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TONKING A THEORY OF CONTENT: AN INFERENTIALIST REJOINDER

Abstract. If correct, Christopher Peacocke’s [20] “manifestationism without verificationism,” would explode the dichotomy between realism and inferentialism in the contemporary philosophy of language. I first explicate Peacocke’s theory, defending it from a criticism of Neil Tennant’s. This involves devising a recursive definition for grasp of logical contents along the lines Peacocke suggests. Unfortunately though, the generalized account reveals the Achilles’ heel of the whole theory. By inventing a new logical operator with the introduction rule for the existential quantifier and the elimination rule for the universal quantifier, I am able to show that Peacocke’s theory only avoids verificationism to the extent that it does not satisfy manifestationism.

Introduction

If there is a titanic struggle in the contemporary philosophy of language, it concerns the relative priorities of truth and inference. On the one side is a broadly Platonist (henceforth “realist”) view that involves explicating our grasp of language and logic in terms of truth conditions. Then, correct inference is cashed out in terms of the impossibility of truth conditions making premises true and conclusions false. Influential adherents of this order of explanation include Davidson and (arguably)

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the early Wittgenstein in the philosophy of language, Montague in linguistics, and Shapiro in the philosophy of math. On the other side is a Kantian inferentialism, which understands our grasp of language and logic in terms of inferential role, and then understands truth itself inferentially, as the in-principle availability of evidence. Influential adherents of this order of explanation include Brandom, Sellars, and (arguably) the later Wittgenstein in the philosophy of language, and Dummett, Hintikka, Tennant, and Wright in the philosophy of math.

The dialectical impasse engendered by this conflict was perhaps first described in Paul Benacerraf's "Mathematical Truth."

It is my contention that two quite distinct kinds of concerns have separately motivated accounts of the nature of mathematical truth: (1) the concern for having a homogeneous semantical theory in which semantics for the propositions of mathematics parallel the semantics for the rest of the language, and (2) the concern that the account of mathematical truth mesh with a reasonable epistemology. It will be my general thesis that almost all accounts of the concept of mathematical truth can be identified with serving one or another of these masters at the expense of the other. (Benacerraf [1], p. 403)

Surmounting this impasse is one of the main research agendas in the philosophy of mathematics.¹ The realist, having a good semantics, needs to address the epistemology of mathematics. Inferentialists, having good epistemologies, need to address the semantics, in this case largely by seeing how much traditional mathematics can be made constructively kosher.

In the philosophy of language, the inferentialist advantage does not concern knowledge of any specific discourse but, instead, linguistic understanding itself. For if inferentialism is correct, then our ability to understand language is to be cashed out in terms of our behavioral sensitivity to the canonical inferences that constitute the meanings of the sentences in question. This direct way in which grasp of meaning is manifested allows the inferentialist to straightforwardly account for the acquisition of language, the ability to communicate with language, and people's ability to assess others' competence as speakers.²

Inferentialism's drawbacks involve a pervasive difficulty in explaining problem areas that seem to cry out for a realist's semantics, for example, much of our modal talk as well as sentences involving reference to infinite totalities and inaccessible

¹E.g. Shapiro [26].

²E.g. "In traditional terms, the trainer knows the *rules* which govern the *correct* functioning of the language. The language learner begins by *conforming* to these rules without grasping them himself" (Sellars [27], p. 422). For perhaps the clearest discussion of these issues, see the introductory section of Wright [36].

areas of space and time. Indeed, if Dummett and others are correct, the inferentialist perspective involves the revision of logic.³

If the inferentialist can claim to have a better epistemology of linguistic understanding, the realist can certainly claim to have a better semantics. Though philosophers of language friendly to transformational syntax may be loathe to admit this, the overwhelming majority of published linguistic semantics is in the tradition of Richard Montague. In linguistics proper, such theories are universally recognized as having the best syntax-semantics interface, and being the most rigorously testable, precisely because they recursively correlate natural language sentences with conditions under which those sentences are true in a model. Only the most near-sighted partisan would deny that the success of post-Montague semantics in empirical linguistics and computer science is a stunning confirmation of Davidson's order of explanation,⁴ where one first recursively correlates sentences with truth conditions, and then tests these correlations via an account of logical consequence defined in terms of truth conditions.

Since two competing tendencies in no way form an exclusive dichotomy, there are many approaches to the realist/inferentialist (Benacerraf's) dilemma. However, all else being equal, the best such strategy would be to try to craft a position that combines the epistemic virtues of inferentialism with the semantic virtues of realism. To date, the only truly rigorous attempt to achieve this remains Christopher Peacocke's *Thoughts: An Essay on Content*. Peacocke tries to craft a realistic theory of content that accommodates Michael Dummett's (late) Wittgensteinian belief

³See, for example, Dummett [10] and [11], Tennant [29], and Wright [35].

⁴Given Montague's own uses of higher order logic, a categorial syntax framework devoid of transformations, and reliance upon truth-in-a-model as his basic notion, some Davidsonians might balk at my assertion that post-Montague grammar is the fulfillment of a Davidsonian style meaning theory. This would be wrong for three reasons: (1) From a linguistics perspective, Davidson's own remarks about the actual architecture of a theory of meaning are both sketchy and not consistent from article to article, (2) Montague is the Isaac Newton of empirical semantics and machine language translation precisely because he first showed how to recursively connect a robust fragment of natural language with an interpreted formal language, (something Davidson, participants in philosophical "theory of meaning" debates from the 60's until the present, as well as 1970's generative semanticists allied with Davidsonians, never accomplished), and (3) Davidson's own substantive philosophical views in no way rely upon anti-Montagovian positions. This being said, consider recent treatment of compositionality and the syntax-semantics interface in the respective disciplines. For example, *every* essay in the canonical (for linguists) Lappin [17] and *nearly every* paper in the top linguistics journals *Linguistics and Philosophy* and *Semantics* builds upon Montague's stellar achievements. On the other hand, *none* of the essays in Hale and Wright [15] and Ludlow [18], for all their talk of "T-theories" and "transformations," exhibit awareness of either Montague's achievements or contemporary semantics as actually practiced by the overwhelming majority of semanticists in linguistics and computer science departments.

that our grasp of language must be manifestable in behavior. For Peacocke (as for the Dummettian), the theory must show how content is a function of actual and possible behavior of people. Then, since it is this “manifestation requirement” that leads Dummettians to be inferentialists, a realist theory of content consistent with it would undermine any reason to be an inferentialist. If successful, Peacocke’s theory would wed the epistemic virtues of inferentialism to the semantic virtues of realism, destroying the Benacerrafian dilemma.

But Peacocke is not successful. Moreover, his failure is instructive, as it illustrates the true costs of manifestationism. In what follows I first explicate some of Peacocke’s ideas concerning grasp of content, showing how they are relevant to satisfying the reasons one might one to be an inferentialist. I then defend Peacocke from a criticism of Neil Tennant’s; this involves explicitly generalizing the theory into recursive form. Unfortunately though, the generalization reveals a serious problem any approach embodying Peacocke’s core ideas. With the help of a new logical operator I call “quonk,” I am able to show that the generalized account cannot provide an adequate answer to Dummett’s challenge. Then, in addition to undermining Peacocke’s theory, quonk entails further stringent success conditions on any theory aspiring to the epistemic advantages of inferentialism.

1. Peacocke’s explanatory *Desiderata*

Thoughts: an Essay on Content contains a defense of what Peacocke calls “manifestationism without verificationism.” Peacocke writes,

It is precisely because I accept two Dummettian principles that the task of outlining a substantive theory of content is so demanding: the principle that a theory of Thoughts must be a theory of things which determine truth values, and the principle that a theorist must give an account of how the semantical properties he attributes are specifically manifested in thought and action.

(Peacocke [20], p. 4)

While Dummett is primarily concerned with explicating understanding of language, the primary *explananda* of Peacocke’s theory are what he calls “contents,” things that satisfy the following four Fregean criteria.

1. Contents have absolute truth-values, without relativization to anything else;
2. Contents are composite, structured entities;
3. Contents are objects of belief, intention, hope, and the other attitudes;
4. One and the same contents can be judged, argued about, or agreed upon by two different thinkers.

(Peacocke [20], pp. 1–2)

Further, Peacocke holds that any acceptable philosophical account of contents must satisfy certain criteria. The first is that, for each content, the theory must specify a set of behavioral dispositions such that the dispositions are true of a person if, and only if, she possesses the content. In this sense the theory will accommodate Dummett's manifestation requirement, as content is then fully determined by the criteria for its manifestation.

Peacocke attempts to meet this explanatory challenge with "normative acceptance conditions." According to Peacocke,

1. A person S possesses a content X if and only if S 's actual and possible behavior conforms to the normative acceptance conditions of X .

These normative acceptance conditions are manifestable behavioral dispositions. In Peacocke's theory, the normative acceptance conditions consist of claims about possible behavior and experience of a person who possesses the content, given possible states of the world.

Normative acceptance conditions are normative in two senses. The first is indicated by a passage in which Peacocke contrasts the normativity of normative acceptance conditions of his account with a causal account of content possession (Peacocke [20], pp. 20–21)). In this context, the normativity is indicated by the fact that intentional notions are used in Peacocke's statement of the relevant behavioral dispositions. The second sense in which the conditions are normative is that they state what we become rationally committed to when we judge a certain concept as true or false.

After working through some initial problems with Peacocke's view, I present his general form of content ascription in the following manner.

S possesses the content X if, and only if, (S judges X and X is true) $\Box \rightarrow \phi$,

where " $P \Box \rightarrow Q$ " means that if P were the case then Q would be the case, and ϕ denotes the set of behavioral dispositions determined for X by the theory of content. This formalization makes clear the sense in which the behavioral dispositions are normative. The entire counterfactual conditional specifies what a person would be committed to were it the case that she judged the sentence and the sentence were true. Thus, when a person possesses a content the whole counterfactual conditional is true of her.

The main way in which Peacocke attempts to satisfy the manifestation requirement is to require that the behavioral dispositions given by the theory serve to individuate contents in question. Thus, two people have the same set of relevant behavioral dispositions if, and only if, they possess the same content. In the context of Peacocke's theory this becomes,

2. Two people's behavior conforms to all of the normative acceptance conditions of X if, and only if, both people possess the content X .

In this manner, any difference in content possession can be manifested in possible behavior.

Thus we have manifestationism. The lack of verificationism is achieved by Peacocke devising his theory in such a way that the normative acceptance conditions of a content can be met (ϕ in the above definition being true) without the speaker in question being aware that they are.

3. A speaker S can possess a given content X , and all of the normative acceptance conditions of a given content X can be met, without the person being able to verify that they are.

Clearly a theory satisfying 1. through 3. will be a theory that satisfies manifestationism without verificationism.

Finally, to make sure that the contents in question can do their proper explanatory work, a fourth requirement is necessary. According to Peacocke, an acceptable theory must show how the truth or falsity of a content is a function of both the behavioral dispositions necessary and sufficient for possession of that content, and the way the world is. This requirement is necessary to show that the behavioral dispositions really do fix content, as (since Frege at least) the truth or falsity of a content is understood to be a function of the content itself and the way the world is.

It should be noted that Dummett's manifestation requirement is designed as a constraint on an account of how we understand the meaning of sentences, not as a constraint upon an account of possession of contents. However, this is no obstacle, as Peacocke indicates how his theory can be evaluated by a Dummettian. Peacocke states the following.

When a sentence s has the sense that p on someone's lips, the following is true of him: the conditions whose obtaining would give him reason to judge that p are precisely those which give him reason to judge that an utterance of s would in fact be true. This identity of conditions holds in actual circumstances, and in any counterfactual circumstances in which s retains for him the sense that p .
(Peacocke [20], p. 115)

This shows that there is no problem with talking about an assertoric sentence having a corresponding content, and holding that a person possesses a content X if she understands an assertoric sentence which has that content.⁵

⁵Dummett himself would agree. For example: "In recent years, a number of analytical philosophers, prominent among them the late Gareth Evans, have rejected the assumption of the priority of

2. Normative acceptance conditions

Peacocke's key insight involves explicating normative acceptance conditions in terms of what he calls the "canonical commitments" and "canonical grounds" of a given content. For every content X there is a class of canonical grounds such that X is true if, and only if, *at least one* of the canonical grounds of X obtains. Similarly, there is a class of canonical commitments such that X is true if, and only if, *all* of the canonical commitments of X obtain. Thus, if any one of X 's canonical grounds obtain, then the truth of X is guaranteed. Whenever this is the case, all of the canonical commitments of X hold as well.

It should be noted that, in natural deduction style systems of logic, introduction rules correspond to Peacockean canonical grounds, and elimination rules correspond to Peacockean canonical commitments. For example, consider disjunction. The \vee -Introduction rules,

$$\frac{\Gamma}{\Gamma \vee \Phi} \quad \frac{\Phi}{\Gamma \vee \Phi}$$

tell us first that if Γ is true, then $(\Gamma \vee \Phi)$ must be true and second that if Φ is true, then $(\Gamma \vee \Phi)$ must be true. The premises of introduction rules are rightly considered grounds because they stipulate the canonical evidence for the truth of a sentence with the dominant logical operator in question. By examining the disjunction rule, one can see why Peacocke states that *at least one* of the canonical grounds must obtain; one only needs one of the pair of possible proofs to ensure the truth of $(\Gamma \vee \Phi)$.

If we consider the conjunction elimination rule, we can see in what sense it stipulates intuitive commitments, and also understand better Peacocke's insight that all such commitments need obtain. The \wedge -Elimination rule,

$$\frac{\Gamma \wedge \Phi}{\Gamma} \quad \frac{\Gamma \wedge \Phi}{\Phi}$$

tells us that a proof of $(\Gamma \wedge \Phi)$ can be transformed into a proof of Γ and that it can be transformed into a proof of Φ . The conclusions of elimination rules are rightly

language over thought and have attempted to explain thought independently of its expression and then to found an account of language upon such a prior philosophical theory of thought. On the face of it, they are overturning the fundamental axiom of all analytical philosophy and hence have ceased to be analytical philosophers. In practice, the change makes a difference only at the very beginning: once their basic philosophy of thought is in place, all proceeds much as before. This is because, although they challenge the traditional strategy of explanation in analytical philosophy, they accept and make use of the same general doctrines concerning the structure of thoughts and sentences; they differ only about which is to be explained in terms of the other." ([13], pp. 3–4)

considered commitments because they are what one is committed to when one accepts as true a sentence with the dominant logical operator in question. Peacocke's insight is correct here, as the falsity of either Γ or of Φ would undermine the truth of $(\Gamma \wedge \Phi)$.

2.1. Observational contents

For Peacocke, the truth conditions of observational contents are understood as being determined by a class of canonical commitments such that the set of dispositions specified by the canonical commitments hold if, and only if, the content is true. For example,

The spectrum of canonical commitments of one who judges a content at t , "That block is cubic" is that: for any position from which he were to perceive the block at t in normal external conditions when his perceptual mechanisms are minimally functioning, he would experience the block from that relative position as cubic, or as a cubic object would be perceived from that relative position.

(Peacocke [20] pp. 15–16)

Thus, at least in the case of observational sentences, Peacocke fulfills the manifestation requirement without embracing the problematic verificationism. To understand "that block is cubic" is simply to incur the canonical commitments whenever one judges the sentence to be true.

It is in this manner that Peacocke avoids equating knowledge of the meaning of a sentence with the ability to recognize verifications of it. Instead, he equates it with a behavioral sensitivity to the set of dispositions specified by the sentence's canonical commitments. These commitments place constraints on the correct use of a statement; when a speaker realizes the canonical commitments of a sentence are not met, then the speaker should withdraw the assertion.

2.2. Logically complex contents

Peacocke does not provide a general account of the possession of logically complex contents. Instead, he gives instances of such contents and argues that one can manifest one's grasp of them without having to recognize verifications of them. For example, where " p " refers to a place already known to be in the domain of places, and " R " is some spatial relation, Peacocke states that to judge that all (physical, currently existent) F 's are G is to be committed to judging, should the question arise, any instance of the schema:

1. If there is an F at the place (if any) bearing R to p , it is G .

(Peacocke [20], p. 34)

The fulfillment of these conditions do not determine that the sentence in question is true. Peacocke suggests adding the idealization that, “the thinker is disposed to recognize a relation as a spatial relation just in case it really is a spatial relation” in the statement of canonical commitments.

For existentially quantified contents Peacocke argues that the canonical grounds of a statement determine its content. When confined to present tense existential quantifications over material objects,

The family of committing conditions, the canonical grounds, for such a quantification “Some F is G ” will then be all conditions of the form

(E) There is at p an F which is G . (Peacocke [20], p. 95)

An existentially quantified content, then, is supposed to be true just in case one of its committing conditions holds, and there is “some supposition which ensures that the thinker is disposed to acknowledge something as a genuine place just in case it is so.” Thus, grasp of the existential is explained in terms of the situations the thinker finds sufficient to assert the existential.

(N) “ $\$A$ ” is judged true when any one of the canonical commitments of A is discovered to fail. (Peacocke [20], p. 87)

For any type of content, to insure classical negation we need

(DN) the thinker is, after reflection, prepared to accept the equivalence of $\$A$ with A , or at least manifests in his inferential practice the immediate consequences of such acceptance. Peacocke [20], p. 89)

If (N) and (DN) are fulfilled, then, in the case of the first type of sentence, a thinker can be said to understand negated sentences.

3. Generalizing the account

At a few places in the text Peacocke speaks of “generalizing” his account. Unfortunately, his remarks on the matter are very brief. For example, he writes,

Even in relation to those few types (of contents) I have been considering, much remains to be elucidated (and no doubt revised). But I hope the sketch has been enough to make it plausible that some adequate account of the form at which I have been aiming could be given. (Peacocke [20], p. 97)

A truly generalized account would state acceptance conditions for atomic sentences containing different kinds of predicates, and provide a compositional, recursive theory of content possession for logically complex contents.

In an unpublished manuscript, Neil Tennant shows that the success of Peacocke's endeavor requires such a generalized account. He does this by showing that one could have the requisite behavioral sensitivity to the canonical commitments of Peacocke's examples and still not understand the universal quantifier. First, Tennant argues that a thinker who grasped the concepts of universal and existential quantification would, upon reflection, acknowledge that $\forall xGx$ and $\exists x\neg Gx$ are inconsistent. According to Tennant, this is because the thinker could recognize the following canonical proof.

- | | |
|-----------------------|--|
| 1. $\forall xGx$ | |
| 2. $\exists x\neg Gx$ | |
| 3. Ga | 1 \forall elimination |
| 4. $\mid \neg Ga$ | 2 assumption for \exists elimination |
| 5. $\mid \perp$ | 3,4 \neg elimination |
| 6. \perp | 2,4–5 \exists elimination |

But then note that if the domain of the universal quantifier were restricted to spatio-temporal objects (and the domain of the existential not so restricted) then " $\forall xGx \wedge \exists x\neg Gx$ " might not contradict.

Call the quantifier defined by Peacocke's clause for the universal (with a domain restricted to spatio-temporal objects) " \forall^ϕ ." Clearly " $\forall^\phi xGx \wedge \exists x\neg Gx$ " is not logically contradictory. In this case the denotation of the predicate G could be specified as the set of all one-tuples such that an object x is in the denotation of G if, and only if, x is a spatio-temporally located object. It is at least *logically* possible that there exists an object that is not spatio-temporally located. The existence of such an object would not contradict the claim that all spatio-temporally located objects are spatio-temporally located. Thus, " \forall " can't mean " \forall^ϕ ." Therefore, Tennant has persuasively demonstrated that merely providing specific examples over restricted domains of the normative acceptance conditions of universally quantified claims is not sufficient for explaining grasp of the concept of universal quantification.

For Tennant the inferentialist, understanding universal quantification does not necessitate understanding anything about space-time precisely because it is the ability to recognize canonical proofs that explains grasp of the quantifier. As Tennant writes,

The rule of universal elimination (which codifies Peacocke's spectrum of canonical commitments) need only ever be applied so as to yield parametric

instantiations. That is, we do not even need to apply it to instances consisting of proper names, or functional or descriptive terms in which proper names or any other primitive descriptive resources of the language are embedded.

(Tennant [30], p. 11)

Tennant is claiming that a language user need only be able to recognize the above proof for the parametric instantiation 'a' in the proof in order to be able to recognize that the two sentences contradict one another. This second point is interesting, albeit one likely to be contested by some holists. Independent of this debate though, Peacocke can answer the challenge posed by Tennant without embracing inferentialism.

If the clauses Peacocke gives for the logical operators can be derived from a recursive definition of concept possession for any arbitrary sentence with a given logical operator dominant (as well as specifications of conditions for the possession of the content of atomic sentences), then Tennant's criticism doesn't get off the ground. The general form of the recursive definition for the logical operators would thus be a genuinely topic-neutral explanation of possession of the concepts involved (the logical operators). With such an account, the topic-specific information would only be entailed by distinct clauses for atomic formulae.

Such a generalization *can* be provided. The key insight of it is that Peacocke's account satisfies manifestationism only by embedding a complex sentence's canonical commitments inside of the logical operator in question. For example, in his clause for universal quantification over spatio-temporal objects, the content possessor had an infinite set of dispositions, but each disposition was behaviorally tractable. This suggests a general clause for the universal quantifier of the form,

(S possesses the content $(\forall x\alpha[x])$) if, and only if,
 (if S judges $(\forall x\alpha[x])$) then
 for all x, S is committed to judging $(\alpha[x])$).

However, a clause of this form clearly fails, as it entails that individuals possess any content that they never in fact judge. This problem can be solved by making the *analysans* counterfactual conditionals, so that we have,

S possesses the content $(\forall x\alpha[x])$ if, and only if,
 (S judges $(\forall x\alpha[x])$) $\Box\rightarrow$
 for all x, S is committed to judging $(\alpha[x])$),

Once again, however, this clause is insufficient. To see that this is the case, consider a clause for the existential quantifier framed this way,

S possesses the content $(\exists x\alpha[x])$ if, and only if,
 $(S$ judges $(\exists x\alpha[x]) \square \rightarrow$
 there exists an x such that S is committed to judging $(\alpha[x])$).

Suppose that S in this case is Jones, and Jones knows what a unicorn is. Moreover, suppose that Jones believes that unicorns exist. Now for simplicity's sake, suppose that only two things in the universe exist, Jones and her dog, Fido. Jones believes, however, that there are other things in the universe besides herself and her dog. In this case it seems that Jones does possess the content "There exist unicorns," and she actually does judge the content, but there does not exist an object such that Jones is committed to judging of that object that it is a unicorn.

We can accommodate this difficulty, however. By stating in the antecedent of the counterfactual conditional that the content in question is true, we have

S possesses the content $(\exists x\alpha[x])$ if, and only if,
 $((S$ judges $(\exists x\alpha[x])$ and $(\exists x\alpha[x])$ is true) $\square \rightarrow$
 there exists an x such that S is committed to judging $(\alpha[x])$).⁶

Thus, Jones' understanding of the content "there exist unicorns" is analyzed in terms of how Jones' behavior would be constrained if unicorns did, in fact, exist.

This form of the clauses seems unproblematic, but it remains to be seen how embedded contents can be handled. The following definition shows, however, that embedded contents are similarly unproblematic.⁷

S possesses the content $\Gamma \longleftrightarrow$
 (1a) If Γ is atomic,
 S judges Γ and Γ is true $\square \rightarrow$
 $(S$ has all of the canonical commitments for Γ as specified
 by the theory of content),
 (1b) $\square (S$ is committed to judging $\Gamma \rightarrow$
 $(S$ has all of the canonical commitments for Γ as specified
 by the theory of content)),
 (2a) If Γ is of the form $(\forall x\alpha[x])$,
 S judges Γ and Γ is true $\square \rightarrow$
 for all x , S is committed to judging $(\alpha[x])$,
 (2b) $\square (S$ is committed to judging $(\forall x\alpha[x]) \rightarrow$
 for all x , S is committed to judging $\alpha[x])$,

⁶Note that the way this is given does not force it to be the same unicorn in the antecedent and consequent of the counterfactual conditional. Nothing is sacrificed by this.

⁷In the definition, " \square " means "it is necessarily the case that."

- (3a) If Γ is of the form $(\exists x\alpha[x])$,
 S judges Γ and Γ is true $\square\rightarrow$
 there exists an x such that S is committed to judging $(\alpha[x])$,
- (3b) $\square (S$ is committed to judging $(\exists x\alpha[x]) \rightarrow$ there exists
 an x such that S is committed to judging $(\alpha[x])$),⁸
- (4a) If Γ is of the form $(A \wedge B)$,
 S judges Γ and Γ is true $\square\rightarrow$
 S is committed to judging A and
 S is committed to judging B .
- (4b) $\square (S$ is committed to judging $(A \wedge B) \rightarrow$
 S is committed to judging (A) and
 S is committed to judging (B)).
- (5a) If Γ is of the form $(A \rightarrow B)$,
 S judges Γ and Γ is true $\square\rightarrow$
 S is committed to judging $\neg A$ or
 S is committed to judging B .
- (5b) $\square (S$ is committed to judging $(A \rightarrow B) \rightarrow$
 S is committed to judging $\neg A$ or
 S is committed to judging B),
- (6a) If Γ is of the form $(A \vee B)$,
 S judges Γ and Γ is true $\square\rightarrow$
 S is committed to judging A or
 S is committed to judging B ,
- (6b) $\square (S$ is committed to judging $(A \vee B) \rightarrow$
 S is committed to judging A or
 S is committed to judging B),
- (7a) If Γ is of the form $(\neg A)$,
 S judges Γ and Γ is true $\square\rightarrow$
 S is committed to judging $(\exists x\neg\alpha[x])$,
 if A is of the form $(\forall\alpha[x])$,

⁸ The (b) clauses clearly don't hold on their own. Clearly, (3b) on its own is false for the same reasons that we had to add the truth of the content as a clause in the wider counterfactual conditional. However, in a derivation of canonical commitments sanctioned by this recursive definition, the (b) clauses are only used on open sentences, where the free variable is bound by a variable treated higher up in the derivation. The original sentence with no free variables occurs as the consequent of a counterfactual conditional, where the antecedent assumes that the sentence is true.

Thus, counterexamples of the sort addressed above don't occur if the (b) clauses are used in a derivation of the sort that I go on to illustrate. An explicit constraint on the clauses could easily be added to the definition, but only at the cost of making it more Byzantine than it already is.

S is committed to judging $(\forall x\neg\alpha[x])$,
 if A is of the form $(\exists x\alpha[x])$,
 S is committed to judging $(\neg B \vee \neg C)$,
 if A is of the form $(B \wedge C)$,
 S is committed to judging $(\neg B \wedge \neg C)$,
 if A is of the form $(B \vee C)$,
 S is committed to judging $(B \wedge \neg C)$,
 if A is of the form $(B \rightarrow C)$, and
 S is committed to judging B ,
 if A is of the form $\neg B$.
 S is committed to the failure of one of the canonical
 commitments of A ,
 if A is atomic.

(7b) \square (S is committed to judging $\neg A \rightarrow$
 S is committed to judging $(\exists x\neg\alpha[x])$,
 if A is of the form $(\forall x\alpha[x])$,
 S is committed to judging $(\forall x\neg\alpha[x])$,
 if A is of the form $(\exists x\alpha[x])$,
 S is committed to judging $(\neg B \vee \neg C)$,
 if A is of the form $(B \wedge C)$,
 S is committed to judging $(\neg B \wedge \neg C)$,
 if A is of the form $(B \vee C)$,
 S is committed to judging $(B \wedge \neg C)$,
 if A is of the form $(B \rightarrow C)$,
 S is committed to judging B ,
 if A is of the form $\neg B$, and
 S is committed to the failure of one of the canonical
 commitments of A ,
 if A is atomic.)⁹

The existence of such a recursive definition should allay fears that embedded contents are not subject to a Peacockean analysis. A thinker need only have the right set of canonical commitments to atomic contents in order to possess a logically complex content. Thus, for even the most complex content, the thinker need only be able to behaviorally manifest her content possession of atomic contents, and thus verificationism is avoided.

⁹Note that these negation clauses are unacceptable to the intuitionist, as they presuppose strictly classical equivalences. This is not question begging; the success of Peacocke's endeavor would undercut Dummett's positive arguments for intuitionism.

To give an example derivation, all that is required is a statement of normative acceptance conditions for atomic contents of a given kind. So let $G(x)$ be a predicate ranging over spatio-temporally located objects. Then, where “ p ” refers to a place already known to be in the domain of places, and “ R ” is some spatial relation, we can (following Peacocke) express the canonical commitments of $G(x)$ with the following:

- (S has all of the canonical commitments for $G(x)$) \longrightarrow
 If S judges an instance of the scheme $G(x)$ then S is committed to judging, should the question arise, that x is at some place bearing R to p and x is a G).

Assume a predicate F has the same clause. Then, we can work through the recursion for $\forall x(Fx \rightarrow Gx)$ in the following manner.

S possesses the concept $(\forall x(Fx \rightarrow Gx))$ if, and only if,

1. If it were the case that (S judges $(\forall x(Fx \rightarrow Gx))$ and $(\forall x(Fx \rightarrow Gx))$ is true), then it would be the case that for all x , S is committed to judging $(Fx \rightarrow Gx)$. (by 2.a)
2. If it were the case that (S judges $(\forall x(Fx \rightarrow Gx))$ and $(\forall x(Fx \rightarrow Gx))$ is true), then it would be the case that for all x , S is committed to judging $\neg Fx$ or S is committed to judging Gx . (by 5.b)
3. If it were the case that (S judges $(\forall x(Fx \rightarrow Gx))$ and $(\forall x(Fx \rightarrow Gx))$ is true), then it would be the case that for all x , S is committed to the failure of one of the canonical commitments of Fx or S has all of the canonical commitments for Gx . (by 1 and 7.b)
4. If it were the case that (S judges $(\forall x(Fx \rightarrow Gx))$ and $(\forall x(Fx \rightarrow Gx))$ is true), then it would be the case that for all x , (S is committed to the failure of being committed to judging, should the question arise, that x is at some place bearing R to p and x is an F) or (S is committed to judging, should the question arise, that x is at some place bearing R to p and x is a G). (by the clauses for Fx and Gx)

While the derived sentence is not identical to Peacocke’s clause for ‘ \forall ,’

to judge that all (physical, currently existent) F ’s are G is to be committed to judging, should the question arise, any instance of the schema:

- (1) If there is an F at the place (if any) bearing R to p , it is G ,

with a reasonable further assumption, line 4 of the derivation does entail something very similar to this. Line 4 logically entails that,

If it were the case that (S judges $\forall x(Fx \rightarrow Gx)$ and $\forall x(Fx \rightarrow Gx)$ is true) then it would be the case that for all x , if it's not the case that (S is committed to the failure of being committed to judging, should the question arise, that x is at some place bearing R to p and x is an F) then (S is committed to judging, should the question arise, that x is at some place bearing R to p and x is a G).

Then, if we accept that

Necessarily, if (S is committed to judging, should the question arise, that x is at some place bearing R to p and x is an F), then it's not the case that (S is committed to the failure of being committed to judging, should the question arise, that x is at some place bearing R to p and x is an F)

we can infer

If it were the case that (S judges $\forall x(Fx \rightarrow Gx)$ and $\forall x(Fx \rightarrow Gx)$ is true), then it would be the case that for all x , if (S is committed to judging, should the question arise, that x is at some place bearing R to p and x is an F) then (S is committed to judging, should the question arise, that x is at some place bearing R to p and x is a G).

Given the changes I have already argued that Peacocke must make, this is nothing more than an alternative expression of Peacocke's clause for " \forall ."

The viability of such a generalized strategy provides an answer to Tennant's first criticism. One can be said to grasp the concepts of the logical operators if (when one judges non-atomic contents) one's actual and counterfactual behavior corresponds to the recursive definition given above. Since the recursive definition is invariant across the kinds of contents expressed by the names, primitive predicates, and functions of a first order language, the clauses are topic-neutral in the requisite sense.

It is still clear that there is a weak sense in which the concepts expressed by the logical operators depend upon non-logical concepts, for if the thinker in question had no atomic concepts then she could not have concepts for the logical constants. It is unclear that this kind of interdependence is problematic. By the recursive definition, our grasp of the logical operators does not depend upon *any particular* kinds of things they might happen to range over. In this manner, Tennant's problem is avoided.

4. Tonking the theory

Though Tennant's criticism is deflected by the recursive definition provided above, the aspect of Peacocke's account that Tennant criticizes is genuinely problematic, albeit for different reasons than Tennant gives. Tennant writes,

I stressed above that Peacocke thinks that universal claims about the world can have their universality revealed only by instantiations about the world. By contrast, I maintain that the grasp of universality stems rather from one's submitting to certain rules in the logic game governing occurrences of the universal quantifier (similar remarks would apply also in the case of the existential quantifier). (Tennant [30], p. 10)

As I will show, this inferentialist conclusion cannot be deflected simply by appeal to the recursive definition.

4.1. Quonk

To see how Tennant's claim about grasp of logic can be motivated, consider a new quantifier, Q' , which I hereby baptize "quonk," and which is defined by the following schematic rules:

Rule of Q' -Elimination:

From $Q'x\alpha[x]$ we may immediately infer $\alpha[t]$.

$$\frac{Q'x\alpha[x]}{\alpha[t]}$$

In applying this rule one replaces every free occurrence of x in $\alpha[x]$ by t .

Rule of Q' -Introduction:

From $\alpha[t]$ we may immediately infer $Q'x\alpha[x]$.

$$\frac{\alpha[t]}{Q'x\alpha[x]}$$

In applying this rule one need not replace every free occurrence of t in $\alpha[t]$ by an occurrence of the variable x .

Quonk is named after the tonk operator (Prior [25]) that has the introduction rule for disjunction and the elimination rule for conjunction. In a language containing tonk, any sentence is provable from any other sentence. *Prima facie*, it is an

inadmissible operator because it is not sound; it leads from true sentences to false sentences.¹⁰

Unlike tonk, quonk is not clearly inadmissible, albeit it is strange. For any sentence $\alpha[t]$, where t is any term in the language, the quonk introduction and elimination rules allow one to infer $\alpha[t']$, where t' is any other term in the language. This forces, for example, any unary predicate in the language to have the extension of the entire domain, and any binary predicate in the language to be an equivalence relation with no partitions.

However, independent of questions concerning Q' 's unacceptability as a logical operator, it does satisfy the recursive clause provided for sentences of the form $\forall x\alpha[x]$. If one were to judge $Q'x\alpha[x]$ and it were true that $Q'x\alpha[x]$, then it would be the case that for all x , one were committed to judging $\alpha[x]$. But then, by Peacocke's theory, one would possess the concept $\forall x\alpha[x]$. Thus $Q'x\alpha[x]$ and $\forall x\alpha[x]$ have the same normative acceptance conditions and hence, for Peacocke, are the same content!

Quonk sets in bold relief the Achilles heel of Peacocke's theory. Peacocke gets manifestationism without verificationism by characterizing a person's dispositions *vis a vis* the canonical commitments of the universal quantifier. Given that canonical commitments are essentially elimination rules, and canonical grounds introduction rules, it is not clear how else he could have done this. Had Peacocke utilized the canonical grounds, he would have been forced to have the speaker recognize canonical proofs of universally quantified statements. But this is verificationism, involving an epistemically constrained notion of truth for universally quantified statements. So, to avoid verificationism, he has to characterize the universal quantifier in terms of its elimination rule (canonical commitments) alone. But the universal quantifier and quonk have the same elimination rule.

4.2. Two objections

Two potential objections must be addressed. First, it might be claimed that open sentences bound with the Q' operator are not truth apt, and thus don't effectively counterexemplify Peacocke's account.

¹⁰Prior uses "tonk" to argue that rules of inference cannot constitute the meaning of a logical operator. The idea is that the original tonk operator is defined uniquely by its inferential role, yet it is still inadmissible as it allows one to conclude falsehoods from truths. Inferentialists respond by articulating and defending proof-theoretic conditions for logicity (e.g. Chapter 10 of (Tennant [31])) that don't involve truth tables or model theory. The debate around tonk concerns whether a realist or inferentialist can better characterize admissibility of logical operators. It is completely orthogonal to the purpose to which I am putting quonk.

In fact, this might be a strategy Peacocke himself would countenance. In “Proof and Truth,” he discusses an operator called “Q” that has the elimination rule for the universal quantifier, but has no introduction rule whatsoever. Peacocke writes,

I suggest that intuitively Q has not been supplied with a meaning, and that correspondingly no content has been fixed by the given inferential role for alleged sentences containing it. . . . If this is right so far, then there is one minimal kind of justification for principles of logic which is inescapably needed. That is the sort of justification which consists in showing that the principles endorsed (and the principles rejected) which essentially involve a certain constant are consistent with the assignment to that constant of a unique concept.
(Peacocke [22], p. 168)

So perhaps the Peacockean would respond by arguing that, like Q, Q’ isn’t really a logical operator, because it has no content whatsoever.

Contra Peacocke’s Q operator, I think it is clear that Q’ *does* have an intuitive meaning. Note that existential and universal quantification coincide for some theories. For example mod-one arithmetic (where ‘0 = 1’ is taken as an axiom) is a theory where all of the atomic sentences are true. It can be proven in this theory that $\forall x \alpha[x] \leftrightarrow \exists x \alpha[x]$ is true for all $\alpha[x]$.¹¹ Moreover, for theories where existential and universal do not overlap, one can define operators analogous to Q’.

Any theory that has a finite classical model, also has a model for a language with a Q’-like operator. It can be shown that any theory with a model with a domain consisting of only one element has a model in a language with the ‘Q’ operator as given above. For theories that have models with domains consisting of only two objects, we can define an operator ‘Q’’ with the following rules.

Rule of Q’’-Elimination:

From $Q''x \alpha[x]$ we may immediately infer $\alpha[t]$.

$$\frac{Q''x \alpha[x]}{\alpha[t]}$$

In applying this rule one replaces every free occurrence of x in $\alpha[x]$ by t .

Rule of Q’’ Introduction:

From $\alpha[t]$ and $\alpha[t']$ and $\neg(t = t')$ we may immediately infer $Q''x \alpha[x]$.

$$\frac{\alpha[t] \quad \alpha[t'] \quad \neg(t = t')}{Q''x \alpha[x]}$$

¹¹For interesting details about this and other aspects of mod-one arithmetic, see Cook and Coghburn [4].

In applying this rule one need not replace every free occurrence of t in $\alpha[t]$ by an occurrence of the variable x .

It is clear how the introduction rule can be extended to yield similar rules for any theory with a finite model.

Moreover, satisfaction clauses can be added for this set of operators. For example, in the case of Q'' we can say that $Q''x\alpha[x]$ is true in M if the cardinality of the domain is no greater than 2 and $\forall x\alpha[x]$ is true in M . Note the reason for the cardinality restriction. Consider the property expressed by “ $\neg(a = t)$.” Q'' Introduction on this yields

$$\frac{\neg(a = t) \quad \neg(a = t') \quad \neg(t = t')}{Q''x\neg(a = x)}$$

by Q'' Introduction. But then by Q'' elimination, you get

$$\frac{Q''x\neg(a = x)}{\neg(a = a)}$$

by Q'' Elimination. So if $\neg(a = t)$, $\neg(a = t')$, $\neg(t = t')$ are all true, then the rules for Q'' allow one to derive a contradiction. But $\neg(a = t)$, $\neg(a = t')$, $\neg(t = t')$ are just the canonical way to state that three or more objects exist. As long as two or less objects exist, there is no problem.

By adding to the introduction rule in the manner of Q'' , a quonk operator can be defined for domains of any finite cardinality, such that $Q'\dots^n x\alpha[x]$ is true in M if the cardinality of the domain is no greater than n and $\forall x\alpha[x]$ is true in M . The $Q'\dots^n$ operator can be consistently added to any theory that has a model of cardinality n or less.

Theories that only have infinite models are irrelevant, as such theories are only finitely axiomatizable using the universal or existential quantifier. To see this, note that the relevant question in this context concerns whether a speaker possesses the universal quantifier or one of the quonk operators. Now consider a finite set of sentences in a language without quantifiers. This set of sentences could represent a finite axiomatization of the quantifier free sentences a competent speaker believes. Then when a quantifier is added, we can ask ourselves whether it is a quonk operator or the universal quantifier. But if the initial theory is finitely axiomatizable in a quantifier free language, then it will have a model of some finite cardinality n . So, at this point one can either add the universal quantifier, or one can add the quonk operator for that cardinality. In both cases the new theory is satisfiable, and in both cases sentences with the new operator will satisfy Peacocke’s clause for the universal quantifier.

In any case, the defender of quonk could very well bite the bullet offered by Peacocke. Indeed, such an admission if anything strengthens the criticism. If

Q' truly is incoherent, then so much the worse for Peacocke's theory, which now doesn't distinguish between a speaker who grasps the universal quantifier and an incoherent speaker. At best, the validity of this line would just show Peacocke to be hoisted by his own petard.

A second response to this criticism is that Peacocke seems to be aware of it at certain points in the text. For example, at one place he writes,

For contents which are individuated by their canonical links, completeness requires uniqueness. If it did not, there could be two such contents with the same pattern of canonical links; so one would have to conclude that their canonical links do not exhaust what determines the identity of such a content. So, to give a maximally simple example, the natural deduction rules which are common to classical alternation and to exclusive disjunction are not all of the rules for both connectives; and when we do add the rest of the rules which separate them and obtain completeness for each one, we also obtain uniqueness on both accounts. (Peacocke [23], pp. 51–52)

Thus, Peacocke realizes that both the introduction rule and elimination rule are necessary for determining the content of a quantifier. However, if I understand him correctly, he thinks that this is only an issue for the inferentialist, who accounts for the meaning of the operators in terms of such rules. I've shown that it is also an issue for Peacocke.

Peacocke is completely unaware that this is a problem for him; in his discussion of the universal quantifier he writes that

While one range of contents may be individuated by their canonical commitments, another range may be individuated by their canonically committing conditions. (Peacocke [20], p. 28)

Then, of course, he goes on to pick canonical commitments for the universal quantifier, and canonical grounds for the existential. But, as I have shown, this results in disaster.

5. Manifestationism without verificationism?

In the inferentialist classic, "Meaning as Functional Classification," Wilfrid Sellars describes "three types of pattern governed linguistic behavior" that are essential to our grasp of meaning.

1. Language Entry Transitions: The speaker responds to objects in perceptual situations, and in certain states of himself, with appropriate linguistic activity.

2. Intra-linguistic Moves: The speaker's linguistic conceptual episodes tend to occur in patterns of valid inferences (theoretical and practical), and tend not to occur in patterns which violate logical principles.
3. Language Departure Transitions: The speaker responds to such linguistic conceptual episodes as 'I will now raise my hand' with an upward motion of the hand, etc. (Sellars [27], pp. 423–24)

Then, as with Dummett, meaning itself is to be explicated as a function of these manifestable behaviors.

It is a consequence of my discussion that Sellars' level of intra-linguistic moves is itself subject to a distinction analogous to that between language entry transitions and language exit transitions. Language entry transitions are bits of perceivable evidence that (along with other beliefs) correctly prompt reports about objects in the environment. These involve canonical evidence for claims. But this is precisely what introduction rules in natural deduction systems stipulate, the canonical evidence for a sentence with the operator in question dominant. Language departure transitions are commitments undertaken (along with other beliefs and desires) once a person reports believing in a sentence. But this is precisely what elimination rules in natural deduction systems stipulate, the canonical evidence a sentence with the dominant operator in question provides. Thus, *within* Sellars' intra-linguistic moves there are entry and departure transitions; for logical operators, these can be described perfectly with introduction and elimination rules of natural deduction systems.

My argument against Peacocke is more general than just the case of determining which behavioral capacities are relevant to grasping logical operators. For example, consider the moral word "wrong." The entry transitions involve, for example calling acts of wanton cruelty wrong. The departure transitions involve behaviors such as not encouraging acts one calls wrong, exhibiting guilt when doing acts one calls wrong, censuring those who routinely perform acts one considers wrong, etc. I think that it is clear that on the ordinary conception of wrongness, grasp of the word "wrong" requires a speaker to be behaviorally sensitive to both entry transitions and departure transitions. Routine flouting of either the entry or departure transitions would be evidence of failure to grasp the meaning of the word.

The example of "wrong" will strike one as implausible precisely to the extent that one thinks that there is no disputing matters of rightness or wrongness. If one really believed this, then one would take the meaning of "wrong" to be fixed solely by its departure transitions. For example, if someone says, "Shepard's pie tastes good," I might cringe, but wouldn't argue. On the other hand if someone says, "Shepard's pie tastes good," and promptly proceeds to gag on a mouthful,

I would assume that they are either being sarcastic, or are misusing the phrase “tastes good.” Language departure transitions are relevant to grasping the meaning of “tastes good.” Unlike “wrong” (at least as used by the person on the street), language entry transitions play little or no role.¹²

As I have shown, the intra-linguistic moves most relevant to grasp of meaning of logical vocabulary constitutively involve analogues to language entry and language departure transitions. For the manifestationist, the meaning of the logical vocabulary must be a function of these transitions. Unfortunately for the realist, no one has managed to do this in a way that takes truth to be prior to inference.

Manifestationism is taxing. The content of a sentence must be a function of speakers’ actual and counterfactual behavior. For logical words, this requires competent speakers to be proficient with purely inferential analogues of Sellars’ language entry and departure transitions. But the inferential analogues to Sellars’ language entry conditions are natural deduction introduction rules, which state canonical evidence (or proof conditions) for claims with dominant logical operators. This is verificationism; a vindication of the inferentialist’s order of explanation, where grasp of meaning and meaning are first to be understood in terms of inferential role and then truth itself as the in-principle availability of evidence.

References

- [1] Benacerraf, P. 1983. “Mathematical Truth.” In *Philosophy of Mathematics* 2nd Edition, H. Putnam and P. Benacerraf (eds.). Cambridge University Press, Cambridge, pp. 403-420.
- [2] Brandom, R. 1998. *Making it Explicit: Reasoning, Representation, and Discursive Commitment*. Cambridge: Harvard University Press.
- [3] Brandom, R. 2001. *Articulating Reasons: An Introduction to Inferentialism*. Cambridge: Harvard University Press.
- [4] Cook, R. and Cogburn, J. 2000. “What negation is not: intuitionism and ‘0=1’,” *Analysis*, 60: 5–12.
- [5] Cytowic, R. 1989. *Synesthesia: A Union of The Senses*. New York: Springer-Verlag.
- [6] Davidson, D. 1984. *Inquiries into Truth and Interpretation*. Oxford: Clarendon Press.

¹²Any moral realism worth its salt needs to accommodate this specific difference between moral and other forms of evaluative discourse. Note that the way I’ve put this is somewhat simplified; no concept allows complete freedom of entry transitions. For example, if someone said that noises or ideas “taste good” we would be right to question their competence with the words, albeit, we might ultimately conclude competence with the words combined with synesthesia. See (Cytowic [5]).

- [7] Dragalin, A.G. 1980. *Mathematical Intuitionism, Introduction to Proof Theory*. Providence: American Mathematical Society.
- [8] Dummett, M. 1973a. "The Philosophical Basis of Intuitionistic Logic." (Dummett, (1978, pp. 215–247)).
- [9] Dummett, M. 1973b. "The Justification of Deduction." (Dummett, (1978, pp. 290–318)).
- [10] Dummett, M. 1976a. "What is a Theory of Meaning? (I)" (Dummett, (1993, pp. 1–33)).
- [11] Dummett, M. 1976b. "What is a Theory of Meaning? (II)" (Dummett, (1993, pp. 34–93)).
- [12] Dummett, M. 1978. *Truth and Other Enigmas*. Cambridge: Harvard University Press.
- [13] Dummett, M. 1991. *The Logical Basis of Metaphysics*. Cambridge: Harvard University Press.
- [14] Dummett, M. 1993. *The Seas of Language*. Oxford: Clarendon Press.
- [15] Hale, B. and Wright, C. eds. 1997. *A Companion to the Philosophy of Language*. Oxford: Blackwell.
- [16] Kant, I. 1998. *Critique of Pure Reason*, trs P. Guyer and A. Wood, Cambridge University Press, Cambridge.
- [17] Lappin, S. 1996, *The Handbook of Contemporary Semantic Theory*. Oxford: Blackwell.
- [18] Ludlow, P. 1997, *Readings in the Philosophy of Language*. Cambridge: MIT.
- [19] Montague, R. 1974. *Formal Philosophy. Selected Papers of Richard Montague*. Edited and with an introduction by Richmond H. Thomason. New Haven and London: Yale University Press.
- [20] Peacocke, C. ed. 1986. *Thoughts: An Essay on Content*. Oxford: Blackwell.
- [21] Peacocke, C. 1991. *A Study of Concepts*. Cambridge: M.I.T.
- [22] Peacocke, C. 1993, "Proof and truth," in *Reality, Representation, and Projection*, eds J. Haldane and C. Wright, Oxford: Oxford University Press, pp. 165–190.
- [23] Prawitz, D. 1965. *Natural Deduction: A Proof-Theoretical Study*. Stockholm: Almqvist and Wiksell.
- [24] Prawitz, D. 1974. "On the Idea of a General Proof Theory." *Synthese*, 27: 63–77.
- [25] Prior, A. 1960. "The Runabout Inference Ticket." *Analysis*, 21: 38–89.
- [26] Shapiro, S. 2000. *Philosophy of Mathematics: Structure and Ontology*. Oxford: Oxford University Press.

- [27] Sellars, W. 1974, "Meaning as functional classification," *Synthese*, 27: 417–437.
- [28] Tennant, N. 1986. "On the Withering Away of Formal Semantics." *Mind and Language*, 1: 302–318.
- [29] Tennant, N. 1987. *Anti-Realism and Logic: Truth as Eternal*, Oxford: Clarendon Press.
- [30] Tennant, N. 1992. "Manifestationism without verificationism?" presented to the Ockham Society (Oxford), and the Leiden Conference on Verificationism and the Theory of Meaning.
- [31] Tennant, N. 1997. *The Taming of the True*. Oxford: Clarendon Press.
- [32] Tennant, N. forthcoming, "The Emperor's New Concepts," *Philosophical Perspectives*.
- [33] Wittgenstein, L. 2001. *Tractatus Logico-Philosophicus*, trs D. Pears and B.F. McGuinness, London: Routledge and K. Paul.
- [34] Wittgenstein, L. 2001, *Philosophical Investigations*, tr G. Anscombe, Oxford: Blackwell.
- [35] Wright, C. 1992. *Truth and Objectivity*. Cambridge: Harvard University Press.
- [36] Wright, C. 1993. *Realism, Meaning, and Truth*, 2nd ed. Oxford: Blackwell.

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