Marrying the prosentential theory of truth to formal semantics

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Robert Brandom's magnum opus *Making It Explicit* cherishes a great ambition: to provide a complete account of language by elucidating the relations between all of its parts, from its role in the most practical of undertakings and most casual of social interactions to its representational aspects and the pivotal role substitution and anaphora play therein. To achieve his ambition, Brandom puts forth a philosophy of language markedly opposed to the mainstream.

The dominant frameworks in the philosophy of language can be subsumed under the label of *representationalism*. In the representationalist view, linguistic expressions are first and foremost entities standing for, or representing, real-world objects and states of affairs: speech is *about* something, knowledge is *of* claims. In more philosopherly talk, proper nouns might be said to *denote* entities, definite descriptions to *refer* to objects. Real-world objects and states of affairs are enmeshed in a network of relations. The representationalist view presupposes logical and set-theoretic vocabulary and conceives of these relations as such. The inferential nature of propositions is then derived from their formal properties, binding linguistic concepts and propositions with an indomitable force of logic. In other words, inferences are conceptually late: they come at the very end, and only after representations have been established.

The approach taken by Brandom, classed within a smaller *inferentialist* tradition, reversed the order of explanation. It gives conceptual high ground to human practices, with linguistic practices considered a subset thereof, and follows a Wittgensteinian metaphor in assimilating language use to a game. That game is stipulated as structured around inferences: one's assertions are taken to

always rest on one's antecedent commitments and shrink the space of one's subsequent commitments. For instance, to utter (1b), one cannot be committed to (1a), i.e. one cannot have endorsed (1a) any time in the past (without later withdrawing the endorsement), nor can one have endorsed anything from which (1a) is inferrable, etc. Likewise, (1b) cannot be followed with the likes of (1c): the material character of (1b) prevents (1c) from being a valid move in the language game on similar grounds.

(1)   a. #Alex has never been anywhere near a suspension bridge.
        b.   Alex has crossed the suspension bridge.
        c. #Alex never got to the other side of the bridge.

The inferentialist view then explains logical notions in terms of material incompatibility, which is taken as a primitive. It is not necessary, Brandom argues, for a mouse to master Aristotelian logic to know that if the cat went to the left, the mouse's best bet is going to the right. Both non-discursive and discursive animals can avail themselves of such reasoning. What distinguishes the discursive ones, *c'est nous*, is our ability to reflect on our reasoning, express its principles explicitly, and—if needed—subject it to criticism and revision. A challenge to the inferentialist is to account for the representational aspect of natural language. Whereas the representationalist gets representations for free (he starts with them), the inferentialist must find a way to arrive at them in later stages of explanation; they are not primitives to him. Brandom answers that challenge by deriving the representationalist aspect of language from the inferential notions via mechanisms of substitution and anaphora.

A natural consequence of adopting an inferentialist approach is the reversal of the conceptual and explanatory status given to different philosophical notions. The representationalist takes the notions of denotation, truth value, and logical functions as primitive; these notions define what counts as a correct inference. The inferentialist starts with discursive practices and inferences, and reaches logical language and truth at a relatively late explanatory stage. Of all these notions, the inferentialist notion of truth will be of the greatest interest to us.

We will propose a formal semantic account of the ordinary English word *true*. The account will be used to vindicate a modification of the prosentential theory of truth endorsed by Brandom.

That is true, a paradigmatic prosentence, will be analyzed as follows: *that* will be treated as an anaphoric referent; *is true* will be treated predicatively. With its predicative treatment of *is true*, the account will resemble a non-deflationist theory of truth (a "property" theory of truth, if you wish). Despite the abandonment of the typical deflationist features, the expressive (as opposed to explanatory) nature of the account will be argued for on the basis of the whole prosentence's compositional semantics. Formal aspects of our theory will be used to show that Boghossian's accusations of conceptual instability do not apply (Brandom, 1994, p. 326-327).

But first, an exposition of the field of formal semantics and the theoretical framework to be employed is in order. Most generally, formal semantics is preoccupied with analyzing the meanings of natural language expressions down to the smallest units. It does so by looking at components of meaning as model-theoretic objects and discovering (or inventing, per reader's philosophical persuasion) the sorts of operations necessary for composing sentential semantics out of sub-sentential units in a fully algorithmic way. The framework adopted here originates with works of Montague (1973), Quine (1960), Partee and Rooth (1983), and others. The details of the treatment will most closely resemble those of Jacobson (1999), (2000), and (2014).

The formal system assumes the existence of several kinds of primitives. First and foremost, there is the set of individuals e (mnemonic for *entity*). The individuals allowed by the theory range from *the point of intersection of Hope Street and Power Street*, to *serendipity*, to *Veles*, to *students taking Pragmatism and Religion*, to *this bird*. In other words, they can be definite descriptions, abstract, mythic, plural, deictic, etc.—the set of individuals embraces ample metaphysical categories. Then there is the set of worlds w, the set of times i, and the set of truth values t. For the sake of convenience, the set of worlds is frequently crossed with the set of times producing a set of world-time pairs $w \times i$ abbreviated as s. The set of truth values t is the two-member set $\{0, 1\}$, where 0 stands for *false* and 1 for *true*.

e, s and t are the basic types of our formal semantic framework. Other types are defined recursively as functions from and to more basic ones. Function types are typically notated by placing their domain and their co-domain between two triangular brackets. For example, $\langle e, t \rangle$

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is a function from individuals to truth values. Intuitively, it takes an individual, and assigns 0 or 1 to that individual. It is therefore a formalization of the pre-theoretical concept of a *predicate*. That is, a predicate such as *is blue*[1] or *flew* assigns 0 to those individuals in the domain which are not blue/did not fly and 1 to those which are blue/did fly. An alternative conceptualization of this theoretical framework relies on sets instead of functions. Transitions from functions to sets are accomplished seamlessly via so-called characteristic functions: a characteristic function of set S is that which maps every member of S to 1 and every non-member of S to 0. Thus, to each predicate function corresponds to a set of all things mapped to 1. In simpler terms, *is blue* can also be viewed as a set of all blue things, and *flew* as the set of all fliers (more literally: all things that flew). We will frequently go between talking about sets and their characteristic functions as equivalent. This formal imprecision will have the pay-off of more legible prose.

At this point, it should be noted that it is not absolutely necessary for functions to be total, that is: not all members of the domain must map to something. Intuitively, certain predicates might simply not apply to all individuals: perhaps *melted* cannot be happily predicated of things which had not been solid. Non-totality of functions will play a role in our account of truth.[2]

The picture sketched above is still oversimplified. From what we have said so far, one might reason that saturated predicates, or propositions, are tantamount to ones and zeroes. Yet, we do not go around saying *one*, *one*, *zero*, *one* to each other. Surely, there must be more to propositions than simple truth values.

Enter world-times pairs. These entities are used to formalize Frege's notion of *bedeutung*, or *sense*, i.e. the conceptual content of our claims, as opposed to their mere reference. Propositions

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[1]Obviously, a more fully developed account needs to break down predicates such as *is blue* down to *is* and *blue*. In this case, the task is easy enough: the semantics of *is blue* is identical to that of *blue*; the role of *is* is purely syntactic— it does not contribute any new meaning (except for the tense, which we will systematically ignore). The semantic unimportance of copula verbs might be reflected in the fact that a great many languages do not have any. In Russian, for example, *the sky is blue* is most naturally rendered as *sky blue*.

More generally, linguistic expressions will be analyzed only to the point of relevance. The reader is asked to have faith that further analysis, even if not demonstrated, is possible.

[2]The introduction of partial functions means that we cannot be as casual about going back and forth between sets and functions. A partial function can be converted into its characteristic set, but back-conversion is impossible. Since characteristic sets "remember" only domain members mapped to 1, information about all other members is lost: given just a characteristic set, we cannot know which members of the domain were mapped to 0 and which were not mapped to anything at all.

are thus refined as functions from world-time pairs to truth values $\langle s, t \rangle$, and predicates as functions from world-time pairs to functions of type $\langle e, t \rangle$, or $\langle s, et \rangle$. (For typographical ease, the innermost set of brackets in a complex function can be omitted. Thus, $\langle s, et \rangle$ is just a notational analgesic for $\langle s, \langle e, t \rangle \rangle$.) These meanings are known as *intensional*. The meanings introduced first, i.e. after the world-time pair argument has been supplied, typically by our world, (e.g. t and $\langle e, t \rangle$) are known as *extensional*. When the semantic composition does not crucially depend on the intensional meanings of its constituent, we will simplify our discussion by talking about extensional meanings only. In communicating a proposition, however, one is communicating an intensional object, not just an extensional binary entity. In doing so, one assigns a truth value to each possible world, or singles out the set of all the worlds in which the communicated proposition holds true. In doing so, one effectively zeros in (pun unintended) on a set of worlds whose *only* commonalities are those imposed by the content of the proposition.

As the reader could have observed, our formal-semantic conceptual network is that of an avowed represententionalist: truth values of sentences are taken to be fundamental primitives, and possible worlds are a fundamental building block in the theory's ontology. This is a result of the discipline's historical allegiance with representationalism, but it does not entail an incompatibility with Brandom's inferentialism. Brandom gives the representationalists a good run for their money in the domain of ontological grounding and bridging the gap between representations and the possibility of gaining real knowledge, but he does not deny the success that the representationally-minded approaches to language have achieved with set-theoretic methods and notions such as entailment. To the contrary: one of his major tasks is to show how the representationalist character of language arises from the inferentialist one. He only makes the reservation that "philosophical semantic theory incorporates an obligation to make the semantic notions it appeals to intelligible in terms of their pragmatic significance. Formal semantics qualifies as semantics only insofar as it is implicitly presupposed that this obligation can be satisfied by conjoining the semantics with some suitable pragmatics" (Brandom, 1994, p. 145). This implicit presupposition is, I believe, fully present in the system fleshed out in this paper.

The formal semantic notions employed here can be recast in inferentialist terms. The concept of a truth, for example, can be recast as a Brandomian endorsement, commitment, or "plighting one's troth" to something (Brandom, 1994, p. 289). The formal mechanism of possible worlds has its correlates (or place) in the inferentialist vision, too. Brandom volunteers to recast his notion of material consequence in possible-world semantics: "one could say that the set of possible worlds in which the premises of these inferences are true is a subset of the set of possible worlds in which their conclusions are true" (Brandom, 1994, p. 98). Later, he states that "possible worlds [...] must be understood as corresponding to maximal sets of compatible propositions," equating a formal semantic primitive with an inferentialist notion (Brandom, 1994, p. 169). I will assume then, without taking any explicit steps to show it, that the inferentialist and representationalist views of language can meet half-way, with inferentialism eventually fully incorporating the representationalist vocabulary on its own terms.

Once formal semantics has been vindicated, the motivation for bridging the gap between it and Brandom-style inferentialism, in particular the prosentential theory of truth, is obvious. To the extent both frameworks hold any water, merging them is an inevitable milestone on the road to a unified theory of language. The philosophical theory must be held accountable to the reality of ordinary language. Similarly, linguistic theorizing must be incorporable into our best philosophical frameworks. As I soon hope to show, both can be done with respect to the deflationist theory of truth, granted a fair bit of tweaking.

But let us return to the more formal aspects of our linguistic musings. As we have shown, predicates can be thought of as functions of type $\langle e, t \rangle$ and regular noun phrases (roughly equivalent to Brandom's notion of *singular term*) as individuals of type e. Using prime to indicate the meaning of a linguistic expression, the sentence *the sky is blue* is modelled by the function *is-blue'(the-sky')*, i.e. *is-blue'* applied to *the-sky'*.

A question of great importance to us is how to model pro-forms, and in particular pronouns. The most naive view would consider them to stand for contextually salient individuals. This view rests on intuitions supported by (2) and (3). In (2), the female pronoun picks out a woman made

salient by previous linguistic context. In (3), the male pronoun picks out a man whose salience has been established by non-linguistic means.

(2) Sarah watched the latest *Avengers*, but she didn't like it.

(3) [Of a person whose name is undisclosed to the speaker:] Thank God he left!

However, this view in untenable in the light of quantificational sentences like (4), where the referent of *they* is not contextually salient, but rather determined by the quantifier. In fact, there is no one referent of *they*; the pronoun stands for a bound variable, i.e. the meaning of the sentence can be more precisely rendered as $\forall x[x$ is a philosopher $\to x$ thinks x is the greatest].

(4) Every philosopher thinks they are the greatest.

A variety of solutions have been advanced in linguistic literature. Kratzer and Heim (1998) and many others adapt a notion of assignment functions to deal with all the cases of pronoun use. The one presented here will not do so. Instead, it will follow in the footsteps of Jacobson (1999), (2000), and (2014). The proposals advanced by Jacobson strike me as conceptually simplest: they assume only one level of linguistic representation and give linguistic expressions direct model-theoretic interpretations, eschewing multiple levels of representation from phrase structure rules, to surface form, to logical form, etc., all present in rival theories (not to be discussed here). As such, I deem Jacobson's work appropriate for expository purposes. This is not to suggest that the rival theories should lead to wholly different conclusions. The same points about the semantics of *true*, I believe, should hold in any formal framework.

What is the semantics of pronouns then? First, let us remind ourselves that propositions are of type t (or, intensionally, of type $\langle s, t \rangle$), i.e. *Rebecca left* is either 1 (true) or 0 (false). Propositions with pronouns in them can be assimilated to open propositions, i.e. *she left* is not a truth value but rather a function from individuals to truth values $\langle e, t \rangle$ (or intensionally: $\langle s, et \rangle$), which is to say it has the same semantics as the predicate *left*: supplied with an individual it returns a truth value.[3] The same facts hold for other pro-forms. The semantic type of nouns—as opposed to

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[3]We greatly simplified the picture, of course. Information about gender must be a (presuppositional) part of the pronoun's semantics. Syntactically, *left* and *she left* have different distributions, too, but that is beyond the scope of our discussion.

noun phrases—is $\langle e, t \rangle$, not e. Intuitively, nouns stand for sets of individuals, not individuals. For example, *cat* denotes the set of all cats, not a single cat (*the* can then pick out the salient/unique individual giving *the cat* of type e). The English prop-word *one* stands for a noun, and so the semantic type of sentences such as (5) is $\langle et, t \rangle$.

(5)   The blue one is good.

Verb phrases are also of type $\langle e, t \rangle$. Pro-verbs in English include what came to be known as VP-ellipsis, i.e. the elision of all post-auxiliary material. In (6), *can't* stands for the unexpressed predicate of the clause, and so that sentence is of type $\langle et, t \rangle$, as is the case with (5).

(6)   Leo can swim, but I can't.

In situations such as (2) and (3), the inputs to these open propositional functions are supplied by contexts. In quantificational cases like (4), the verb maps to a homophonous verb which identifies the slot left open by the pronoun with its subject slot so that the quantifier can properly quantify over both. The mechanical details will not be presented here.

Finally, we are ready to ask the question: what is the semantic type of pronouns themselves? The only answer compatible with the heretofore observations and stipulations is: they are identity functions of type $\langle e, e \rangle$ on individuals. The obvious type mismatch between pronouns of $\langle e, e \rangle$ and e which is a domain of predicates of type $\langle e, t \rangle$ is solved by allowing for function composition. That is to say, in case of combining with a pronoun (instead of a noun phrase), the predicate receives an identity function on individuals, not an individual, as though it were offered a promissory note saying "you won't combine with an individual now, but wait for it: you'll combine with one at a later stage." The promise is then kept in one of two ways: in quantificational cases, the individual slot is eventually filled at the level of syntactosemantic composition. In "pronoun of laziness" cases,[4] an open slot is passed up throughout the entire composition; at the end, it is up to the speaker to find the right contextually salient individual and supplant it before the propositional meaning of type t (or $\langle s, t \rangle$) is arrived at.

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[4]Why this label is mostly misleading is discussed by Brandom (1994) at length.

In his account of truth, Brandom (1994) adapts a version of the prosentential theory of truth advocated by Grover et al. (1975). The account models sentences such as *that is true* after pronouns, i.e. it postulates *that is true* stands to *snow is white* in the same way *she* stands to *Sarah* in (2). To avoid pitfalls of theories which take truth to be a mysterious property predicated of curious entities known as propositions, they propose to treat *is true* as a (perhaps unanalyzable) functional language bit which together with what comes to its left makes up a prosentence. Brandom pushes back as he sees no reason against taking the left part of the prosentence as anaphorically referring to a sentential token, but he postulates the right part (*is true*) should still be given a distinct status of a *prosentence forming operator* (1994, p. 305). To anticipate the future, we *will* fall back on the subject-predicate distinction in our revised account of truth. We will try to avoid the philosophical pitfalls that have been associated with it by pointing out features of the account close to the deflationists' hearts.

The move anticipated in the previous paragraph will be necessary to bridge the gap between the philosophical theory and linguistic reality. Grover et al. (1975) treat the ordinary subject-predicate surface form of sentences such as *that is true* as misleading and precursory to philosophical confusion. Little can be done with such a formulation in our formal framework committed to direct compositionality. Brandom takes *that* to refer back to an antecedent sentence tokening and *is true* as a *sui generis* operator. If anything can be made of Brandom's claims in our framework, it is that if sentences are of type $\langle s, t \rangle$, then the sentential-anaphoric *that* would have to be of type $\langle st, st \rangle$, and the prosentence forming *is true* would have to be an identity function of type $\langle st, st \rangle$. While none of this is technically impossible, it calls for a massive deviation from the null-hypothesis formulated generally as "if it looks like a duck, swims like a duck, and quacks like a duck, then it probably is a duck," and specifically: "if it looks like it has a subject-predicate structure, then it probably does have a subject-predicate structure." To treat Brandom's analysis literally would violate the principle of parsimony, as it entails—from the linguistic point of view—introducing a slew of duplicate syntactic categories different from the preexistent ones only in that they have to do with the notion of truth.

Obviously, the duck-style null-hypothesis might be wrong. We may need a whole slew of duplicate categories after all. Brandom points out a precedent of a semantically-motivated introduction of a non-obvious syntactic category: the generalized quantifier. This category is now commonly accepted by philosophers as well as linguists. Brandom wants to liken the split he wants to introduce to this precedent: "when it is claimed here that '... is true' does not express a property, this means that it is not even of the right grammatical form to do so—anymore than 'no one' is of the right form to pick out an individual, although there are some features of its use that could mislead one on this point" (Brandom, 1994, p. 327). Yet, there are considerable disanalogies between generalized quantifiers and the Brandom's prosentence-forming operators, which significantly weakens Brandom's case. Let us consider four of them to show why Brandom's argument does not bear scrutiny.

First and foremost, one can easily and non-arbitrarily draw a line between generalized quantifiers such as *no one*, *everyone*, *some student*, *no women*, etc. and noun phrases along morphosyntactic lines (i.e. lines demarcating distinct word forms and structures). Despite having largely overlapping distributions, the internal composition of generalized quantifiers is considerably different from that of noun phrases: whereas noun phrases occur without determiners or with the definite determiner *the*, general quantifiers are always headed by one of a small closed class of items: *no*, *some*, *every*, etc. The point is not that these carry their quantifier natures on their sleeves, but rather that once the distinction is made, one can discern its morphosyntactic correlates. The same is not the case with *be true*: in singling it out as unique, Brandom makes a move which is perhaps motivated philosophically, but has no grounding in morphosyntactic reality. *Be true* has no particular internal composition (aside from being a run-of-the mill adjectival predicate), no morphological processes make exceptions for it, no new special rules apply to it. In sum, while there are extra-philosophical ways of discerning quantifiers from noun phrases, nothing of this sort can be said of *be true*.

The second point is a more technical one. While the details will not be worked out here, Partee and Rooth (1983), taking after Montague (1973), show that to properly account for quantifiers

of ordinary English one need to counter-intuitively stipulate that they are of type $\langle et, t \rangle$. The predicates which then become their arguments retain their $\langle e, t \rangle$ type. Yet, it has been argued above that in a prosentence of the Brandomian sort, both *that* and *is true* would have to be of type $\langle st, st \rangle$, both constituents deviating from their "naive" types.

Clearly, this extravagant typing could not be restricted to *that* and *is true* only. After all, all sorts of expressions can come before *is true*: *that*, *this*, *that sentence*, *"tar is black," everything the policeman said*, etc. The prosentence-forming operator itself dons many different gowns: *is true*, *was true*, *could have been true*, *had been true*, etc. The anaphoric part of a prosentence, being as varied as it is, calls for an implementation of a unary rule mapping individuals to propositions they stand for. The prosentence-forming operator cannot be arrived at via an analogous rule: such a rule would have to pick out predicates of a certain kind (the "truth kind") and map them to the afore-mentioned identity functions of type $\langle st, st \rangle$ (modulo all the temporal and aspectual restrictions introduced by the copulas and auxiliaries). But of course treating truth as a predicate is specifically what we want to avoid. We would then have to avail ourselves of an even more baroque solu-tion: we start with a simple lexical non-predicative item *true* of type $\langle st, st \rangle$ and introduce rules for changing the types of everything that takes the non-predicative *true* as its argument or that the non-predicative *true* takes as *its* argument. For example, with *true* being of type $\langle st, st \rangle$, *is* would have to map to an expression of type $\langle \langle st, st \rangle, \langle st, st \rangle \rangle$ in order to yield *is true* of type $\langle st, st \rangle$. The same goes for all auxiliaries.

Thus, even though the details are never unveiled in the course of Brandom's argument, in agree-ing with his proposal one must consent to much more type-meddling than is required for Partee and Rooth (1983)' account of generalized quantifiers. In essence, Brandom's account involves introducing disproportionately more complexity to the theory than the widely accepted account he defers to, which significantly weakens his case.

Thirdly, cross-linguistic studies reveal that generalized quantifiers do not masquerade as noun phrases in all languages. The cases of quantification so far considered all fall in the category of *D-quantification* (a mnemonic for *determiner*). D-quantification is expressed on the determiner of

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a noun phrase. In English, the quantifying determiners include the aforementioned *no*, *some* and *every*. The other type of quantification is known as *A-quantification* (a mnemonic for *adverbs, auxiliaries, and affixes*): it relies on expressing the quantificational content through morphemes associated closely with the verb. While D-quantification has been given much attention in philosophical writings, English employs both strategies. D-quantification is demonstrated in (7), adverbial A-quantification in (8), and auxiliary A-quantification in (9). Observe the quantificational character of the adverb and the auxiliary. One does not interpret (8) as talking about color-shifting birds, or (9) as talking about an ability of theirs (Partee, 2008).

(7)   Some swans are black.
(8)   Swans are sometimes black.
(9)   Swans can be black.

While English uses both quantificational strategies, Partee et al. (1987) suggest that only A-quantification is linguistically universal. As D-quantification is revealed to be only one of two viable quantificational strategies (and very likely not the main one), the syntactic similarity between generalized quantifiers and noun phrases in English comes off as somewhat parochial.

Yet, parallel facts do not seem to hold in the case of truth: I do not know of any languages where expressions tantamount to *be true* cannot function as predicates (or to avoid begging the question: as what appear to be predicates). The corresponding truth word in any given language might belong to one of many lexical classes. For example, it might be a noun phrase, as is *sei* (roughly "truth") in Japanese, or even an adverb, as is *ñoa'me* (roughly "truly") in Cofán. Nonetheless, in each of them it can always function in a predicative-like fashion. In Japanese — trivially so; there is nothing surprising about a predicative use of a noun phrase such as *sei*. In Cofán — less trivially so, as *ñoa'me* must first undergo a two-step procedure before an expression equivalent to the English *be true* is arrived at.[5] If all languages allow for a predicative-like treatment of truth, as I believe is the case, denying truth the status of a real predicate is unjustified just on the basis of syntactic facts.

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[5] First, the adverb *ñoa'me* modifies the verb *su* "say" to give *ñoa'me su* "say truly." Second, the passivizing *'cho* tacks onto *ñoa'me su* resulting in *ñoa'me su'cho* "be truly said," an expression equivalent to the English *be true*. These two convolutions notwithstanding, we end up deriving an expression as predicative as any other.

Lastly, while Brandom is right to say that some features of quantifiers' use could mislead one to take them as noun phrases (1994, p. 327), it must be also be noted that there are other features which could be used to point out one's error. For example, (10) shows that quantifiers can be negated by simply preposing them with *not*, while (11) shows that noun phrases cannot. Observe that there is nothing semantically aberrant about (11); the problem is purely syntactic. (12) shows that the same negated noun phrase constitutes a perfectly grammatical answer.

(10)   Not everyone has been to Japan.

(11)   *Not Alex has been to Japan.

(12)   A: Who's been to Japan?
        B: Not Alex!

By contrast, I do not know of any like syntactic data that tells *is true* apart from other predicates.

In short, we have tried to show that a refusal to grant *that is true* the familiar and intuitively appropriate subject-predicate structure, while philosophically motivated, is linguistically groundless and unparsimonious. All other things being equal, an approach more in step with our best understanding of natural language's syntax and semantics would be desirable. In the next few pages, we will try to pursue such an approach, keep equal as many other things as possible, and maybe even hope for a theoretical benefit or two at the end of the day.

In doing so, we will first have to solve the type-mismatch problem. While the Montague-style semantics developed and refined by many subsequent publications illuminates a great number of natural language phenomena, the tight typing of all linguistic expressions it involves means we are in a fix when confronted with sentences such as (13) and (14).

(13)   To dance is fun.

(14)   That Eli arrived is interesting.

Normally, properties are understood to be predicable of individuals; they are of type $\langle e, t \rangle$—same type as verb phrases and adjectives. Yet in (13), a property is apparently predicated of another property, causing a type mismatch. In (14), a property is predicated of a proposition (of type $\langle s, t \rangle$), resulting in a similar problem.

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In response to that problem, three general classes of solutions have been proposed. The first one, based on Russel's theory of types, posits a hierarchy of properties based on what they are predicated for. That is, while properties predicated of individuals are of type $\langle e, t \rangle$, properties, as in (13), are of type $\langle et, t \rangle$. The second one relies on developing a first-order theory of properties to rid itself of types entirely.[6] The third one posits expanding the set of entities to include *individual correlates* of properties and propositions, understood as their "nominalized" counterparts. The third class is most compatible with the solution proposed so far; it will be adapted in the rest of the paper (Chierchia, 1985).

There is some intuitive basis for allowing propositions to live a double life as individuals. Once all sorts of metaphysical entities have been admitted to the circle of individuals, there is no reason to deny that status to functions—we can surely talk about functions as *things*. Yet, we must make sure not to admit actual functions (as understood theory-internally) wherever individuals can go. After all, (15) is starkly ungrammatical. Hence, we must "reify" or—to use Pauline Jacobson's metaphor—saran-wrap our functions.

(15)   *Birds fly is fun.

We link functions to their individual correlates via a bijective function ε. That is, given a function f, $\varepsilon(f)$ (also notated as e_f) is the individual correlate of f. Naturally, $e_{\langle s, et \rangle}$ and $e_{\langle s, t \rangle}$ are subsets of e, and so (13) and (14) can now be given straightforward semantics: *fun′(ε(dance′))* and *interesting′(ε(arrived′(Eli′)))*.

It now makes complete sense that *true* takes an individual as its argument, even though intuitively truth has to do with propositions/sentences. This individual might be supplanted from context, as is the case in (16), where the pronoun is the identity function of type $\langle e_{\langle s, t \rangle}, e_{\langle s, t \rangle} \rangle$ on individual correlates of propositions, a quotation in (17), arguably a nominalization strategy, or an individual correlate-forming *that* in (18). The strategy generalizes straightforwardly to quantificational cases such as (19), even though they will not be discussed at length.

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[6]While adopting this strategy would invalidate my second counterargument against Brandom's treatment of *that is true* on page 10, I do not think it would effectively make Brandom's strategy any more plausible. Strategies relying on getting rid of types treat predication as a primitive notion that applies cross-categorically; it is very difficult to see how one could adapt them to accommodate Brandom's solution.

(16)   This is true.

(17)   "Tar is black" is true.

(18)   That Eli arrived is true.

(19)   Everything the policeman said is true.

To spell out the semantics of *true* is not much greater a feat. As a predicative adjective, it takes an individual (specifically, an individual correlate to a proposition) and returns 1 just in case the function whose correlate is its argument returns 1 in the relevant world:

$$true'(e_{\langle s,t \rangle}) = \begin{cases} 1 & \textit{if } \langle s,t \rangle(s_0) = 1 \\ 0 & \textit{otherwise} \end{cases}$$

No additional stipulations about the nature of *true*'s only argument are necessary: the fact that only those pronouns, quotations, and complement phrases which stand for propositions, and quantifiers which stand for sets of sets of propositions may serve as arguments of *is true* is built right into the semantics of *true*. There is nothing mysterious about it: the situation resembles that of *melted* being predicable only of things previously solid.

Now the reader might think we got as far from the prosentential theory of truth as possible: we broke down *true*-containing sentences into subparts defying the anti-disquotational persuasion of Grover et al. (1975), we challenged the prosentence-forming operator postulate contra Brandom (1994), and we topped it all off with a subject-predicate analysis, reifying (propertying?) truth in a blow against the fundamental postulate of deflationists. All these sins notwithstanding, we will now try to argue our way back into deflationism's womb.

Despite having deviated from what is classically associated with deflationism, our account can still be viewed as preserving its two fundamental aspects: the prosentential semantics of *that is true* and the fact that *truth* is given an *expressive*, not an *explanatory* role.

Even though we analyzed *that is true* like every other sentence, it has a type appropriate for a prosentence and prosentential semantics. Type-wise, *that is true*, for example, is a result of function composition of *that* ($\langle e_{\langle s,t \rangle}, e_{\langle s,t \rangle} \rangle$) with *is true* ($\langle e_{\langle s,t \rangle}, t \rangle$), yielding a function from (individual correlates of) propositions to truth values ($\langle e_{\langle s,t \rangle}, t \rangle$). Prosentences are therefore, like all other pro-forms, functions from (word-time pairs to functions from) a pro-form specific type (in case

of pronouns: e; in case of verb phrase ellipsis: $\langle e, t \rangle$; in case of prosentences: $e_{\langle s,t \rangle}$) to truth values. Semantics-wise, the definition of *true*′ ensures the full prosentence has the same sense as its antecedent, i.e. it is true just in case the antecedent is true.[7] This parallels other pro-forms in that the semantics corresponds exactly to the semantics of the antecedent. In effect, both the type and semantics of prosentences are analogous to those of other pro-forms.

Truth in our account is given an *expressive*, not an *explanatory* role. The subject-predicate picture is the most natural one to adopt given how robustly predicative truth is cross-linguis-tically. Yet the semantics of "true" is unlike that of any other predicate in that in specifying it, one must crucially avail oneself of the theory internal notion of t, a truth value. In other words, *true* differs from all other predicates in that it makes a previously implicit notion explicit. In formal semantics, truth is a primitive, but it does not have to be: as was argued above, formal semantics should be and can be treated as a part of the same project Brandom undertakes in *Making It Explicit* (1994). If truth must then be redefined as the Deweyan warranted assertibility, or Brandomian plighting one's troth to a claim, it puts us in no worse a position: the predicate of truth then makes the formal notion of plighting one's troth explicit.

Boghossian diagnosed many forms of deflationism with an affliction with results in incoherence. Deflationist accounts deny correspondence theories of truth. In consequence, being used predicatively is all there is to being a property. Brandom summarizes Boghossian's worry as follows: "on a deflationary construal, one is forbidden to deny that the predicate '... is true' denotes a property [...]. Yet it is the essence of deflationism to deny these claims" (Brandom, 1994, p. 326). Brandom wiggles his way out of the problem by denying that *is true* is a predicate, but we cannot do as he did: in our account *is true* is a predicate of flesh and bone. As a consequence, truth can be construed as a property.

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[7]The account of truth here provided is, in the Tarskian sense, materially adequate. The reader might find it striking that all this led us to Tarski's Convention T. While the resemblance (or veritable identity!) is undeniable, one must remember that as is the case with any journey, how one gets there matters at least as much as where ones ends up. We did not begin by defining truth in the Tarskian fashion; instead, we began by treating it as a primitive in a formal theory of semantics (to be welded with Brandom's inferentialism), and ended up whence Tarski departed.

This can potentially open us to the sort of criticisms leveled against non-deflationist theories. Yet, even though truth is a property for us, it is not a very substantial one; and unless a rigorous definition of *property* is provided, one can raise similar objections to other deflationist accounts, too. In Grover et al. (1975)'s disquotational proposal, truth can be viewed as the property of being substitutable for x in x *is true*. In Brandom (1994)'s non-disquotational one, on the other hand, it can be said to be the property of all possible anaphoric referents to "that is true." In general, it is very difficult to prevent linguistic gerrymandering to the effect of construing anything as a property. Enough contortions can give you the paradoxical property of being non-self-predicable. (Is the property of being non-self-predicable non-self-predicable? If it is, then it is not. If it is not, then it is.) Properties are very slippery, and unless higher-order logical frameworks are involved, extreme caution should be exercised in constructing arguments relying crucially on the notion of propertihood.

But again, even if truth is a property, it is not in any sense a fundamental one. It appears late in the account and boils down to making explicit a notion implicit in our social practices of endorsement, commitment, or plighting one's troth. On page 323, Brandom accuses "[p]hilosophers [of having] misconstrued ordinary talk using 'true' [...] on the basis of a mistaken grammatical analogy to predicates and relational expressions" (1994). In our view, the error lies not in a mistaken grammatical category, but rather an illusion of depth where the semantics is absolutely trivial. Truth is, so to speak, an economy-class property.

Recasting the notion of truth as we have gives us a few obvious payoffs. Since the account is formulated with regard to natural language semantics, the coverage of truth-like locutions is greatly extended. For example, *truth*, the nominalization if *true*, can presumably be given a fairly straightforward treatment. While the details will not be given here, one will likely have to equate the semantics of (20) with (21), whose form (*it is true that* ...) is a perfectly well understood one: thanks to the introduction of individual correlates of functions, we know how to predicate something of a proposition now. By the semantics of *true*, (21) will be equivalent to (22), yielding a perfectly unremarkable sentence.

(20)   The truth of the fact that Eli arrived has overwhelmed me.

(21)   That it is true that Eli arrived has overwhelmed me.

(22)   That Eli arrived has overwhelmed me.

Thus, we managed to satisfy the deflationists by straightforwardly boiling down the truth-containing (20) to the truth-less (22), while doing justice to natural language semantics at the same time, which many deflationist accounts have struggled with.

Lastly, it is possible the account developed here will have a way of addressing some of the more philosophically contorted uses of the word *truth*. Brandom scolds philosophers for saying things like (23), but perhaps unnecessarily so. If *truth* is considered a property (albeit a weak one), and a way is provided to map a function to its individual correlate, (23) can be understood as "the set of true propositions is one set (trivially), but there is more than one set of propositions such that someone believes the propositions of that set (almost trivially)." The former Major League Baseball player Oscar Gamble is commonly believed to have said "they don't think it be like it is, but it do," which I take to express a similar attitude.

(23)   Truth is one, but beliefs are many.   (Brandom, 1994, p. 323)

The point here is not that there is something uniquely insightful about (23), but rather—as a deflationist should hope—that it expresses a complete banality. To the extend that coherent semantics can be provided for it (which I believe is desirable and which our account accommodates with perfect ease), that turns out to be that case.

This formal semantic account inspired by Brandom's deflationism does not require empirically-unfounded grammatical stipulations, allows for a natural incorporation of more aspects of ordinary language truth-talk than many deflationist accounts, treats *true* as a predicate, and yet it retains the expressive character of Brandom's proposal. Consequently, it helps verify aspects of deflationist theories while maintaining their key insights. But maybe something stronger than that holds. Even though our account is formulated in only one theoretical framework, the treatment of truth in others would have to be, I believe, analogous. To the extend the formalism can be

interpreted in the deflationist terms, as I have tried to interpret it here, formal semantics may therefore not only maintain key insights of deflationism, but in fact actively confirm them.

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