'}$, there is no function f such that $\{A\phi\}^{\mathfrak{A}}_{c} = f(\{\phi\}^{\mathfrak{A}}_{c})$ and $\{A\phi\}^{\mathfrak{A}}_{c'} = f(\{\phi\}^{\mathfrak{A}}_{c'})$. But *Compositionality* requires the existence of such a function because *A* is assigned no semantic value (no Content), wherefore the application of *A* to a sentence must be treated as a unary syntactic operation that takes a sentence and outputs a sentence.

Analogous proofs can be given for the monstrosity of *N* ("now") and *Y* ("yesterday") in LD. These monsters can be exorcised by assigning a Content to each rigidifying operator – say, by letting $\{A\}^{\mathfrak{A}}_{c} = w_c$, $\{N\}^{\mathfrak{A}}_{c} = t_c$, and $\{Y\}^{\mathfrak{A}}_{c} = t_c - 1$.

2. Operator arguments assume a coarse-grained conception of propositions

My reconstructions of Kaplan's operator argument (Operator Argument I) and Lewis's operator argument (Operator Argument II) both make use of *Intensionality* and *Propositionality*, which together entail the claim that propositions are functions from indices to truth values – or that propositions are, to use a popular piece of jargon *coarse-grained*. *Propositionality* and *Intensionality* are explicitly cited in Kaplan's operator argument, and while Lewis rejected *Propositionality*, he clearly agreed with Kaplan that propositions are coarse-grained: he thought that propositions and the semantic values of sentences were both kinds of intensions, differing, however, in the kinds of indices they took as arguments (for propositions, the arguments are worlds, for the semantic values of sentences, world-time-location triples). It is also difficult to see how Kaplan's and Lewis's arguments could be plausibly reconstructed without the use of assumptions that jointly entail that propositions are coarse-grained.

It is therefore surprising that the literature on operator arguments has proceeded entirely without confronting the question of whether operator arguments must rely on a coarse-grained conception of propositions. (It is even more surprising that some prominent critics of operator arguments have explicitly claimed that their soundness is independent of the question of whether propositions are coarse-grained.[56] For if it turned out that operator arguments must rely on a coarse-grained conception of propositions, then the reply to them would be both simple and plausible: the coarse-grained conception of propositions is incorrect – propositions have structure. There would be no need for philosophers who wish to reject operator arguments for various relativist theses to speculate on the intricacies of natural language syntax and semantics,

[56] E.g., King (2003), (2007: 164), Ninan (2011: 401, n. 1).

as many works in this genre do at great length.[57] Nor would there be any need to argue in support of the correct reply to operator arguments, as most philosophers who have given the topic serious consideration have already concluded that the coarse-grained conception of propositions is incorrect, and the main arguments against it are widely known.

As it happens, operator arguments do require the assumption that propositions are coarse-grained. This can be shown by giving an example of a language $\mathcal{L}$ (*i*) whose semantic value assignment is compositional (in the sense that it is – in a non-vacuous way – not a counterexample to *Compositionality*) and (*ii*) propositional (in the sense that it is – in a non-vacuous way – not a counterexample to *Propositionality*), and (*iii*) such that the propositions assigned as semantic values to $\mathcal{L}$-sentences in contexts are not coarse-grained, (*iv*) such that $\mathcal{L}$ contains, for some π, at least one π-shifting operator and at least one π-rigidifier, (*v*) such that the assumption of π-Absolutism is consistent with the syntactic and semantic assumptions made about $\mathcal{L}$. Because of (*v*) and (*iv*), the *Truth-Functionality Lemma* does not follow from the semantic and syntactic assumptions made about $\mathcal{L}$. Because of (*v*), (*i*), and (*ii*), the *Noncompositionality* Lemma* does not follow from the syntactic and semantic assumptions made about $\mathcal{L}$. If the semantic and syntactic assumptions made about $\mathcal{L}$ are sufficiently detailed, the example should be regarded as showing that *Operator Argument I* (which uses the *Truth-Functionality Lemma*) and *Operator Argument II* (which uses the *Noncompositionality Lemma*) both rely on a coarse-grained conception of propositions. It is essential that the semantic and syntactic assumptions made about $\mathcal{L}$ are sufficiently *detailed,* for of course π-Absolutism will be consistent with appropriately non-detailed

[57] King (2003), (2007: ch. 6), Glanzberg (2011), Ninan (2011), Cappelen and Hawthorne (2009: ch. 3).

semantic and syntactic assumptions about $\mathcal{L}$. What level of detail is appropriate? I will assume that Soames (2010) and King (2007, Appendix) represent a kind of "industry standard" for structured-propositions-semantics, and the presentation of the example below will meet that standard: like Soames and King, I will give a recursive definition of sentencehood for the object language, a recursive definition of semantic value, and a truth definition for the propositions assigned as semantic values (in contexts) to the sentences of the object language. In addition, I will give one definition not present in Soames' or King's presentations of their structured-propositions semantics, which is a definition of a translation function from the object language to a fragment of English. The translation function can be used to ascertain that the object language does indeed contain a π-shifting and a π-rigidifying operator, and that the semantic value assignment together with the truth definition for structured propositions assign the intuituively correct truth conditions to object-language sentences relative to contexts.

2.1. A structured-propositions semantics for a simple language

In this section, I will, first, specify the syntax of $\mathcal{L}_0$, a very simple language with time-shifting operators. I will interpret the language by inductively defining a translation function * from its sentences to English sentences. This will be referred to as the *translational semantics* of $\mathcal{L}_0$. The translation function is presumed to preserve what Kaplan calls the "character" of each sentence: in other words, for all contexts *c*, and for all $\mathcal{L}_0$-sentences *S*, $\langle S \rangle_c = \langle {}^*S \rangle_c$, where $^*S$ is the English translation of *S*. Then I will give the *official semantics* of $\mathcal{L}_0$ by defining a semantic value assignment that assigns to each $\mathcal{L}_0$-sentence, relative to a context, a structured proposition. This will be followed by a truth definition for the propositions expressed by $\mathcal{L}_0$-sentences. The section will

conclude with a discussion of how the example $\mathcal{L}_0$ shows that the operator arguments rely on a coarse-grained conception of propositions.

2.1.1. Syntax

rain and ***snow*** are the only atomic $\mathcal{L}_0$-sentences; if *S* is an $\mathcal{L}_0$-sentence, then so are ⌜ **F***S* ⌝ and ⌜ **N***S* ⌝; nothing else is an $\mathcal{L}_0$-sentence.

2.1.2. Translational semantics

For each $\mathcal{L}_0$-sentence *S*, the translation of *S* into English (**S*) is defined as follows. *(***rain***) = 'It is raining', *(***snow***) = 'It is snowing', and for all $\mathcal{L}_0$-sentences *S*, *(⌜ **F***S* ⌝) = ⌜ It will be the case that **S* ⌝, and *(⌜ **N***S* ⌝) = ⌜ It is now the case that **S* ⌝.

$\mathcal{L}_0$ then, has one shifty operator: the time-shifter **F**. **N**, on the other hand, though it is a tense operator, is not a time-*shifter*, because, as the translational semantics reveals, $|\ulcorner\ \mathbf{N}S\ \urcorner|_c = |S|_c$ for all *c*.

2.1.3. Official semantics

For the official semantics of $\mathcal{L}_0$, we assume that the propositions expressed by nonatomic sentences of $\mathcal{L}_0$ share the structure of the sentences that express them; in particular, that, for all operators ○ and all sentences *S*,

($\mathcal{L}_0$○) $[\![\ulcorner\ \bigcirc S\ \urcorner]\!]_c = \langle [\![\bigcirc]\!]_c, [\![S]\!]_c \rangle$,

This guarantees that there are no counterexamples to *Compositionality* among the $\mathcal{L}_0$-sentences.

For the atomic sentences:

($\mathcal{L}_0$R) $[\![\textbf{\textit{rain}}]\!]_c = \langle raining, t_c \rangle$

($\mathcal{L}_0$S) $[\![\textbf{\textit{snow}}]\!]_c = \langle snowing, t_c \rangle$,

where *raining* is the property of being a time at which it is raining, and *snowing* is the property of being a time at which it is snowing, and t_c is the time of c.

For the operators:

($\mathcal{L}_0$F) $[\![\textbf{F}]\!]_c$ is the > relation on times

($\mathcal{L}_0$N) $[\![\textbf{N}]\!]_c$ is the now_c relation in which any time t_1 stands to a time t_2 iff $t_2 = t_c$

Thus, the semantic value of **F** is the same in every context, and the semantic value of **N** is different in any pair of contexts with distinct times (because $[\![\textbf{N}]\!]_c$ is the relation in which every time stands to the time of c, this will be a different relation for different contexts).

2.1.4. Truth for structured propositions

The truth conditions of the propositions expressed by $\mathcal{L}_0$-sentences are given by the following, where t is any time, P any property, R any dyadic relation, and $p[t]$ the proposition that results from replacing each occurrence of each time occurring in proposition p with an occurrence of t.

(T1) $\langle P, t\rangle$ is true iff t has P^1

(T2) $\langle R, p\rangle$ is true iff $p[t]$ is true for some t standing in R to the unique time occurring in p

2.2. The relevance of $\mathcal{L}_0$ to the operator arguments

Let us now suppose that Time Absolutism is true. Given this assumption, the sentences 'It is raining' and 'It is snowing', and their $\mathcal{L}_0$-translations express propositions that are *specific with respect to time*. What this means, in a structured-propositions semantics, is that these sentences express in each context propositions containing the time of the context as a constituent – and this is, of course, the case according to the official semantics. But we should also wish to be able to show that $\mathcal{L}_0$-sentences have, in contexts, time-specific truth conditions that match those of their English translations. Thus, for example, because the 'It is raining' is true in c iff it is raining in t_c, and 'It will be the case that it is raining' is true in c iff it is raining at some time later than t_c, we should wish to be able to derive from the official semantics of $\mathcal{L}_0$, with the aid of the truth definition for structured propositions, that ***rain*** is true in c iff it is raining in t_c, and that ⌜ **F** ***rain*** ⌝ is true in c iff it is raining at some time later than t_c. And this we can do:

Example 1:

$|\textbf{\textit{rain}}|_c$ = T iff $\langle raining, t_c\rangle$ is true (by ($\mathcal{L}_0$R))
iff t_c has *raining* (by (T1))
i.e., it is raining at t_c

Example 2:

$\ulcorner$ **N *rain*** $\urcorner|_c$ = T iff $\langle now_c, \langle raining, t_c\rangle\rangle$ is true (by ($\mathcal{L}_0$O), ($\mathcal{L}_0$N), ($\mathcal{L}_0$R))
iff $(\exists t\colon t = t_c)\ \langle raining, t_c\rangle[t]$ is true (by (T2))
iff $(\exists t\colon t = t_c)\ \langle raining, t\rangle$ is true (by definition)
iff $(\exists t\colon t = t_c)\ t$ has *raining* (by (T1))
iff t_c has *raining* (by logic)
i.e., it is raining at t_c

Example 3:

$\ulcorner$ **F *rain*** $\urcorner|_c$ = T iff $\langle >, \langle raining, t_c\rangle\rangle$ is true (by ($\mathcal{L}_0$O), ($\mathcal{L}_0$F), ($\mathcal{L}_0$R))
iff $(\exists t\colon t > t_c)\ \langle raining, t_c\rangle[t]$ is true (by (T2))
iff $(\exists t\colon t > t_c)\ \langle raining, t\rangle$ is true (by definition)
iff $(\exists t\colon t > t_c)\ t$ has *raining* (by (T1))
i.e., it is raining at some time later than t_c

Example 4:

$\ulcorner$ **F N *rain*** $\urcorner|_c$ = T iff $\langle >, \langle now_c, \langle raining, t_c\rangle\rangle\rangle$ is true (by ($\mathcal{L}_0$O), ($\mathcal{L}_0$F), ($\mathcal{L}_0$N), ($\mathcal{L}_0$R))
iff $(\exists t\colon t > t_c)\ \langle now_c, \langle raining, t_c\rangle\rangle[t]$ is true (by (T2))
iff $(\exists t\colon t > t_c)\ \langle now_c, \langle raining, t\rangle\rangle$ is true (by definition)
iff $(\exists t\colon t > t_c)\ (\exists t'\colon t' = t_c)\ \langle raining, t\rangle[t']$ is true (by (T2))
iff $(\exists t\colon t > t_c)\ (\exists t'\colon t' = t_c)\ \langle raining, t'\rangle$ is true (by definition)
iff $(\exists t\colon t > t_c)\ (\exists t'\colon t' = t_c)\ t'$ has *raining* (by (T1))
iff $(\exists t\colon t > t_c)\ t_c$ has *raining* (by logic)
i.e., at some time later than t_c, it is raining at t_c

Examples 1 and 2 show that $\ulcorner$ **N *rain*** $\urcorner|_c = |\textbf{\textit{rain}}|_c$ for all *c*, which is correct by the translational semantics. Example 3 shows that, for all *c*, $\ulcorner$ **F *rain*** $\urcorner|_c$ = T iff it is raining at some time later than the time of *c*. Example 4 shows that (unless there is a last time) **F** is vacuous when its operand begins with an **N**. All of this is correct, according to the translational semantics, on the assumption that Time Absolutism is correct.

By Examples 1 and 3, for all *c*,

(*r*) $|\textbf{\textit{rain}}|_c$ = T iff it is raining at t_c

(F*r*) $|\ulcorner\ \textbf{F}\ \textbf{\textit{rain}}\ \urcorner|_c$ = T iff ($\exists t$: $t > t_c$) it is raining at t

It is tempting to think that this shows that **F** is not truth-functional, because the additional assumption needed for showing that is so trifling, but let us make the assumption explicit anyway: what we need is the assumption that it is not the case that there are times t and t' such that $t > t'$ and t has *raining* but t' does not have *raining*. This assumption, together with (*r*) and (F*r*), entails that **F** is not truth-functional.

What remains to be shown is that the syntactic and semantic assumptions made about $\mathcal{L}_0$, including the truth definition for structured propositions (i.e., §§2.1.2-.2.1.5 above), are consistent with Time Absolutism. But this hardly requires showing: the assumptions say nothing at all about propositions being *true at a time*, so they are clearly consistent with Time Absolutism. Because §§2.1.2-.2.1.5 are consistent with Time Absolutism, and $\mathcal{L}_0$ has a time-shifting operator (which was shown not truth-functional), the instance of the *Truth-Functionality Lemma* for time is not entailed by §§2.1.2-.2.1.5. Because §§2.1.2-.2.1.5 are consistent with Time Absolutism, and $\mathcal{L}_0$ has a time-shifting as well as a time-rigidifying operator and the official semantics for $\mathcal{L}_0$ is compositional and propositional, the instance of the *Noncompositionality* Lemma* for time is not entailed by §§2.1.2-2.1.5. Because the syntactic and semantic assumptions §§2.1.2-.2.1.5 are up to the industry standard of explicitness in structured-propositions semantics, we may conclude that operator arguments for Time Relativism (that is, ones in the form of *Operator Argument I*, which make use of the *Truth-Functionality Lemma*, and ones in the form of *Operator Argument II*, which make use of the *Noncompositionality* Lemma*) rely on a coarse-grained conception of propositions.

And of course, while our example involved time-shifting operators, small variations on it can be used to produce examples that establish that any operator argument for any relativist thesis relies on a coarse-grained conception of propositions. To obtain such examples, we may leave the syntax of $\mathcal{L}_0$ unchanged, and simply revise the translational semantics to read, for example:

*(⌜ **F***S* ⌝) = ⌜ Somewhere, it is the case that **S* ⌝,

and

*(⌜ **N***S* ⌝) = ⌜ Here, it is the case that **S* ⌝,

or

*(⌜ **F***S* ⌝) = ⌜ Necessarily, it is the case that **S* ⌝,

and

*(⌜ **N***S* ⌝) = ⌜ Actually, it is the case that **S* ⌝,

and we can accordingly revise official semantics and the truth definition for propositions to give the intuitively correct results for these and other reinterpretations of $\mathcal{L}_0$.

3. Comparison with the Standard Reply

How does the present strategy of replying to operator arguments compare with the Standard Reply, which denies the existence of π-shifting operators whenever the replier finds π-Relativism unacceptable, and maintains that the alleged π-shifters are, in fact quantifiers that bind π-variables? The present strategy is clearly preferable. Because the Standard Reply does not challenge the other premises of operator arguments, it supplies

an operator argument for a new kind of relativism with the premise it needs: that what looked like π-shifting operators are in fact variable-assignment shifting operators. In fact, King (2003) not only does not *challenge* the *Vacuity Lemma* and the *Noncompositionality Lemma* – he *accepts* them, and therefore accepts the *Truth-Functionality Lemma* (which is an immediate consequence of the *Vacuity Lemma*) and the *Noncompositionality* Lemma* (which is an immediate consequence of the *Noncompositionality Lemma*) as well. This is problematic, because insofar as these principles are accepted, it seems that the advocate of the Standard Reply is forced to endorse *Variable-Assignment Relativism*. According to the Standard Reply, any operator which appears to shift a parameter π such that π-Relativism is unacceptable, is in fact a quantifier binding variables that range over π. But because quantifiers themselves are sentential operators that shift variable assignment, if the advocate of the Standard Reply accepts the *Truth-Functionality Lemma* or the *Noncompositionality* Lemma*, he seems to have unwittingly exchanged all of the offending relativisms for Variable-Assignment Relativism. And surely this is a bad trade – no one has ever endorsed Variable-Assignment Relativism, presumably for a reason.

"But wait a minute", an advocate of the Standard Reply might say, "quantifiers are not variable assignment shifters by your criterion (p. 61). If a quantifier, say '$\exists x$', is a variable assignment shifter, then, on your criterion, ⌜ $\forall x\ S$ ⌝ must be not only non-truth-functional but also logically equivalent to some sentence of the form ⌜ $(\forall g\colon S'(g))$ in/at g, S ⌝, where 'g' is a variable that ranges over variable assignments. And it isn't."

I have two replies to this.

First reply: My criterion for shiftiness was not meant to be taken particularly seriously. It was meant to enable the reader to acquire a rough-and-ready grasp of the target phenomenon. There is no agreed-upon definition of "shift" in the literature.

However, there are paradigms, and, historically at least, the quantifiers of first-order logic are *the* paradigm of shifty operators: they were the first sentential operators ever to be given what might be called a "shifty semantics", in Tarski (1935), in which ⌜ $\forall v_n$ S ⌝ is defined as true at ("satisfied by") an infinite sequence of objects σ iff S is true at every sequence that results from shifting the *n*th member of σ. This was the inspiration for "Kripke semantics", which treats non-variable-binding sentential operators in the same manner, as shifting some other parameter. Insofar as we think of "Kripke semantics" as revealing the shiftiness of modal operators, we ought to think of the paradigm it is based on as revealing the shiftiness of quantifiers.

Second Reply: In the end, it doesn't matter for my point whether quantifiers are shifty or not. Let us suppose that quantifiers have some other semantic property – *schmiftiness* – that they share with all variable-binding operators and no others. Quantifiers *schmift* the variable-assignment parameter. The problem for the Standard Reply is that both the *Noncompositionality* Lemma* and Lewis's original *Noncompositionality Lemma*, which was found to be questionable, turn into truths when we replace the word 'shift' in them with the word 'schmift'. A language with variable-binding operators cannot have a semantics that is both propositional and compositional, so if there is a language with operators that schmift the variable assignment, then *Propositionality* and *Compositionality* cannot both be true. This conclusion was argued for at length in Chapter 1, and I will not repeat those arguments here.

What of Variable Assignment Relativism, then? It is clear what this would look like in Lewis-Kaplan semantics: an index now has a variable assignment coordinate, and propositions expressed by sentences with free variables vary in truth value from one assignment to another. Variable Assignment Relativism, I maintain, is too bizarre to be seriously considered.

To begin to appreciate the bizarreness of Variable Assignment Relativism, consider an atomic sentence with a free second-order variable – say, '$X(0)$', where '0' is a constant that refers to 0. According to the Variable Assignment Relativist, '$X(0)$' expresses a proposition – the same proposition – in every context, a proposition whose truth value varies with the variable assignment of the index. Let us call the proposition '$X(0)$' expresses in every context 'Prop'. There is a variable assignment g such that g('X') = the property of being an x such that $x = x$ and Kansas is flat, and there is a variable assignment g' such that g'('X') = the property of being an x such that $x = x$ and Juhani is writing. According to Variable Assignment Relativism, Prop is true at $\langle w, t, l, g \rangle$ iff, in w, Kansas is flat, and Prop is true at $\langle w, t, l, g' \rangle$ iff, in w, Juhani is writing. Of course, '$X(0)$' is true in a context c iff Prop is true at the index of c. Suppose, then, that the variable assignment of the present context c_{pres}, in which I assert '$X(0)$', is g, and that the variable assignment of a subsequent context c_{sub}, in which you assert '$\neg X(0)$', is g'. According to Variable Assignment Relativism, the proposition I assert in c_{pres} is true iff Kansas is flat, and the proposition you assert in c_{sub} is true iff Juhani is not writing, and yet the proposition I assert in c_{pres} is the negation of the proposition you assert in c_{sub}, so we disagree. But what is this proposition we disagree on? How could there be a proposition such that, when I endorse it in c_{pres}, it is true iff Kansas is flat, but when you endorse it in c_{sub}, it is true iff Juhani is writing? Is it not clear that there is no such proposition, but rather that the variable assignments of the two contexts account for different propositions being expressed in c_{pres} and c_{sub} – the proposition that Kansas is flat in c_{pres}, and the proposition that Juhani is writing in c_{sub}.

For further bizarre consequences, consider that the Variable-Assignment Relativist must think of the truth value of a proposition as relative to an assignment of semantic values to (some of) the words occurring in sentences used to express it.

Presumably a single proposition can be expressed by multiple sentences – in different languages, say. Consider a context *c* such that 'He is short' and 'Il est cort' express the same proposition in *c*, and suppose that 'he' and 'il' in these sentences are free variables, but that the variable assignment of *c* assigns a short person (Shorty) to 'he' and a non-short person (Colossus) to 'il'. It would seem that the proposition expressed by 'He is short' in *c* is true iff Shorty is short, and that the proposition expressed by 'Il est cort' in *c* is true iff Colossus is short, but these are the same proposition, and Shorty is short and Colossus isn't short – a contradiction. The solution the Variable Assignment Relativist is driven to adopt is what I called, in ch. 1, an orthographic conception of the semantics of free variables, according to which there is no context in which ⌜ $S(v)$ ⌝ and ⌜ $S(v')$ ⌝ express the same proposition if $v \neq v'$. (The same conclusion could be reached by considering examples of vacuous quantification, as in ch. 1.)

3

Internalism and Relativism

This chapter deals with the prospects for semantic internalism. Part I deals with the lessons of Putnam's classic twin earth thought experiments: it argues that the thought experiments establish not only, as is widely recognized, that there is *a* kind of semantic content that is broad, but that they establish also that *if* there is also a kind of semantic content that is narrow (not broad), then such content must be *relativist* or *non-classical* – i.e., it must be a kind of content that can determine more than one extension per (centerless) world, dependent on such further parameters as *agent* and *time*. Semantic internalism, then, is a form of relativism. Part II discusses a recent attempt at characterizing a notion of narrow semantic content: David Chalmers' epistemic two-dimensionalism, which does what the lessons of twin earth require of semantic internalism: it treats narrow contents ("primary intensions") as having extensions only relative to centered worlds (world-agent-time triples). I argue that examples involving centered worlds with partial or complete qualitative symmetry refute epistemic two-dimensionalism's account of narrow content. In the concluding remarks in Part III, I argue that considerations of symmetry place constraints additional to those due to the Twin Earth thought experiment on any account of narrow semantic content.

All references to "content" below will be to the *semantic* content of a linguistic expression, or of its utterance. The semantic content of a sentence is a proposition, and the semantic contents of subsentential expressions are whatever they must be in order to

determine the semantic contents of the sentences they compose according to familiar semantic composition rules – which need not be *compositional* in the standard sense, and which are not compositional in the standard sense when the language under discussion has variable-binding operators, as shown in ch. 1. However, because quantification and variable-binding are not implicated in any essential way in the examples discussed in this chapter, I will ignore the counterexamples to the compositionality of content they generate and I will appeal below, from time to time, to the assumption that semantic contents are assigned to expressions in a compositional manner. Such appeals to compositionality are to be understood as including a tacit caveat about variable-binding.

I. What we learn from the Twin Earth thought experiments

I begin with some definitions. An occasion or *case* of language use is a pair $\langle w, u\rangle$, where w is a world and u an utterance of a linguistic expression that takes place in w. If X is the expression of which u is an utterance in w, we say that X *expresses* content C in $\langle w, u\rangle$ (or: $expr(X, C, \langle w, u\rangle)$) iff u expresses C in w. The *utterance* of $\langle w, u\rangle$ (or $u_{\langle w, u\rangle}$) is u, the *world* of $\langle w, u\rangle$ (or: $w_{\langle w, u\rangle}$) is w, the *agent* of $\langle w, u\rangle$ (or: $a_{\langle w, u\rangle}$) is the agent who, in w, produces u, and the time of $\langle w, u\rangle$ (or: $t_{\langle w, u\rangle}$) is the time at which, in w, u occurs. We say that case c is *internally like* c' (or: $c \approx c'$) iff (*i*) the temporal part of a_c that begins at the beginning of t_c and ends at the end of t_c in w_c is an intrinsic qualitative duplicate of the temporal part of $a_{c'}$ that begins at the beginning of $t_{c'}$ and ends at the end of $t_{c'}$ in $w_{c'}$, (*ii*) the temporal part of a_c that ends at the beginning of t_c in w_c is an intrinsic qualitative duplicate of the temporal part of $a_{c'}$ that ends at the beginning of $t_{c'}$ in $w_{c'}$, and (*iii*) the temporal part of a_c that begins at the end of t_c in w_c is an intrinsic qualitative duplicate

of the temporal part of $a_{c'}$ that begins at the end of $t_{c'}$ in $w_{c'}$. We say that a content *C* that *X* expresses in *c* is *narrow* (or: *nar*(*C*, *X*, *c*)) iff, for all c' such that $c' \approx c$, the expression of which $u_{c'}$ is an utterance in $w_{c'}$ expresses content *C* in c'. We say that a content *C* that *X* expresses in *c* is *broad* (or: *broad*(*C*, *X*, *c*)) iff it is not the case that, for all c' such that $c' \approx c$, the expression of which $u_{c'}$ is an utterance in $w_{c'}$ expresses content *C* in c'. (If it is not the case that *expr*(*X*, *C*, *c*), then neither *broad*(*C*, *X*, *c*) nor *nar*(*C*, *X*, *c*)) The variables '*X*', '*C*', '*c*', '*w*', '*u*', embellished with primes and other diacritics as appropriate, will range over, respectively, expressions (expression types), contents, cases, worlds, and utterances (of expressions, i.e., expression tokens).

The twin earth thought experiments of Putnam (1975) are generally thought to establish the following semantic externalist thesis.

SE: $\exists C\, \exists X\, \exists c\ broad(C, X, c)$.

But, as many authors have noted,[58] SE is consistent with the following *weak semantic internalist* thesis:

WSI: $\forall C\, \forall X\, \forall c\ (expr(X, C, c) \rightarrow \exists C'\ nar(C', X, c))$

[58] E.g., here is Chalmers on the contents mental states:

> The existence of wide [broad] content is compatible in principle with the hypothesis that every mental state has a narrow content: that is, that there is a (different) sort of content such that, for every mental state of the subject, corresponding mental states of intrinsic duplicates have the same content of this sort. This hypothesis has intuitive appeal... (Chalmers 2003: 46).

And what goes for the broadness of the contents of mental states presumably goes for the broadness of the contents of utterances.

WSI says, in other words, that any expression that has a content in a case also has a narrow content in that case. WSI is endorsed both by *ecumenical inernalists* who, like Chalmers, are happy to agree that the twin earth thought experiment shows that some expressions have broad contents in some cases but also claim that all expressions also have narrow contents in all cases (in which they have any content at all), and by *hard-core internalists*, who endorse

HCSI: $\forall C\, \forall X\, \forall c\, (expr(X, C, c) \rightarrow nar(C, X, c))$,

which entails WSI. That is, hard-core internalists endorse WSI because they deny that any content expressed by any expression is broad in any case.

It is widely recognized that the twin earth thought experiments establish SE and therefore refute HCSI. I will presuppose this consensus throughout this chapter. The only sort of semantic internalism I will be concerned with is ecumenical internalism, which entails WSI.

What has not been widely recognized is that the twin earth thought experiments refute even WSI, and therefore refute ecumenical internalism – *if* the classical conception of propositions as either true or false eternally and everywhere, and for every agent, is correct. The alternative is some form of relativism.

I will assume that a content *determines* a unique extension (or nothing) in each case: the content of a sentence determines a truth value, the content of an *n*-place predicate determines a set of *n*-tuples, and the content of a singular term determines an individual. Using '$det(C, c)$' for the extension-determination function, we can express the classical conception of content as follows.

Classical Content

$\forall C\ \forall w\ \forall u\ \forall u'$ [(*det*(C, $\langle w, u\rangle$) exists $\wedge$ *det*(C, $\langle w, u'\rangle$) exists)

$\rightarrow$ *det*(C, $\langle w, u\rangle$) = *det*(C, $\langle w, u'\rangle$)]

According to *Classical Content*, a content determines the same extension with respect to every case with the same world. *Classical Content* rules out the possibility that, e.g., an utterance of mine of 'It is raining' made today and an utterance of yours of 'It is raining' made tomorrow might express the same content (proposition) while differing in extension (truth value). If our utterances do differ in truth value and if *Classical Content* is true, our utterances must express different propositions.

Someone who rejects *Classical Content* is a believer in *nonclassical* or *relativist* content. An advocate of nonclassical content presumably does not hold the eccentric view that counterexamples to *Classical Content* are due to the relativity of the extensions determined by contents to *utterances* – alleged contents with utterance-relative extensions seem more akin to Kaplanian "characters" or what used to be called "standing meanings" than to contents. Rather, the (non-eccentric) relativist maintains that the extension determined by a content is relative to some parameters which are determined by utterances in worlds but that can be present in worlds even when utterances are not: agents and times are the natural choice. Following Chalmers, I will say that the *scenario* of c is the triple $s = \langle w_c, a_c, t_c\rangle$, where w_c will also be called the *world of* s (w_s), a_c the *agent of* s (a_s), and t_c the *time of* s (t_s). "The scenario of c" will be abbreviated "*scn*(c)". While there are, of course, many other relativist views, the only relativist alternative to *Classical Content* that will be considered in this chapter is the view that the extension of a content varies with scenario.

I maintain that the twin earth thought experiments establish this:

Internalism to Relativism (I-to-R)

If WSI is true, then *Classical Content* is false.

Here is the argument. First, I will make the following uniqueness assumptions, which are dispensable but simplify the argument:

Broad Uniqueness

$\forall C\ \forall X\ \forall c\ (broad(X, C, c) \rightarrow \forall C'(broad(X, C', c) \rightarrow C' = C))$

Narrow Uniqueness

$\forall C\ \forall X\ \forall c\ (nar(X, C, c) \rightarrow \forall C'(nar(X, C', c) \rightarrow C' = C))$

These assumptions say that an expression has no more than one narrow content and no more than one broad content in any given case. I will use "$\{X\}_c$" to denote the narrow content (if any) that expression *X* has in case *c*, and "$\{\{X\}\}_c$" to denote the broad content (if any) *X* has in *c*. WSI together with *Broad Uniqueness* and *Narrow Uniqueness*, and the further assumption that each case is a case of at most one expression type,[59] entails:

[59] What entitles me to this assumption? Are there not clear counterexamples – puns, for example – in which one and the same utterance is of two or more expression types? In fact, I do not think that there are clear counterexamples: whether we should say that a case (in the non-technical sense) in which a speaker intends to be interpreted as uttering two or more sound-alike or look-alike expressions at the same time and location is a case in which one utterance is an utterance of more than one expression depends on how we decide some rather obscure issues concerning the individuation of events, utterances and other actions being events. If the view of events defended by Kim in (1993, ch. 3) is correct, each action is an instance of exactly one action type, wherefore (e.g.), given that the action type of uttering the word 'bank$_1$' (meaning *financial institution*) is distinct from the action type of uttering the word 'bank$_2$' (meaning *side of*

Narrowness

$\forall X\ \forall X'\ \forall c\ \forall c'\ ((c \approx c' \wedge \{\{X\}\}_c \text{ exists} \wedge \{\{X'\}\}_{c'} \text{ exists}) \rightarrow$

$\{X\}_c = \{X'\}_{c'}.)$

I will also make use of the following, seemingly natural principle.

Connection

$\forall X\ \forall c\ (\{X\}_c \text{ exists} \wedge \{\{X\}\}_c \text{ exists}) \rightarrow det(\{X\}_c, c) = det(\{\{X\}\}_c, c))$

Connection says that, in each case in which an expression has both a broad content and a narrow content, both contents determine the same extension. One could imagine an ecumenical internalist objecting to Connection: perhaps narrow content determines *narrow extension*, which may be distinct from the extension determined by broad content? This is not a serious option, however, for reasons that will emerge below. For now I will simply assume *Connection* without argument.

I take it that any Twin Earth thought experiment establishes the following.

TE: $\exists X\ \exists X'\ \exists w\ \exists u\ \exists u'\ (\langle w, u\rangle \approx \langle w, u'\rangle \wedge det(\{\{X\}\}_{\langle w, u\rangle}, \langle w, u\rangle) \neq det(\{\{X'\}\}_{\langle w, u'\rangle}, \langle w, u'\rangle))$

a river), there can be no action that is an utterance of both words. But if the reader does not accept Kim's view of events, he or she is advised to adopt a definition of 'case' according to which a case is a world-utterance pair such that the utterance occurs in the world *and* is an utterance of at most one expression in that world.

E.g., strip away the quantifiers from TE and assign to '*w*' a world containing both Earth and its twin, to '*u*' my utterance of 'Hesperus' (which is assigned to '*X*') on earth in *w* and to '*u′*' my twin's corresponding utterance of twin-'Hesperus' (which is assigned to '*X′*') on twin earth in *w*. Cases $\langle w, u\rangle$ and $\langle w, u'\rangle$ are internally alike, and the broad content 'Hesperus' has in $\langle w, u\rangle$ determines Venus in $\langle w, u\rangle$, while the broad content twin-'Hesperus' has in $\langle w, u'\rangle$ determines something distinct from Venus – twin-Venus – in $\langle w, u'\rangle$. This pair of cases, like any twin earth example of the classic form, is an instance of TE. Any ecumenical internalist will accept that there is such a pair of cases, so any ecumenical internalist will accept TE.

TE and *Connection* entail:

TE2: $\exists X\, \exists X'\, \exists w\, \exists u\, \exists u'\, (\langle w, u\rangle \approx \langle w, u'\rangle \wedge$

$det(\{X\}_{\langle w, u\rangle}, \langle w, u\rangle) \neq det(\{X'\}_{\langle w, u'\rangle}, \langle w, u'\rangle))$

Narrowness and TE entail:

TE3: $\exists X\, \exists X'\, \exists w\, \exists u\, \exists u'\, (\langle w, u\rangle \approx \langle w, u'\rangle \wedge \{X\}_{\langle w, u\rangle} = \{X'\}_{\langle w, u'\rangle})$

TE2 and TE3 entail:

$\exists w\, \exists u\, \exists u'\, \exists C\, det(C, \langle w, u\rangle) \neq det(C, \langle w, u'\rangle)$,

which contradicts *Classical Content*. This concludes the argument for *I-to-R*.

Variants of the above argument in which the variables '*X*' and '*X′*' are instantiated to names of a particular type of expression can be used to show that the

narrow contents of that expression type do not determine a unique extension with respect to a world. E.g., if '*X*' and '*X′*' are instantiated to names of names, the argument shows that the narrow content of a name, if there is such a thing, determines one extension for one agent (myself) and time, and another for another agent (my twin) and time. Similarly, if '*X*' and '*X′*' are instantiated to names of sentences, the argument shows that the narrow content of a sentence, if there is such a thing, has one truth value at one agent and time, and a different truth value at another, within a single world. (We can obtain an example like this by considering my utterance of 'Hesperus is made of gold' on earth and my twin's utterance of the twin of this sentence on twin earth, and by assuming that twin-Venus is made of gold whereas Venus is not.)

The above argument shows that there is a rather high cost to maintaining even an ecumenical internalist position: one must embrace a nonclassical conception of content, according to which propositions have different truth values at different agents and times within a single world.

The conclusion of the argument, *I-to-R*, is, of course, not a theorem of logic, so a committed ecumenical internalist who is also committed to *Classical Content* could consistently deny it. Three of its premises, in particular, may appear to be questionable: *Broad Uniqueness*, *Narrow Uniqueness*, and *Connection*. However, resistance to the conclusion by resisting these premises will prove futile.

Broad Uniqueness and *Narrow Uniqueness* certainly are questionable. On some views of vagueness, for example a vague expression expresses multiple broad contents. An ecumenical internalist who has this view will presumably deny both *Broad Uniqueness* and *Narrow Uniqueness*. No matter; *I-to-R* follows without these controversial assumptions, if we adjust *Connection* accordingly. To allow for the

possibility that expressions may express multiple broad and narrow contents, we replace *Connection* with

Pluralist Connection

$\forall X\ \forall c\ (\exists C\ \exists C'\ (broad(X, C, c) \wedge nar(X, C', c))$

$\rightarrow \exists C''\ \exists C'''\ (broad(X, C'', c) \wedge nar(X, C''', c) \wedge det(C'', c) = det(C''', c))$

Somewhat more loosely put: if X has a broad and a narrow content in c, then X has at least one broad content in c and at least one narrow content in c such that the former and the latter determine the same extension in c. TE, in turn, is replaced by:

Pluralist TE

$\exists X\ \exists X'\ \exists C\ \exists C'\ \exists w\ \exists u\ \exists u'\ (\langle w, u\rangle \approx \langle w, u'\rangle \wedge\ broad(X, C, \langle w, u\rangle) \wedge broad(X', C', \langle w, u'\rangle) \wedge \neg\ \exists C''\ \exists C'''\ (broad(X, C'', \langle w, u\rangle) \wedge broad(X', C''', \langle w, u'\rangle) \wedge det(C'', \langle w, u\rangle) = det(C''', \langle w, u'\rangle))$

Somewhat more loosely put: some X has a broad content in some c, some X' has a broad content in some c' internally like c, and no broad content X has in c determines in c the same thing that any broad content X' has in c' determines in c'. Any classic twin earth example is certainly an instance of *Pluralist TE*. For example, even if the philosopher – let's call him *the pluralist* – who thinks that vague expressions typically express multiple broad contents thinks that the various broad contents expressed by 'Hesperus' in an Earth case determine multiple largely overlapping planet-shaped bodies orbiting Earth, and that the various broad contents expressed by twin-'Hesperus' in a Twin Earth case determine multiple largely overlapping planet-shaped bodies orbiting Twin Earth,

the pluralist will presumably deny that there is anything that is both determined by a broad content 'Hesperus' has in the Earth case and by a broad content of 'Hesperus' in the Twin-Earth case. The situation is even clearer when we consider sentences: again, 'Hesperus is made of gold' in an Earth case with a non-golden Venus, and twin-'Hesperus is made of gold' in a Twin-Earth case with a golden Twin-Venus, will do. Every broad content of the former determines Truth, and every broad content of the former determines Falsehood.

WSI and *Pluralist TE* entail:

TE*1: $\exists X\, \exists X'\, \exists C\, \exists C'\, \exists w\, \exists u\, \exists u'\, (\langle w, u\rangle \approx \langle w, u'\rangle$

$\wedge\, nar(X, C, \langle w, u\rangle) \wedge nar(X', C', \langle w, u'\rangle)$

By the definition of '*nar*',

TE*2: $\exists X\, \exists X'\, \exists C\, \exists C'\, \exists w\, \exists u\, \exists u'\, ((\langle w, u\rangle \approx \langle w, u'\rangle \wedge nar(X, C, \langle w, u\rangle) \wedge$

$nar(X', C', \langle w, u'\rangle)) \rightarrow \exists C''\, (nar(X, C'', \langle w, u\rangle) \wedge nar(X', C'', \langle w, u'\rangle)))$

TE*1, TE*2, and *Pluralist Connection* entail:

$\exists X\, \exists X'\, \exists C\, \exists w\, \exists u\, \exists u'\, (nar(X, C, \langle w, u\rangle) \wedge nar(X', C, \langle w, u'\rangle)$

$\wedge\, det(C, \langle w, u\rangle) \neq det(C, \langle w, u'\rangle)),$

and therefore

$\exists w\, \exists u\, \exists u'\, \exists C\, det(C, \langle w, u\rangle) \neq det(C, \langle w, u'\rangle),$

which contradicts *Classical Content*.

What of *Connection*, or its pluralist-friendly variant, *Pluralist Connection*? A committed advocate of both ecumenical internalism and *Classical Content* – a classical ecumenical internalist – could dig in his heels and reject both, but this would be a very bad move.

Consider first a classical ecumenical internalist who accepts the *Uniqueness* principles but rejects *Connection*. And consider again

(HG) Hesperus is made of gold

in the Earth case *c* and the twin sentence twin-(HG) in the Twin Earth case *c*′ with a golden Twin-Venus. $\{\{\text{twin-(HG)}\}\}_{c'}$ determines Truth in *c*′, and $\{\{\text{(HG)}\}\}_{c}$ determines Falsehood in *c*. By *Classical Content*, the narrow content $C = \{\text{(HG)}\}_{c} = \{\text{twin-(HG)}\}_{c'}$ must determine the same truth value in *c* and in *c*′. But what could this truth value be? Either of the classical truth values gives an absurd result in one of the cases, and the rejection of bivalence is not one of the options on the table.

The classical ecumenical internalist who rejects the *Uniqueness* principles and rejects *Pluralist Connection* faces a similar problem: clearly, every broad content (HG) has in *c* determines Falsehood in *c*, and every broad content twin-(HG) has in *c*′ determines Truth in *c*′. Suppose that *C* is *a* narrow content (perhaps one of several) (HG) has in *c*; by *Classical Content*, it follows that *C* determines the same truth value *V* in both *c* and *c*′. Now either these cases are both counterexamples to *Pluralist Connection* or not. If they are both counterexamples to it, then *V* cannot be any of the truth values determined by the broad contents (HG) has in *c* – so *V* is not Falsehood –

and *V* cannot be any of the truth values determined by the broad contents twin-(HG) has in *c*′ – so *V* cannot be Truth; so *V* must be a third truth value, which is absurd (assuming, again, that the rejection of bivalence is not on the table). If, on the other hand, *c* and *c*′ are not a counterexample to *Pluralist Connection*, then *V* will either be the truth value that all of the broad contents (HG) has in *c* determine in *c* (and in *c*′), or the truth value that all the broad contents twin-(HG) has in *c*′ determine in *c*′ (and in *c*), but not both, and I maintain that both options are absurd. It is not the case that the options are absurd because a choice between them is "arbitrary" – for if we reject *Narrow Uniqueness*, *C* may be one of many narrow contents (HG) has in *c*, and it may be that (say) half of the narrow contents (HG) has in *c* agree in truth value in *c* with the broad contents (HG) has in *c*, and the other half agree in truth value in *c* with the broad contents twin-(HG) has in *c*′. This is egalitarian, and not arbitrary. Rather, the problem is that, no matter which alternative we choose, either *C* is false in *c*, in which case the utterance of (HG) in *c* asserts a false proposition in *c*, or *C* is true in *c*′, in which case the utterance of twin-(HG) asserts a false proposition in *c*′. But it is clear that the utterance of (HG) in *c* asserts no proposition false in *c*, and that the utterance of twin-(HG) in *c*′ expresses no proposition true in *c*′.

Or so I maintain. I have not considered the view that the narrow content of a sentence in a case need not be *asserted* by the utterance of the case in the world of the case. One form of ecumenical internalism – call it *esoteric ecumenical internalism* – maintains that ecumenical internalism and *Classical Content* are both true, but rejects *Connection* and *Pluralist Connection*. The esoteric ecumenical internalist responds to my arguments for *Connection* and *Pluralist Connection* by claiming that, in natural language, speech act and propositional attitude verbs always ascribe broad contents (or, at least, they do so whenever both a broad content and a narrow content are expressed

by the utterance the ascription concerns – presumably some utterances in some cases express only narrow contents). If so, I may be right to claim that no false proposition is *asserted* (or, indeed, *expressed* – since 'expressed' is also a word of natural language) by (HG) in *c*, and that no true proposition is *asserted* by twin-(HG) in *c′*, even though either (HG) *N-asserts* in *c* a false proposition or twin-(HG) *N-asserts* in *c′* a true proposition. *N-asserting* is a relation such that, for any *c*, *S*, if *S* expresses a broad content in *c*, then *S* in *c* bears it to the narrow content of *S* in *c*. The term 'N-asserts' belongs to the language of Cognitive Science, which is not a natural language. Just as we do not fault physicists for using technical terms without giving explicit definitions for them, but rather judge them by the success of the theories that deploy the terms, we should not fault speakers of Cognitive Science for not giving us an explicit definition of 'N-asserts', but should rather judge them by the success of the theories that deploy 'N-asserts'. So says the esoteric ecumenical internalist. On this last point, I agree with the esoteric ecumenical internalist – N-assertion has a claim to our attention only if the speakers of Cognitive Science give us a theory of N-asserting. So far they have not, so it does not, and I will continue to think that the above arguments for *Connection* and *Pluralist Connection* are sound.[60],[61]

Finally: why do I claim that Twin Earth thought experiments of the standard form show that, if ecumenical internalism is true, then, not only is *Classical Content* false, but that the extension determined by a content must vary with world-agent-*time*-

[60] The character of the esoteric ecumenical internalist is inspired by Chomsky (e.g., 2000, chs. 3, 6, 7) and Segal (2000), and by McGilvray's (1999) exposition of Chomsky's views. I do not, however, wish to be read as attributing the esoteric ecumenical internalist's views to either Chomsky or Segal.

[61] In recent years some philosophers have found the view that a declarative sentence *S* may have a semantic content *C* in a context *c* even though *C* is not asserted by the utterance of *c* in the world of *c* attractive for reasons not having to do with ecumenical semantic internalism (e.g., Cappelen and Lepore 2005, Soames 2009).

triples rather than simply world-agent-pairs? The internally alike cases in Twin Earth thought experiments of the standard form differ with respect to agent, so why posit time-relativity as well? Reply: it is true that Twin Earth thought experiments of the standard form do not demonstrate the need for the time-relativization of the extensions determined by contents, but they do *suggest* this, because Twin Earth thought experiments of a *non-standard* form can be used to show it. Consider a world w_{Loop} with an agent – *Loop Man*, to give him a name – who lives on both Earth and Twin Earth, but who calls each by a name spelled and pronounced 'Earth'. Loop Man's life is one of eternal recurrence: for any two years Y_1 and Y_2, the time-slice of Loop Man that begins at the beginning of Y_1 and ends at the end of Y_1 is, in w_{Loop}, an intrinsic qualitative duplicate of the time-slice of Loop Man that begins at the beginning of Y_2 and ends at the end of Y_2 in w_{Loop}. On January 1st of every other year, Loop Man migrates to Twin Earth, baptising it 'Earth', and on January 1st of the next year, he migrates back to Earth, baptising it 'Earth' and removing the previous name spelled 'Earth' from his vocabulary. For each year Y_n, Loop man produces an utterance u_{Y_n} of a name spelled 'Earth' on January 15th, and this utterance refers to the planet he is on. It follows that, for any n, $\langle w_{\text{Loop}}, u_{Y_n}\rangle \approx \langle w_{\text{Loop}}, u_{Y_{n+1}}\rangle$, so if the name spelled 'Earth' has a narrow content in $\langle w_{\text{Loop}}, u_{Y_n}\rangle$, this content must determine different extensions in $\langle w_{\text{Loop}}, u_{Y_n}\rangle$ and in $\langle w_{\text{Loop}}, u_{Y_{n+1}}\rangle$. $\langle w_{\text{Loop}}, u_{Y_n}\rangle$ and $\langle w_{\text{Loop}}, u_{Y_{n+1}}\rangle$ have the same agent, so relativizing the extension determined by a content to a world and an agent is insufficient. $\langle w_{\text{Loop}}, u_{Y_n}\rangle$ and $\langle w_{\text{Loop}}, u_{Y_{n+1}}\rangle$ differ with respect to time, so the relativization must be (at least) to worlds, agents, and times.

II. Narrow content in epistemic two-dimensional semantics

David Chalmers' epistemic two-dimensionalism (E2D) (Chalmers 2003, 2006a, 2006b, 2011) is, at present, the most promising attempt at an account of narrow content, not least because it is the only one on offer that adopts a non-classical view of content, and is thereby immune from refutation by Twin Earth thought experiments of the standard form. The entities that are meant to play the role of narrow contents in E2D – "primary intensions", "1-intensions", or "epistemic intensions", as they are variously called in Chalmers' work – are functions from what I called (following Chalmers) *scenarios* to extensions. Each case c is associated with a unique scenario $scn(c)$, as defined above; that is,

$$scn(c) = \langle w_c, a_c, t_c \rangle.$$

But not every scenario is the scenario of a case: every triple $s = \langle w, a, t \rangle$ of an agent a (the agent of s or a_s) that exists in world w (the world of s or w_s) at time t (the time of t or t_s) is a scenario. E2D's fundamental semantic notion,[62] *extension-at-a-scenario* is

[62] There is, in fact, a more fundamental semantic notion in E2D, which explains why the semantics of E2D is called "two-dimensional": it is the notion of X's extension (in a case c) at a pair $\langle s, w \rangle$ ("$|X|_{c,\langle s, w\rangle}$"), where s is a scenario and w a world. The semantics is meant to handle both "first-dimensional" sentential operators, which – to use the common jargon – "shift" the scenario coordinate of a scenario-world pair, and "second-dimensional" sentential operators, which either "shift" or "rigidify" the world coordinate of a scenario-world pair. (Might there be operators that "rigidify" the scenario coordinate, in addition to ones that "shift" it? Chalmers had better say "No", for such operators threaten to refute the Core Thesis [see below]: if there were an "epistemic actuality" operator $\mathbf{A}_E$ that does to the scenario coordinate what 'actually' does to the world coordinate, then '$\mathbf{A}_E\phi$' would have a necessary 1-intension whenever ϕ is true and a necessarily false 1-intension whenever ϕ is false, and it would follow by the Core Thesis that '$\mathbf{A}_E\phi$' is *a priori* if true and that '$\neg\mathbf{A}_E\phi$' is *a priori* if true.) The other semantic notions of E2D can be, and perhaps should be, defined in terms of the notion of extension at a scenario-world pair: X's extension in c can be defined as

defined in epistemic terms: very roughly, the extension of *X* in case *c* at scenario *s* ("$|X|_{c,s}$" for short), if it exists, is the object (individual, set, or truth value) *x* such that, from the perspective of *c*, the hypothesis that *s* is actual or obtains *a priori* entails a certain sentence that can be used to uniquely pick out *x* in the world of *s*. The function $\lambda s|X|_{c,s}$ is the *1-intension* of *X* in *c* ($[\![X]\!]^1_c$), which is also said to be the narrow content of *X*. According to what Chalmers calls the "Core Thesis" of E2D, a sentence is *a priori* iff its 1-intension is necessary (i.e., takes each scenario to Truth). The *2-intension of X* in *c* ($[\![X]\!]^2_c$) is the *classical possible-worlds intension* (function from worlds to extensions) of *X* in *c*, and is said to be the broad content of *X* in *c*, whenever *X* has a broad content in *c*.

These are the broad contours of the E2D picture. Details follow.

II.1. The semantic framework

Let us say that *the language of c* (L_c) is the language to which u_c belongs in w_c. If we know – as I will assume we do – what the classical possible-worlds intension of *X* in *c* (i.e., $[\![X]\!]^2_c$) is, we can define *extension-in-a-case-at-a-scenario* for any primitive expression of L_c using two further primitives: *semantically neutral in c* and *a priori sentence in c*. For now these notions will simply serve as placeholders – I will return to them below.

$|X|_{c,\langle scn(c),w_s\rangle}$; the 1-intension of *X* in *c* can be defined as $\lambda s|X|_{c,\langle s,w_s\rangle}$, and the 2-intension (classical possible worlds-intension) of *X* in *c* can be defined as $\lambda w|X|_{c,\langle scn(c),w\rangle}$. I bring all of this up only to set it aside. The two-dimensional aspect of E2D semantics is not relevant to the success or failure of E2D as an account of narrow content. For my purposes it will do to introduce the two dimensions of semantic evaluation separately, as I will do below.

Let us say that the *canonical language* of *c* (CL_c) is, as a first approximation, the language containing the fragment of L_c containing all the words of L_c that are *semantically neutral* in *c*, together with the first-person pronoun of L_c and the translation of 'now' into the language of L_c, and nothing else. (I will use '$\mathbf{I}_c$' and '$\mathbf{now}_c$' for the translations of 'I' and 'now' into L_c.) And let us make the following

Syntactic-Semantic Idealization

For all *c*, (*i*) the only nonlogical expressions in L_c are singular terms (proper names, $\mathbf{I}_c$, and $\mathbf{now}_c$, and individual variables, for which '*x*', '*y*', '*z*', '*x′*', '*y′*', '*z′*', ... will be used as schematic names) and *n*-place predicates, for any *n*; and (*ii*) L_c contains the logical apparatus of standard first-order logic with identity (I will use the usual symbols '$\forall$', '$\exists$', '$\neg$', '$\vee$', '$\wedge$' '$\rightarrow$', '$\leftrightarrow$', '=' as schematic names for the translations of these logical constants into L_c), (*iii*) L_c contains the definite description operator 'ι', which is governed by the convention that if $S \in L_c$, then $\ulcorner (\iota x\text{: } S) \urcorner$ is a singular term in L_c, and (*iv*) L_c contains an infinitary conjunction operator.

As well as:

Semantic Assumption

For all *c*, the logic of L_c is a kind of negative free logic in which names and definite descriptions may lack extension, and any atomic sentence containing an extensionless name or definite description is false.

A definition of *the extension of X in case c at scenario s* ($|X|_{c,s}$) follows.

II.1.1. Canonical Extension at a Scenario

For expressions in CL_c:

(C1) $|\mathbf{I}_c|_{c,s} = a_s$

(C2) $|\mathbf{now}_c|_{c,s} = t_s$

(C3) If $X \in CL_c$ but X is neither $\mathbf{I}_c$ nor $\mathbf{now}_c$, then $|X|_{c,s} = [\![X]\!]^2_c(w_s)$.

II.1.2. Noncanonical Extension at a Scenario

Let us say that the *canonical description* of s in L_c ($D_{c,s}$) is the infinitary conjunction of CL_c-sentences of finite length that are true at s (i.e. are such that $|S|_{c,s}$ = Truth).[63] And let us say that an open sentence ⌜ $S(x_1, ..., x_n)$ ⌝ in CL_c is *true of* a sequence of objects $\langle o_1, ..., o_n\rangle$ in c at s iff for some (or, equivalently, every) variable assignment g such that $g(\text{`}x_1\text{'}) = o_1$, ..., and $g(\text{`}x_n\text{'}) = o_n$, $|$⌜ $S(x_1, ..., x_n)$ ⌝$|_{c,s}$ = Truth relative to g.[64] Then, if N is a noncanonical name in L_c:

[63] Chalmers himself says a canonical sentence has "the form D & 'I am D_1' & 'now is D_2', where D, D_1, and D_2 are all semantically neutral [i.e., canonical], and D_1 and D_2 are identifying predicates relative to the information in D (that is: D implies 'Exactly one individual is D_1' and 'Exactly one time is D_2' (Chalmers 2006a: 87). Chalmers does not say what D is, but apparently it is to be an infinitary conjunction of some kind, perhaps one containing all true canonical sentences of finite length that do not contain occurrences of either 'I' or 'now'. The disadvantage to defining the "standard form" of the canonical sentence of a scenario in Chalmers' way is that there is no guarantee, as he himself acknowledges (*ibid.*) that D implies 'Exactly one individual is D_1' and 'Exactly one individual is D_2'.

[64] Here variable assignments make their first and last appearance in the present chapter. I am, of course, cutting some corners. For an object language with quantifiers and variables, the basic semantic notion in E2D cannot be the doubly relative $|X|_{c,s}$; it must be the triply relative $|X|_{c,s,g}$, where g is a variable assignment. Cases do not contain

(NC1) $|N|_{c,s}$ = the x such that, for some ⌜ $S(x)$ ⌝ in CL_c, ⌜ $D_{c,s} \rightarrow N = (\iota x\colon S(x))$ ⌝ is *a priori* in c and ⌜ $S(x)$ ⌝ is uniquely true of x at c.

And if P is a noncanonical n-place predicate in L_c, then

(NC2) $|P|_{c,s} = \{\langle o_1, ..., o_n\rangle |$ for some ⌜ $S(x_1, ..., x_n)$ ⌝ in CL_c,

⌜ $D_{c,s} \rightarrow \forall x_1 ... \forall x_n (P(x_1, ..., x_n) \leftrightarrow S(x_1, ..., x_n))$ ⌝ is *a priori* and

⌜ $S(x_1, ..., x_n)$ ⌝ is true of $\langle o_1, ..., o_n\rangle$ in $c\}$

For now we may suppose that, when X is a complex expression, $|X|_{c,s}$ is determined by the extensions of the parts of X according to the usual "compositional" rules (although this is not quite right, as we shall see in Remark 6 below).

II.1.3. Narrow content in E2D

Finally, the definition of *1-Intension* is:

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variable assignments, and we cannot add variable assignments to scenarios or else sentences will express narrow contents (1-intensions) with variable-assignment-relative truth values – a view about content that we should all want to avoid, as we saw in ch. 2, §3). However, since none of the examples in the discussion to follow involve variable-binding, I think it is permissible to ignore variables here. (Chalmers himself does so consistently. His only remark on variables and quantification in E2D in (2006a), which is his most detailed exposition of his semantic approach is that "quantified modal claims will not generally be well-defined in the epistemic case, and quantified modal logic will be largely inapplicable in this domain" (2006a: 102).) I trust the reader can make good enough sense of my talk of "$|X|_{c,s}$ relative to g" without an explicit definition.

1-Intension

$\forall c\ \forall X \in L_c\ [\![X]\!]^1_c = \lambda s|X|_{c,s}$.

$[\![X]\!]^1_c$ is called the *1-intension* of *X* in c. E2D is committed to the claim that *1-intensions are narrow*, in the sense that, if $[\![X]\!]^1_c$ exists, then $[\![X]\!]^1_c$ is a narrow content of *X* in *c*. Because E2D is further committed to the *Uniqueness* principles from Part I – that is, that each *X* has at most one narrow content and at most one broad content in *c* – we may put this as follows:

1-Narrowness

$\forall X\ \forall X'\ \forall c\ \forall c'\ (c \approx c' \rightarrow ([\![X]\!]^1_c \text{ exists} \rightarrow [\![X]\!]^1_c = [\![X']\!]^1_{c'}))$

Further, there is a straightforward argument from highly plausible premises to the conclusion that E2D is a form of ecumenical semantic internalism. The following premise is certainly plausible, given the *Uniqueness* principles.

2-Universality

$\forall C\ \forall X\ \forall c\ (\textit{expr}(X, C, c) \rightarrow [\![X]\!]^2_c \text{ exists})$

Whatever one's view of content may be – structured or coarse-grained, classical or relativist – presumably everyone agrees that, if an expression has a unique content in a case, then the content determines a unique classical possible-worlds intension in that case. It is uncontroversial that a structured content determines the same classical possible-worlds intension in every case, and a relativist content determines a unique classical possible-worlds intension *in a case*, because the values of alethic parameters

other than world are provided by the case. Given the background *Uniqueness* assumptions, it follows that, if an expression has a content at all in a case, then it has a unique classical possible-worlds intension in that case, and this is what *2-Universality* says.

Clauses (C1)-(C3) and (NC1)-(NC2) may appear to guarantee that:

1→2

$\forall X\ \forall c\ ([\![X]\!]^2_c \text{ exists} \rightarrow [\![X]\!]^1_c \text{ exists})$,

given that the 2-intensions of complex expressions are subject to a "compositionality" principle of some sort. In fact, it is not clear what "compositionality" would amount to when expressions are assigned 2-intensions with respect to *cases of* those expressions, in light of the fact that a case of a complex expression is *not* a case of any of its immediate constituents. What clauses (C1)-(C3) and (NC1)-(NC2) clearly do guarantee is that $[\![X]\!]^1_c$ exists if $[\![X]\!]^2_c$ exists when *X* is a simple expression of the language of *c* (if not enough canonical sentences are *a priori* in *c*, and *N* is a noncanonical name, $[\![N]\!]^1_c$ may be the function that assigns nothing to any scenario – nevertheless, $[\![N]\!]^1_c$ does exist by (NC1)), but there does not appear to be any way of obtaining *1→2* by an induction on the length of a sentence (see Remark 5 below), and it is difficult to see how *1→2* might be obtained if not by such an induction. Even so, I will grant Chalmers *1→2* for the sake of argument.

E2D is further committed to:

2-Broadness

$\forall X\ \forall c\ (\{\{X\}\}_c \text{ exists} \rightarrow \{\{X\}\}_c = [\![X]\!]^2_c)$

2-Broadness, *1→2*, *2-Universality*, and *1-Narrowness*, and the plausible assumption that $[\![X]\!]^2_c$ exists only if *expr*(*X*, $[\![X]\!]^2_c$, *c*), entail:

$\forall C\ \forall X\ \forall c$ (*expr*(*X*, *C*, *c*) $\rightarrow \exists C'$ *nar*(*C'*, *X*, *c*)),

which was labelled "WSI" (weak semantic internalism) in Part I. E2D, then, is committed to weak semantic internalism, and, because it recognizes the broadness of some contents (2-intensions) in some cases, it is committed to ecumenical semantic internalism.

E2D also accepts *Connection*, because it accepts the following principle (which is labelled "(T3)" in 2006b: 586):

(*) $\forall X\ \forall c$ ($[\![X]\!]^2_c$ exists $\rightarrow [\![X]\!]^1_c(scn(c)) = [\![X]\!]^2_c(w_{scn(c)})$),

(*), together with *2-Broadness*, *1→2*, *2-Universality*, *1-Narrowness*, entails *Connection*. Given the *Uniqueness* assumptions and the plausible assumption that an expression does not have an extension in a case unless that extension is determined by at least one content the expression has in that case, we may speak of the extension an expression *X* has in a case *c simpliciter*, using the symbol "$|X|_c$" for this: that is $|X|_c = |X|_{c,scn(c)}$. Thus we get:

E2D Connection

$\forall X\ \forall c$ ($[\![X]\!]^2_c$ exists $\rightarrow [\![X]\!]^1_c(scn(c)) = [\![X]\!]^2_c(w_{scn(c)}) = |X|_c$),

which will be of some importance below.

II.1.4. Remarks on the foregoing

Remark 1. Given *Syntactic-Semantic Idealization*, *Semantic Assumption*, and standard assumptions about how the extensions of sentences depend on the extensions of their parts, (NC2) guarantees bivalence: if there is a ⌜ $S(x_1,..., x_n)$ ⌝ in CL_c such that ⌜ $D_{c,s} \rightarrow \forall x_1...\forall x_n(P(x_1, ..., x_n) \leftrightarrow S(x_1, ..., x_n))$ ⌝ is *a priori* and ⌜ $S(x_1, ..., x_n)$ ⌝ is true of $\langle o_1, ..., o_n\rangle$ in *c*, then $|P|_{c,s}$ is a set of *n*-tuples; if not, $|P|_{c,s}$ is the empty set. It is not, in fact, clear whether Chalmers thinks the extension of a noncanonical predicate is "scruted" from the canonical description of a scenario in accordance with (NC2) or with some close variant thereof,[65] but the choice of close variants here will make no difference to the discussion to follow, so I will stick with (NC2).

Remark 2. How harmless is the *Syntactic-Semantic Idealization*? It is clearly false: hardly any actual case is such that its language contains all of the logical resources posited by *Syntactic Idealization*. But the idealization will be harmless if it can be read as shorthand for a truth, and perhaps it can: perhaps the truth in the vicinity of the

[65] Another salient option is:

(NC2′) If, for some ⌜ $S(x_1, ..., x_n)$ ⌝ in CL_c,
⌜ $D_{c,s} \rightarrow \forall x_1...\forall x_n(P(x_1, ..., x_n) \leftrightarrow S(x_1, ..., x_n))$ ⌝ is *a priori*, then
$|P|_{c,s} = \{\langle o_1, ..., o_n\rangle |$ ⌜ $S(x_1, ..., x_n)$ ⌝ is true of $\langle o_1, ..., o_n\rangle$ in $c\}$,
and otherwise $|P|_{c,s}$ does not exist.

(NC2′) allows the extension of a predicate at a scenario to go undefined, which does not guarantee bivalence. Chalmers seems to be happy with partial 1-intensions for expressions other than singular terms (see the discussion of vagueness in Chalmers 2006a: §3.4.1), so (NC2′) may be more in the spirit of Chalmers' E2D than (NC2).

idealization is that the logical apparatus it posits in the language of every case could be *added* to the language of every case without altering the 1-intensions of the other words in the language of the case. If so, we can make sense of the claim that, e.g., ⌜ N = (ιx: $S(x)$) ⌝ is true in a case c whose language lacks a definite description operator as being shorthand for the claim that, in w_c, it is (non-vacuously) true that, if a_c had ι in his language at t_c while all other words in a_c's language had the 1-intensions they have in w_c at t_c, then ⌜ N = (ιx: $S(x)$) ⌝ would have been true for a_c at t_c. (This raises the further question of how to evaluate a sentence for truth at a world, time, and agent when the sentence is not being uttered by the agent at the time in the world – a question Chalmers will have to answer anyway, and that I will return to in Remarks 4 and 5.)

Remark 3. Above, I said that $|X|_{c,s}$ was to be defined in terms of two *primitives*: *sentential a priority* (in a case) and *semantic neutrality* (in a case). Though such technical notions may seem to be particularly ill-suited to play the role of primitives in a theory of narrow content, they are, in fact, primitives in Chalmers' work. On the first notion, he is explicit about this: while Chalmers says various suggestive things about what it is for a sentence to be *a priori* in a case, he warns us that these things should only "be seen as an intuitive characterization of a notion that is being taken as primitive" (Chalmers 2006a: 99, n. 16). And while Chalmers does not instruct us to regard *semantic neutrality* as a primitive notion, neither does he supply a definition for it – that is left as a task for future research (Chalmers 2006a: 86-87). Let us consider each notion in turn to see what can be extracted from Chalmers' discussion that might make them intelligible.

The two main themes in Chalmers' discussions of sentential *a priority* in a case are the notion's connection to another theoretical primitive – *idealized rational*

reflection – and to a species of necessity definable in terms of E2D's semantic apparatus.

The first connection, apparently, is this: *S* is *a priori* in *c* iff *S* "expresses [in *c*] an *a priori* thought", and a "thought is a priori when it can be conclusively non-experimentally justified on ideal rational reflection" (Chalmers 2006a: 98).[66] This suggestion, I think, raises more questions than it answers. In particular, because of the role sentential *a priority* is meant to play in E2D's account of narrow content (see Remark 7 below), the notion of a "thought" expressed by a sentence in a case used here must be narrow: that is, if *S* expresses thought *T* in *c*, then, for any $c' \approx c$, the utterance of c' also expresses *T* in c'. But then the thought expressed by *S* in *c* is presumably none other than $[\![X]\!]^1_c-$ otherwise Chalmers is positing two distinct layers of narrow content: thoughts and 1-intensions.

The second connection is more informative. It comes in the form of what Chalmers calls the "Core Thesis" of E2D. In Chalmers' own words:

> **Core Thesis:** For any sentence S, S is a priori iff S has a necessary 1-intension (Chalmers 2006a: 64).

By "necessary 1-intension" Chalmers means a 1-intension that assigns Truth to every scenario, or one that is, as I will also say *true at every scenario*. I propose to understand the Core Thesis as a generalization over cases: for all *c*, *S*, *S* is *a priori* in *c* iff, for all *s*, $[\![S]\!]^1_c(s)$ = Truth. Various constraints on sentential *a priority* follow from the Core

[66] Here I am taking some liberties in expressing Chalmers view using the ideology of cases, of which Chalmers makes no use. What is *a priori* for Chalmers is a "sentence token" *simpliciter* (*ibid.*), rather than a sentence in a case. However, for reasons that will become evident in Remark 5 below, Chalmers would be well advised to replace his talk of sentence tokens with talk of sentences in cases.

Thesis. For example, it follows that, if *S* is *a priori* in *c*, then *S* is consistent (in L_c), since an inconsistent sentence is false at every scenario (in L_c, though I will elide the relativization to cases and languages below[67]). It follows that *a priority* is closed under deductive consequence: if *S* deductively follows from *S′*, then *S* is true at every scenario at which *S′* is true, so, if *S′* is true at every scenario (and therefore, by the Core Thesis, *a priori*), then, if *S* deductively follows from *S′*, *S* is also true at every scenario (and therefore *a priori*). It follows that *a priority* is factive: if *S* is *a priori* in *c*, then *S* is true at every scenario, so in particular *S* is true in the scenario of *c*. It also follows that ⌜ $S \rightarrow S'$ ⌝ is *a priori* iff *S′* is true at every scenario at which *S* is true, because ⌜ $S \rightarrow S'$ ⌝ is true at every scenario (so, *a priori*, by the Core Thesis) iff *S′* is true at every scenario at which *S* is true.

A third connection, which is not endorsed by Chalmers, but which would seem to shed even more light on the notion of sentential *a priority*, is this: if there is an operator **A** that is a translation of 'it is *a priori* that' into L_c, then *S* is *a priori* in *c* iff ⌜ **A***S* ⌝ is true in *c*. This requires us to be able to evaluate *S* as true or false in *c* even when *c* is not a case of *S*, which need not be problematic: for example, if L_c has enough words to express the Löwenheim-Skolem theorem, and *S* is a sentence that expresses the Löwenheim-Skolem theorem in L_c, then it is quite natural to think that ⌜ **A***S* ⌝ is true in *c*, even if ⌜ **A***S* ⌝ is never uttered by the agent of *c* in the world of *c*, because ⌜ **A***S* ⌝ is true in a context-independent way in L_c. Perhaps a connection between the *a priority* of *S* in *c* and the truth in *c* of ⌜ **A***S* ⌝ can be used in explaining sentential *a priority* for all

[67] The logical notions used here, "inconsistent" and "deductive consequence", are also case-relative: obviously, whether a sentence is inconsistent or a deductive consequence of another sentence in a case depends on what the words occurring in the sentence mean in that case.

cases, if ⌜ **A***S* ⌝ can be evaluated as true or false in *c* even when **A** does not belong to L_c – the strategy suggested above in Remark 3 might work.

Remark 4. The most informative thing Chalmers says about the second primitive, *semantically neutrality*, is that an expression is semantically neutral in a case only if it is not *twin-earthable* in that case (Chalmers 2006a: 86). In fact, it appears that we may regard an expression as semantically neutral in a case *if and only if* it is not twin-earthable in that case,[68] so let us turn to the notion of twin-earthability – I will treat non-twin-earthability as interchangeable with semantic neutrality in E2D.

Twin-earthability is something like broadness. In the loose sense(s) of 'broad' in which the term tends to get used in discussions of semantic internalism and externalism, the idea is clear enough: *X* is twin-earthable just in case *X* has a broad content. But in the present chapter, the content of an expression can only be said to be broad or narrow relative to a case of that expression. Because of the way in which the notion of *semantic neutrality*/*twin-earthability* is used in defining the notion of *canonical language*, if an expression *X* cannot count as non-twin-earthable in a case *c* unless *c* is a case of *X*, it will follow that the only word in L_c that is non-twin-earthable in *c*, is that word, if any, of which *c* is a case, and this will have the consequence that, for each *c*, there are at most three words in CL_c (that word, if any, of which *c* is a case, plus $\mathbf{I}_c$ and $\mathbf{now}_c$) – a disastrous consequence, as shown in Remark 8. The disaster can be averted by adopting the following definition. A word *X* is *non-twin-earthable* in ⟨*w*, *u*⟩ iff (*i*) for some *u′*, the agent of ⟨*w*, *u′*⟩ = the agent of ⟨*w*, *u*⟩ and ⟨*w*, *u′*⟩ is a case of *X*, and (*ii*) it is not the case that there is an utterance *u″* and a content *C* such that *broad*(*X*, *C*, ⟨*w*, *u″*⟩) and the agent of ⟨*w*, *u″*⟩ = the agent of ⟨*w*, *u*⟩. (This seems acceptable, at least, if we assume that it is

[68] Chalmers' worries about counterexamples at (2006a: 87) are not to the point here.

metaphysically necessary that every agent utters every word in his or her language at least once – a plausible assumption, if, as I assume, internal or mental tokenings of expressions count as utterances.)

Remark 5. The definition of extension-in-a-case-at-a-scenario above may appear to have innocently relied on standard "compositional" assumptions about how the extensions of complex expressions depend on the extensions of their parts, relativized to pairs of cases and scenarios – e.g., the assumption that $|\ulcorner\, t = t'\, \urcorner|_{c,s}$ = Truth iff $|t|_{c,s} = |t'|_{c,s}$, the assumption that $|\ulcorner\, S \wedge S'\, \urcorner|_{c,s}$ = Truth iff $|S|_{c,s}$ = Truth and $|S'|_{c,s}$ = Truth, and so on. Of course, we do not know what $|X|_{c,s}$ is, for any c, s, or X (except for $\mathbf{I}_c$ and $\mathbf{now}_c$), unless we know what $[\![X]\!]^2_c$ is, but, it might seem, we can use our knowledge of $[\![X]\!]^2_c$, together with (C1)-(C3) and (NC1)-(NC2), to figure out what $|X|_{c,s}$ is. This is incorrect. Working through the standard assumptions about how the extensions of complex expressions depend on their parts, to figure out what, say, $|\ulcorner\, t = t'\, \urcorner|_{c,s}$ is, we would have to figure out what $|t|_{c,s}$, and $|t'|_{c,s}$ are, and to figure that out, we would have to figure out what $[\![t]\!]^2_c$ and $[\![t']\!]^2_c$ are, and apply each of these functions to s. This is not possible, because, if $|\ulcorner\, t = t'\, \urcorner|_{c,s}$ exists, then c is a case of $\ulcorner\, t = t'\, \urcorner$, but if c is a case of $\ulcorner\, t = t'\, \urcorner$, then c is not a case of t and c is not a case of t', wherefore $[\![t]\!]^2_c$ and $[\![t']\!]^2_c$ will not exist. So it is, at least, on the definition of "case of" that I have been using: because $|\ulcorner\, t = t'\, \urcorner|_{c,s}$ exists only if c is a case of $\ulcorner\, t = t'\, \urcorner$, and $[\![t]\!]^2_c$ and $[\![t']\!]^2_c$ exist, respectively, only if c is a case of t, and c is a case of t', $|\ulcorner\, t = t'\, \urcorner|_{c,s}$ exists only if $[\![t]\!]^2_c$ and $[\![t']\!]^2_c$ do not exist. The problem can be somewhat alleviated with the following stipulations, which I will adopt:

Case-Parthood

For all w, w', u, u', $\langle w, u\rangle$ is *part* of $\langle w', u'\rangle$ iff $w = w'$ and, in w, u is part of u'.[69]

Unique Occurrence

For all X, Y, c, c', if Y has a unique occurrence in X, c is a case of X, and c' is the part of c that is a case of Y, then $[\![Y]\!]^2_c = [\![Y]\!]^2_{c'}$.

These stipulations are not sufficient, however, to guarantee that every constituent of X has a 2-intension in every case in which X has a 2-intension. The problem is that a constituent Y of a complex expression X of which c is a case may have multiple occurrences in X, in which case $[\![Y]\!]^2_c$ remains undefined for all that *Case-Parthood* and *Unique Occurrence* say. Because of this fact, we cannot have a principle of compositionality for 2-intensions in the standard form, namely:

($\forall O$: O is an n-ary syntactic operation) ($\exists f$: f *is an* n-ary function) ($\forall X_1$, ..., X_n: $\exists Y$: $Y = O(X_1, ..., X_n)$ ($\forall c$) $[\![O(X_1, ..., X_n)]\!]^2_c = f([\![X_1]\!]^2_c, ..., [\![X_n]\!]^2_c)$.

The trouble is that $[\![O(X_1, ..., X_n)]\!]^2_c$ may exist even though not all of $[\![X_1]\!]^2_c$, ..., $[\![X_n]\!]^2_c$ do, because it may be that $X_j = X_k$ for distinct j and k ($1 \leq j,k \leq n$).

However, we can have something very much like compositionality – a principle that, I think, captures (at least, nearly enough for present purposes) what the fuzzy, pre-

[69] The notion of parthood for utterances is, I take it, clear enough to be a useful primitive in semantics: for example, if I produce a spoken utterance u of 'I am writing', u has an initial part that is the unique part of u that is an utterance of 'I', followed by a part that is the unique part of u that is an utterance of 'am', which in turn is followed by part that is the unique part of u that is an utterance of 'writing'.

theoretic notion of compositionality says when applied to expressions in cases. Following the spirit, though not quite the letter,[70] of Chalmers' E2D, I propose that we should think of intensions (both 1-intensions and 2-intensions) as attaching directly to cases, rather than to expressions in cases: the 1-or-2-intension of $\langle w, u \rangle$ is just the 1-or-2-intension u expresses in w; the 1-or-2-intension of X in $\langle w, u \rangle$ is the 1-or-2-intension of $\langle w, u \rangle$ if, in w, u is an utterance of X, and otherwise is nothing. I propose the following rough-and-ready compositionality principle, in which "$[\![.]\!]$" is schematic for any semantic value assignment, the salient ones in this chapter being the 1-intension assignment and the 2-intension assignment.

> *Case Compositionality*
>
> (For all n-adic syntactic operations O) (for all cases c) (for some n-adic function g) (for all expressions $X, Y_1, ..., Y_n$) if X is the result of applying O to $Y_1, ..., Y_n$ (in that order; this list may include repetitions), then, if c is a case of X, then $[\![c]\!] = g([\![c_1]\!], ..., [\![c_n]\!])$, where each c_i is the n_ith part of c that is an utterance of Y_i,

[70] Officially, the objects that are assigned 1-intensions and 2-intensions in E2D are not expressions, expressions-in-cases (as in my presentation) or even expressions-in-contexts (as is more common in semantics), but expression *tokens* or *utterances simpliciter* (Chalmers 2006b: 585). But this cannot be exactly what is intended. Utterances do not have their semantic properties essentially: e.g., my utterance of 'Hesperus' would have had a different classical possible-worlds intension if I had been intrinsically as I actually am but the history of my utterance had originated in a baptism of a planet other than Venus. Since E2D purports to offer an account of narrow content, it must offer an account not only of the actual semantic properties of actual utterances, but also of the counterfactual semantic properties of (actual or merely possible) utterances; therefore it cannot represent these properties by assigning intensions to utterances once and for all, but it must assign intensions to utterances relative to worlds. We had better think of what Chalmers calls "utterances" as what I have called "cases", which are pairs $\langle w, u \rangle$ of a world w and an utterance u occurring in w.

where n_j is defined as 1 + the number of occurrences of Y_j in Y_1, ..., Y_{j-1}. I believe that *Case Compositionality* is also implicit in Chalmers' work.[71]

In its use of "the n_ith part of u", *Case Compositionality* presupposes that it is metaphysically necessary that there is an order to the parts of an utterance of a complex expression that correspond to the occurrences of its immediate constituents. In the case of a spoken utterance, this is usually (although conspicuously not in one of the examples considered in sec. II.2) the temporal order in which the parts of the utterance occur. In the case of a written utterance, this is, depending on the writing system, the left-to-right order or the right-to-left order – or it may be something else entirely.

Case Compositionality is, as I said, only rough and ready. In fact, the principle suffers from both actual and possible counterexamples. First, the presupposition that there is an order to the parts of an utterance of a complex expression corresponding to occurrences of its immediate constituents is at least possibly false: e.g., Dorr (2004: 185) describes a language whose speakers utter sentences by collecting word-utterances (say, pieces of paper with words written on them) into bags of different colors, which in turn can be collected into larger bags, and so on. And it is not even actually true – at least if mainstream syntax[72] is to be believed – that the order in which the parts of an utterance of a complex expression that correspond to occurrences of its immediate constituents occur in an utterance of the complex expression is the same as the order of occurrence of the constituents in the complex expression itself at the level of syntax (Logical Form) that matters to semantics: e.g., in the latter but not the former, the order

[71] See (T2) in Chalmers (2006b: 586).

[72] By this I mean the Chomsky-inspired syntax expounded in textbooks like Radford (1997) and assumed in textbooks like Heim and Kratzer (1998).

of occurrence of determiner phrases is indicative of scope.[73] Furthermore, mainstream syntax posits "phonetically null" constituents that are not pronounced: e.g., "traces" or unpronounced variables.[74] If such constituents have no utterances that are parts of the utterances of the expressions of which they are immediate constituents, then they are a further counterexample to *Case Compositionality*.[75] I assume that there is some true principle *like Case Compositionality* that is not vulnerable to these counterexamples, but I will not attempt to articulate it. *Case Compositionality* serves well enough for the present chapter, as none of the examples considered in sec. II.2 can plausibly be thought to be counterexamples to it.

Remark 6. Why should we accept *1-Narrowness*? Chalmers' own thought[76] is that, for any case c, the narrowness of the 1-intensions of expressions of CL_c in c (if the CL_c-expression in question has a 1-intension in c) is guaranteed by the definition CL_c, and that, because of the way the 1-intensions of non-canonical L_c-words in c are defined in terms of the 1-intensions of CL_c-expressions in c plus the notion of sentential *a priority*, it must be that the 1-intensions of non-canonical L_c-expression in c, if it exists, is narrow in c – given the further assumption that sentential *a priority* is narrow (in the sense that for all c, c', if $c \approx c'$ and S is *a priori* in c, then the sentence S' that corresponds to S in c' is *a priori* in c').

There are two problems with this thought.

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[73] See Heim and Kratzer (1998: §7.3), May (1985: 5ff).

[74] See May (1985: 5), Radford (1997: 111), Heim and Kratzer (1998: 185).

[75] In fact, traces are a counterexample to *Case Compositionality* even if they *have* utterances that are parts of all utterances of sentences that have them as constituents, for reasons set out in ch. 1. However, because none of the examples in this chapter involve binding, I will ignore this issue.

[76] See Chalmers (2003: §6).

The first problem is that nothing about the definition of CL_c guarantees that the 1-intension a CL_c-expression has in *c* is narrow in *c*. We may grant that the requirement that CL_c-expressions other than $\mathbf{I}_c$ and $\mathbf{now}_c$ be non-twin-earthable in *c* guarantees that the 1-intensions those CL_c-expressions have in *c* are narrow in *c*. However, if we do, we may not grant *Syntactic-Semantic Idealization* – at least not until we find reasons to think that the logical constants of L_c are not twin-earthable in *c*. Furthermore, there is no guarantee that the 1-intensions of $\mathbf{I}_c$ and $\mathbf{now}_c$, the two CL_c-words that are clearly twin-earthable in *c*, are narrow in *c*.

The second problem is that there is no guarantee that sentential *a priority* is narrow in the above sense. And, in fact, if the link I proposed in Remark 3 between sentential *a priority* and the truth of a sentence of the form ⌜ **A***S* ⌝ is assumed, there will be specific reasons to doubt that sentential *a priority* is narrow. For example, if I have an intrinsic qualitative duplicate who, due to unfortunate external circumstances, expresses no classical possible-worlds intension at all with his twin of my utterance of '2 is prime', then the sentence that is the twin of my 'It is *a priori* that 2 is prime' also expresses no classical possible-worlds intension, so it cannot be true in my twin's case, even though 'It is *a priori* that 2 is prime' is true in my case. This is not meant to be a conclusive refutation of Chalmers' claim that sentential *a priority* is narrow, and I will not press this concern further, as I think there are far more decisive considerations against the combination of *1-Narrowness* with *E2D Connection*.

Remark 7. The initial characterization of CL_c as the language containing the fragment of L_c containing all the words of L_c that are *not twin-earthable* in *c*, together with $\mathbf{I}_c$ and $\mathbf{now}_c$, was, as I said, "a first approximation" only. In fact, if CL_c is characterized in this way, then *E2D Connection* is clearly false:

Let *c* be an arbitrary case in the actual world, whose agent is an English speaker who has the name 'Aristotle' in his vocabulary and who uses it to refer to Aristotle, wherefore |'Aristotle'|$_c$ = Aristotle. By (NC1), and the definition of *1-intension*, if $[\![\text{'Aristotle'}]\!]^1_c(c)$ exists, then some sentence of the form

(A) $D_{c,scn(c)} \rightarrow$ Aristotle = (the x: $S(x)$)

must be a *priori* in *c*, such that ⌜ $S(x)$ ⌝ ∈ CL_c, and ⌜ $S(x)$ ⌝ is uniquely true of Aristotle at *scn*(*c*). But suppose that the only non-twin-earthable nonlogical words in the language of L_c are words that cannot (together with 'I' and 'now') be used to form an open sentence that is uniquely true of Aristotle at *scn*(*c*); then there can be no such sentence, and it follows that $[\![\text{'Aristotle'}]\!]^1_c(c)$ does not exist, and therefore, $[\![\text{'Aristotle'}]\!]^1_c(c) \neq$ |'Aristotle'|$_c$ – a counterexample to *E2D Connection*.

This is not a remote possibility. *Actual* counterexamples like the above abound: any child who has a non-canonical name in his vocabulary but has not acquired enough non-twin-earthable words to uniquely describe the referent of the name will do for a counterexample. Clearly, the "first approximation" characterization of CL_c is unacceptable. But what can take its place? Chalmers' proposal is that CL_c is not, in fact the language to which the utterance of *c* belongs, but an "idealized language" with an "arbitrarily large lexicon" (Chalmers 2003: 50). How large? One suggestion one finds in Chalmers' work is that (*i*) all cases have the same canonical language, and (*ii*) if some word *W* is non-twin-earthable in some case, then there is a word in the common canonical language that is a synonym or translation of *W* (Chalmers 2011: 76-77). Furthermore, we are instructed to think of the words in the canonical language, except for (for each *c*) $\mathbf{I}_c$ and $\mathbf{now}_c$, as "qualitative" (Chalmers 2006a: 76); if every qualitative

property is expressed in some case by a non-twin-earthable word, then it would follow that the canonical language shared by all cases is rich enough to be able to give a complete qualitative description of a scenario, in the following sense.

> *Qualitative Expressive Completeness*
>
> (For all c, s, s') if there is a qualitative fact that obtains in w_s but not in $w_{s'}$, then (for some $S \in CL_c$) S contains no occurrences of $\mathbf{I}_c$ or $\mathbf{now}_c$ and S is true in c at w_s but not true in c at $w_{s'}$.

I know of no reason to believe that every qualitative property is expressed in some case by a non-twin-earthable word, so I know of no reason to accept *Qualitative Expressive Completeness*; however, if we could accept *Qualitative Expressive Completeness*, this would make *E2D Connection* seem quite a lot more palatable than it otherwise would. I will grant Chalmers *Qualitative Expressive Completeness* for now.

The "idealization" proposed by Chalmers introduces many problems that I will not discuss here, as my objections to E2D as an account of narrow content are independent of them. For example, it is unclear how we can continue to regard the objects of semantic evaluation as utterances-in-worlds if we are now committed to assigning semantic properties to expressions X in cases c such that X does not belong to L_c. It is also unclear what it takes for a sentence S to be *a priori* in a case c when S does not belong to L_c. And since CL_c must contain ($\mathbf{I}_c$ or $\mathbf{now}_c$ aside) only words that are non-twin-earthable in c, we must be able to make sense of the claim that a word that does not belong to the L_c is not twin-earthable in c. It is far from clear how we can make sense of all of this. But I mention these problems only to set them aside.

II.2. Problems of symmetry

Does E2D offer an acceptable account of narrow content? I claim that it does not, because certain pairs of cases in worlds with complete or partial qualitative symmetry can be used to show (provided that any expression that has a unique 2-intension in a case has a unique 1-intension in that case) that either *1-Narrowness* or *E2D Connection* is false. In Part I, we found no acceptable account of narrow content could reject *Narrowness* (obviously) or *Connection*. *1-Narrowness* and *E2D Connection* correspond to these in the E2D setting, so *1-Narrowness* and *E2D Connection* are conditions *sine quibus non* of E2D being able to offer an account of narrow content, so, I claim, E2D is hopeless as an account of narrow content.

My objection to E2D as an account of narrow content makes use of *Case Compositionality* and two further, apparently trifling, assumptions about what 1-intensions are and how they compose. Of course, we have already seen that *Case Compositionality* suffers from some counterexamples, but this should not detain us from applying it to the examples below, all of which involve only *simple sentences*, i.e. sentences in which an *n*-place predicate is combined with *n* singular terms. None of the potential counterexamples to *Case-Compositionality* discussed in Remark 6 concerned such sentences, with the possible exception of sentences involving phonetically null yet semantically significant constituents. However, we may simply stipulate that there are no semantically significant phonetically null constituents in the sentences to be discussed below. (In fact, the main example involves sentences of the form ⌜ $t = t'$ ⌝ with t and t' both proper names, and it is rather implausible[77] to suggest that such sentences contain phonetically null but semantically significant constituents.)

[77] Contra Hawthorne and Manley (2012, ch. 6).

The first further, apparently trifling, assumption is:

(=1) For all cases *c*, $[\![\text{`='}]\!]^1_c$ is the 1-place function from scenarios to 2-place functions[78] such that, for all scenarios *s*, $[\![\text{`='}]\!]^1_c(s)$ is the 2-place function such, that, for all functions g, h from scenarios to individuals, $[\![\text{`='}]\!]^1_c(s)(g,h)$ = Truth if $g(s) = h(s)$, and otherwise $[\![\text{`='}]\!]^1_c(s)(g,h)$ = Falsehood.

Of course, the E2D semanticist is under no obligation to assign a 1-intension to '=',[79] but if we are in the business of assigning 1-intensions to logical constants, (=1) (or something equivalent) seems a natural choice. In particular, we should want the 1-intension of '=', when combined with the same 1-intension twice over, to yield the necessary 1-intension (function that takes each scenario to Truth), in accordance with Chalmers' "Carnapian Thesis", which entails that *t* and *t′* have the same 1-intension iff ⌜ *t* = *t′* ⌝ has a necessary 1-intension.[80]

Case Compositionality posits a semantic operation $O_=$ on 1-intensions corresponding to the syntactic operation of combining the identity predicate – clearly, given (1=), $O_=$ is the operation of applying a function to a pair of arguments:

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[78] I am not assuming here that the *symbol* '=' has the same 1-intension in every case – obviously it does not – rather, I am saying that *the identity predicate of* L_c (for which I am using ''='') has in *c* this 1-intension, which is close to being a truism.

[79] '=' could be given a syncategorematic treatment in which '=' is regarded as a syntactic operation that takes a pair of singular terms *t*, *t′* to ⌜ *t* = *t′* ⌝, and a semantic operation corresponding to this syntactic operation could be identified with the function $f_=$* such that, for all functions *g*, *h*, from scenarios to objects, $f_=$*(*g*, *h*) = the function *p* such that, for all scenarios *s*, *p*(*s*) = Truth if *g*(*s*) = *h*(*s*) and *p*(*s*) = Falsehood otherwise. But this proposal is equivalent to (=1) in that it gives the same result for "composing" the 1-intensions of *t*, '=', and *t′* in any given case, in accordance with *Case Compositionality*.

[80] See Chalmers (2006a: 57): the "Carnapian Thesis" is simply a generalization about "intensions" of any kind.

($=_{Comp}$) (For all c, c_1, c_2)(for all singular terms t, t') if c is a case of ⌜ $t = t'$ ⌝ and c_1 is the first part of c that is a case of a singular term and c_2 is the second part of c that is a case of a singular term, then $[\![\ulcorner\ t = t'\ \urcorner]\!]^1_c = [\![c]\!]^1 = [\![\text{`='}]\!]^1([\![c_1]\!]^1, [\![c_2]\!]^1)$.

($=_{Comp}$) is the above-mentioned, apparently trifling assumption about how 1-intensions compose. The reader will recall that *Case Compositionality* assigns 1-intensions and 2-intensions directly to cases – in ($=_{Comp}$), I am using '$[\![c]\!]^1$' to designate the 1-intension of case c.

(1=) and ($=_{Comp}$), entail, together with *E2D Connection*:

(1) (For all singular terms t, t')(for all c, c_1, c_2) if c is a case of ⌜ $t = t'$ ⌝ and c_1 is the first part of c that is a case of a singular term and c_2 is the second part of c that is a case of a singular term, and $[\![c_1]\!]^1 = [\![c_2]\!]^1$, then ⌜ $t = t'$ ⌝ is true in c.

Furthermore, given that:

(2) (For all singular terms t, t')(for all c, c_1, c_2) if c is a case of ⌜ $t = t'$ ⌝ and c_1 is the first part of c that is a case of a singular term and c_2 is the second part of c that is a case of a singular term, then, if ⌜ $t = t'$ ⌝ is true in c, then $|t|_{c_1} = |t'|_{c_2}$,

we have:

(3) (For all singular terms t, t')(for all c, c_1, c_2) if c is a case of ⌜ $t = t'$ ⌝ and c_1 is the first part of c that is a case of a singular term and c_2 is the second part of c that is

a case of a singular term, and $[\![c_1]\!]^1 = [\![c_2]\!]^1$, then ⌜ $t = t'$ ⌝ is true in c and $|t|_{c_1} = |t'|_{c_2}$.

Put in plainer language, and cutting some corners, (3) says that, if the two singular-term utterances in the utterance of an identity sentence have the same 1-intension, then the singular-term utterances also have the same extension, and the utterance of the identity sentence is true. (3) and *1-Narrowness* entail:

(4) (For all singular terms t, t')(for all c, c_1, c_2) if c is a case of ⌜ $t = t'$ ⌝ and c_1 is the first part of c that is a case of a singular term and c_2 is the second part of c that is a case of a singular term, and $c_1 \approx c_2$, then $[\![c_1]\!]^1 = [\![c_2]\!]^1$ and ⌜ $t = t'$ ⌝ is true in c and $|t|_{c_1} = |t'|_{c_2}$.

II.2.1. Mirror Man

Here, finally, is the example that will make trouble for the combination of *1-Narrowness* and *E2D Connection*. It is inspired by an example used for another purpose in Fine (2007: 36):

> [L]et us imagine a universe that is completely symmetric around someone's center of vision. Whatever she sees to her left *is* and *looks* qualitatively identical to something she sees on her right (not that she conceptualizes the two sides as "left" and "right" since that would introduce an asymmetry). She is now introduced to two identical twins, one to her left and the other to her right, and she simultaneously names each of them "Bruce"; using a left token of "Bruce" for the left twin and a right token of "Bruce" for the right twin. The two tokens of "Bruce" are then always used in tandem so as not to disturb the symmetry. Thus if she uses a left token of "Bruce" to say "Bruce is wearing pink pyjamas," she simultaneously uses a right token of "Bruce" to utter the same thing. She can even assert the non-identity of the two Bruces by simultaneously uttering

> the one token of "Bruce" from the left side of her mouth, the other token from the right, and a word for non-identity from the middle of her mouth.

The example I have in mind is just like Fine's in that it features a world in which perfect qualitative symmetry obtains around the center of vision of an agent – call him "Mirror Man" – but Mirror Man has, like perhaps most actual English-speaking philosophers, two non-coreferential names that are spelled and pronounced 'Aristotle', which he only ever utters in tandem from the left and right sides of his mouth. I will call these names 'Aristotle$_1$' and 'Aristotle$_2$' – the orthographic difference here is only a difference in *my* names for the two names used by Mirror Man, which are qualitatively indiscernible. Now let c_{MM} be a case of 'Aristotle$_1$ = Aristotle$_2$' in which Mirror Man is the agent and 'Aristotle$_1$' is uttered from the left side of Mirror Man's mouth, 'Aristotle$_2$' from the right, and '=' from the middle, and call the part of $c_=$ that is a case of 'Aristotle$_1$' 'c_1' and the part of $c_=$ that is a case of 'Aristotle$_2$' 'c_2'. Clearly, 'Aristotle$_1$ = Aristotle$_2$' is false in c_{MM}, and |'Aristotle$_1$'|$_{c_1}$= |'Aristotle$_2$'|$_{c_2}$. However, because of the symmetry of the world in which c_1 and c_2 occur, $c_1 \approx c_2$, so, by (4), it follows that:

(a) $[\![c_1]\!]^1 = [\![c_2]\!]^1$

(b) 'Aristotle$_1$ = Aristotle$_2$' is true in c_{MM}, and

(c) |'Aristotle$_1$'|$_{c_1}$= |'Aristotle$_2$'|$_{c_2}$.

(b) and (c) flatly contradict our assumptions, and (a) entails, together with the Core Thesis, that 'Aristotle$_1$ = Aristotle$_2$' is *a priori* in c_{MM} – a counterexample to the factivity of *a priority*.

While my primary goal is to show that E2D does not offer an acceptable account of narrow content, it is of independent interest – to those who may find some version of E2D attractive for reasons other than their commitment to ecumenical semantic internalism – that counterexamples to *E2D Connection* with the structure of the example of Mirror Man can be generated without assuming *1-Narrowness*. Let us call the view comprising all of the claims I have attributed to E2D except *1-Narrowness* "Broad E2D". Broad E2D (and therefore, of course, E2D as well) is refuted by many actual examples: for example, consider the actual, present case c_N of 'Now = now'. By *E2D Connection* and (C2), the first part c_1 of c_N that is an utterance of 'now' refers to the time t_1 at which c_1 occurs, and the second part c_2 of c_N that is an utterance of 'now' refers to the time t_2 at which c_2 occurs, and (as a matter of fact) $t_1 \neq t_2$, so by (2), 'Now = now' is false in c_N. However, $[\![c_1]\!]^1 = [\![c_2]\!]^1$ = the function that takes each scenario to its time, so by (3), 'Now = now' is true in c_N and $t_1 = t_2$, a contradiction.[81]

II.2.2. Case Compositionality is not to blame

The fact that *Case Compositionality* even clashes with E2D's treatment of 'now', without the assumption of *1-Narrowness* may be thought to point to a problem with *Case Compositionality* rather than with E2D – perhaps *Case Compositionality* was

[81] There are ways of solving the problem of 'Now = now' which do not help E2D deal with Mirror Man example. Perhaps the most obvious solution is to concede that (C2) gets the epistemic two-dimensional semantics of $\mathbf{now}_c$ wrong and to propose a different semantics. For example, $\mathbf{now}_c$ could be associated with a denumerable infinity of 1-intensions such that the *n*th occurrence of a case of $\mathbf{now}_c$ in a case of a sentence is associated with the *n*th 1-intension of $\mathbf{now}_c$. This would be rather like the view (sometimes attributed to Frege: see Parsons 1981) that each expression is associated with a denumerable infinity of Fregean senses, and an occurrence of an expression under *n* embeddings in *ungerade* contexts expresses its *n*th sense.

simply the wrong way to implement the idea of compositionality for utterances in worlds? This thought misdiagnoses the problem.

First, there is a second route to absurdity from the example of Mirror Man, which does not involve any appeals to *Case Compositionality*. In the Mirror Man vignette, perfect qualitative symmetry obtains in the worlds of the cases c_1 and c_2, wherefore $D_{scn(c_1)} = D_{scn(c_2)}$. But for it to be the case that $|\text{`Aristotle}_1\text{'}|_{c_1} \neq |\text{`Aristotle}_2\text{'}|_{c_2}$, by (NC1), it must be that there is a canonical sentence ⌜ *S*(*x*) ⌝ that is uniquely true of one thing *x* at *scn*(c_1), and a canonical sentence ⌜ *S*′(*x*) ⌝ that is uniquely true of another thing *y* distinct from *x* at *scn*(c_2) such that

$$D_{scn(c_1)} \rightarrow \text{Aristotle}_1 = (\text{the } x\text{: } S(x))$$

is *a priori* in c_1 and

$$D_{scn(c_2)} \rightarrow \text{Aristotle}_2 = (\text{the } x\text{: } S'(x))$$

is *a priori* in c_2, which is impossible because $D_{scn(c_1)} = D_{scn(c_2)}$.

The argument just given makes salient a feature of the Mirror Man vignette that is of independent interest – to those who may find some version of E2D attractive for reasons other than their commitment to ecumenical semantic internalism – which is that it enables the derivation of a contradiction from E2D assumptions without *1-Narrowness*. We just provided one. The previous paragraph's argument showed that the distinctness of $|\text{`Aristotle}_1\text{'}|_{c_1}$ and $|\text{`Aristotle}_2\text{'}|_{c_2}$ requires the existence of a canonical sentence ⌜ *S*(*x*) ⌝ that is uniquely true of one thing at *scn*(c_1), and a canonical sentence

⌜ $S'(x)$ ⌝ that is uniquely true of a distinct thing at $scn(c_2)$, and that, because of the symmetry of the world in which c_1 and c_2 both occur, there could be no such pair of sentences, but of the E2D assumptions, the argument only made use of (NC1) – it did not make use of *1-Narrowness*.

If further reasons are needed for why blaming the problems certain symmetric worlds cause for E2D on *Case Compositionality* misdiagnoses the problems, here is one more. There is a slight variation on the example of Mirror Man that does not require the assumption of *Case Compositionality* for the derivation of a contradiction. Let the example be as before except in that there is a minor asymmetry in the world external to Mirror Man: the man Mirror Man refers to by 'Aristotle$_1$' is not a qualitative duplicate of the man he refers to by 'Aristotle$_2$', but the former is (say) an ancient Greek philosopher and the latter a 20th-century Greek shipping magnate.[82] And let c_1 be a case

[82] How can Mirror Man, who is always symmetric, obtain and then simultaneously deploy two names for distinct things that do not differ in canonical description? We may suppose that reference for each of the names is secured by the kinds of causal-historical facts that generally fix reference for names if the remarks on the metasemantics of names in Kripke (1980) are on the right track. We may suppose, for example, that Mirror Man simultaneously performs two acts of dubbing, one of which involves an act of pointing at Aristotle$_1$ with his left hand, appropriately causally linked with his first-ever utterance of 'Aristotle$_1$', and the other of which involves an act of pointing at Aristotle$_2$ with his right hand, appropriately causally linked with his first-ever utterance of 'Aristotle$_2$'. Thereafter, we may suppose, Mirror Man retains two qualitatively indiscernible but distinct mental files (stored in distinct functional locations within his symmetric brain) associated with the two names, and he has no disposition whatsoever to assent to the sentence 'Aristotle$_1$ = Aristotle$_2$'. The case is not unlike some of the more mundane examples described by Kripke (1980): e.g., it is plausible that many of us associate (intrinsically) qualitatively indiscernible mental files with a pair of names (say, distinct files for 'Gell-Mann' and 'Feynman', both of which contain nothing but the description 'a famous physicist'), and that the distinctness of the files together with the distinct causal histories of the names and our lack of any disposition to assent to the sentence in which the identity predicate is flanked by the two names, is sufficient to secure distinct referents for the names. Presumably the fact that the names 'Gell-Man' and 'Feynman' are not spelled or pronounced alike is not essential to the famous example Kripke made of these names; if not, it is difficult to see what would prevent Mirror Man from having two names spelled and pronounced 'Aristotle', which he associates with qualitatively indiscernible but distinct mental files, and which differ in extension (reference).

of ‘Aristotle$_1$ is a philosopher’ and c_2 a case of ‘Aristotle$_2$ is a philosopher’, where ‘is a philosopher’ means in Mirror Man’s language what it actually means in English. Now clearly ‘Aristotle$_1$ is a philosopher’ is true in c_1 whereas ‘Aristotle$_2$ is a philosopher’ is false in c_2, but because $c_1 \approx c_2$, $[\![c_1]\!]^1 = [\![c_2]\!]^1$, and, in spite of the asymmetry external to Mirror Man, the world of c_1 = the world of c_2, the agent of c_1 = the agent of c_2, and the time of c_1 = the time of c_2, so $scn(c_1) = scn(c_2)$, wherefore $[\![c_1]\!]^1(scn(c_1)) = [\![c_2]\!]^1(scn(c_2))$, so, by *E2D Connection*, |‘Aristotle$_1$ is a philosopher’|$_{c_1}$ = |‘Aristotle$_2$ is a philosopher’|$_{c_2}$, which is to say, ‘Aristotle$_1$ is a philosopher’ has the same truth value in c_1 as ‘Aristotle$_2$ is a philosopher’ does in c_2, contrary to hypothesis.

II.2.3. *Location-Enriched E2D*

I will call examples like the first Mirror Man vignette, in which the whole world that hosts the twin utterances is symmetric, *symmetric world cases*, and examples like the second Mirror Man vignette, in which only the agent is symmetric, *symmetric agent cases*.

Symmetric world cases and symmetric agent cases are, in effect, Twin Earth cases involving only one agent and time. One could easily be misled into thinking that such counterexamples can be overcome within a modified E2D framework in the same way in which the original Twin Earth examples were dealt with by E2D. The epistemic two-dimensionalist’s response to the twin earth problem was to embrace a conception of content that allows the extension determined by a content to vary with the same parameters with which the extension of an expression is shown to vary between internally alike cases. Thus, because the Twin Earth thought experiments show that the extension of an expression varies between internally alike cases with a shared world but

which differ with respect to the agent and time of the utterance, the epistemic two-dimensionalist concludes that the narrow content of an expression is a function not from worlds to extensions but from world-agent-time triples to extensions. Symmetric world cases and symmetric agent cases show that the extension of an expression can vary between internally alike cases with the same world, agent, and time of utterance, but differ with respect to the location of utterance (left vs. right side of the agent's mouth), so why should the epistemic two-dimensionalist not conclude that narrow contents are functions not from world-agent-time triples to extensions, but from world-agent-time-*location* quadruples to extensions?

Let us consider the proposed generalization of the E2D strategy for defining narrow content – I will call it *Location-Enriched E2D* – in more detail. According to Location-Enriched E2D, $scn(c) = \langle w_c, a_c, t_c, l_c \rangle$, where l is the location at which u_c occurs in w_c. An indexical – say, 'here' – is added to the canonical language, with the stipulation that $|\text{'here'}|_{c,\langle w,\ a,\ t,\ l\rangle} = l$. 1-intensions are functions from scenarios to extensions, characterized in terms of the notion of sentential *a priority* as before, but 1-intensions are now assumed to be sensitive to locations, so that a 1-intension may associate different extensions with scenarios that differ only with respect to location. The thought is that, in the symmetric world case, this allows the 1-intension 'Aristotle$_1$' has in c_1 to be the same as 1-intension 'Aristotle$_2$' has in c_2 while also allowing that 1-intension to determine different extensions in c_1 and c_2, because $scn(c_1)$ and $scn(c_2)$ differ with respect to location; thus we are not forced to conclude that 'Aristotle$_1$ = Aristotle$_2$' is true in c, or so it might appear. In the symmetric agent case, similarly, the thought is that 'Aristotle$_1$ is a philosopher' can have the same 1-intension in c_1 as 'Aristotle$_2$ is a philosopher' does in c_2, without it following that the truth value of

'Aristotle$_1$ is a philosopher' in c_1 is the truth value of 'Aristotle$_2$ is a philosopher' in c_2, because *scn*(c_1) and *scn*(c_2) differ with respect to location.

In fact, Location-Enriched E2D remains vulnerable to the original counterexample involving symmetric worlds – it only blocks the second route to a contradiction from such counterexamples, which proceeds via (C1) and does not use *1-Narrowness*: for example, if Location-Enriched E2D is assumed, it might be that the 1-intension 'Aristotle$_1$' has in c_1 = the 1-intension 'Aristotle$_2$' has in c_2 = the 1-intension of '(the *x*: *x* is a person $\wedge$ *x* is directly north of here)' (again, I am assuming a homophonic translation between Mirror Man's language and ours), in which case that 1-intension can yield different objects applied to *scn*(c_1) and *scn*(c_2), because $|\text{'here'}|_{c_1,scn(c_1)} \neq |\text{'here'}|_{c_2,scn(c_2)}$. However, even according to Location-Enriched E2D, 'Aristotle$_1$ = Aristotle$_2$' will be true in *c*, because the first part of *c* that is a case of a singular term is associated with the same 1-intension as the second part of *c* that is a case of a singular term. This argument relies, again, on *Case Compositionality*, but the temptation to begin tinkering with E2D's compositionality principle should be resisted – *Case Compositionality* is still not at fault.

This is so because, while Location-Enriched E2D can deal with the kind of symmetric agent case considered above, it is vulnerable to refutation by slight variations on it: Consider a pair of symmetric agent cases just like in the second Mirror Man vignette except in that the agent – call him "Gabriel" – is an angel, and suppose that Gabriel's simultaneous utterances of 'Aristotle$_1$ is a philosopher' and 'Aristotle$_2$ is a philosopher' are internal mental tokens of these sentences. Because angels are point-sized[83], the utterance of case c_1 of 'Aristotle$_1$ is a philosopher' and the utterance of case c_2 of 'Aristotle$_2$ is a philosopher' occur in the same point-sized location, wherefore

[83] Or so the theological authorities tell us: see Hawthorne and Uzquiano (2011).

scn(c_1) = *scn*(c_2), and the refutation of Location-Enriched E2D can proceed as the refutation of plain E2D using the symmetric agent case did above, without citing *Case Compositionality*.

In addition, if it is not metaphysically necessary that there are locations, we do not need point-sized agents to refute Location-Enriched E2D. One can imagine a qualitatively symmetric agent in a locationless world which nevertheless has a rich enough network of causal relations between utterances, baptisms, and other events to secure two distinct referents for two simultaneous, qualitatively indiscernible utterances of 'Aristotle$_1$ is a philosopher' and 'Aristotle$_2$ is a philosopher'. If there is a metaphysically possible world fitting this description, then that world contains two cases that are a counterexample to Location-Enriched E2D.

And, just like the refutation of plain E2D using a symmetric agent case, the refutation of Location-Enriched E2D using a symmetric case with a point-sized agent or a locationless wold is of independent interest because it relies on (NC1) instead of *1-Narrowness*.

II.2.4. *Are there symmetric cases?*

A cheap and easy way to respond to the problem posed for E2D by symmetric cases is to simply deny that there are any such cases. This involves denying that it is metaphysically possible for there to be the kind of symmetry that obtains in the worlds in which the symmetric cases allegedly occur. For if such symmetry were metaphysically possible, then there would be a metaphysically possible world in which it obtains, and two distinct ordered pairs comprising that world and an utterance within

it would constitute a counterexample to the combination of *1-Narrowness* and *E2D Connection*. This response, I think, is too cheap and too easy.

Presumably anyone who denies the metaphysical possibility of the particular kinds of symmetry involved in symmetric world cases and symmetric agent cases denies it on more general metaphysical grounds. Presumably the philosopher who denies that there are symmetric world cases believes that there are no qualitatively symmetric worlds at all. That is an old debate that I cannot enter into here. It is much less clear, however, what the basis might be for denying that there are symmetric agent cases. Presumably the actual world contains some parts that are qualitatively symmetric. And if it does, why should it not contain agents that are qualitatively symmetric? Is there something special about agents in virtue of which it is not possible for a qualitatively symmetric agent to exist? Following Uzquiano and Hawthorne (2011), one could invoke various theological authorities in support of the *actual* existence of point-sized agents. And even if the theological authorities are wrong, they do seem to describe a way the world could have been: the world could have contained agents made of physical stuff, as well as point-sized agents capable of producing multiple colocated utterances. (Fine (2000) provides more mundane examples of multiple colocated utterances.)

But suppose that, for whatever reason, it is not possible for there to be a qualitatively symmetric agent, in which case there are no symmetric world cases and no symmetric agent cases. Even so, close variations on the symmetric world and symmetric agent cases can be used to refute the claim that 1-intensions are narrow.

First, we can alter the examples (both of symmetric worlds and agents) so that the qualitative symmetry is less than perfect: let the agent of each case have one molecule in his right eardrum that lacks a symmetric counterpart on the left. It would be

absurd to claim that this one-molecule difference would result in the two names spelled 'Aristotle' having different 1-intensions in c_1 and c_2. Any internalist presumably holds not only that (some kind of) semantic content is shared by utterances in internally alike cases, but that that kind of content is not *only* shared by internally alike cases: if 'Aristotle' in my language has a narrow content, its narrow content is presumably stable over variation in the number of molecules that compose my ears when I do not undergo any other intrinsic change.

Second, recall that refutation of E2D using symmetric world cases need not go by way of *1-Narrowness* at all: (NC1) together with the assumption that the *scenarios* of c_1 and c_2 have the same canonical description suffices. But without the unnecessarily generous (to E2D) assumption of *Qualitative Expressive Completeness*, we are free to assume that the scenarios of c_1 and c_2 have the same canonical description without assuming that perfect qualitative symmetry obtains in the world in which c_1 and c_2 occur. The world can be as asymmetric as you please; as long as the canonical language is impoverished enough to lack the means for describing the asymmetries in it, the scenarios of c_1 and c_2 have the same canonical description, and it will follow, by (NC1) and Chalmers' assumption that sentential *a priority* is narrow in the sense of Remark 6, that 'Aristotle$_1$' in c_1 has the same extension as 'Aristotle$_2$' in c_2. For suppose that c_1 and c_2 have the same canonical description; then, because sentential *a priority* is narrow and $c_1 \approx c_2$, any sentence of the language of c_1 (which is the same as the language of c_2) is *a priori* in c_2 iff it is *a priori* in c_2. So, in particular, any sentence of the form

(**) $S \rightarrow N = (\text{the } x\text{: } S'(x))$,

where ⌜ $S'(x)$ ⌝ is canonical, is *a priori* in c_1 iff it is *a priori* in c_2. By (NC1), if $|\text{‘Aristotle}_1\text{’}|_{c_1}$ exists, $|\text{‘Aristotle}_1\text{’}|_{c_1}$ uniquely satisfies some canonical open sentence ⌜ $S'(x)$ ⌝ at $scn(c_1)$ such that some sentence of the form (**) is *a priori* in c_1; and likewise for $|\text{‘Aristotle}_2\text{’}|_{c_2}$. But because $scn(c_1) = scn(c_2)$, and a sentence of the form (**) is *a priori* in c_1 iff it is *a priori* in c_2, either $|\text{‘Aristotle}_1\text{’}|_{c_1}$ does not exist or $|\text{‘Aristotle}_1\text{’}|_{c_1} = |\text{‘Aristotle}_2\text{’}|_{c_2}$; but $|\text{‘Aristotle}_1\text{’}|_{c_1}$ does exist, so $|\text{‘Aristotle}_1\text{’}|_{c_1} = |\text{‘Aristotle}_2\text{’}|_{c_2}$.

II.2.5. *Coordinate proliferation and Bare-Bones E2D*

The various examples of cases in wholly or partly symmetric worlds considered above put pressure on the epistemic two-dimensionalist from two directions. On the one hand, they put pressure on the advocate of E2D to respond by engaging in *coordinate proliferation*; on the other, insofar as coordinate proliferation leaves E2D’s account of narrow content vulnerable to objections using *Case Compositionality*, they put pressure on the advocate to respond by either rejecting *Case Compositionality* or our seemingly innocent assumptions about the 1-intension ‘=’ and the semantic operation that corresponds to the syntactic operation of combining ‘=’ with two singular terms. Let us consider each response in turn.

Shifting from E2D to Location-Enriched E2D helped the advocate of E2D deal with some symmetric agent cases but not all. The advocate of E2D might hope to continue to employ the same strategy of *coordinate proliferation* against any further counterexamples: if world-agent-time-location quadruples are not sufficient, then add a fifth parameter with respect to which the symmetric utterances in the counterexamples to Location-Enriched E2D differ. Perhaps, for example, the point-sized agent’s

colocated utterances differ in direction – one is directed at Aristotle$_1$, the other at Aristotle$_2$ – so the coordinate proliferator will add a direction coordinate to scenarios. And if there are further symmetric agent examples with utterances with the same direction but different referents, the coordinate proliferator will hope to find a sixth parameter, and so on. But it seems rather unlikely that a suitable further parameter can always be found: Must utterances have directions? (What does it even mean to say that an utterance has a direction?) Could we not simply stipulate that Gabriel's two utterances have no direction?

It is plausible, however, that one sort of thing that could be treated as a coordinate must always be present in cases in which names are used to refer: above I considered a world with "a qualitatively symmetric agent in a locationless world which nevertheless has a rich network of causal relations between utterances, baptisms, and other events to secure two distinct referents for two simultaneous, qualitatively indiscernible utterances of 'Aristotle$_1$ is a philosopher' and 'Aristotle$_2$ is a philosopher'". In that passage I helped myself to the assumption that something like the causal-historical metasemantics of names familiar from Kripke (1980) is metaphysically necessary – that (to switch to the language of possible worlds) every world in which an utterance *u* of a name refers to something *x* is one in which there is a suitable kind of causal chain leading from some speaker's causal interaction (however indirect) with *x* to the production of *u*. If this is correct, then the coordinate proliferator can make do with just one coordinate in addition to world, agent, and time: causal chain. But a causal chain leading from referent to utterance just seems like the wrong kind of thing to include in a scenario – it is a *metasemantic* rather than a semantic parameter. Claiming that the extension determined by a content is relative to a causal

chain leading from referent to utterance is too close for comfort to the option deemed "eccentric" in Part I: that the extension determined by a content is utterance-relative.

The most promising form of coordinate proliferation is one that treats the extensions of names (and other non-canonical expressions) as coordinates of scenarios, or, better yet, as coordinates of coordinates of scenarios, as follows. Let us say that a *Tarskian scenario* is an $s = \langle w, a, t, \sigma_1, \sigma_2 \rangle$, where σ_1 is a (possibly infinite) sequence of individuals existing in w and σ_2 is an (also possibly infinite) sequence of sets of 'tuples of such that the nth member of σ_2 is a set of i_n-tuples of individuals existing in w, where i_n is the adicity of the nth noncanonical predicate in L_c. (This requires a convention for assigning integers to noncanonical expressions; some convention for assigning integers to noncanonical names is also assumed below.) What I will call *Bare-Bones E2D* replaces clauses (NC1) and (NC2), with:

(NC1*) $|N_n|_{c,s}$ = the nth member of σ_1, and

(NC2*) $|P_n|_{c,s}$ = the nth member of σ_2,

where N_n is the nth noncanonical name in L_c and P_n the nth noncanonical predicate in L_c. To guarantee *E2D Connection*, we must somehow ensure that whenever c is a case of N_n, the scenario of c is a $\langle w, a, t, \sigma_1, \sigma_2 \rangle$ such that the nth member of σ_1 is the extension N_n has in c, and that, whenever c is a case of P_n, the scenario of c is a $\langle w, a, t, \sigma_1, \sigma_2 \rangle$ such that the nth member of σ_2 is the extension P_n has in c. Bare-Bones E2D is no longer an *epistemic* form of two-dimensionalism, since it makes no use of *a priority* or other epistemic notions in giving the semantics of the noncanonical fragment of the

language of a case. (Chalmers, in fact, endorses something very like Bare-Bones E2D for demonstratives.[84])

Coordinate proliferation alone cannot solve the problem of symmetry, because, in an example like the original Mirror Man vignette, the left case of 'Aristotle_1' and the right case of 'Aristotle_2' have, by *1-Narrowness*, the same 1-intension, so, by *Case Compositionality* and (=1) and ($=_{\text{Comp}}$), '$\text{Aristotle}_1 = \text{Aristotle}_2$' has a necessary 1-intension, so, by *E2D Connection*, the utterance of '$\text{Aristotle}_1 = \text{Aristotle}_2$' is true. *E2D Connection* is sacrosanct for the epistemic two-dimensionalist internalist, and rejecting *Case Compositionality* would be overkill because the latter is so weak: *Case Compositionality* allows the 1-intensions of '=' and singular terms to compose in different ways in different cases. What the advocate of Bare-Bones E2D should reject is ($=_{\text{Comp}}$) – he should allow the 1-intensions of '=' and two singular terms to compose in different ways in different cases. No doubt the advocate of Bare-Bones E2D must also

[84] Chalmers (2012: 173) discusses the "two tubes" example from Austin (1990), which is rather similar to the Mirror Man vignettes: a person with a qualitatively symmetric visual field refers to a red dot on the left by one token of 'this' and a qualitatively (visually) indiscernible red dot on the right by another token of 'this'. The problem is (for Chalmers, although this was, of course, not Austin's original problem): how do the 1-intensions of the two utterances of 'this' differ? Chalmers writes:

> [O]ne will have to invoke indexicals here so that the primary intension of each 'that' will be roughly equivalent to that of "the cause of this experience" for different phenomenal indexicals 'this.' In [the two tubes] case, the phenomenal indexical must be considered a primitive indexical akin to 'I' and 'now'. Formally, evaluating the primary intension of such an indexical requires a centered world [scenario] where the center includes not just the subject and a time but also certain marked experience tokens to which the phenomenal indexicals are linked. Then 'that=that' will be false at [centered] worlds where the two relevant experience tokens marked at the center are caused by different objects.

But any finite number of distinct non-coreferential occurrences of the same demonstrative can occur in a (case of a) sentence, so to handle multiple occurrences of a single demonstrative in general in the way he proposes to handle Austin's "two tubes" case, Chalmers will need scenarios to be (at least) quadruples $\langle w, a, t, \sigma_{\text{this}} \rangle$, where σ_{this} is an infinite sequence of experience tokens which supply referents for occurrences of 'this'.

say something further about how the way in which the 1-intensions of '=' and two singular terms compose depends on the case, but I will not speculate about what that further thing might be.

The advocate of Bare-Bones E2D must also say something further about why we should think the functions from Tarskian scenarios to extensions that Bare-Bones E2D associates with cases are narrow. But I will not speculate about what that further thing might be. No doubt the Bare-Bones E2D theorist can issue stipulations that guarantee the narrowness of 1-intensions: e.g., he may stipulate that, if *c* and *c′* are internally alike, then the expression of which *c* is a case has the same index number as the expression of which *c′* is a case.

The most serious problem with Bare Bones E2D as an account of narrow content is not that it cannot plausibly make good on its claim that 1-intensions, as it defines them, are narrow, or on its claim that they satisfy *Connection*. The real problem is that Bare Bones E2D does not offer us an account of narrow content because its 1-intensions are not *contents* – they are not suitable objects of assertion, belief, and other propositional attitudes. Functions from centered worlds of the familiar kind – world-agent-time triples, or what Chalmers calls "scenarios" – have some claim to being contents. They are egocentric or perspectival contents, representing ways the world might be from a point of view within it. There are classical arguments (e.g., Lewis 1979) that purport to show that such contents must be posited to explain the apparent fact that one can know all the qualitative and singular facts about the world without knowing, so to speak, "where one is" within the world. Such arguments may be right or wrong, but at least there is a reasonably clear intuitive content to the claim that someone has a belief whose content varies in extension with respect to time, agent, and world. The same cannot be said about the claim that someone has a belief whose content varies

in extension with respect to an infinite sequence of objects and an infinite sequence of sets of *n*-tuples of objects, which are posited for the sole purpose of supplying extensions to the "twin-earthable" words in a speaker's language. Tarskian scenarios are, in effect, centered worlds of the usual kind bundled together with variable assignments, wherefore Bare-Bones E2D is a form of Variable Assignment Relativism and should be rejected for reasons similar to those why Variable Assignment Relativism was rejected in ch. 2, §3.

III. New constraints on narrow content

The Twin Earth thought experiments showed that, if each utterance that has a content has a narrow content, then narrow content is nonclassical content: it requires parameters other than a world – at least, an agent and a time – to determine an extension. The natural response on the part of the ecumenical internalist, which is most fully developed in Chalmers' work on epistemic two dimensionalism, is to take contents (or the intensions they determine) to be, rather than functions from worlds to extensions, functions from centered worlds, or what Chalmers calls "scenarios" – where the scenario of c ($scn(c)$) = $\langle w_c, a_c, t_c \rangle$ – to extensions. The symmetric cases show that this is not enough, but that:

Symmetry: $\exists X\, \exists X'\, \exists w\, \exists u\, \exists u'\, (\langle w, u\rangle \approx \langle w, u'\rangle \wedge\ scn(\langle w, u\rangle) = scn(\langle w, u'\rangle) \wedge$

$$det(\{\{X\}\}_{\langle w, u\rangle}, \langle w, u\rangle) \neq det(\{\{X'\}\}_{\langle w, u'\rangle}, \langle w, u'\rangle))$$

Variations on the symmetric cases show that adding locations or directions to scenarios does not help with the problem. It is, of course, not possible to survey every possible

way of enriching scenarios with further coordinates to show that they all fail, but I am fairly confident of the following claim. *Each way of enriching scenarios with further coordinates either succumbs to symmetric counterexamples or yields a conception of scenarios (such as Tarskian scenarios) on which functions from scenarios to extensions are not suitable to play the role of narrow contents, because they are not suitable objects of belief and assertion.* Furthermore, symmetric cases show that narrow content, if there is such a thing, is anomalous in that the following principle, the analogue of which is trivial for classical possible worlds intensions, is false.

Identity: $\forall t\ \forall t'\ \forall c\ \forall c'\ \forall c''$ (($\{\ulcorner\ t = t'\ \urcorner\}_c$ exists $\wedge$ c' is the first part of c that is a case of a singular term $\wedge$ c'' is the second part of c that is a case of a singular term $\wedge$ $\{t\}_{c'} = \{t'\}_{c''}$) $\rightarrow$ *det*($\{\ulcorner\ t = t'\ \urcorner\}_c$, c) = Truth)

In my view, the narrow "contents" an ecumenical internalist must posit in order to get around the problem of symmetric cases are not contents at all. Others may disagree. But they are clearly very unlike the contents we are familiar with.

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