Disquotationalism and the Compositional Principles

Richard G Heck Jr

Draft of August 28, 2013

> . . . [S]emantics. . . is a sober and modest discipline which has no pretensions of being a universal patent-medicine for all the diseases of mankind, whether imaginary or real. You will not find in semantics any remedy for decayed teeth or illusions of grandeur or class conflicts. Nor is semantics a device for establishing that everyone except the speaker and his friends is speaking nonsense. (Tarski, 1944, p. 345)

In their paper "The Use of Force Against Deflationism", Bar-On and Simmons (2007, p. 61) helpfully distinguish three sorts of deflationary theses about truth. *Metaphysical* deflationism is a thesis about the property of truth, namely, that it is insubstantial, or that it has no essential nature, so that a theory of truth—in the sense in which the correspondence and coherence theories are theories of truth—is both unnecessary and impossible. *Linguistic* deflationism is a thesis about the word "true", namely, that its meaning is adequately explained by Tarski's schema (T) or something along the same lines. *Conceptual* deflationism is a thesis about the role the notion of truth may legitimately play in our theorizing, namely, that there are no interesting connections between truth and other concepts, such as meaning or belief. Rather, the word "true" plays only an 'expressive' function, allowing us to state certain claims that we could not state without it, but playing no essential explanatory role (Field, 1994, §5; Williams, 1999, p. 547).

Most deflationists seem to regard the linguistic thesis as fundamental. Exactly how the metaphysical thesis is supposed to follow from it has never been clear to me, probably because I do not understand what it is supposed to mean that truth is not a 'substantial property' (cf. Field, 1994, p. 265, n. 19). But the real issue, in any event, concerns the

conceptual thesis. And here, it is clear, deflationists have generally regarded it as following from the linguistic thesis: Surely an expression that is explained in terms that make it all but redundant cannot play any essential explanatory role. In practice, the argument for this claim takes a form first used explicitly by Horwich (1990). The work the notion of truth appears to do in various settings, it is claimed, can in fact be done entirely by a notion of truth that is stipulatively introduced in accordance with the requirements of linguistic deflationism. So the dialectic consists of the deflationist's opponent identifying some theoretical setting in which the notion of truth seems to be doing important explanatory work, and the deflationist responding by attempting to show that the role the truth-predicate is playing in that context is, in fact, purely expressive.

Bar-On and Simmons's main purpose in their paper is to show that conceptual deflationism does not follow from linguistic and metaphysical deflationism. In particular, they argue that Frege, though he was a linguistic deflationist, is not a conceptual deflationist (Bar-On and Simmons, 2007, §II) and that Brandom (1994), though he is both a linguistic and a metaphysical deflationist, is not a conceptual deflationist, either (Bar-On and Simmons, 2007, §III). More precisely, Bar-On and Simmons argue that the notion of truth plays an essential role in Frege's account of assertion and in Brandom's account of 'commitment', and that in neither case is truth's role merely expressive. They do not, however, actually defend Frege's claim that assertion is the presentation of a thought as true,[1] nor Brandom's account of commitment in terms of taking to be true, so it is open to a deflationist simply to reject those accounts. Deflationists hold that truth's only *legitimate* role is expressive. They need not deny that naughty philosophers have tried to make other uses of it.

Frege's own attitude toward truth is nonetheless instructive. On the one hand, Frege famously insists that "... the sentence 'The thought that 5 is a prime number is true' contains... the same thought as the simple '5 is a prime number'" (Frege, 1984c, op. 34). On the other hand, truth plays an absolutely central role in Frege's thought about language and, in particular, in the semantics that he develops for his formal language in Part I of *Grundgesetze der Arithmetik* (Frege, 2013). For Frege, the most fundamental linguistic unit, from a logical point of view, is the

[1]There's a nice historical discussion of this aspect of Frege's view by Textor (2010). My own view is that there is something profoundly right about it, but that the right way to understand it is as ultimately expressed though Frege's thesis that the reference of a sentence is its truth-value and, therefore, that the sense of a sentence—the thought it expresses—is its truth-condition. Which brings us to the next paragraph.

sentence; the most basic semantic fact about a sentence is its being true or false; and the sense of a sentence—the thought it expresses—is its truth-condition. How can Frege hold all these views? Part of what explains the apparent tension is the fact that Frege's deflationary remarks always concern ascriptions of truth to what he called 'thoughts', that is, to propositions, more or less.[2] There is no reason to think that Frege was a linguistic deflationist about *sentential* truth. Frege never expresses a view about the meanings of sentences like "'Snow is white' is true", probably because, as Strawson (1950, pp. 129–31) makes clear, such attributions are extremely uncommon in ordinary language. In so far as Frege was a deflationist at all, then, he was a deflationist about *propositional* truth, not about sentential truth. And, in the context of Frege's semantics, the notion of truth that is in play is one that applies not to thoughts but to sentences. So Frege is no kind of deflationist about the notion of truth that plays a role in his semantic theory.

Now, a semantic theory of the sort Frege was the first to develop is not a 'theory of truth' in the sense in which the coherence theory is a theory of truth. But one need not think it is possible, or even desirable, to have a theory of truth in that sense—the sense relevant to *metaphysical* deflationism—to think that the notion of truth might do interesting and useful work (Davidson, 1996, 1999).[3] Truth-conditional semantic theories are *about* truth even as they are also about sentences and other linguistic items, and if the role truth plays in such theories cannot be revealed as purely expressive, then conceptual deflationism is false. But, to emphasize, the issue here concerns truth as applied to sentences, so what we need to ask is whether linguistic deflationism about *sentential* truth provides us with the resources to unmask the use of truth in semantics as purely expressive. To put it differently, the question is whether deflationism about sentential truth is consistent with taking semantics seriously.[4]

[2]The other part of the explanation concerns the true purpose of Frege's deflationary remarks, which is to undermine the view that the relationship between a thought and its truth-value is that of subject to predicate rather than, as Frege thinks, that of sense to reference. For discussion, see Heck and May (2013, esp. §5) and Heck (2010).

[3]The opponent of deflationism also does not need an alternative to linguistic deflationism. If there is no simple explanation of what the word "true" means, that simply show that it is, unsurprisingly, a lot like other words.

[4]It seems clear that deflationism about *propositional* truth is consistent with taking semantics seriously. Soames (1988; 1999) holds precisely such a combination of views. Semantics, as he sees it, assigns propositions to sentences (relative to contexts). Truth simply does not enter the picture. It's a more interesting question whether deflationism

I shall henceforth use the now common term 'disquotationalism' for deflationism about sentential truth. The term comes from Quine:

> By calling ["snow is white"] true, we call snow white. The truth predicate is a device of disquotation. ... We need it to restore the effect of objective reference when for the sake of some generalization we have resorted to semantic ascent. (Quine, 1986, p. 12).

The linguistic part of the disquotationalist thesis is thus that the two sentences

(1) Snow is white.

(2) "Snow is white" is true.

are not just materially equivalent, but equivalent in some much stronger sense that makes the truth-predicate "dispensible when attributed to sentences that are explicitly before us" (Quine, 1987, p. 214). Quine would never call such pairs of sentences synonymous, of course. What he says instead is that "[a]scription of truth just cancels the quotation marks" (Quine, 1990, p. 80). Quine thus seems to regard (2) as a stylistic variant of (1). Field expresses the same idea when he says that the two sentences are "fully cognitively equivalent" (Field, 1994, p. 250), and he explicitly regards the equivalence between (2) and (1) as a "conceptual necessity" (Field, 1994, p. 258).[5]

This is an extremely strong claim, one that has some very odd consequences.[6] As Field (1994, §9) both notes and emphasizes, for example,

of this sort is compatible with truth-conditional semantics. I think it is, but arguing the point would take more space then I have here.

[5]Strictly speaking, as Field (1994, pp. 250–1) notes, the latter sentence seems committed to the existence of the sentence "Snow is white", whereas the former sentence does not. So, officially, Field's view is that they are fully cognitively equivalent modulo that commitment. But Field himself tends to disregard this aspect of the view, and I will tend to do so as well.

[6]I'll note, in passing, that the common deflationist claim that we learn the word "true" by learning that A is, in some strong sense, equivalent to $\ulcorner$"A is true"$\urcorner$, is much less plausible for disquotationalism that for deflationism. This is because, as mentioned earlier, truth is almost never attributed to sentences in natural language, and it is not even clear that children are able to think consciously about sentences at the sort of age at which they learn the word "true". And that is even waiving the point (a version of which applies in both cases), that it is an empirical question how children acquire the word "true", and I know of no actual evidence that it is by learning a rule of disquotation.

the following is true if the truth-predicate is read disquotationally:[7]

(3) Even if "snow" had meant *grass*, the sentence "snow is white" would still have been true.

That is because it is equivalent to:

(4) Even if "snow" had meant *grass*, snow would still have been white.

And that is because, as Field (1994, p. 266) remarks, echoing Quine, "to call 'Snow is white' disquotationally true is simply to call snow white...", whether or not we are inside a modal context.

This is not a dispensible feature of the truth-predicate as a disquotationalist understands it. The sentence A has to be equivalent, in the strongest possible sense, to ⌜"A" is true⌝ if the truth-predicate is to play the expressive role disquotationalists think it plays.[8] If, for example, I say, "The axioms of Euclidean geometry are not all true, but they might have been", then Field (1994, p. 265) wants this to be a way for me to affirm the contingency of what the axioms of geometry express, *not* the fact that they might have been true because they might have meant something different. It follows that "The axioms of Euclidean geometry are all true" must not have any extra, 'semantic' content but must simply express what the axioms of Eucliean geometry do. Similarly, if I were to say, "It is sometimes possible to see objects behind the sun because the axioms of Euclidean geometry are not all true", that is supposed to be a way for me to affirm that the non-Euclidean character of space is responsible for the somewhat surprising behavior of photons, not to make the absurd claim that optics is beholden to the semantics of English.

Now, the obvious thing to say here is that the reason "The axioms of Euclidean geometry are not all true, but they might have been" expresses the contingency of what the axioms express is because the 'axioms' are not sentences but what those sentences express. That is, truth is being predicated not of sentences but of propositions (Heck, 2004, §2). But this is not a line that a disquotationalist can take, since invoking propositions threatens to commit us to a substantial notion of representational content, which is part of what disquotationalism opposes (Field, 1994, pp. 266–7). A disquotationalist precisely does not want to understand attributions of truth to sentences in terms of the truth of the proposition

[7] If one is worried about the use of "means" in the antecedent, replace it by: Even if "snow" had been used the way "grass" is used, and conversely.

[8] Gupta (1993) hammers this point throughout his paper, especially in §III.

the sentence expresses. Rather, the disquotationalist view is that attributions of truth to sentences are to be treated as primitive, and they are to be understood in terms of disquotation.[9]

Still, it is often useful, when one is trying to understand what a disquotational truth-predicate is, to compare it to a propositional truth-predicate. The claim that A and ⌜It is true that A⌝ are equivalent in some very strong sense seems reasonable. For that reason,

(5) Even if "snow" had meant *grass*, it would still have been true that snow was white.

is unproblematically true. But the disquotationalist's (3) is intended to be equivalent to (5), though it uses a sentential truth-predicate rather than a propositional one, so as to avoid the commitment to propositions.[10] When "true" is read disquotationally, then, ⌜"A" is true⌝ is supposed to be just as obviously equivalent to A as ⌜It is true that A⌝ is.

A different way to reach the same conclusion is to note that, if ⌜"A" is true⌝ had some content beyond that of A itself, then that content could well be essential to putative explanations in which attributions of truth appeared. It would not follow that conceptual disquotationalism was false, but the typical strategy for establishing it would no longer be available: Uses of the truth-predicate could not simply be eliminated in the way disquotationalists propose, even when truth was ascribed to a single, explicitly specified sentence, let alone when it was used in generalizations, as it is in semantics.

A simple example of such a generalization is:

(6) A conjunction is true iff both of its conjuncts are true.

Following Field (2005), I shall call such principles 'compositional principles'. And the main question I want to discuss in the remainder of the paper is how disquotationalists should understand the use of the truth-predicate in compositional principles (that is, within certain sorts of semantic theories).[11] Even in (6), the use of the truth-predicate is

[9]Ultimately, disquotationalism is not so much a view about truth as it is a view about content: It is the denial that truth conditions have any significant role to play in the theory of mind and language (Field, 1994, §1).

[10]In a sense, the whole point of a disquotational truth-predicate is to try to get the effect of a propositional truth-predicate without the commitment to propositions.

[11]I will focus here on truth-theoretic semantics, but it should be clear, I think, that nothing really depends upon this restriction. The disquotationalist's task would only be harder if we were discussing a semantic theory that made use of more complex sorts of semantic values.

supposed to be 'purely expressive'. How so?

I shall argue in Section 1 that the truth-predicate is not being used in (6) to express an infinite conjunction, as is often suggested. I shall then turn, in Section 2, to an older question, namely, what right disquotationalists even have to compositional principles, a problem Horwich (1990, §???) raises for himself. As we shall see, an answer has since been developed by Field (2005), and this in turn yields an answer to the question what expressive role truth plays in compositional principles. I shall then argue, in Section 3, that Field's method for generating compositional principles over-generates and then, in Section 4, that this reveals a deeper problem, which is that what Field's method generates are not the compositional principles as they are understood in semantic theory. In particular, part of what (6) is typically understood to express is that conjunction is truth-functional. But, if the truth-predicate as it occurs in (6) is read disquotationally, then (6) is compatible with conjunction's not being truth-functional. In Section 6, I will reinforce this point with a brief history of truth-functionality and then, in Section 7, extend the point by looking even more briefly at corresponding issues concerning quantification.

I want to acknowledge in advance that the central claims to which I shall argue disquotationalism is committed may well seem so absurd that no one could possibly be committed to them. This is worrying. But they are no more absurd than (3), in the end, and they flow from exactly the same source: the disquotationalist's insistence that the primary function of "is true" is simply to erase quotation marks. And that, obviously, is not a feature of the view that is dispensible, but is its very core.

1 What Expressive Role Does 'True' Play in Compositional Principles?

As mentioned above, disquotationalists regard the truth-predicate as being merely an 'expressive' device. People sometimes put this point by saying that the truth-predicate allows us to make generalizations we could not make without it. But the slogan can't just mean that. *Every* predicate allows us to make generalizations we could not make without it. For example, the predicate "blue" allows us to express the generalization "All pigs are blue", which we could not express if we did not have the word "blue" in our language (or a synonym). So the disquotationalist slogan must mean something else.

Which, of course, it does. When disquotationalists characterize the truth-predicate as a 'device of generalization', what they mean is that the truth-predicate gives us a way to express generalizations all of whose instances we can already assert. It's just the generalization that we can't assert. That distinguishes the cases involving "true" from the case of "All pigs are blue". Not even its instances can be asserted without the use of "blue". More precisely still, the truth-predicate is supposed to act as a 'device of infinite conjunction' (Field, 1994, §5; Halbach, 1999; etc). In the cases of interest, we shall be able to assert the various instances of some generalization, but, because there are infinitely many such instances, we cannot actually assert them all, absent some mechanism for forming infinite conjunctions, which is exactly what the truth-predicate is supposed to allow us to do.

Consider, for example, the law of excluded middle: Every sentence of the form $A \vee \neg A$ is true. The disquotationalist's suggestion is that this means no more and no less than that either Bill smokes or Bill does not smoke, and either Fred runs or Fred does not run, and so forth. The individual instances—"Either Bill smokes or Bill does not smoke", "Either Fred runs or Fred does not run"—have nothing to do with truth. To express the generalization, of course, what we need to do is quantify over these instances. What we seem to want to say is thus something like:

(7) For all S, if S is of the form $A \vee \neg A$, then S.

But that, familiarly, seems to be ill-formed, since S is occupying both term and sentence positions. What the truth-predicate does, according to disquotationalists, is to solve this problem for us by converting the position occupied by a sentence into one occupied by a term: "Fred runs or Fred does not run" is replaced by "'Fred runs or Fred does not run' is true", and our generalization can then expressed as:

(8) For all S, if S is of the form $A \vee \neg A$, then S is true.

All we're trying to do here, or so disquotationalists say, is to wrap the instances of $A \vee \neg A$ into a neat package and affirm them, all at once. The role the truth-predicate is playing is purely grammatical, and (8) means no more than what (7) was supposed to mean: It simply expresses the infinite conjunction that either Bill smokes or Bill does not smoke, and either Fred runs or Fred does not run, and so forth. In particular, (8) has no more to do with truth, semantics, or logic than would that infinite conjunction, if only we could write it down.

There are several difficulties with this idea. It is, first of all, a very delicate matter just how we should understand the claim that truth-attributions such as (8) express infinite conjunctions. As Gupta (1993, §III) argues, "express" here has to be understood in a very strong sense. It is surprising that so little effort has been made to articulate that sense.[12] The only serious attempt of which I am aware, due to Halbach (1999), cannot be regarded as successful (Heck, 2004, pp. 330–2). Worse, as Gupta also notes, this sort of proposal appears to conflate the truth of a generalization with the truth of its instances. The statement that all sentences of the form $A \vee \neg A$ are true has nothing to do with which instances of that form happen to be present in the language. On the contrary, it is supposed to be a law: It is supposed to be, in the usual sense, 'projectible'. Even if new sentences are added to our language, so that $A \vee \neg A$ comes to have new instances, those too are required to be true.

I shall not pursue these compaints further, as sympathetic with them as I may be. The point I want to make here, rather, is that the compositional principles simply are not statements in which the truth-predicate is used as a device of infinite conjunction.[13]

The problem is very simple. The only 'infinite conjunction' we might plausibly take (6) to express is far too weak to have any chance of being what it actually does express. Formalize (6) as:

(9) $\forall x \forall y[\mathrm{T}(\ulcorner x \wedge y \urcorner) \equiv \mathrm{T}(x) \wedge \mathrm{T}(y)]$

What sentences not involving the truth-predicate count as instances of the infinite conjunction expressed by (9)?[14] It is hard to see what they might be if not sentences of the form: $A \wedge B \equiv A \wedge B$, so that (9) expresses the infinite conjunction of such claims as "Fred runs and Bill walks iff Fred runs and Bill walks", that is, the infinite conjunction of a bunch of instances of $p \equiv p$. That might sound like music to the disquotationalist's ears. But it should not be.

Consider these two generalizations:

(10) $\forall x \forall y[\mathrm{T}(\ulcorner x \wedge y \urcorner) \equiv \mathrm{T}(\ulcorner x \wedge y \urcorner)]$

[12] One can only wonder how Quine would feel about a view that relies upon so heavily upon what looks, to all the world, like a claim of synonymy.

[13] I have made this point before (Heck, 2004, pp. 331–2), but in a somewhat different context and without sufficient emphasis. Halbach (2001, p. 192, fn. 26) seems to agree.

[14] One might think that (9) should express an infinite conjunction of infinite conjunctions, but this does not evade the problem, since the terms of that conjunction are the same as in all the cases we shall discuss, and the difference is only one of grouping.

(11) $\forall x \forall y[\mathrm{T}(\ulcorner x \wedge y \equiv x \wedge y \urcorner)]$[15]

If (9) is supposed to express an infinite conjunction, then presumably these do, too. And there appears to be no option but to take them, too, to express the conjunction of all sentences of the form: $A \wedge B \equiv A \wedge B$. But these are all very different. For example, (10) is logically valid. And, while (11) is not itself logically valid, it follows from any set of principles entailing that all instances of a truth-functionally valid schema are true. For example, it will follow from that very principle:

(12) If A is a tautology, then all instances of A are true.

This principle is very weak. But (9) is in no sense trivial. Together with similar principles, at least, it has significant logical strength (Heck, 2013b).[16]

The point, then, is that (9), (10), and (11) have very different logical properties. It follows that they cannot all express the same infinite conjunction. On the contrary, at most one of them can express the infinite conjunction of sentences of the form: $A \wedge B \equiv A \wedge B$. But if any of these expresses that infinite conjunction, then surely it is (11), which does so in precisely the sense in which $\forall x[\mathrm{T}(\ulcorner x \vee \neg x \urcorner)]$ expresses the conjunction of instances of the law of excluded middle. But then (9) does *not* express that infinite conjunction, and there is no other infinite conjunction it plausibly does express.

The point applies to other compositional principles as well, such as:

(13) $\forall x[\mathrm{T}(\ulcorner \neg x \urcorner) \equiv \neg \mathrm{T}(x)]$

If (13) expresses an infinite conjunction, it can only be the conjunction of all sentences of the form: $\neg A \equiv \neg A$. But, if so, then that same infinite conjunction seems equally to be what is expressed by these two generalizations:

(14) $\forall x[\mathrm{T}(\ulcorner \neg x \urcorner) \equiv \mathrm{T}(\ulcorner \neg x \urcorner)]$

[15] A missing bracket in "Truth and Disquotation" may have obscured what formula (12) on p. 332 was meant to be. It was this one.

[16] Since the notion of a tautology is definable in PA (and, in fact, in Q), one could simply take "x is true" to mean: x is a tautology. Then (12) is immediate. Note, by the way, that this holds even for quantification, *so long as the compositional princples are not in place*. If they are, then the statement "logic is true" is quite strong: When added to PA, it implies the statement "all axioms of PA are true" (Cieśliński, 2009, p. 412). That looks like another reason to think that the compositional principles have significant logical strength, even in the absence of induction for semantic notions, which is not needed here.

(15) $\forall x[\mathrm{T}(\ulcorner \neg x \equiv \neg x \urcorner)]$

The former is trivial; the latter follows from (12). So (13), (14), and (15) have very different logical properties, and at most one of them can express the infinite conjunction of all sentences of the form: $\neg A \equiv \neg A$. But (15) expresses that conjunction if anything does, so (13) does not express it.

I have heard it said in conversation that disquotationalists do not really mean that 'true' is *always* used to express infinite conjunctions, but that this is its 'purpose' or 'role' in our language. But I do not know what to make of such teleological claims. Words do not have 'purposes' in our language, except to allow us to express whatever concepts they are express, and I see no reason to regard "true" as different from other words in this respect. Moreover, even if the truth-predicate had been explicitly introduced so as to allow us to express infinite conjunctions, it would not follow that, once we had it, we could not use it for quite different purposes, including ones that involved truth's playing a significant explanatory role.[17] The disquotationalist therefore owes us an answer to the question what 'purely expressive' role the truth-predicate plays in compositional principles, if it is not to allow us to formulate infinite conjunctions.

2 Disquotationalist Derivations of Compositional Principles

Disquotationalists often seem to be of two minds about compositional principles. On the one hand, for example, Field (1994, p. 269) insists that "...compositional principles have no interest in their own right". On the other hand, however, Field is of course aware that there are those who find such principles as:

(6) A conjunction is true iff both of its conjuncts are true.

to be of substantial interest, and he wants to be able to explain both why such principles are true, when they are, and why they are insubstantial and so can do no explanatory work.

There is a history to this issue. In his book *Truth*, which helped launch the current interest in deflationism, Horwich suggested that

[17] In essentials, I owe this point to Jamie Tappenden, who once remarked that, even if the extension of the truth-predicate is fixed by something like Convention (T), it does not follow that we cannot go on to theorize about the set of true sentences and formulate possibly significant generalizations about it.

we can get everything we need to know about truth from the 'minimal' theory that consists just of the T-sentences.[18] It is obvious, however, that a theory of truth containing just the T-sentences is very, very weak. Without such principles as (6), it's hard to see how such a truth-predicate could be of much use at all. It certainly could not be used for the sorts of purposes for which the truth-predicate is typically used in logic.[19]

Horwich (1990, §????) claimed, however, to be able to derive the compositional principles from the T-sentences—or, better, from the 'T-scheme', thought of as an axiom scheme having the T-sentences themselves as instances. The argument proceeds as follows:[20]

(i) "A and B" is true iff A and B.

(ii) "A" is true iff A.

(iii) "B" is true iff B.

(iv) "A and B" is true iff "A" is true and "B" is true.

The first three steps are delivered by the T-scheme; the last then follows by simple propositional reasoning.

Prima facie, this argument has two serious problems. First, it does not appear to be an argument at all. An argument consists of a sequence of claims allegedly related in some relevant way (e.g., deductively). But this 'argument' does not consist of a sequence of claims, and it is not at all obvious how to interpret it. Second, in so far as one does have some idea how to interpret it, one wants to interpret "A" and "B" as variables. But then these variables appear both inside and outside quotation marks, something that is usually regarded as a bad idea.

One charitable way to interpret the 'argument' is to regard it not as an argument but as an argument *schema*. So understood, however, the

[18] Horwich's discussion proceeds in terms of propositional truth, and so his position in *Truth* is not obviously disquotationalist. But Horwich is, in fact, committed to disquotationalism, since he is also committed to a deflationist view of meaning (Horwich, 1998).

[19] Here's an example. Let $\mathcal{T}$ be a theory. Suppose we have a theory of truth for $\mathcal{T}$ that allows us to prove the T-sentences. Then, if $\mathcal{T}$ is finitely axiomatized, we will also be able to prove, pretty trivially, that all of $\mathcal{T}$'s axioms are true. But what if $\mathcal{T}$ is not finitely axiomatized, but only finitely axiomatiz*able*? In that case, we can also prove that all of $\mathcal{T}$'s axioms are true, but only if certain compositional principles are available.

[20] The same sort of argument is given by Field (1994, pp. 258–9). Horwich actually discusses the conditional; Field, disjunction. I'll discuss conjunction, for reasons that will become clear below. There are similar arguments to be found in the writings of many others, such as Hill [[REF]] and Burgess and Burgess [[REF]].

argument fails to show what its proponents claim it shows. What the schematic argument shows is that we can prove *every instance* of the compositional principle for conjunction. That, as Gupta (1993, p. 67) emphasizes, is not at all the same thing as being able to prove (6) itself. Indeed, if our background logic is first-order logic, or some other logic whose for which the compactness theorem holds, the generalization (6) simply cannot follow from its infinitely many instances. Otherwise, it would have to follow from finitely many of them, which it obviously does not (Shapiro, 1998, p. 496).

One might think the disquotationalist can simply concede this point.[21] The disquotationalist needs to show that an 'insubstantial' theory of truth can do all the work for which a 'substantial' theory of truth was supposed to be needed. The suggestion, then, would be that what needs amending is the original proposal regarding the content of that 'insubstantial' theory: that it should contain just the T-sentences, or something of the sort. The new proposal would be that it should include the sorts of generalizations we've been discussing, that is, that the disquotationalist should just claim the compositional principles as her own.

Not only would this reply simply beg the question whether the disquotationalist actually has a right to the compositional principles, but it is *ad hoc*. We're supposed to add various generalizations about truth to the 'minimal' theory containing just the T-sentences, generalizations like (6). But which generalizations are 'like' (6)? Discussion of these issues tends to idealize by taking the language to which the truth-predicate applies to be a formal (usually first-order) language. And, in that case, we know well enough which compositional principles will be needed to allow us to make the generalizations the truth-predicate typically allows us to make. But disquotationalism isn't a view about truth as applied only to the sentences of formal languages.[22] Truth as it is used in semantics, at least, applies to sentences of natural language. But then there is no clear limit to the sorts of compositional principles we will need to add. Indeed, if we take the case of first-order languages as our model, then,

[21] This sort of suggestion was made during the discussion period when I presented some of this material at Princeton in 2009. Cieśliński (2009, p. 412) comes close to making it in print in his discussion of the conservativeness argument against deflationism. He seems simply to assume that the deflationist is entitled to the compositional principles when he adopts $\mathsf{PA}(S)^-$ as his base theory.

[22] It isn't always clear whether disquotationalism is supposed to be a 'revolutionary' or 'hermeneutic' view. But the point to be made next makes that moot in the present context. Still, my sense is that many disquotationalists have missed some fundamental issues because they have tended to focus on formal languages.

in that case, what we need to add to the minimal theory, to make it actually do the work we need it to do, is a full-blown Tarski-style theory of truth, as Field (1999, pp. 534–5) himself has noted. That makes me suspect that, in the case of a natural language, what would be needed is precisely what would, from a different point of view, be regarded as constituting a full semantic theory for the language in question. That makes the question what right a disquotationalist has to compositional principles pressing once again. Compositional principles are the very principles that semantic theories articulate, and truth appears to play a substantial role in such theories. If so, then "Disquotationalism doesn't work without the compositional principles, so I guess we'd better add them" looks worryingly like another way of saying "Disquotationalism doesn't work, so we shouldn't be disquotationalists".

If something like the schematic argument rehearsed on page 12 could be resuscitated, however, then the problems we have been discussing would vanish. In light of our discussion in Section 1, the disquotationalist must abandon the claim that the compositional principles express infinite conjunctions; in light of Gupta's criticisms, she must abandon the claim that compositional principles simply follow from their instances. But the possibility is still open, at least in principle, that the compositional principles should follow from certain general principles about truth that the disquotationalist anyway accepts, in particular, that they should follow from the T-scheme, itself understood as having a certain kind of generality, rather than simply as a convenient way of summarizing the infinite list of its instances. This proposal has, in fact, been developed by Field (2005).

The sort of contrast to which I have just alluded, between two ways of understanding the T-scheme, is one that has been of significant interest to philosophers of logic and mathematics in the last several years. Consider, for example, the induction scheme of Peano arithmetic:

(16) $A(0) \wedge \forall x(A(x) \rightarrow A(Sx)) \rightarrow \forall x A(x)$

There are two says of understanding this scheme. One is to take it as simply a convenient shorthand for the infinite list of 'induction axioms' of PA. The other is to regard it as having a kind of generality, so that the scheme itself is, in some sense, the real axiom.

The contrast emerges when we consider what ought to happen when we expand the language of PA, say, by adding a truth-predicate. If we understand the induction scheme in the first way, so that it is just a compact way of summarizing the real axioms, of which there are infinitely

many, then the fact that the expansion of the language introduces new sentences, which are of the same form as the induction axioms we already accept, is of no interest. The fact that the axioms we accept have a common form is itself of no interest beyond the fact that it permits such a compact listing. We might call such a conception of the induction scheme *static*.

On the other way of understanding the scheme, (16) is not just a compact way of listing a bunch of axioms. The common form of those axioms is precisely what is of interest. The fact that the expanded language contains new sentences of that form then does provide us with new axioms. The scheme is thus *dynamic* or, as it is more often put, 'open-ended'.

It is the static conception that is usually regarded as the 'official' one in mathematical logic, but Feferman (1996) has shown that the dynamic conception can be made to do mathematical work.[23] The dynamic conception has also been put to philosophical work by McGee (1997) and to joint philosophical and technical work by me (Heck, 2011). It is probably fair to say that the dynamic conception remains controversial. But it is probably also fair to say, or so it seems to me, that it is actually the more natural of the two. It is, I think, pretty clearly what the founders of modern logic had in mind, as well.

Moreover, it is the dynamic conception that articulates how a disquotationalist should, and most disquotationalists do, understand the role of the T-scheme. The T-scheme is not supposed to be a static summary of a bunch of principles that apply only to our language as we now have it, so that the introduction of a new expression would give us no reason to accept instances of the T-scheme for sentences that contained it. On the contrary, disquotationalists understand the T-scheme as a general principle—indeed, as *the* general principle—that governs the use of the truth-predicate (Field, 1994, p. 266, n. 20). To put the point in terms of the language of conceptual role semantics that some disquotationalists employ, the T-scheme summarizes a disposition that competent users of the truth-predicate must have, namely, to accept aribtrary instances of that scheme. So the T-scheme, as disquotationalists understand it, is 'open-ended', generating new instances of itself as the

[23] Feferman introduces the notion as a 'more natural' way of developing ideas which with he has, in one form or another, been concerned throughout his career (Feferman, 1962, 1991). The idea has its roots in Turing's work on ordinal logics (Turing, 1939).

language changes.[24]

Given this understanding of the T-scheme itself as a general principle, it is natural to wonder if there isn't some way of reasoning with it *as* a general principle so as to establish other general principles from it. Such reasoning is precisely what the Horwich-inspired argument on behalf of (6) was attempting. As we saw, there are several problems one might have with that reasoning. But something like this reasoning is, in fact, quite common. I've come to realize that I have often given arguments of the same sort myself.[25]

The argument I have in mind is a well-known argument for the claim that the T-scheme fixes the extension of the truth-predicate.[26] Here is the argument. Suppose that both $T(x)$ and $\tau(x)$ satisfy the T-scheme. Then:

(i) $T(\ulcorner A \urcorner) \equiv A$, since $T(x)$ satisfies the T-scheme.

(ii) $\tau(\ulcorner A \urcorner) \equiv A$, since $\tau(x)$ satisfies the T-scheme.

(iii) $T(\ulcorner A \urcorner) \equiv \tau(\ulcorner A \urcorner)$, by propositional logic.

Since this holds for any sentence A, $T(x)$ and $\tau(x)$ have the same extension.

It's a nice question how such arguments should be understood. One might suspect that the argument tacitly uses the notion of truth. I would not be unsympathetic. But, dialectically, I doubt this sort of worry will get much traction. The argument just rehearsed does not seem to employ the notion of truth, but to make perfectly good sense in its own right.

[24]Gupta (1993, §5) expresses some doubt about whether disquotationalists can understand the T-scheme as any kind of generalization. I think this is at best a stand-off and so shall not pursue the issue.

[25]There's an even more interesting question in this same vicinity, namely, whether schematic reasoning might help explain what justification we have for regarding all the axioms of PA as true. There is no problem about why we regard *each* of the axioms as true: We accept the axiom, we accept the T-sentence for it, and we make a simple inference. But it is much less obvious with what right we regard *all* the axioms as true. In the context of an axiomatic theory of truth for the language of arithmetic, the proof is by induction, and the instance of induction we need necessarily involves semantic vocabulary. One might wonder if there is a different story to be told, along the lines we are discussing. Unfortunately, I do not have the space to pursue this issue here, but I hope to do so elsewhere.

[26]A corollary of this argument is that any predicate that satisfies the T-scheme will be extensionally correct, in the sense that its extension will agree with the ordinary truth-predicate, "...is true" in the sentences to which they both apply. This is because the ordinary truth-predicate itself satisfies the T-scheme.

And Field (2005, §3) offers a detailed account of the sorts of principles that might govern such arguments, principles that suffice, he claims, to allow for proofs of all the compositional principles comprising a full truth-theory for any first-order language. In the case of the schematic argument for (6), the thought is that the various steps of the argument are, as Field puts it, "part of the language", in perfectly good order as they are. They just contain free schematic variables. And once we have reached the conclusion:

(iv) "ϕ and ψ" is true iff "ϕ" is true and "ψ" is true.

we may infer

(v) For all sentences S and T, $\ulcorner S$ and $T\urcorner$ is true iff S is true and T is true.

by a principle allowing for the replacement of schematic letters that are everywhere within quotation marks by variables ranging over sentences. The details are a little messy, but not that bad.

For our purposes, the more important point is that Field's interpretation of such arguments also yields an answer to the question how disquotationalists should understand the expressive role played by the truth-predicate in compositional principles: It functions as a device that allows what is really substitutional quantification to appear as objectual quantification. Indeed, Field (1994, p. 259) suggests that the schematic approach "corresponds to a very weak fragment of a substitutional quantifier language. . . ". That the truth-predicate is really just a expressive device that permits substitutional quantification to appear, syntactically, as objectual quantification over sentences is a fairly common idea in deflationist writing, so it is no surprise that it should surface here.

The problem, then, is not that 'schematic reasoning' cannot be used to establish principles like (6). The problem, as we shall see in the next section, is that this kind of argument works too well.[27]

3 Schematic Reasoning Over-generates

There is another argument that Field might have given for (6):

[27] A somewhat different worry is that this sort of reasoning works only when the object language is part of the meta-language. We cannot, for example, use schematic reasoning to establish that $\ulcorner$'A und B'$\urcorner$ is true (in German) iff A is true (in German) and B is true (in German). But disquotationalism privileges the homophonic case anyway, so I shall do not pursue the point.

(i) "A and B" is true iff A and B.

(ii) "A and B" is true iff "A" is true and "B" is true.

(iii) For all sentences S and T, $\ulcorner S$ and $T\urcorner$ is true iff S is true and T is true.

The first two steps are justified by the disquotational character of the truth-predicate; the last, by the principles governing schematic reasoning.

Once one sees this argument, however, it becomes apparent that it generalizes quite widely and can equally well be used to prove:

(17) For all sentences S and T, $\ulcorner S$ because $T\urcorner$ is true iff S is true because T is true.

Thus:

(i) "A because B" is true iff A because B.

(ii) "A because B" is true iff "A" is true because "B" is true.

(iii) For all sentences S and T, $\ulcorner S$ because $T\urcorner$ is true iff S is true because T is true.

Here again, the first two steps are justified by the disquotational character of the truth-predicate; the last, by the principles governing schematic reasoning.

One might think it obvious that this argument should fail. Consider the obvious adaptation of the original schematic argument to the case of "because":

(i) "A because B" is true iff A because B.

(ii) "A" is true iff A.

(iii) "B" is true iff B.

(iv) "A because B" is true iff "A" is true because "B" is true.

That certainly does fail, since substitution of material equivalents is not permitted inside intensional contexts. But as Field (1994, p. 258) notes in the context of one of his presentations of this sort of argument, the first three biconditionals all hold, for the disquotationalist, "of conceptual necessity... in virtue of the cognitive equivalence of the left and right

hand sides". Such a strong equivalence surely does justify the inference made at (iv). And something similar is true of the previous argument. According to the disquotationalist, the sentences ⌜"A" is true⌝ and A itself are equivalent in a very strong sense, since the predicate "is true" simply erases the quotes around the sentence A and then gets out of the way. Substitution of one for the other is therefore permitted globally.

This will no doubt seem odd, but it is a familiar oddity. One might equally well have thought that substitution of ⌜"A" is true⌝ for and by A itself would not be permitted in modal contexts. But, as we saw earlier (see page 5), it is. For that reason, we can also prove a composition principle for necessity:

(18) "Necessarily, A" is true iff, necessarily, "A" is true.

Thus:

(i) "Necessarily, A" is true iff, necessarily, A.

(ii) "A" is true iff A

(iii) "Necessarily, A" is true iff, necessarily, "A" is true.

Indeed, the conclusion of this argument simply expresses what Field himself argues is required if "true" is to play the expressive role disquotationlists think it plays. So, similarly, ⌜"A" is true⌝ must be substitutable for and by A, even when it occurs in the context of a "because" statement, the reason being, again, that the former really amounts to no more than the latter, if the truth-predicate is read disquotationally.

As mentioned above, it is often useful to compare what happens when we use a disquotational truth-predicate to what happens when we use a propositional one. This claim:

(19) It is true that A because B iff it is true that A because it is true that B.

seems perfectly acceptable. But the disquotationalist's (17) is intended to be equivalent to (19), though it uses a sentential truth-predicate rather than a propositional one, so as to avoid the commitment to propositions. If so, then (17) should be as acceptable to a disquotationalist as (19) is to the rest of us.

The same point emerges if one reflects on the fact, mentioned at the end of the last section, that, for a disquotationalist, the truth-predicate is functioning in compositional principles essentially as substitutional quantifier. On that interpretation, (6) amounts to

$$\Pi S\, \Pi T\, \Pi U[U = \ulcorner S \text{ and } T \urcorner \rightarrow U \equiv (S \text{ and } T)]$$

and (17) amounts to:

$$\Pi S\, \Pi T\, \Pi U[U = \ulcorner S \text{ because } T \urcorner \rightarrow U \equiv (S \text{ because } T)]$$

There is nothing whatsoever wrong with either of these. They are trivialites, more facts of syntax (or orthographics) than of semantics.[28]

Field (2005, pp. 23–4) discusses a closely related point in connection with the question whether his schematic treatment extends to belief attributions. The particular question at issue there is whether schematic reasoning can be used to prove:

(20) "S believes that A" is true iff S believes that "A" is true.

Field offers various reasons to doubt that (20) can in fact be proven schematically and expresses some doubt about (20) itself. But, for the reasons already given, I find Field's discussion hard to align with his disquotationalist commitments.[29] From the semantic point of view, (20) is extremely dubious. But from the disquotational point of view, surely (20) ought to be correct. It has to be correct if the truth-predicate is to play the expressive role disquotationalists think it plays. Suppose I want to affirm John's belief in the Euclidean character of space. Then I might say, "John believes that the axioms of Euclidean geometry are all true". If that is not to be a comment on John's beliefs about the semantics of English (cf. Field, 1994, pp. 265–6), then $\ulcorner$"A" is true$\urcorner$ has to be equivalent to A,[30] even inside intensional contexts. So the equivalence seems provable in usual way:

[28] Much the same point can be made about Horwich's attempt to deflate the notion of compositionality (Heck, 2013a).

[29] I am independently puzzled by this remark:

> . . . [I]n order for [(20)] to be usable in a full compositional semantics, we'd also need other applications of substitutivity that are likewise dubious; e.g., we'd need that S believes that 'p or q' is true if and only if S believes that 'p' is true or S believes that 'q' is true. (Field, 2005, p. 24)

I'm not sure what Field is thinking here—he doesn't explain further—and I cannot think of any reason myself that one would need such a principle in a compositional semantics, whether it was based upon (20) or not. But the goals of disquotational 'semantics' are not terribly clear, anyway.

[30] As I mentioned in note 5, these are not entirely equivalent: The former commits one to the existence of the sentence A. But it is not obvious that this commitment has to be the believer's, as opposed to the attributor's. To assume it did would be to make strong assumptions about how the content of the complement clause has to be related to the content of the belief attributed.

(i) "S believes that A" is true iff S believes that A

(ii) "S believes that A" is true iff S believes that "A" is true

Here again, the comparison with the propositional case is instructive:

(21) It is true that S believes that A iff S believes that it is true that A.

I can imagine someone lodging sophisticated objections against (21), but I doubt that ordinary speakers would sense much of a difference between "S believes that A" and "S believes that it is true that A".

Field (2005, p. 24) also expresses concern that the relevant application of the rule that allows schematic variables to be replaced by objectual ones ranging over sentences might be questionable, since it "seems to depend for its plausibility on the assumption that we can unproblematically quantify into" the appropriate sort of context. But there is nothing wrong with quantifying into intensional contexts. We do it all the time in ordinary language.[31] If 'quantifying in' seems puzzling, it is because of other theoretical commitments we have, not because it is obviously problematic. Specifically, the problems connected with quantifying in arise *because of our commitments regarding the semantics of quantification*: because we want to regard the quantified variable as ranging over ordinary objects (people and planets, rather than intensions or modes of presentation). Even more fundamentally, it is because we so much as think of variables as having values that 'quantifying in' is a problem. If one thought of the truth of a quantified statement in terms of the truth of its instances, then, as Marcus (1972) was fond of pointing out, there would be no problem at all.[32] Field cannot have it both ways. He cannot both suggest that we regard questions about the semantics of attitude attributions as "misguided" and then invoke the very problems that motivate such questions when trying to avoid unwelcome consequences of his own view.

[31]There is someone Superman knows can fly that Lois does not, because Superman knows that Clark Kent can fly, and Lois does not. But there may well not be anyone that Lois knows can fly that Jimmy does not, even though Lois knows that Superman can fly, and Jimmy does not know that Clark can fly.

[32]The fact that there are objects without names need not be an obstacle. One can always consider expanded languages, in which new names have been introduced. And one need not consider a single language in which every object has a name. It suffices to consider, for each finite set of objects, a language in which each of them has a name. That makes for rather a lot of languages, but each of them is just a finite extension of the base language.

But whatever the status of (20), it should be clear that few of Field's worries about it carry over to (17) and (18). There is no obstacle whatsoever to quantifying into causal or modal statements.[33] And the suggestion, which we did not discuss, that (20) might fail because S "may have peculiar beliefs about truth" (Field, 2005, pp. 23–4) has no analogue in those cases. While my own view, then, is that Field is committed to (20) as well as to (17) and (18), it is enough for what follows if he is committed only to the latter two.

4 Truth-functionality

Friends of semantics will no doubt have greeted (17) and (18) with bemusement. But what exactly is supposed to be wrong with them? Why do they feel so different from (6)? The reason, I take it, is that we tend to read (6) as expressing the truth-functionality of conjunction, in which case (17) should affirm the truth-functionality of "because", contrary to fact. But if (17) is true, when the truth-predicate is read disquotationally, then obviously it cannot, so read, affirm the truth-functionality of "because". By parity of reasoning, then, (6), read disquotationally, cannot affirm the truth-functionality of "and", either.

It follows that the sorts of arguments we have been examining do *not* allow the disquotationalist to prove the compositional principles *as a friend of semantics would understand them*. In particular, this sort of reasoning cannot be used to demonstrate the truth-functionality of conjunction, which I take to be one of the central semantic facts about it. Assuming, of course, that it is a fact about it. Strawson (1952, pp. 79–82) most famously, but many others as well, denied that "and" is truth-functional, on the ground that there is a temporal aspect to its meaning: A sentence like

(22) They got married, and they had a baby

could be true, he claimed, even though

(23) They had a baby, and they got married

was false. But how this issue is decided has no effect whatsoever on whether (6) is true when the truth-predicate is read disquotationally. If

[33]These are intensional but not, as it is said, hyperintensional, and it is the latter that really causes problems.

truth is disquotational, then ⌜"A" is true and "B" is true⌝ just means what ⌜A and B⌝ means which is just what ⌜"A and B" is true⌝ means, and that is the end of it, no matter what "and" actually means. If that were not so, then the truth-predicate could not be used, in the context of a conjunction, for the expressive purposes for which the disquotationalist thinks we need it.

I am assuming, of course, that the question whether "and" is truth-functional is an important semantic issue, and that it should affect the form of the compositional principle we accept for it. Foes of semantics might not agree, but my goal here is not to convince them of the virtues of semantics. My goal is to argue that the notion of truth, as it appears in semantics, is not playing the merely expressive role that a disquotational truth-predicate plays: One cannot understand the use of the truth-predicate, in semantics, as purely disquotational, as just a tool of 'semantic ascent'. Rather, the notion of truth is doing serious theoretical work, and that work is nowhere more visible than in disputes over truth-functionality. The fact that "and" is truth-functional (if, again, it is one) is supposed to explain certain aspects of its behavior, and the fact that "because" is not truth-functional is supposed to explain some of the ways in which it is unlike "and". So truth has a robust, explanatory role to play in semantic theory.

A disquotationalist might respond that truth-functionality is, to be sure, an important phenomenon, but that it is not a semantic but a logical phenomenon, one that has to do with what sorts of inferences are valid, not with whether (6) is true. Presumably, the inferences in question would be something like:

(i) A and B

(ii) B if, and only if, C

(iii) Hence, A and C

Even at first sight, however, one ought to be suspicious of this sort of characterization of truth-functionality. If the biconditional is not itself truth-functional, then it may license such substitutions in cases where the connective under discussion is not truth-functional.[34] For

[34] It is often noted that this sort of inference is valid in many logics in which the connectives are not truth-functional. For example, such inferences are valid in intuitionistic logic, in supervaluational systems, and so forth, and not just for conjunction but for the other connectives, as well, even though the connectives are not truth-functional in such systems.

example, if the biconditional expresses strict equivalence, then it will license substitutions inside modal contexts.[35] It is rarely held nowadays that the natural language conditional is truth-functional, so this sort of inference, formulated in natural language, almost certainly does not capture truth-functionality. But, even if we set that worry aside, the offered condition is easily seen to be both too weak and too strong.

To see that the condition is too weak, consider the conditional itself. Then the inference in question takes the form:

(i) If A, then B.

(ii) B if, and only if, C.

(iii) Hence, if A, then C.

This will be valid so long as the conditional is transitive, whether or not it is truth-functional, and the same goes for the case in which we substitute in the antecedent. The inferential conception would thus count the conditional as truth-functional whether it is or not. (It's like Wittgenstein's meter stick: We're using it to measure itself.)

One might suggest, in response, that the inference should not be stated in terms of "if and only if", but in some other terms. One idea, for example, would be to take the second premise to be:[36]

(ii′) Either B and C, or it is not the case that B and it is not the case that C.

which is disquotationally equivalent to:

(ii″) Either "B" is true and "C" is true, or "B" is false and "C" is false.

But this proposal has even greater flaws. As mentioned earlier, it is controversial whether "and" is truth-functional. If it is not, then (ii′) is not truth-functional, either, and the possibility will again arise that it will support inferences it should not. More importantly, I have used the familiar crutch "It is not the case that. . . " because it is difficult to know how otherwise to indicate what the negations of the sentences in

[35] And, of course, the English phrase "if, and only if" may have different readings in different occurrences, which will complicate matters further.

[36] Another idea would be to introduce some technical notion in terms of which to state the inference, a notion that would presumably be explained by stipulating the validity of certain inferences in which it participates. But for the sorts of reasons mentioned in note 34, I doubt this will suffice.

question are supposed to be. It is not unreasonable to suspect that it will not be possible to say, in general, what the negation of a sentence is except in terms of the notions of truth and falsity. But the crutch does not work well enough, anyway, as the following pair of sentences demonstrates:[37]

(24) Anyone can swim the English Channel.

(25) It is not the case that anyone can swim the English Channel.

There may well be a reading of (25) on which it is the negation of (24), but there is also a reading on which it means: No one can swim the English Channel. And in some contexts, that is the preferred reading, as this fragment of dialogue shows:

Tony: Can Gertrude swim the English Channel?

Alex: It is not the case that anyone can swim the English Channel.

So the proposed reformulation will not work, either.[38]

But however the inference is formulated, requiring it to be valid if a connective is to be truth-functional is too strong a condition. I have mentioned several times now that it is controversial whether "and" is truth-functional. That question is *not*, however, decided simply by considering the truth-values of such sentences as (22) and (23). Even if those two sentences can have different truth-values, it does not follow that

[37] I learned examples of this kind, many years ago, from Jaakko Hintikka. He offered them as counterexamples to the T-scheme, or at least to one direction of it, viz:

> If anyone can swim the English Channel, then it is true that anyone can swim the English Channel.

On what seems to me to be the most natural reading, that is false. Note that this also shows that A and ⌜It is true that A⌝ are not always intersubstitutable. A better example, in that case, is the pair:

(i) If anyone can swim the English Channel, then Gertrude can.

(ii) If it is true that anyone can swim the English Channel, then Gertrude can.

(Gertrude Ederle became the first woman to swim the Channel in 1926, at the age of nineteen.)

[38] The problem is even more obvious if we add stress:

(24′) *Anyone* can swim the English Channel.

(25′) It is not the case that *anyone* can swim the English Channel.

And, of course, the stressed version of the latter is putatively the negation of the stressed version of the former.

"and" is not truth-functional. The reason for the difference in truth-value could, in principle, lie not in the meaning of "and" but in the interaction of the tenses on the verbs with each other and with other elements of the syntactic structure of the sentence. Such an account was developed by Partee (1984, §IV) in the context of Discourse Representation Theory; King and Stanley (2004, pp. XXX-XX) make it clear that similar accounts could be stated in other frameworks.

Ultimately, of course, it is an empirical question what accounts for the temporally sequenced reading of conjunctions and so whether "and" is truth-functional. But the point here is conceptual: One cannot simply read off from the truth-values of sentences in which "and" occurs whether it is truth-functional. There is too much else going on in such sentences for such an inference to be legitimate. If so, however, no inferential test of the sort we are considering can work. Truth-functionality just isn't a matter of inference.

One might respond that, if Partee is right, then (22) and (23) aren't, on the readings in question, actually conjunctions. They ahve some more complex structure. So, if we consider sentences that really are conjunctions, then the inferential test will work. But then the question is how we are supposed to tell which sentences 'really are' conjunctions. And the point is not that it is hard to know. The point is that one cannot explain facts about meaning by appealing to facts about syntactic structure unless one can explain how facts about structure affect facts about meaning. And how structure affects meaning is what semantics is about—one of the things it is about, anyway.

This sort of point is perhaps easiest to understand in connection with quantification. Consider, for example:

(26) Most professors know a student who hates every class.

There are several possible readings for this sentence, but it seems to me that (26) cannot mean that every class is such that some student hates it, and that student is known by most professors.[39] Why not? The familiar answer is that the three quantifiers in (26) can take different scopes,[40] but that not every possible ordering of the scopes is available. And, of course, that is right. But it is only a partial explanation, and

[39]Whereas it can mean, I think, that every class is such that most professors know a student who hates it.

[40]Variable-free semantic theories would explain the phenomenon differently. But the remarks to follow also apply to them. Perhaps even more so, since syntax does so little work in such frameworks.

it would be no explanation at all if we did not understand how scope affects meaning: (26) has the readings it does, and not others, because certain scope relationships are possible, and a sentence in which the quantifiers take *these* scopes has *this* meaning; one in which they take *those* scopes has *that* meaning; and to get *this* (unavailable) meaning, the scopes would have to be *this other* way, which they can't, for some reason, be.

As we'll see in Section 7, the history of quantification illustrates this sort of point nicely. It is one thing to understand that different sorts of structures are available in the case of a sentence like (26), and it is quite another thing to understand how a sentence's having a certain structure makes a certain meaning available for it.

5 Schematic Reasoning and Compositional Principles

Toward the end of his paper on schematic reasoning, Field makes the following two suggestions:[41]

> First, it may simply be misguided to look for compositional truth or meaning principles for attitude constructions. Second. . . , the fact that compositional principles of truth or meaning are straightforward for some constructions but not others is not fundamentally a fact about the application of the notion of truth or meaning to different constructions, but is simply a fact about the underlying logic of those constructions. Facts about the logic of these constructions explain the facts about how the notions of truth and *meaning that* apply to them, rather than the other way around. (Field, 2005, p. 24)

The logic of "and" and "or" permits a simple derivation of the compositional principles for them, but the logic of attitude constructions, Field thinks, does not. Now, as I have said, if the truth-predicate is disquotational, then this seems wrong. But set that aside. Suppose we accept, as almost anyone would,[42] that A and ⌜"A" is true⌝ are materially equiva-

[41]Field (2005, p. 21) conjectures that schematic reasoning can be used to prove compositional principles about meaning, as well as about truth. I suspect he is right, but in that case the vacuity of the resulting claims is even more obvious than it is in the case we are discussing here (Heck, 2013a).

[42]Modulo concerns about the paradoxes, of course, though those will affect this entire discussion and so may be set aside for the moment.

lent. Then it looks as if schematic reasoning will permit the derivation of the compositional principle for "and", though not for "because" and "necessarily". That is, it looks as if (6) will be *provable* by schematic reasoning. How, then, can anything like (6) be thought an empirical hypothesis, one that is supposed to figure in an explanation of

(27) "Alex swims and Tony runs" is true iff Alex swims and Tony runs.

and similar such semantic facts?

I do not mean to attribute this line of thought to Field, but it is naturally suggested by his paper, and it took me more than a moment to formulate a response to it. So it seems worth considering, at least briefly.

To see the response, consider (27) itself. One might equally wonder how it could need explaining at all. There seems to be a way of knowing that (27) is true that simply involves reflecting on the meaning of the word "true". Suppose, then, that I grant that (27) can, in this way, be known by reflection, or even *a priori*. It does not follow that (27) is not empirical, nor that it does not stand in need of explanation. I can know *a priori* that I am here now, but it is an emprical fact nonetheless, and one that can be explained. Moreover, my own view is that the full story about how one might come to know (27) on the basis of reflection is significantly more complicated than: 'true' disquotes (Heck, 2004, §5). The complications matter. In particular, one cannot come to know (27) by this sort of reflection unless one already understands the embedded sentence "Alex swims and Tony runs". That understanding, on my view, partially consists in knowledge of (27). That need not make the reflective knowledge circular. It just means that, once one has come to know (27) in one way—by learning to speak the fragment of English of which it is a part—and one has also come to understand the word "true", then another, more 'reflective' way to know (27) also becomes available.

Something similar is true of compositional principles. The semantical view is that principles like (6) are more fundamental than such T-sentences as (27): Part of the reason (27) is true is precisely the fact that a conjunction is true just in case both its conjuncts are, but it is no part of why (6) is true that (27) is true.[43] It is no threat to this position if, once such T-sentences are in place, one can do 'reverse semantics'[44] and derive the more fundamental compositional principle for conjunction

[43]Indeed, (6) could be true even if (27) was not true: The latter might be an idiom.

[44]There is a program in the foundations of mathematics known as 'reverse mathematics' (Simpson, 2009). It is sometimes said to involve deriving axioms from theorems.

from the less fundamental T-sentences it partly explains by reflecting on the pattern exhibited by such T-sentences generally.

It is no doubt an interesting question why such schematic derivations seem to be available in some cases, but not in others. But there is an obvious sense in which Field's schematic arguments simply piggyback on genuine semantics: Deflated versions of whatever semantic machinery is required are introduced and then treated schematically. I suspect that such mimicry is also possible in other sorts of cases. The difference is simply that more sophisticated sorts of semantic machinery are involved. And, in many case, there is, as yet, no semantic theory to mimic.

6 A Brief History of Truth-Functionality

I argued in the previous section that truth-functionality cannot be characterized in terms of the validity of inferences. It is, rather, a semantic phenomenon, one that can only be characterized in terms of the notion of truth, which thus plays a role in semantics that is not simply expressive. The history of the notion of truth-functionality teaches us the same lesson. A brief summary of that history may therefore help to reinforce the point.

Common wisdom seems to have it that the notion of truth-functionality is due to Boole, but it is not. Boole does think of (what we would call) sentence-letters as having 'values', and he thinks of conjunction and the like as corresponding to operations on those values, the values and operations together forming (what we now call) a Boolean algebra. But Boole does not think of the values of sentence-letters as truth-values. They are, rather, classes, subsets of the 'universe of discourse', which he originally regards, in *The Mathematical Analysis of Logic,* as comprised of 'cases' or 'circumstances', whence the value of a sentence-letter would be the set of circumstances in which it is true (Boole, 1847, pp. 48ff). By *The Laws of Thought*, however, Boole had become dissatisfied with this view, because it requires "a definition of what is meant by a 'case' ", which he thinks will involve us in matters beyond the bounds of logic (Boole, 1854, ch. XI, §16). In the later book, he therefore regards the universe of discourse as consisting of times, and the value of a sentence-letter is the set of the times at which it is true. Other authors made yet other choices. But almost all the Booleans take the values of sentence-letters to be subsets of some universe of discourse.[45] The reason is that hypo-

[45]Schröder (1972, p. 224) expresses a similar view in his review of *Begriffsschrift*.

thetical judgements can thereby be revealed to be universal affirmative propositions, relations between classes:

> Let us take, as an instance for examination, the conditional proposition "If the proposition X is true, the proposition Y is true". An undoubted meaning of this proposition is, that the *time* in which the proposition X is true, is *time* in which the proposition Y is true. (Boole, 1854, ch. XI, §5)

More generally, the 'calculus of judgements', sentential logic, can thus be reduced to the 'calculus of classes', which is roughly Aristotelian logic, thus unifying what might otherwise have looked like unrelated parts of logic (Heck and May, 2013, §3).

The question what comprises the universe of discourse has proved not to be the crucial point. Boole's great insight was precisely that, no matter what we take the universe to comprise, if we treat the sentential connectives as expressing set-theoretic operations on its power set, then the (Boolean) algebra so determined will validate the laws of classical logic. And the flexibility inherent in Boole's approach has proven an advantage. His original view, that the universe comprises 'cases', inspired some of the earliest work on modal logic. His later view, that it comprises times, had a similar influence on tense logic.

Boole does pay special attention to the case in which the universe contains just one element. Then we have a two-element Boolean algebra, with elements Boole would have denoted 1 and 0. But Boole does not interpret 1 and 0 as truth and falsity:[46] They denote the universe and the empty set, as they always do in his work. Boole regards this case as especially important because it makes the calculations in which he is interested especially easy.[47] But—and this is the point—none of this affects Boole's theory of those calculations, that is, his attempt to axiomatize the structure of a Boolean algebra (that is, his attempt to formalize sentential logic). The sorts of inferences mentioned above, in

MacColl (1877, pp. 9–10) comes closest to the modern conception, but his official view is that the sentence-letters denote 'statements'.

[46]In *The Laws of Thought*, Boole sometimes treats "true" as meaning "true throughout the whole of the time to which our discourse refers" (Boole, 1854, ch. XI, §11) and false as meaning "that within those limits there is no portion of time for which it is true". That essentially collapses us into the two-element case, but it is not the official understanding, and it is a puzzling view, anyway, since it seems to leave out propositions that are true sometimes and false others.

[47]These are the calculations that would now be done with truth-tables. Boole does not have those, however. His calculations are, instead, algebraic manipulations.

terms of which it was proposed to characterize truth-functionality, were well-known to Boole. Identity features prominently in his calcuations, as do the substitutions that it licenses. But the notion of truth-functionality simply is not present, because Boole does not, as we have seen, think in terms of truth and falsity.

The notion of truth-functionality is not present in Frege's *Begriffsschrift*, either, though Frege does present a complete formalization of sentential logic, and inferences of the sort discussed above are frequently made. Indeed, one of the rules governing the sign for 'identity of content', which acts much like the biconditional (and is written: $\equiv$), is proposition (52), which is a form of Leibniz's Law and which permits precisely such substitutions.

But Frege does not explain the conditional in *Begriffsschrift* in terms of truth and falsity. His explanation reads, rather, as follows:[48]

> If A and B stand for contents that can become judgements. . . , there are the following four possibilities:
>
> (1) A is affirmed and B is affirmed;
>
> (2) A is affirmed and B is denied;
>
> (3) A is denied and B is affirmed;
>
> (4) A is denied and B is denied.
>
> Now
>
> $$\begin{array}{l} \vdash\!\!\!\top A \\ \quad\llcorner B \end{array}$$
>
> stands for the judgement that the third of these possibilities does not take place, but one of the other three does. (Frege, 1967, §5, emphasis removed)

Frege does not even think of the conditional as expressing a function in *Begriffsschrift*. He seems to get that idea from Boole, who clearly does think of the sentential connectives that way (Heck and May, 2013, §3). The idea that the conditional expresses a *truth*-function is Frege's own, however, and it does not appear until 1891, in his lecture *Function and Concept* (Frege, 1984b, opp. 20ff). The crucial innovation Frege has made

[48]The language of affirmation and denial is inappropriate, as Frege himself would eventually come to realize: When one asserts a conditional, one is not thereby affirming or denying its antecedent or consequent. This is of course what Geach (1965) famously called "the Frege point".

at that point is to introduce the idea of a truth-value—and with it the idea that sentences denote their truth-values. Then the way is open to regarding the conditional as, quite literally, expressing a truth-function: a function whose arguments and values are truth-values.[49]

The notion of truth-functionality did not emerge, then, either from the algebraic manipulations we find in Boole nor from the codification of inference presented in *Begriffsschrift*. Though these earlier efforts no doubt help prepare the way, truth-functionality appears only within and as part of the semantic perspective that Frege embraces in his later writings.

I would suggest, in fact, not only that truth-functionality cannot be explained in terms of inference, but that even compositional principles like (6) do not really capture it. Properly to capture it, we need to follow Frege and think of sentences as having 'semantic values' of their own and of connectives like "and" as operating on those values.[50] That, in fact, is often how things are done in developed presentations of truth-theoretic semantics for natural languages (e.g., Larson and Segal, 1995). The possible semantic values for sentences, truth and falsity, form a two element Boolean algebra, and the semantic values of conjunction, disjunction, and the like are the Boolean operations of that algebra. In such a treatment, it is not just the particular clause for conjunction that expresses its truth-functionality, but the semantic framework in which that clause is stated. Semantic notions then play an even more fundamental role than they do if the theory is formulated simply using compositional principles.

7 Quantification

To this point, we have been considering only the simplest of cases: those sentential connectives that are plausibly truth-functional. We have seen that the tools Field and other deflationists have provided for deriving such principles as (6) work too well. Their doing so reveals that what

[49]There is of course a complication in the fact that Frege regards the truth-values themselves as being objects among the other objects, so the arguments of the conditional include other objects besides the truth-values, such as 2 and the null class. But, in practice, we can regard the conditional as a truth-function, because of how the 'horizontal' works, and Frege himself tends to treat it that way.

[50]This point is argued in detail by Dummett in the early chapters of *The Logical Basis of Metaphysics*. He expresses it by saying that a "meaning-theory must. . . incorporate a semantic theory" (Dummett, 1991, p. 63).

disquotationalists are able to 'derive'—that is, (6), in its disquotational reading—is simply not the same principle that plays an important role in (a certain sort of) semantic theory. Moreover, truth plays a role not only in the formulation of compositional principles, but in the statement of more general principles like truth-functionality. And that role is not one that disquotationalists can acknowledge.

These same sorts of issues arise with respect to quantification. Field (2005, §5) argues that schematic reasoning can also be used to derive disquotational versions of such principles as Tarski's clause for the existential quantifier. But, though I shall not pursue the point in any detail, the principle Field derives is no more closely related to Tarski's than his schematic version of the clause for conjunction was.[51] The point I want to make here is simply that, although Field speaks throughout of "assignment functions" as pairing "objects" with variables, he does not tell us anything about these objects. He appears just to assume that they are ordinary, everyday objects. But why? If we make that assumption, then the uniform schematic treatment of quantification that is otherwise available to us vanishes, which I would take to refute the assumption, absent some reason to set intensional contexts aside for special treatment.[52]

The more important point, however, is the one made earlier: that the usual reason to regard quantification into intensional contexts with suspicion is bound up with common, but nonetheless substantial, assumptions about the semantics of quantification. This point emerges with particular clarity if one reflects on the dispute between Marcus (1961) and Quine (1961) over quantification into modal contexts and, in particular, on Marcus's emphasis on the role played by 'extensionalizing principles'.[53] Indeed, I would have thought that the obvious way for a disquotationalist to think of the truth of a quantified formula was in terms of the truth of its instances, not in terms of assignments. To think of variables as having values, and of the truth of a quantified formula in terms of satisfaction, is already to think semantically.

[51]There is nothing in the sort of schematic argument that Field gives that requires the open formula into which we are quantifying to be extensional. This is unsurprising since, as was said above, the expressive role the truth-predicate plays in compositional principles, according to the disquotationalist, is that of a substitutional quantifier, and you can quantify, substitutionally, into intensional contexts without difficulty.

[52][[REF Dummett on Tugendhat.]]

[53]Marcus goes so far as to deny, in the discussion that followed her exchange with Quine, that, in the strictest sense, nine *is* the number of planets (Marcus et al., 1962, p. 136).

Moreover, just as the truth-functionality of "and" fails to be captured by the disquotational reading of (6), so there are general claims about the semantics of quantification that no schematic derivation can yield. It is generally accepted nowadays that natural language quantifiers are, in some appropriate sense, 'binary', so that (roughly speaking) one forms a sentence from two open formulae—$\mathsf{Q}x(Fx\,;\,Gx)$—not from just one, as in familiar presentations of first-order logic. That, of course, is just a matter of syntax.[54] The fruitful semantic idea is that quantifers in natural language express certain sorts of comparisons between the extensions of the two formulae involved. And there are important hypotheses about what these comparisons must be like. Barwise and Cooper (1981) noticed, for example, that natural language quantifiers are 'conservative', in the sense that they support the following sort of inference:

$$\begin{array}{l} \mathsf{Q}x(Fx\,;\,Gx) \\ \therefore \mathsf{Q}x(Fx\,;\,Fx \wedge Gx) \end{array}$$

Thus, if every girl is smart, then every girl is a smart girl; if most boys are funny, then most boys are funny boys; and so forth. This suggests, in turn, that the first component of the quantifier serves to restrict the domain of the second, so that the comparison is not between the extension of Fx and that of Gx, but between the extension of Fx and that of $Fx \wedge Gx$. A yet further suggestion is that the comparison between these must always concern cardinality, something that would follow from the the more general claim that the truth of a quantified sentence is always insensitive to permutations of the domain (Sher, 1991).

Of course, the proper formulation of these various generalizations remains a matter of dispute, and my own formulations are not only vague but long since out of date. The point is simply that, except for conservativity, these sorts of generalizations, which figure prominently in actual work on quantification in natural language, essentially involve the notion of truth and related semantic concepts. One might propose that these generalizations should be reconceived in terms of the acceptability of certain inferences. But this does not seem very plausible. It is not at all clear to me how one might formulate the corresponding inference in the case of the generalization concerning cardinality. But however one

[54] In fact, most linguists would regard quantifier words, like 'some' and 'most', as combining with a noun phrase to form a determiner phrase, so that the appropriate logical form were more like: $(\mathsf{Q}x : Fx)(Gx)$. But the discussion here does not turn upon such issues. For details, see any decent textbook on the subject, such as Heim and Kratzer (1998).

did so, it would involve complex inferences involving equinumerosity. In the case of the generalization involving permutations, it would involve *really* complex inferences involving one-one functions on the universe. Neither seems to be within the ken of everyone who understands such constructions, and yet (or so the hypothesis is) everyone's use accords with such generalizations.

The deeper point is that it is an important question *why* such inferences are, in general, valid.[55] This question is not to be compared to the question why conjunction elimination is valid. The question is not, that is to say, one whose answer would follow from one's view about whether we should think of the validity of such inferences as fundamental and as partly constituting the semantic facts, or should instead think of the validity of the inferences as a consequence of semantic facts.[56] Conservativity purports to be a general fact about natural language determiners. It entails, for example, that there *cannot* be (even, *could not* be) a natural language determiner "Quum" such that "Quum Fs are G" is true just in case there are fewer Fs than Gs: "There are fewer Fs than Gs" does not imply "There are fewer Fs than there are Fs that are G", because the latter can never be true. The obvious question is then *why* there cannot be such a determiner, and it is hard to imagine what the answer could be if it did not involve general principles concerning the semantics of such words. In Barwise and Cooper (1981, §4.4), for example, conservativity is derived from what they call the "Determiner Universal", which states a general, and purportedly universal (in the sense of universal grammar), condition on the semantics of determiners. And Barwise and Cooper suggest several other such constraints, as well, almost all of which are semantic.

The history of quantification is instructive here, as well. It is often said that Frege introduced the quantifier in *Begriffsschrift*, but this is somewhat misleading. Frege does use notation in *Begriffsschrift* that is trivially inter-translatable with modern quantifer-variable notation, and his formal theory in *Begriffsschrift* is equivalent to modern second-order logic, with its first-order fragment being sound and complete.[57] The

[55]The same question might be raised about inferences related to truth-functionality, but the distinction I am about to make is harder to maintain in that case.

[56]It is perhaps worth saying explicitly that nothing in this paper is meant to address this issue. The issue here has not been how we are to explain the *concept* of conjunction, but only how we should think about the semantics of "and". It is one of the many disadvantages of disquotationalism that it essentially deprives us of this very distinction.

[57][[FIXME Note on substitution rule.]]

syntax of what we now call quantifiers is thus made reasonably clear in *Begriffsschrift*.

Nonetheless, there are no quantifiers in *Begriffsschrift*. What corresponds to our universal quantifier is what Frege calls the "concavity", but he does not think of it as expressing universal generality. Its purpose, rather, is simply to "delimit[] the scope that the generality *indicated by the letter* covers" (Frege, 1967, §11, my emphasis). What expresses generality is thus not the quantifier but the "letter", that is, the variable.[58] The concavity has no meaning at all, but is pure syntax. In the strict sense, then, there could not have been an existential quantifier in *Begriffsschrift*. Frege could of course have defined an abbreviation of $\urcorner\mathfrak{a}\urcorner$, which is his version of $\neg\forall a\neg$, if he had wished to do so. But he could not have treated the existential quantifier as primitive and defined the universal as an abbreviation. Generality is expressed by the variable, and that generality is always universal.[59]

It is not until the 1890s, when Frege has fully embraced the semantic perspective, that quantifiers really appear in his work. Now he regards "$\mathfrak{a}\ \phi(\mathfrak{a})$" as referring to a 'second-level concept'—the letter phi here is marking the argument place—a concept that is true or false of concepts and is, specifically, true only of those concepts under which all objects fall (Frege, 2013, v. I, §8). Though Frege continues to treat the universal quantifer as primitive, and the existential as defined, this is now a matter of convenience, not of principle. Generality, then, is no longer expressed by the variable. Its purpose now is purely syntactic, as the concavity's was before: The sole purpose of the variable is to help indicate which concept is the argument to the quantifier by marking the

[58]Frege makes this clear at the beginning of the book:

> I... divide all signs that I use into *those by which we may understand different objects* and *those that have a completely determinate meaning*. The former are *letters* and they will serve chiefly to express *generality*. (Frege, 1967, §1)

The emphasis is Frege's. He uses such emphasis throughout *Begriffsschrift* when he is articulating the central features of his new conception of logic.

[59]The costs of this way of thinking are especially visible in Russell's discussion of variables in the *Principles* (Russell, 1903, ch. VIII). Russell regards such phrases as "a man", "every man", and "some man" as each denoting a man, just not any particular man. This aspect of Russell's view changes in "On Denoting" (Russell, 1905), which opens with a general discussion of how 'denoting phrases' should be understood—*not* as names of different kinds of variables—and then continues with a discussion of why descriptions should be treated similarly. It seems not widely to be appreciated how important this change in Russell's view of quantification was.

argument-places of the complex predicate that occurs in the quantifier's own argument-place. This new account also yields an answer to perhaps the most pressing issue concerning quantification: What is the semantic significance of scope? Relative scope turns out, on Frege's account, to be a matter of the order in which certain functions are applied: The difference between "$\forall x \exists y(Rxy)$" and "$\exists y \forall x(Rxy)$" is like the difference between "$f(g(x))$" and "$g(f(x))$".

8 Closing

Davidson (1984) famously takes the task of semantic theory to be the construction of a compositional theory of truth that delivers such theorems as:

(28) "Snow is white" is true iff snow is white.

Ironically, though, given how frequently (28) is used to illustrate the goals of semantic theory, we do not actually know how to formulate a theory that will generate it without getting a great deal else wrong. That is, we do not have a (widely accepted) semantics for mass terms. Field (1994, p. 269) thinks there may well be none to be had and so that it is a virtue of disquotationalism that it relieves us of the need to look for one. And Field (2005, p. 24) would deny that any explanation of the truth of (28), of the sort semantic theory purports to provide, is required, going so far as to suggest that "it may simply be misguided to look for compositional truth or meaning principles" in such cases. After all, if disquotationalism is true, then (28) is just a verbose way of writing:

(29) Snow is white iff snow is white.

And no deep explanation is needed of that. So, ultimately, it seems unsurprising that disquotationalism cannot make good sense of such compositional principles as (6), or of semantic theory more generally.

It is of course open to a disquotationalist simply to insist that the use of truth in semantic theory, since it is not 'merely expressive', is illegitimate. And it is not part of my purpose here to convince anyone of the interest of natural language semantics, nor of linguistic theory more generally. My goal has simply been to force a choice between conceptual disquotationalism and semantics by showing that the work the notion of truth does in semantic theory cannot be regarded as 'merely expressive', even in the simplest cases. Now, my own view is that the insights

gained over the last few decades more than suffice to demonstrate the fruitfulness of the semantic enterprise and of the central role that the thesis of compositionality has played in shaping it (even if it has never been clear precisely what compositionality demands). The fact that we have no *a priori* guarantee that there are compositional principles to be found is simply a reflection of the fact that the compositionality of natural language is an empirical hypothesis. And the difficulty of formulating such principles for mass terms, or attitude constructions, or generics, or what have you, is no more surprising than is the difficulty of formulating conditions on the use of small clauses, in syntax, or on vowel reduction, in phonology.

I, then, choose to embrace natual language semantics and reject conceptual disquotationalism. But, as I have also said, I will not argue for that choice here.[60]

References

Bar-On, D. and Simmons, K. (2007). 'The use of force against deflationism: Assertion and truth', in D. Greimann and G. Siegwart (eds.), *Truth and Speech Acts: Studies in the Philosophy of Language*. New York, Routledge, 61–89.

Barwise, J. and Cooper, R. (1981). 'Generalized quantifiers and natural language', *Linguistics and Philosophy* 4: 159–219.

Boole, G. (1847). *The Mathematical Analysis of Logic*. Cambridge, Macmillan, Barclay, & Macmillan.

—— (1854). *The Laws of Thought*. London, Walton and Maberly.

Brandom, R. (1994). *Making It Explicit: Reasoning, Representing, and Discursive Commitment*. Cambridge MA, Harvard University Press.

Cieśliński, C. (2009). Truth, conservativeness, and provability. Forthcoming in *Mind*.

Davidson, D. (1984). 'Truth and meaning', in *Inquiries Into Truth and Interpretation*. Oxford, Clarendon Press, 17–36.

[60]A talk based upon this paper was presented at a workshop on semantics held at Rutgers University in September 2012. Thanks to John P. Burgess for conversations that helped me to clarify some of the central ideas of the paper. Thanks also to my commentator at Rutgers, Karen Lewis, [...]

—— (1996). 'The folly of trying to define truth', *Journal of Philosophy* 93: 263–278.

—— (1999). 'The centrality of truth', in J. Peregrin (ed.), *Truth and Its Nature (If Any)*. Boston, Kluwer, 105–115.

Dummett, M. (1991). *The Logical Basis of Metaphysics*. Cambridge MA, Harvard University Press.

Feferman, S. (1962). 'Transfinite recursive progressions of axiomatic theories', *Journal of Symbolic Logic* 27: 259–312.

—— (1991). 'Reflecting on incompleteness', *Journal of Symbolic Logic* 1991: 1–49.

—— (1996). Gödel's program for new axioms: Why, where, how and what? In P. Hájek (ed.), *Gödel '96*, volume 6 of *Lecture Notes in Logic*, Berlin. Springer.

Field, H. (1994). 'Deflationist views of meaning and content', *Mind* 103: 249–285.

—— (1999). 'Deflating the conservativeness requirement', *Journal of Philosophy* 96: 533–40.

—— (2005). 'Compositional priniciples vs. schematic reasoning', *The Monist* 89: 9–27.

Frege, G. (1967). 'Begriffsschrift: A formula language modeled upon that of arithmetic, for pure thought', tr. by J. van Heijenoort, in J. van Heijenoort (ed.), *From Frege to Gödel: A Sourcebook in Mathematical Logic*. Cambridge MA, Harvard University Press, 5–82.

—— (1984a). *Collected Papers on Mathematics, Logic, and Philosophy*, McGuiness, B., ed. Oxford, Basil Blackwell.

—— (1984b). 'Function and concept', tr. by P. Geach, in Frege 1984a, 137–56. Also in Frege 1997, 130–48.

—— (1984c). 'On sense and meaning', tr. by M. Black, in Frege 1984a, 157–77. Also in Frege 1997, 151–71.

—— (1997). *The Frege Reader*, Beaney, M., ed. Oxford, Blackwell.

—— (2013). *The Basic Laws of Arithmetic*, tr. by P. A. Ebert and M. Rossberg. Oxford, Oxford University Press.

Geach, P. T. (1965). 'Assertion', *Philosophical Review* 74: 449–65.

Gupta, A. (1993). 'A critique of deflationism', *Philosophical Topics* 21: 57–81.

Halbach, V. (1999). 'Disquotationalism and infinite conjunction', *Mind* 108: 1–22.

—— (2001). 'How innocent is deflationism?', *Synthese* 126: 167–94.

Heck, R. G. (2004). 'Truth and disquotation', *Synthese* 142: 317–52.

—— (2010). 'Frege and semantics', in M. Potter and T. Ricketts (eds.), *The Cambridge Companion to Frege*. Cambridge, Cambridge University Press, 342–78.

—— (2011). 'A logic for Frege's Theorem', in *Frege's Theorem*. Oxford, Clarendon Press, 267–96.

—— (2013a). 'Is compositionality a trivial principle?', *Frontiers of Philosophy in China* 8: 140–55.

—— (2013b). The logical strength of compositional principles. Manuscript.

Heck, R. G. and May, R. (2013). 'Truth in Frege', in M. Glanzberg (ed.), *The Oxford Handbook of Truth*. Oxford, Oxford University Press. Forthcoming.

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

Horwich, P. (1990). *Truth*. Oxford, Blackwell.

—— (1998). *Meaning*. Oxford, Clarendon Press.

King, J. C. and Stanley, J. (2004). 'Semantics, pragmatics, and the role of semantic content', in Z. G. Szabó (ed.), *Semantics versus Pragmatics*. Oxford, Oxford University Press, 111–64.

Larson, R. and Segal, G. (1995). *Knowledge of Meaning*. Cambridge MA, MIT Press.

MacColl, H. (1877). 'The calculus of equivalent statements and integration limits', *Proceedings of the London Mathematical Society* IX: 9–20.

Marcus, R. B., Quine, W. V. O., Kripke, S., McCarty, J., and Føllesdall, D. (1962). 'Discussion on the paper of Ruth B. Marcus', *Synthese* 14: 132–43.

Marcus, R. B. (1961). 'Modalities and intensional languages', *Synthese* 13: 303–22.

—— (1972). 'Quantification and ontology', *Noûs* 6: 240–50.

McGee, V. (1997). 'How we learn mathematical language', *Philosophical Review* 106: 35–68.

Partee, B. (1984). 'Nominal and temporal anaphora', *Linguistics and Philosophy* 7: 243–86.

Quine, W. V. O. (1961). 'Reply to Professor Marcus', *Synthese* 13: 323–30.

—— (1986). *Philosophy of Logic*, 2nd edition. Cambridge MA, Harvard University Press.

—— (1987). *Quddities: An Intermittently Philosophical Dictionary*. Cambridge MA, Belknap Press.

—— (1990). *Pursuit of Truth*. Cambridge MA, Harvard University Press.

Russell, B. (1903). *The Principles of Mathematics*. Cambridge, Cambridge University Press.

—— (1905). 'On denoting', *Mind* 14: 479–93.

Schröder, E. (1972). 'Review of Frege's *Conceptual Notation*', tr. by T. W. Bynum, in T. W. Bynum (ed.), *Conceptual Notation and Related Articles*. New York, Oxford University Press, 218–32.

Shapiro, S. (1998). 'Proof and truth: Through thick and thin', *Journal of Philosophy* 95: 493–521.

Sher, G. (1991). *The Bounds of Logic: A Generalized Viewpoint*. Cambridge MA, MIT Press.

Simpson, S. (2009). *Subsystems of Second Order Arithmetic*, 2d edition. Cambridge, Cam.

Soames, S. (1988). 'Semantics and semantic competence', in S. Schiffer and S. Stelle (eds.), *Cognition and Representation*. Boulder CO, Westview Press, 185–207.

—— (1999). *Understanding Truth*. Oxford, Clarendon Press.

Strawson, P. F. (1950). 'Truth', *Proceedings of the Aristotelian Society* supl vol 24: 129–56.

—— (1952). *Introduction to Logical Theory*. London, Methuen.

Tarski, A. (1944). 'The semantic conception of truth and the foundations of semantics', *Philosophy and Phenomenological Research* 4: 341–75.

Textor, M. (2010). 'Frege on judging as acknowledging the truth', *Mind* 119: 615–55.

Turing, A. (1939). 'Systems of logic based on ordinals', *Proceedings of the London Mathematical Socieity* 45: 161–228.

Williams, M. (1999). 'Meaning and deflationary truth', *Journal of Philosophy* 96: 545–64.