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Extension, Intension and Dormitive Virtue

"A thing is what it is and not another thing" Bishop Butler.

1. Introduction

Would it be fairer to say that Charles Peirce's logic was 'intensionalist' or 'extensionalist'? I will argue that despite its apparent anachronism, this question is worth asking. Firstly, the distinction embodies an idea that Peirce himself worked with early in his career, though he ultimately moved beyond it. Secondly, there are interesting things to be said on both sides of the question, and insofar as that is the case, the treatment of this issue will deal yet another blow to the 'philosophy of -isms', or 'position reification' which represents a widespread methodological nominalism in the analytic tradition. Lastly, it will emerge that Peirce's treatment of the notion of hypostatic abstraction points the way to ultimately transcending the terms in which the question is posed, raising interesting consequences along the way for the issue of the proper relationship between logic and metaphysics. This is a vexed issue which is not currently receiving much attention in the analytic tradition (despite that tradition's strong emphasis on both areas of philosophy) and about which Peirce did some careful thinking.

The question of extensionalism, intensionalism and Peirce has not been treated as a separate question in the literature on Peirce. It has obvious connections to Peirce's notion of continuity (or real generality), which has been so treated,[1] and to his notion of vagueness[2] and his account of the semeiotic object, all of which are highly relevant to my question. However, to focus specifically on my question is to consider Peirce from an analytic perspective rather than from within the perspective of Peirce scholarship (wherein there is no shortage of work of a very high quality). If it can be demonstrated that Peirce has much to offer a keynote problem of the analytic tradition as perceived by that tradition, it is my opinion that it will be worth any extra time and trouble spent 'inter-translating'.

2. The Distinction

Basically and intuitively, the distinction between an extensionalist and an intensionalist logic concerns whether a full account of the truth of statements

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can be given in terms of the ***individuals*** picked out by its terms (extensionalism), or whether some irreducible account must be taken of ***ideas*** which those terms convey (intensionalism). As such the dispute has obvious links to the realist-nominalist debate in which Peirce took a considerable interest. This will be discussed but the result will not be the simple nominalist-extensionalist, realist-intensionalist dichotomy one might initially imagine.

A further feature of the distinction between extensionalism and intensionalism, which has been widely taken as a criterion to separate the two positions, is that within an extensionalist logic, substitution is possible ***salva veritate*** (that is, without thereby changing the truth-value of the statement concerned) with respect to identical instances of some basic logical form, whereas in an intensionalist logic it is not. The variety of different logical forms with respect to which such substitution might take place accounts for some of the variety of different extensionalisms on offer in the current philosophical landscape. So for instance, one might frame a version of the criterion where what is substituted is ***co-referring singular terms.*** Thus, if the following statement is true:

(S1) Superman was on top of the Empire State Building yesterday at 10 a.m.

And if Superman is identical with Clark Kent, then it seems obvious that the following statement is also true:

(S2) Clark Kent was on top of the Empire State Building yesterday at 10 a.m.

This, then, is the sort of inference an extensional logic allows. Consider, however, the statement (also true):

(S3) Superman is believed to be the bravest man in the world.

Would this statement remain true if the term 'Clark Kent' were substituted in place of 'Superman'? It appears not. Here lies the motivation for intensional logics, for it seems that in this case the term 'Superman' does not pick out a person ***per se.*** Rather, it picks out an ***attribute*** of that person — a particular way that person is.

Alternatively, the substitutivity criterion may concern ***predicates*** that pick out the same class of individuals. Consider, for example, the two predicates, 'was rescued by Superman' and 'was rescued by Clark Kent'. In the world described by the Superman story, these terms arguably pick out the same class of fortunate people. Yet is it truth-preserving to substitute one term for the other in statements such as the following?

(S4) All those rescued by Superman remember him with gratitude to the end of their days.
It is not, so here the extensionalist/intensionalist question arises once again. The criterion has also been extended to cover *coextensive classes.*

It is worth noting the way in which these two characterisations of extensionalism versus intensionalism (firstly in terms of individuals versus ideas, and secondly in terms of substitutivity *salva veritate* or the lack thereof) are connected. Our intuitive conception of individuals is that they are relatively discrete, and come with their individuation built in, as it were, (such that one can, for example, point to a table in the corner of the room and say "Look at that thing" and everyone in the room will know that one means the table and not half of the table plus a group of air molecules just to the left of the table). On the other hand, ideas or meanings are not amenable to such neat ostensive individuation (which is why philosophers have so much work to do). These two characterisations might, however, come apart if it could be established that individuals do *not* individuate more cleanly than ideas. At any rate this dispute between extensionalists and intensionalists can be seen to be at bottom about individuation, and the mind-independence thereof.

As Peirce himself pointed out in an early piece entitled "On Comprehension and Extension,"[3] some such distinction as between the extension and intension of a term may be identified in the work of the medieval logicians, though it was not prominent there. It was with the Port Royal Logic that it began to be accorded some importance. Even in Peirce's day, an enormous variety of fine differences in meaning of the distinction had accumulated, which Peirce painstakingly catalogued, and this situation has only grown worse.[4] For this reason I will focus my discussion of the distinction by presenting the way it is defined by Carnap, who was responsible for giving it its prominence in the analytic tradition, and was then the focus of influential criticism by Quine.

Carnap identifies extensions with *classes* and intensions with *properties.* He writes that two "designators" (his term for 'term') have the same extension if they "stand for the same individual" (such as, for instance, 'Superman' and 'Clark Kent'); which he refers to as those designators being *equivalent.*[5] On the other hand, two designators have the same intension if they possess a stronger form of equivalence which he calls *L-equivalence.* "L-equivalence" stands for logical equivalence, an equivalence which "follows from the semantical rules alone",[6] or in other words, is analytically true.[7]

However, Carnap's "method of extension and intension" allows him to reduce intensions to extensions *via* the notion of a state-description (which is a complete list of the truth-values of all statements, and thus a proto-possible world, the idea for which he got from Wittgenstein's *Tractatus*). He analyses (or, as he puts it, *explicates*) what it is for an equivalence to "follow from the semantical rules alone" by claiming that it is for the statement of that equiva-

lence to be true in all state-descriptions. If we consider all state-descriptions then the equivalence of 'mother' and 'female parent' survives, as a world where something is a mother and not a female parent is ruled out by the meanings of the terms concerned, and thus there is no corresponding state-description. The equivalence of 'Superman' and 'Clark Kent' does not survive however. Carnap thus creates a higher-level, metalinguistic extensionalism and claims that there is no need for intensions as ideas, meanings or any sort of entities in their own right:

> The term 'property' is to be understood in an objective, physical sense, not in a subjective mental sense; the same holds for terms like 'concept', 'intension', etc. The use of these and related terms does not involve a hypostatization.[8]

3. Classic Extensionalism: Quine

Despite Carnap's disavowal of hypostatizing intensions, Carnap's two-level extensionalism whereby he holds to extensions and intensions, but reduces the latter to the former in the metalanguage, is not yet extensionalist enough for Quine, whose goal is a 'one-level extensionalism'.

Like Carnap, Quine has a distaste for "subjective mental" entities. The notion of ***meaning***, which he calls "a baffling word"[9], comes in for a particular serve as the sort of entity a properly scientific, or naturalistic philosophy should not work with (though he points out that this is not to deny that "words and statements are meaningful").[10] Quine raises a number of objections against admitting meanings into a properly naturalist philosophy. First of all, there is the issue of meanings being "mental" entities, which for Quine seems already to render them unacceptably occult:

> Meanings...purport to be entities of a special sort: the meaning of an expression is the idea expressed. Now there is considerable agreement among modern linguists that the idea of an idea, the idea of the mental counterpart of a linguistic form, is worse than useless for linguistic science.[11]

Secondly, the term has a dubious history in Aristotelian essentialism (Quine writes, "Meaning is what essence becomes when it is divorced from the object of reference and wedded to the word"[12]). This too is already to render the notion of meaning unacceptable to a properly scientific philosophy, he feels, for was not the Scientific Revolution enabled by Western philosophy escaping from the shackles of an overly ***a priori*** scholastic logic to a properly ***a posteriori*** naturalism? Thus, Quine argues that the concept of meaning is just not explanatory:

> The evil of the idea idea is that its use, like the appeal in Moliere to a ***virtus dormitiva***, engenders an illusion of having explained something.[13]

Quine is here referring to a passage in Moliere's ***Malade Imaginaire*** which satirises scholastic philosophy. In this passage, a candidate for a degree in medicine is asked during his examination why it is that opium makes people sleepy. The candidate replies that it is because the opium has a 'dormitive virtue', to loud acclaim from his examiners and the chorus. The phrase has entered philosophical folklore as a paradigmatic example of a non-explanation. So, for Quine, to say (for instance) that the term 'Superman' has a different ***meaning*** from the term 'Clark Kent' and this is why substitutivity fails in sentences such as (S3) is merely to restate the problem, not solve it.

Quine seeks to further undermine the reality of meanings through his famous attack on the analytic-synthetic distinction, of which one of the main targets is Carnap. This is the distinction between types of truth: truth by virtue of meanings alone (the analytic, Carnap's "L-truth") versus truths which are "grounded in fact" (the synthetic, which Carnap sometimes refers to as "F-truth"). Quine attacks this distinction by painstakingly seeking a criterion for analyticity, without success. He finds that "synonymy" is circular, "definition" is unhelpful, substitutivity ***salva veritate*** too weak, and that Carnap's supposed "semantical rules" do not constitute a neat boundary around a set of truths as Carnap claims they do.[14] He concludes that any true statement may be revised, if we are presented with the right evidence:

> Carnap, Lewis, and others take a pragmatic stand on the question of choosing between language forms, scientific frameworks; but their pragmatism leaves off at the imagined boundary between the analytic and the synthetic. In repudiating such a boundary I espouse a more thorough pragmatism.[15]

Having breached the dividing wall between analytic and synthetic truth, Quine hopes that the way is now clear for extensionalism to over-run the entire kingdom of predication. For, unlike meanings, referents are something that the logician, equipped with quantification theory, can really work with. This extensionalism leads him to make certain further logical choices which bear discussion.

4. Quine: Some Extensionalist Choices

First of all, Quine is utterly against any prospect of quantified modal logic. This is because the substitutivity ***salva veritate*** which extensionalism requires seems not to be possible in such a logic. Quine gives as an example the follow-

ing two sentences:

(N1) Necessarily nine is greater than seven.
(N2) Necessarily the number of planets is greater than seven.[16]

The former sentence is true and the latter false, and yet nine *is* the number of planets, so in an extensional language the substitution should be licensed. Here, Quine argues, Aristotelian essentialism rears its ugly head again. For if one can change the truth-value of a claim of necessity merely by picking out one of the objects referred to in that claim under a different description, then it seems that one is ascribing essential properties to the object in question, by "adopting an invidious attitude toward certain ways of uniquely specifying *x*... and favoring other ways..."[17] Quine claims not to be able to make sense of such *de re* necessity. As he is not willing to deal with "intensional objects" either, he decides to make modal contexts entirely opaque.

These cases have been much discussed, and alternative proposals for dealing with such failures of substitutivity within an extensional framework have been put forward (for instance, identifying and distinguishing ambiguities of quantifier scope in the statements concerned). However, suffice it to say that the choice Quine himself makes is that quantified modal logic is unworkable, for "...necessity does not properly apply to the fulfillment of conditions by *objects*...apart from special ways of specifying them."[18]

Quine's argument against quantified modal logic extends naturally to *attributes*. Quine notes that attributes would be "intensional objects", and this is enough for him to choose not to admit them:

> The worries introduced by the logical modalities are introduced also by the admission of attributes...The idiom 'the attribute of being thus and so' is referentially opaque, as may be seen, for example, from the fact that the true statement:
> (39) The attribute of exceeding 9 = the attribute of exceeding 9 goes over into the falsehood:
> The attribute of exceeding the number of the planets = the attribute of exceeding 9
> under substitution according to the true identity.[19]

The second choice Quine makes, which may be traced to his extensionalism in a roundabout way, is that he is suspicious of classes and even physical objects as logical primitives. It might seem that Quine's distaste for the messy individuation of meanings would lead him to see both physical objects and classes of discrete particulars as paradigms of individuatory clean-ness which an extensionalist should welcome ontological commitment to. However, he re-

veals himself as more subtle than this in his interesting paper, "Identity, Ostension and Hypostasis".

Here he challenges the notion of a physical object as straightforwardly individuated via ostension. His chosen example is the river Cayster, presumably the river most likely to have inspired Heraclitus' famous remark that one cannot step into the same river twice. He notes that when one points to the Cayster and says, "That river", one may be referring to a "river-stage", (which picks out the water enclosed by that particular set of river-banks at that particular time) or to a "water-stage" (which picks out a particular set of water-molecules once and for all, that set of water molecules then proceeding to head downstream forever). Any decision to narrow the range of possible ostensions and to lay down identity criteria for the Cayster will be, Quine argues, a choice motivated by considerations of simplicity in our reasoning more than anything else. In this he claims to follow Hume, according to whom the idea of "external objects" was a useful fiction:

> ...we gain formal simplicity of subject matter by representing our subject matter as a single object, Cayster, instead of a multiplicity of objects a, b, etc., in river kinship. The expedient is an application, in a local or relative way, of Occam's razor: the entities concerned in a particular discourse are reduced from many, a, b, etc., to one, the Cayster. Note, however, that from an overall or absolute point of view the expedient is quite opposite to Occam's razor, for the multiple entities a, b, etc., have not been dropped from the universe; the Cayster has simply been added.[20]

As for classes, hypostasis of these is an extra ontological step which must be similarly acknowledged:

> It is clearest, I think, to view this step of hypostasis of abstract entities as an additional step which follows after the introduction of the corresponding general terms...A new fundamental operator "class of", or "-ness" is appealed to in this step.[21]

Quine's third notable choice concerns the issue of the proper relationship between logic and metaphysics. He advocated a simple, easy relationship between the two in that once one has one's logic in order (first-order!) one can read one's ontology off one's existential quantification. In fact this is one of the broad unifying themes of *From a Logical Point of View* – that (famously) "to be is to be the value of a bound variable...". Such a strategy might seem to beg metaphysical questions such as nominalism, but in "Logic and the Reification

of Universals" Quine defends his criterion as acceptably neutral. His reasoning runs as follows. Whatever, *qua* metaphysician, your favoured entities are going to turn out to be, presumably you are going to refer to them at some stage. So why shouldn't you, *qua* logician, analyse that reference by using a bound variable whose 'value' is your favoured entity?

He further claims that it is not that he is prejudging the issue over the "existence of abstract entities", it just makes sense to reduce them where one can.[22] And, he argues, such reductions are often called for:

> The bulk of logical reasoning takes place on a level which does not presuppose abstract entities.[23]

On this point we will see Peirce disagreeing crucially. We will also see that Peirce had a rather different account than Quine's of the proper relationship between logic and metaphysics. But first I will consider the way in which it might seem initially plausible to consider Peirce by extensionalist lights.

5. *Apparent Extensionalism in Peirce*

The instinct of many Peirce scholars is to dismiss the idea that it might be of any use to think of Peirce under an extensionalist rubric because of his *synechism* – his commitment to real continuity (which he himself referred to as the keystone of all his thinking). Peirce defined the notion of continuity to which he was committed as follows:

> A true continuum is something whose possibilities of determination no multitude of individuals can exhaust.[24]

Given this, how could Peirce desire an extensionalist logic in which every referring term refers to some individual or determinate multitude of individuals? How could he, for instance, seek to reduce properties to classes of their instantiations as Quine and Carnap do? However, Peirce also wrote:

> A collection is whatever stands to a general predicate of single subjects in a certain relation *sui generis*, such that for every such predicate there is a single collection and for every collection there is such a predicate.[25]

"Collection" was Peirce's term for class. This statement by Peirce might seem to endorse extensionalism insofar as it suggests an interchangeability between predicates and sets of particulars ("single subjects").[26]

It might seem that one can reconcile these two statements of Peirce's by considering the distinction which Peirce makes between his (medieval) realism

and what he called ***nominalistic Platonism***. I will present this argument and then show why it is not enough to do justice to the subtlety of Peirce's realism.

Peirce's medieval realism (which is often referred to as realism about ***universals***, but Peirce preferred to call it realism about the ***general***) distinguishes between the real and the existent. Whereas the existent is particular and causally efficacious, the real is general and indeterminate, and its defining character is its mind-independence, which Peirce explicates as follows:

> ...***Realism*** and ***realitas*** are not ancient words. They were invented to be terms of philosophy in the thirteenth century, and the meaning they were intended to express is perfectly clear. That is ***real*** which has such and such characters, whether anybody thinks it to have these characters or not.[27]

Therefore, the real is not defined against the nonexistent but against the ***fictive*** (in a medieval sense which means that the thing in question is 'made up', and so has just the characters we give it).

Of course, to do full justice to Peirce's realism one has to recognise that the terms 'reality' and 'existence' are to some degree standing in for his categories, and his most serious work on the realism question was done through these more exact conceptions. This is not the place to give a detailed exposition of Peirce's categories, but I will note that Firstness may be vaguely ostended by the notions of possibility, spontaneity and newness, Secondness by the notions of reaction, efficient cause and effect and discontinuity, and Thirdness by the notions of mediation, regularity and intelligibility.

At any rate, even the distinction between the real and the existent has largely been lost in twentieth century philosophy. This has led to those who still wish to defend medieval realism feeling obliged to argue that universals ***exist***. A notable example here is David Armstrong, who begins his landmark work on realism with respect to universals by stating:

> Nominalism is defined as the doctrine that everything there is is a particular and nothing but a particular. A Realist is one who denies this proposition, holding that Universals exist.[28]

Armstrong then has little to say against those who argue that his existent universals add nothing to the debates in which he posits them, for example to explain true predication. For instance, Michael Devitt has challenged Armstrong convincingly:

> The Quinean sees no problem for Nominalism in the likes

> of [sentences of the form 'a is F'] because there is a well-known semantic theory which shows that ['a is F'] can be true without there being any Universals: ['a is F'] is true if and only if there exists an x such that 'a' designates x and 'F' applies to x.[29]

Peirce called a position like Armstrong's "nominalistic Platonism"[30] as it claims to be committed to universals (hence the 'Platonism') but in claiming that those universals *exist* it treats them as if they were particular things (hence the 'nominalistic'). Peirce wrote that this is to grievously distort the medieval debate:

> But I ask, can anybody who has seen Westminster Abbey, who had read the Prologue to the *Canterbury Tales*, and who stops to consider that the metaphysics of the Plantagenet age must have more adequately represented the general intellectual standing of that age, when metaphysics absorbed its greatest heuristic minds, than the metaphysics of our day can represent our general intellectual condition, can any such person believe that the great doctors of that time believed that generals *exist*? They certainly did not so opine, but regarded generals as modes of determination of individuals; and such modes were recognised as being of the nature of thought.[31]

So, the question arises, why not defend Peirce as an extensionalist by noting two points. The first point is that his realism is not a nominalistic Platonism, and so does not posit extra existent entities. Rather, it addresses itself to the (general) patterns which shape the behaviour of those entities that do exist, and argues that at least some of them are independent of what we might think about them. The second point is that Peirce's quarrel with nominalism is that it barricades the road of discovery by treating certain phenomena as ultimate and therefore inexplicable. (For if everything is particular, the nominalist reasons, there must be some at least in-principle total story which would list all the particulars and their properties, after which nothing more could be said that is true.) By contrast, synechistic realism is committed to every posit made by science being subject to further explanation somewhere down the "road of discovery". Thus, Peirce writes:

> The synechist...would never be satisfied with the hypothesis that matter is composed of atoms, all spherical and exactly alike. If this is the only hypothesis that the mathematicians are as yet in condition to handle, it may be supposed that it

> may have features of resemblance with the truth. But neither the eternity of the atoms nor their precise resemblance is, in the synechist's view, an element of the hypothesis that is even admissable hypothetically. For that would be to attempt to explain the phenomena by means of an absolute inexplicability. In like manner, it is not a hypothesis fit to be entertained that any given law is absolutely accurate.[32]

Given these two points, why not argue that, as synechism is not a metaphysical but a logical hypothesis, Peirce's quarrel with nominalism is not that it considers generality as made up of ***nothing but individuals***, but that it considers generality as made up of ***some number of individuals***? This number, whatever it might be, introduces an arbitrary and inexplicable element (a Secondness) into whatever hypotheses include general terms, and thus is synechistically unacceptable. In this way, Peirce might be seen to be effecting a profound synthesis between "the great argument for nominalism", the insight that universals cannot float free ontologically from their instantiating individuals (for, nominalists argue, there is no manhood if there are no men) with the realist demand that generality consist in more than just a set of things. However, to argue this way would be to neglect the vital role played in Peirce's logic by hypostatic abstraction. And this is the issue I will turn to in the next section.

6. Introducing Hypostatic Abstraction

Peirce distinguishes between what he calls "prescissive" and "hypostatic" abstraction. Prescissive abstraction is the mere predication of some feature to something; hypostatic abstraction involves treating that feature as an entity in its own right. As Peirce explains it:

> The most ordinary fact of perception, such as "it is light", involves precisive abstraction, or prescission. But hypostatic abstraction, the abstraction which transforms "it is light" into "there is light here,"...is a very special mode of thought.[33]

He claims that the two varieties of abstraction are "entirely disconnected", and complains that most of the logics of his day muddle the two up. (We saw, however, that this was not true of Quine.)

Peirce's favorite argument for illustrating the process of hypostatic abstraction was the traditional butt of ridicule with respect to the hypostases of the scholastics, already mentioned by Quine, 'dormitive virtue'. This was no mere perversity on his part, but a desire to shock his readers' complacency with respect to the importance of this form of abstraction. He wrote:

> You remember the old satire which represents one of the

> old school of medical men, — one of that breed to whom medicine and logic seemed closely allied sciences, — who when asked why opium puts people to sleep answers very sapiently "because it has a dormitive virtue." Instead of an explanation he simply transforms the premiss by the introduction of an ***abstraction***, an abstract noun in place of a concrete predicate. It is a poignant satire, because everybody is supposed to know well enough that this transformation from a ***concrete predicate*** to an abstract noun in an oblique case, is a mere transformation of language that leaves the thought absolutely untouched. I knew this as well as everybody else until I had arrived at that point in my analysis of the reasoning of mathematics where I found that this despised juggle of abstraction is an essential part of almost every really helpful step in mathematics.[34]

T.L. Short[35] has noted that Peirce's hypostatic abstraction has two particular distinguishing features. The first is that, as Peirce puts it, it is "a necessary inference whose conclusion refers to a subject not referred to by the premise".[36] How could this be? It is because of the second distinguishing feature of hypostatic abstraction, which is that the hypostatic abstraction is an ***ens rationis***. That is, its being consists in something else's being true. In the case of dormitive virtue, we must take it as established that opium-taking and sleepiness possess a relationship of reliable covariance. (That is, the statement "Opium makes people sleepy" already has modal force[37].) Now the argument to the conclusion:

> (DV) There is something about opium which makes people sleepy.
>
> is a necessary one, for the conclusion must follow given the truth of the premise. If sleepiness really does track opium across all manner of different possible circumstances (including the absence of all other non-opiate soporifics), there must be something about ***the opium*** which is bringing about this result. And yet the conclusion does mention an object not mentioned in the premise, namely, 'something about opium which makes people sleepy'. This object is extremely vague, but no less new for all that.

It might be objected that the inference cannot in fact be necessary, for consider the reliable covariance between rain and the fall of a barometer, such that a statement such as "When the barometer falls, it rains" is true. Can we infer necessarily from that reliable covariance the conclusion:

> (RV) There is something about a barometer's fall which

> makes it rain?[38]

This conclusion might appear ridiculous. However there *is* 'something about a barometer's fall' which is causally efficacious in producing rain — the fall in air pressure which is present within the barometer and which it is the barometer's entire function to record. This is just to say that in the case of these inferences which turn on hypostatic abstraction, the true object of inquiry will often need some disentangling as inquiry proceeds. However, the necessary conclusion is really only that there is *something* behind the phenomenon in question, with further properties which are worthy of investigation. (In this sense, Peirce writes, hypostatic abstraction is merely "a fact considered as a substantive".) Barometers do not fall randomly — the reliable covariance between barometer fall and rain permits of further explanation.

At this point the following query might arise. "An *ens rationis* — what is that, though, metaphysically speaking? It appears to be some sort of idea — what good is that to us?" Short argues that under the right conditions (which he spells out as satisfying an "existence claim" and a "uniqueness claim"), what we hypostatically abstract can be not an *ens rationis* but rather, something real:

> ...the reality of something that explains the facts from which it is abstracted is not that of an *ens rationis*. For what consists only in a fact about something else cannot also explain that fact....even though the dormitive virtue is defined in terms of its presumed effects, it is not identified with them. It is that which we postulate as *having* those effects. Hence, if it exists at all, then it is not an *ens rationis* or abstraction.[39]

This, however, is to miss just what is distinctive about Peirce's realism, which is his commitment to the reality of Thirdness. Peirce makes it clear that *all* hypostatic abstractions are *entia rationis*, and that the important question is whether an *ens rationis* can, at the same time as being an *ens rationis*, be real. He concedes that many will not be real but contends that it is vital to recognise that some are. To argue for this, he first looks to the pragmatic(ist) maxim for a clarification of the meaning of 'real'. He finds that something is real if "all the practical consequences of it are true".[40] He then notes that the very definition of a hypostatic abstraction is of something whose being consists in the truth of another fact (in the case of dormitive virtue this is the truth that opium makes people sleepy). For this reason, *if* opium makes people sleepy then the hypostatic abstraction *must* be real:

> On pragmatistic principles *reality* can mean nothing except the *truth* of statements in which the real thing is asserted.

> To say that opium has a dormitive virtue means nothing and can have no practical consequences except what are involved in the statement that there is some circumstance connected with opium that explains its putting people to sleep. If there truly be such a circumstance, that is all that it can possibly mean...to say that opium really has a dormitive virtue. Indeed, nobody but a metaphysician would dream of denying that opium ***really*** has a dormitive virtue.[41]

Rather than Short's assertion that "no real general that actually determines behaviour is a mere ***ens rationis***",[42] it is closer to the truth to say that "Every real general that actually determines behaviour is a mere ***ens rationis***" (leaving off the derogatory appelation 'mere', as Peirce urged in other but related contexts). Real generals are 'mind-like' in the sense that their being consists in their actually (and potentially) determining behaviour ***in intelligible ways.*** This mind-like character that is given to the Universe by real Thirdness is strange at first to those used to railing against idealism as an insouciant embrace of the 'subjective' error which inevitably lurks in one's beliefs. But the 'ideas' invoked by Peirce's Objective Idealism are not the frail cognitions of individual minds. Rather, the real idea is a much more general concept of which human mentality is a special case and though we partake of real ideas when we think truly, insofar as we are in error we do not partake of them.

Such an Objective Idealism is not unsupported by common-sense, as illustrated by the following dialogue Peirce set up between his own view and the view of a contemporary positivist (Karl Pearson) who was as unsympathetic to real Thirdness as many analytic philosophers are today:

> "Why," says Dr. Pearson, "you must not deny that the facts are really concatenated; only there is no rationality about that." "Dear me," says the disciple, "then there really is a concatenation that makes all the component accelerations of all the bodies scattered through space conform to the formula that Newton, or Lami, or Varignon, invented?" "Well, the formula is the device of one of those men, and it conforms to the facts." "To the facts its inventor knew, and also to those he only predicted?"..."Yes." "Then," says the disciple, "it appears to me that there really is in nature something extremely like action in conformity with a highly general intellectual principle." "Perhaps so," I suppose Dr. Pearson would say, "but nothing in the least like rationality." "Oh," says the disciple, "I thought rationality was conformity to a widely general principle."[43]

Thus Quine was right, in a way, to fear that hypostatic abstraction somehow led one to embrace "the mental". But I will now argue that he was wrong to feel that by virtue of that it interfered with sound logic.

7. The Importance of Hypostatic Abstraction

The important role hypostatic abstraction plays in our reasoning is illustrated by Peirce, again using the example of dormitive virtue, where the role may be found in vestigial form:

> Something or other...there must be in opium, some peculiarity of it which if it were understood would explain our invariably observing that...this drug is followed by sleep. That much we may assert with confidence; and it seems to me to be precisely this which is asserted in saying that opium has a dormitive virtue which explains its putting people to sleep. It is not an explanation; but it is good sound doctrine, namely that *some*thing in opium must explain the facts observed.[44]

So, *contra* Short, the proper role of hypostatic abstraction is not explanatory. Those who have made fun of *virtus dormitiva* are right about that. However, Peirce claims, it is a necessary first step in the process of finding an explanation. If we are to find an explanation of the sleepiness that opium typically produces, we need to identify as an object of thought 'that which gives opium its dormitive powers' before we can inquire into it. This particular operation of thought mostly passes unnoticed, but is logically distinct nonetheless.

Peirce had a sophisticated account of the object which distinguished between the *Immediate Object,* or the object as it appears to us (which he referred to enigmatically as a "hint"), and the *Dynamic Object*, which is the object we are referring to as it really is.[45] So, to give an example popular in the analytic tradition, the Immediate Object of the term 'water' possesses such features as colourlessness, odourlessness, and pourability, while the Dynamic Object of the term is at least approached through the discovery that water's chemical formula is H_20. The Immediate Object is always more vague than the Dynamic Object, where vagueness is defined as signification which is indeterminate in that further information must be supplied for it to become more determinate, whereas generality is indeterminate only in that it applies to many individuals. Vagueness is thus an instance of Firstness to generality's Thirdness.[46] Inquiry, then, is largely a process of precisifying the objects of one's thought to bring them closer and closer to the Dynamic Objects to which they correspond. We can see in the case of opium that the Immediate Object can be extraordinarily vague ('whatever it is in opium that gives it its power to make people sleepy') and yet even here we can conceive of how the progress to a more Dynamic Ob-

ject might go (for instance, through a chemical analysis of opium and a comparison with the chemical structure of other soporific drugs).

The operation of hypostatic abstraction, then, shows Peirce's realism at work 'on the ground', as it were. For we have seen that Peirce defines the real as that whose characters are independent of what anyone might think they are. But if we run *that* claim through the pragmatic maxim, inquiring in what way it might impact on our experience, it emerges that the real objects are the ones we can continually discover more about. The process of hypostatic abstraction, then, is a means to 'open up' previously unattended to aspects of the objects of our thinking, to make them objects in their own right and inquire as to their characters, at which point, if the objects turn out to be real, the cycle may begin again.[47] In this way, as well as hypostatic abstractions demonstrating the reality of Thirdness in their character as ***entia rationis***, as already noted, hypostatic abstractions demonstrate the reality of Firstness also.

Hypostatic abstraction can thus be seen as a vital ingredient in 'real-world', as opposed to syllogistic, logic. Consider the classic inference:

> Socrates is a man.
> All men are mortal.
> Therefore Socrates is mortal.

Here the premisses are provided ready-made for the inference in question, and manhood is already set up as the pivot around which the inference turns. However, in the sort of reasoning we perform in everyday life and which scientists perform both experimentally and theoretically one often needs to ***pick out*** the relevant feature around which inferences may pivot (so much so that to do it well often takes real insight and results in significant steps forward in science). Yet this too is part of logic, according to Peirce.

8. Hypostatic Abstractions as Intensional Objects?

A hypostatic abstraction such as 'dormitive virtue' seems to be an intensional object if anything is, for it is present wherever opium is present, and yet is not identical with it. It is not opium ***per se*** but something about opium — whatever it is that gives opium its tendency to put people to sleep. It therefore fulfils the criteria for one of Quine's disdained "attributes".[48] For Quine writes:

> Attributes...are individuated by this principle: two open sentences which determine the same class do not determine the same attribute unless they are analytically equivalent.[49]

Even though opium's dormitive virtue is coextensive with opium itself, it would not be truth-preserving to substitute the term, 'opium's dormitive virtue' for 'opium' in the true statement, "Opium is a pleasurable and addictive

drug".

So is Peirce, by virtue of his advocacy of hypostatic abstraction an 'intensionalist'? Not really. Why this is is best brought out by asking, What is the paradigm 'extensional object' for an extensionalist like Quine? I began this paper by citing as an example the person who is both Superman and Clark Kent, but we have seen that there is no necessity that a physical object, such as a person, which is composed of numerous parts both spatial and temporal, should be ostensively individuated in exactly the form in which we do individuate it, as Quine himself noted with respect to the Cayster. Rather, the individuation of any physical object is a hypostatic abstraction. Peirce recognised this, writing in answer to an imaginary interlocutor who questioned the reality of a "filament" (which he defined as "a portion of matter which at any one instant is situated in a line"):

> ...although all there is is particles yet there really is a filament because to say that the filament exists is simply to say that particles exist. Its mode of being is such that it consists in there being a particle in every point that a moving particle might occupy.[50]

What about the ultimate particles of which matter is composed, then? Surely they cannot be carved in different ways by a perverse and wilful individuator? Why not take them as the ultimate 'extensional objects'? Even here, however, such atoms will be extended in time, and so will be divisible into many temporal parts. For that reason, to talk about them as individuals persisting across time will also require a hypostatic abstraction. In short — when it comes to the objects of our thought (and so to the values of our bound variables), it is 'hypostatic abstractions all the way down'. There are no purely 'extensional objects' in the sense of objects whose individuation is in no way shaped by the ways in which they are identified, and from this it follows that neither are there any 'intensional objects' which fail to make the extensional grade. There are just objects, more or less determinate. Barcan Marcus has made something of the same point against Quine, noting that in complaining of the referential opacity of certain contexts, he takes for granted a notion of identity that is far from straightforward, and bears much of the responsibility for creating the problem in the first place.

> ...difficulties revolve about the substitution of equivalences in contexts involving "knows that", "is aware that", and in particular "is necessary that", and "is possible that"...the opacity lies with Quine's use of such terms as "identity", "true identity", "equality".[51]

Quine came halfway to this realisation in "Identity, Ostension and Hypostasis", but failed to follow it through to its ultimate undermining of his extensionalism. One can even identify a 'Paradox of Extensionalism', in that the more one carves one's ontology into individual chunks picked out by bound variables (which chunks are pointed to by definite descriptions but not individuated or in any sense constituted by those definite descriptions), the more those chunks will be found to possess alternative descriptions which militate against the substitutivity *salva veritate* which the extensionalism was meant to ensure. The more one reduces one's reference to pure *pointing*, the more troublesome and irreducible alternate attributes of that which is pointed to will emerge.

Where Quine is committed to a first-order logic, Peirce's logic is best described as a 'no-order logic' (or possibly an 'infinite-order logic'), in which the distinction between predicates and individuals is context-relative. More exactly, though predicates always appear with individuals (and *vice versa*) in sound inference, whether any given object of thought appears as a predicate or an individual will depend on the inferential needs at the time, and hypostatic abstraction is the logical operation that bridges the transition between the predicate and the individual.[52] The logical power of such abstractive 'level-hopping' is perhaps demonstrated most fundamentally in Peirce's reduction proof that no more than his three categories are required to do justice to all possible logical relations. This proof turns crucially on a putative relation of Fourthness being hypostatically abstracted into an individual, to which its four relata are then related by four interconnected relations of "teridentity",[53] but lack of space does not permit me to do more than mention it here.

Peirce also believed that understanding hypostatic abstraction is particularly important for analysing the logic of *mathematics*. For mathematics is a form of thought particularly prone to cannibalising itself by taking its own predicates as objects of investigation (performing "operations on operations", as Peirce puts it). So it is that abstraction reaches heights in mathematics undreamed of in the physical sciences. Quine thought that the only question raised by hypostasis in the philosophy of mathematics was whether one should be ontologically committed to classes.[54] Thus preoccupied by metaphysics, he missed the logical question raised by hypostatic abstraction — namely what is its unique and vital role in working inference (and moreover, challenging questions such as why such an inference should be so useful). This observation brings me to a final discussion of what exactly the proper relationship between logic and metaphysics might be.

9. Conclusion: Beyond Extensionalism and Intensionalism

I began this paper by opposing a crude characterisation of extensionalism as explicating truth in terms of reference to individuals which possessed a mind-independent individuation, and intensionalism as allowing at least some

role for ideas which, one would think, surely must possess a 'mind-dependent' individuation. Yet it has emerged that things are not nearly so simple. For one thing, ***ideas*** (in the form of hypostatic abstractions which are ***entia rationis***) are needed to carve out ***individuals*** from the ontological flux. For another thing, such ideas, if real, will possess an individuation that is as mind-independent as one could wish, by virtue of the realities of Firstness and of Thirdness. For once the Immediate Object has been set up (real Firstness), the determination of those features which bring it closer to its Dynamic Object (real Thirdness) may be a matter of genuine, ***a posteriori*** scientific discovery, as we saw with the example of water and H_2O.

These reflections point the way to at least some of the difference between Quine and Peirce on the relation between logic and metaphysics. We saw that Quine worked with an extensionalist framework so that he could read his ontology straight from the existential quantifier. For Peirce, however, what logic hands to metaphysics is not a set of entities, or even a set of 'types'[55] of entities. It is not the job of the logician to legislate on such matters. If he tries to, great confusion may result. For instance, we saw that Quine attacked meanings as something the naturalistically inclined philosopher should eschew. However, the notion of 'the meaning' of a term or proposition is a confused reification of a properly logical notion (which Peirce spelled out in terms of the expectations one is led to form by a sign, that is, in terms of signs' Thirdness in a thinking subject). Quine was right to be suspicious of such a confused reification, but not right to dismiss the phenomena which were wrongly reified in order to create it (such as real Thirdness).

Rather than entities or types of entities, what is provided to metaphysics by logic according to Peirce is ***modes of being*** — categories,[56] which ***all*** entities (of all types) which anyone might have cause to quantify over will partake in to some degree. Thus, in Peirce, the reified notions of 'idea' and 'individual' I began this paper with are transformed into (very roughly) an invocation of the categories of Firstness/Thirdness and of Secondness respectively. It is for the metaphysician (and these days the natural scientist) to discover and catalogue the many different types of entities there are. Peirce's categories pertain to the fundamental logical relationships which those entities might bear to one another ***qua*** entity alone. Thus Peirce's notion of the relationship between logic and metaphysics manages to be at once more minimal than Quine's (in that it 'gets out of metaphysics' way') and yet more useful, in that it provides a simple but generative categorial structure, which has been proven rich enough to capture the forms of all possible relations.

On this issue of the proper relationship between logic and metaphysics, taking into account all the advances in logic (and also, perhaps, in the foundations of mathematics) since Peirce's day, there is much more to be said, however. I suspect that someone should focus on it as an object of inquiry in its own right.[57]

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NOTES

1. See, for instance, John Boler, *Charles Peirce and Scholastic Realism: A Study of Peirce's Relation to John Duns Scotus*, (Seattle: University of Washington Press, 1963), Brian Noble, "Peirce's Definitions of Continuity and the Concept of Possibility", *Transactions of the Charles S. Peirce Society* vol. 25 (Spring 1989), pp. 149-174, Wayne Myrvold, "Peirce on Cantor's Paradox and the Continuum", *Transactions of the Charles S. Peirce Society*, vol. 31 (Summer 1995), pp. 508-541.

2. On which see, for instance, Claudine Engel-Tiercelin, "Vagueness and the Unity of C.S Peirce's Realism", *Transactions of the Charles S. Peirce Society* vol. 28 (Winter 1992), pp. 51-82, and Jay Zeman, "Peirce on the Indeterminate and on the Object: Initial Reflections", *Grazer Philosophische Studien* 32 (1988), pp. 37-49.

3. Charles Peirce, "Upon Comprehension and Extension", *Writings of Peirce: a Chronological Edition*, ed. Max Fisch, (Bloomington: Indiana University Press, 1982), vol. 2, pp. 70-86.

4. See Ruth Barcan Marcus in her paper, "Extensionality", *Mind* (1960), pp. 55-62, and also L. Jonathan Cohen, "Criteria of Intensionality", *Proceedings of the Aristotelian Society* 42 (1968), pp. 123-142.

5. Rudolf Carnap, *Meaning and Necessity* (Chicago: University of Chicago Press, 1947), p. 13.

6. Carnap, p. 1.

7. A referee has protested that Carnap's state description method reconstructs only logical truth, not analyticity for — as Quine has pointed out for a language with "extra-logical synonym-pairs" such as 'bachelor' and 'unmarried man' the state description method will assign independent truth-values to statements such as "Fred is a bachelor", and "Fred is an unmarried man". This objection seems valid, but the fact remains that Carnap himself *did* describe the state description method as "an explicatum for what Leibniz called necessary truth and Kant analytic truth". Carnap, p. 8.

8. *Ibid.*, p. 16.

9. Willard Van Orman Quine, *From a Logical Point of View* (Massachusetts: Harvard University Press, 1953), p. 48.

10. *Ibid.*, p. 11.

11. *Ibid.*, p. 48.

12. *Ibid.*, p. 22.

13. *Ibid.*, p. 48.

14. *Ibid.*, pp. 20-37.

15. *Ibid.*, p. 46.

16. *Ibid.*, p. 143.

17. *Ibid.*, p. 155.

18. *Ibid.*, p. 151.

19. *Ibid.*, pp. 156-7.

20. *Ibid.*, p. 70.

21. *Ibid.*, p. 76.

22. *Ibid.*, p. 117.

23. *Ibid.*, p. 116.

24. Charles Peirce, *Collected Papers* (Massachusetts: Harvard University Press, 1960), 6.170.

25. Charles Peirce, *New Elements of Mathematics*, ed. Carolyn Eisele, (The Hague: Mouton, 1976), Vol. 3 part I, p. 65.

26. Note, however, that although Peirce states that for every predicate there is a *single* collection, he does not make the corresponding claim in the reverse direction. (I am indebted to Jim Franklin for raising this point in private correspondence.)

27. Peirce, *Collected Papers*, 5.430.

28. D.M. Armstrong, *Universals and Scientific Realism* (Cambridge: Cambridge University Press, 1978),Vol. I, p. 1.

29. Michael Devitt, "'Ostrich Nominalism' or 'Mirage Realism'?" *Pacific Philosophical Quarterly* 61 (1980), p. 435.

30. Susan Haack has written that Armstrong may more exactly be described as a "nominalistic Aristotelian", in "'Extreme Scholastic Realism': Its Relevance to Philosophy of Science Today", *Transactions of the Charles S. Peirce Society*, Vol XXVIII, No. 1 (Winter 1992), p. 36. This is because he emphasises that universals are 'immanent' in the things that instantiate them, rather than 'transcendent'. However for the purposes of this argument the relevant factor of Armstrong's theory of universals is merely his claim that they *exist*.

31. Peirce, *Collected Papers,* 5.503.

32. Charles Peirce, *Philosophical Writings of Peirce*, ed. Justus Buchler (New York: Dover Publications, 1955), p. 355.

33. Peirce, *Collected Papers*, 4.235.

34. Charles Peirce, *Pragmatism as a Principle and Method of Right Thinking: The 1903 Harvard Lectures on Pragmatism*, ed. Patricia Turrisi (Albany: SUNY Press, 1997), p. 133.

35. T.L. Short, "Hypostatic Abstraction in Physical Science", *Grazer Philosophische Studien* 32 (1988), pp. 51-68, and "Hypostatic Abstraction in Self-Consciousness", in *The Rule of Reason*, ed. Brunning and Forster (Toronto: University of Toronto Press, 1997), pp. 289-308.

36. Peirce, *Collected Papers*, 4.463.

37. "The soporific virtue of opium is an object whose being consists in the fact not merely that opium has, in sufficient doses, always put people to sleep, but that it always will, and always would unless some other influence counteracted it." Peirce, *New Elements of Mathematics*, Vol. 4, p. 11.

38. (some "stormitive virtue", perhaps...)

39. Short, "Hypostatic Abstraction in Physical Science", pp. 54-5.

40. Peirce, *Pragmatism as a Principle and Method of Right Thinking*, p. 134.

41. *Ibid.*, p. 134.

42. Short, p. 55n.

43. Peirce, *Collected Papers*, 8.152.

44. Peirce, *Pragmatism as a Principle and Method of Right Thinking*, p. 133.

45. See, for instance, Peirce, *Collected Papers*, 4.536, though here he refers to the Dynamic*al* Object.

46. For a good account of this see Jay Zeman's paper, cited in footnote

2.

47. This point links in interesting ways with Peirce's discussion of infinitesimals and the way in which they may, in his terms, "burst open", and this would be a fruitful topic for further study.

48. It has been argued by a referee that it does not follow from the fact that opium's dormitive virtue is present whenever opium is present but not identical with it, that dormitive virtue is an *attribute*, for it might rather be a *part* of opium. This, however, seems to be ruled out on *a posteriori* grounds, since opiates and their characteristic effects on the human organism are notoriously divisible.

49. Quine, p. 157.

50. Peirce, Pragmatism as a Principle and Method of Right Thinking, p. 135.

51. Barcan Marcus, p. 60.

52. This raises the question of whether it is possible to go the other way as well — to transform individuals into predicates. This would be a form of prescissive abstraction (bearing some relationship to the scholastic notion of haecceity, insofar as a haecceity was conceived of as a property).

53. This proof is reconstructed in detail in Robert Burch, *A Peircean Reduction Thesis* (Lubbock: Texas Tech. University Press, 1995), but the ideas behind it are given a lucid exposition in Burch's "Peirce's Reduction Thesis", *Studies in the Logic of Charles Sanders Peirce*, ed. N. Houser (Bloomington: Indiana University Press, 1996), pp. 234-251.

54. See for instance, Quine, pp. 121-127.

55. Not even in the sense of type-theory, at least if each 'type' is envisaged as categorizing entities in some absolute sense.

56. Strictly speaking, the categories are first derived in Peirce's phenomenology. However, they are greatly elaborated in his logic, and one of logic's important tasks, he believed, was to deliver the fundamental conceptions of metaphysics. ("It follows that if we find three distinct and irreducible forms of rhemata, the ideas of these should be the three elementary conceptions of metaphysics." Peirce, *Collected Papers*, 3.422)

57. In the writing of this paper I am indebted to Thomas Riese for discussion about the importance of hypostatic abstraction, to Richard Robin for influential disagreement over the issue of Peirce and extensionalism, to Claudine Engel-Tiercelin for pointing out the importance of Peirce's categories within his discussion of realism, to Daniel Stoljar for discussion about Quine, and for other help to Israel Scheffler, Jim Franklin, Huw Price, Michael Hoffman, James Chase and Josh Parsons. This paper is dedicated to the memory of the late Tom Anderson, Peirce enthusiast.

REFERENCES

Armstrong, David
1989 *Universals: An Opinionated Introduction*, Colorado: Westview Press.

Boler, John
1963 *Charles Peirce and Scholastic Realism: A Study of Peirce's Relation to John Duns Scotus*, Seattle: University of Washington Press.

Burch, Robert
1996 "Peirce's Reduction Thesis", *Studies in the Logic of Charles Sanders Peirce*, ed. N. Houser. Bloomington: Indiana University Press, pp. 234-251.
Carnap, Rudolf
1947 *Meaning and Necessity*, Chicago: University of Chicago Press.
Cohen, L. Jonathan
1968 "Criteria of Intensionality", *Proceedings of the Aristotelian Society*, 42, pp. 123-142.
Devitt, Michael
1980 "'Ostrich Nominalism' or 'Mirage Realism'?", *Pacific Philosophical Quarterly*, 61, pp. 433-439.
Haack, Susan
1992 "'Extreme Scholastic Realism': Its Relevance to Philosophy of Science Today", *Transactions of the Charles S. Peirce Society*, Vol XXVIII, No. 1, pp. 19-50.
Hookway, Christopher
1985 *Peirce*, London: Routledge.
Hookway, Christopher
1988 *Quine: Language, Experience and Reality*, Stanford: Stanford University Press.
Jubien, Michael
1972 "The Intensionality of Ontological Commitment", *Nous*, 6, pp. 378-387.
Ketner, Kenneth and Putnam, Hilary
1992 "The Consequences of Mathematics", *Introduction to Reasoning and the Logic of Things: The Cambridge Conferences Lectures of 1898*, Massachusetts: Harvard University Press.
Marcus, Ruth Barcan
1960 "Extensionality", *Mind*, pp. 55-62.
Peirce, Charles S.
1955 *Philosophical Writings of Peirce*, ed. Justus Buchler, New York: Dover Publications.
Peirce, Charles S.
1960 *Collected Papers*, Massachusetts: Harvard University Press.
Peirce, Charles S.
1976 *New Elements of Mathematics*, ed. Carolyn Eisele, The Hague: Mouton.
Peirce, Charles S.
1982 "Upon Comprehension and Extension", *Writings of Peirce: a Chronological Edition*, ed. Max Fisch, Bloomington: Indiana University Press, Vol. 2, pp. 70-86.
Peirce, Charles S.
1997 *Pragmatism as a Principle and Method of Right Thinking: the 1903 Harvard Lectures on Pragmatism*, Albany: SUNY Press.
Quine, Willard Van Orman
1953 *From a Logical Point of View*, Massachusetts: Harvard University Press.

Short, T.L.
1988 "Hypostatic Abstraction in Physical Science", *Grazer Philosophische Studien,* 32, pp. 51-68.

Short, T.L.
1997 "Hypostatic Abstraction in Self-Consciousness", *The Rule of Reason*, ed. Brunning, J. and Forster, P.. Toronto: University of Toronto Press, pp. 289-308.

Weinsheimer, Joel
1983 "The Realism of C.S. Peirce, or How Homer and Nature Can be the Same", *American Journal of Semiotics*, Vol. II, No. 1-2, pp. 225-263.

Wolter, Allan
1978 "An Oxford Dialogue on Language and Metaphysics", *Review of Metaphysics,* 32, pp. 323-348.

Zalta, Edward
1988 *Intensional Logic and the Metaphysics of Intentionality*, Massachusetts: MIT Press.

Zeman, Jay
1988 "Peirce on the Indeterminate and on the Object: Initial Reflections", *Grazer Philosophische Studien,* 32, pp. 37-49.