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THE EPISTEMIC INADEQUACY OF ERSATZER POSSIBLE WORLD SEMANTICS[†]

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Abstract

In this paper it is argued that the conjunction of linguistic ersatzism, the ontologically deflationary view that possible worlds are maximal and consistent sets of sentences, and possible world semantics, the view that the meaning of a sentence is the set of possible worlds at which it is true, implies that no actual speaker can effectively use virtually any language to successfully communicate information. This result is based on complexity issues that relate to our finite computational ability to deal with large bodies of information and a strong, but well motivated, assumption about the cognitive accessibility of meanings of sentences ersatzers seem to be implicitly committed to. It follows that linguistic ersatzism, possible world semantics, or both must be rejected.

Introduction

Possible world semantics holds that the meanings of all well-formed declarative sentences in a language $\mathrm{L_i}$ are to be equated with the set of all possible worlds at which that sentence P is true.[1] Where $\mathrm{P_{wwf}}$ are the well-formed declarative sentences of language $\mathrm{L_i}$, $P \in \mathrm{P_{wwf}}$, W is the set of worlds $\{w_1, w_2, \ldots, w_n\}$ at which P is true, and W is the set of all possible worlds such that for each w_i, $w_i \in$ W:

(Def. 1) The meaning, $|P|$, of any P in a given $\mathrm{L_i} = W$.

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[1] See Lewis [1] and Cresswell [2].

There are, of course, a variety of views concerning the nature of possible worlds, and, hence, a variety of views concerning how we ought to interpret Def. 1. One attractive and ontologically conservative view is linguistic ersatzism, and this view has been championed by the likes of such notables as C.I. Lewis [3], Carnap [4], Hintikka [5] and Montague [6]. There are, however, serious problems with this particular view of possible worlds, especially as it is applied in the analysis of the semantics of actual languages as employed by real linguistic agents. These worries arise in the context of some objectionable computational aspects of possible world semantics and linguistic ersatzism that threaten our ability to cognitively grasp the meanings of sentences. As a result this conjunction of views implies our inability to communicate information and so cannot be an adequate semantics for real languages.

1. *Linguistic Ersatzism*

Before we can analyze the acceptability of this view, we must consider how the ersatzer conceives of possible worlds. Essentially, on this view a possible world is to be reductively identified with a maximal and consistent set of sentences. So we can define ersatzer possible worlds as follows. Where each S_l is a maximal and consistent set of sentences in some language and $w_{\mathrm{j}} \in \mathrm{W}$,

(Def. 2) $(\forall w_{\mathrm{i}})(\exists S_l) w_{\mathrm{i}} = S_l$.

Thus, for ersatz semantics the meaning of a sentence P is exhaustively given by linguistically specifying the various ways the total world could have been such that the sentence in question is true, and this is just to specify the set of maximally complete and consistent state-descriptions at which P is true.[2] We will refer to the set of S_l that constitute W for a given P, as S, or the 'S-set' of P. The S-set of a given P, is the semantic, or information, content

[2] One might argue that the ersatzer need not *identify* meanings with possible worlds understood as sets of sentences and suggest that the ersatzer should simply regard these constructions as useful fictions or models of actual meanings. However, this tactic is not really open to the ersatzer. First, either the ersatzer who accepts possible world semantics identifies meanings with possible worlds, or that view is simply not a version of possible world semantics. Second, without the identification of meanings with possible worlds the metaphysical motivation of ersatzism, to reject realism about possible worlds by reducing them to sets of sentences, is lost. Finally, if such a theorist holds that the sets of sentences that characterize possible worlds are merely useful fictions or models and not to be identified with meanings then the *ersatzer* not only loses any reason to reject realism about possible worlds but is in danger of being thereby committed to a rejection of realism about meaning (for more on this last problem see section 5.2).

of P in the Wittgensteinian and Popperian sense that the S-set specifies for P the "range that it leaves open to the facts (41)" [7].[3]

2. *Ersatzism and Our Grasp of Meanings*

Owing to its ontological austerity, ersatzism concerning possible worlds is one of the most well entrenched views concerning the nature of possible worlds. Nevertheless, this appealing conjunction of linguistic ersatzism and possible world semantics entails that no actual human being is physically capable of producing or comprehending meaningful sentences of most ordinary and many formal languages (i.e. no such being could possess adequate semantic competence). But of course this is absurd, and so either ersatzism or possible world semantics or both must be rejected. Deriving this conclusion that contradicts the empirical facts of human language use from the conjunction of these two compelling doctrines will require only that we accept a rather mild and well-verified claim concerning the reasoning/computational abilities of finite agents like ourselves, and an intuitively plausible claim concerning the relationship between the meaningful use of language and the cognitive accessibility of such meanings that ersatzers seem to be implicitly committed to.

3. *The Epistemic Assumption*

The first condition to be imposed on a theory of meaning is *the epistemic assumption*. It simply states that to meaningfully use, or to effectively communicate by using, a sentence requires that the user have knowledge that the sentence means what it does.[4] In other words, one must 'grasp' the meaning

[3] Compare Popper [8], 119–120.

[4] One might be tempted to claim that such beliefs need only be *de re* beliefs and not *de dicto* beliefs, but, following Pollock [9], 60–81, *de re* beliefs are either derived from prior *de dicto* beliefs or acquired directly by perception. Neither of these options would work here for the ersatzer for obvious reasons. Moreover, Salmon [10] gives us some reason to believe that *de re* beliefs are reducible to *de dicto* beliefs. Alternatively, one might be tempted to argue that effective communication requires only that one know how to use a given sentence. But, we there are good reasons to believe that knowing how to use a sentence for effective communication *requires* knowing what it means. We are in good company here in making this assumption as this sort of cognitivist view is shared in various forms by Dummet [25], Davies [26], Heck [27], Higgenbottom [28] and Larsen and Segal [29], among others.

of an expression to use it correctly.[5] In accord with the basic principles of epistemic logic this will be interpreted as requiring of A that $B_{A,T}(P$ means S) & $J_{A,T}B_{A,T}(P$ means S) & (P means S), where $B_{A,T}P$ represents A's belief that P in situation T and $J_{A,T}B_{A,T}P$ represents A's being justified in his believing that P in situation T. This principle guarantees the satisfaction of the intuitively plausible requirement that S-sets must be the object of a positive doxastic attitude on the part of A.

From this principle it follows that if $B_{A,T}(P$ means S) & $J_{A,T}B_{A,T}(P$ means S), then S must be cognitively accessible to A in some minimal respect. This derived requirement will be referred to as the doxastic assumption. Moreover, if A's successful use of a sentence requires that she believe that P means S by the epistemic assumption, then it seems that A must minimally be able to conceive that S if A is to successfully use that sentence. This further derived basic requirement will be referred to as the conceivability assumption.

3.1. *The Epistemic Assumption Formalized*

The EA may be controversial, but, nevertheless, it appears to be an important component of the sort of semantical theories to be discussed here. It can be given a more precise formulation as follows:

> (EA) For any agent A, A's use of P of L_i in situation T for purposes of effective communication $\rightarrow K_{A,T}(P$ means S).[6]

In EA $K_{A,T}(P$ means S) symbolizes A's knowledge that P means S in T, and this is intended to be in accord with Def. 1 and 2. By the basic principles of epistemic logic we can reformulate EA as follows:

> (EA′) For any agent A, A's use of P of L_i in situation T for purposes of effective communication $\rightarrow B_{A,T}(P$ means S) & $J_{A,T}B_{A,T}(P$ means S) & (P means S).

It might be argued that language users should not be required to *explicitly* verify or check that P means S; that $J_{A,T}B_{A,T}(P$ means S) need only be interpreted as it being the case that A *could* verify that P means S. Perhaps

[5] Compare Creswell [11]. Also, Jackson [12] has very recently defended this position in the context of possible worlds semantics.

[6] 'Effective communication' is here used in the sense of successful transmission of information.

it need only be the case that it is, in principle, physically *possible* for the language user to do so. In responding this way, ersatzers might be thus tempted to suggest that the meaning claims are *implicit* epistemic or doxastic states, and also that our justifications for believing that some meaning is the meaning of a given sentences need only be such that they could be produced.

So one might object that EA′ is an excessively strong epistemic principle to impose on language users in that, given this assumption, it appears that meaningful use of any sentence requires that the language user have explicit knowledge of the meaning of a sentence and that she be able in the explicit cognitive possession of the justification for the associated meaning claim, as opposed to some weaker cognitive stance toward that meaning claim such as mere belief, or partially justified belief. These worries can be accommodated as follows:

(EA″) For any agent A, A's use of P of $\mathrm{L_i}$ in situation T for purposes of effective communication $\rightarrow iB_{A,T}(P$ means S) & $\Diamond J_{A,T}B_{A,T}$ (P means S) & (P means S).

Here $iB_{A,T}P$ indicates A's implicitly believing that P in T, and $\Diamond J_{A,T}B_{A,T}$ (P means S) indicates the physical possibility of A's being justified in believing that (P means S). So all that EA″ requires of A for A to successfully communicate is that A implicitly believes that P means S and that A could justify that P means S.

Having offered this interpretation of the epistemic assumption, we can now offer a more formal presentation of the doxastic assumption as follows:

(DA) $iB_{A,T}(P$ means S) & $\Diamond J_{A,T}B_{A,T}(P$ means S) $\rightarrow C_{A,T}$S.

Here $C_{A,T}P$ means that P is conceivable for A in T. DA simply asserts that A's being in the positive but implicit doxastic state of believing truly that P means S also implies that A be able to possess the minimal, neutral, sub-doxastic state of comprehension or conception of the meaning of P. It is hard to see how this could be denied. If P is to be successfully used by A in communication, then the members of S must be thinkable for A.[7] Recall

[7] Here we are defining the requisite concept of conceivability as the type of cognitive access to members of S which requires that the members of S are consistent and which is minimally required for belief. We note that the relevant concept is closely related to David Chalmers concept of ideal positive conceivability [24], although with a verificationist twist. More importantly, while it is surely possible to conceive of set's being inconsistent or to conceive that some of its members are inconsistent (and it is in fact easy to construct arbitrary examples of such sets, e.g., the set of all round squares), it is not possible to conceive an inconsistency. The former possibility is a real possibility — it is just conceiving of the fact that a given set is inconsistent — whereas the latter kind of case is simply not possible. For

that S $=_{\text{df.}} \{S_l, S_{\text{m}}, S_{\text{n}}, \ldots, S_{\text{k}}\}$, and it seems reasonable to assume that the conceivability of S is just the conceivability of individual the elements of S.[8]

Given DA it is then plausible to believe that the additional derived principle, *the (strong) conceivability assumption*, is also true:

(SCA) $C_{A,T}\text{S} \rightarrow K_{A,T}(\oplus\text{S})$.

Here '$\oplus$S' indicates that the elements of S are individually consistent. SCA simply asserts that a meaning is conceivable for A in T only if A knows that each element of S is consistent. We can then expand the consequent of SCA as follows:

(SCA) $C_{A,T}\text{S} \rightarrow B_{A,T}(\oplus\text{S})$ & $J_{A,T}B_{A,T}(\oplus\text{S})$ & $\oplus$S.

As with EA, one might be tempted to ague that SCA is too strong and suggest that A need not explicitly believe that the members of S are individually consistent, and that A need only be (physically) able to justify this in principle.

We can then formulate the weak conceivability assumption as follows:

example one cannot conceive of a round square although one can conceive of facts about or properties of round squares, e.g., that a round square is impossible. Moreover, one can even conceive of the fact that the set of round squares is inconsistent because this is required by the fact that we know and thus believe that such a set is inconsistent. What is not conceivable is a round square since all such inconsistent states of affairs are inconceivable. The relevant point here is that the ersatzer who accepts possible world semantics is committed to the view that we must be able to conceive the members of the sets that constitute the meanings of sentences, each of which is a possible world reductively identified with a maximal and complete set of sentences. See f.n. 8 for more on this. This is to be carefully distinguished from the possibility of conceiving that an S-set is in fact inconsistent which is the basis of knowing that such an S-set is inconceivable. The relevant objects of conceivability for the purposes of our arguments are the *members* of the S-sets (and not some descriptive condition the members meet) and the members of S-sets cannot be conceived unless they are consistent.

[8] One might be tempted here to argue that the grasping of such a set does not require grasping its individual members and only requires grasping some (descriptive) condition that its members meet. But this intensionalist maneuver is not open to the ersatzer. If the descriptive condition in question is not the set of possible world descriptions constituting the meaning of the sentence, then to adopt this position would be to cede ersatzism. The meaning of the sentence being grasped would then just be the (presumably intensional) descriptive condition and not the set of sentences it describes, but this is not what ersatzism takes meaning to be.

(WCA) $C_{A,T}\mathrm{S} \rightarrow iB_{A,T}(\oplus\mathrm{S}) \,\&\, \Diamond J_{A,T}B_{A,T}(\oplus\mathrm{S}) \,\&\, \oplus\mathrm{S}$.

This principle should seem rather obviously true when we recognize that conceivability is a success term related to the primitive concept of coherent thought *simpliciter*; having positive doxastic attitudes, such as belief, towards sentences or towards the propositions they express requires that the contents of such beliefs meet some minimal (internal) coherence requirements. Of course, it follows from WCA that $\oplus$S, and so we find that, at least in terms of the meanings of declarative sentences, inconsistency is the mark of inconceivability and, by EA$''$ and DA, conceivability is a requirement for successful use of such expressions. The conceivability of these candidate possibilities, however, is not independent of our ability to verify that they are or are not consistent, as that ability seems to, at least in part, constitute the conceivability of those possibilities.[9]

While there may be something like meanings of expressions that are inconceivable but consistent, because they are too complex for us to verify as consistent, it cannot be the case that the meaning of an expression is inconsistent and conceivable. To allow inconsistencies to be conceivable seems blatantly incoherent and we must be able to distinguish the conceivable from the inconceivable if we are to meaningfully use language. So, to put it both strongly and clearly, *successful* conception requires the possibility of consistency determination. Barring then our positing 'magical' methods of consistency verification on the basis of some faculty like imagination, intuition, etc., it seems that it must be physically possible for A to determine the consistency of the elements of the members of every S for each P by some feasible, physically possible, method if she is to successfully use those sentences in communication. Otherwise, for all A knows, P might be mere gibberish and its use may convey no information at all.

[9] We want to be clear that the keystone of our argument is the contention that conceivability requires verification of consistency and we think that there are very good reasons to endorse this principle. Most importantly, unless one is willing to admit that inconsistent/impossible objects are conceivable, then it follows that if x is conceivable, then x is consistent. In effect, we regard conceiving as a mental act that requires some vetting of the conceivable from the inconceivable, since otherwise conceivability is of no use to those who defend possible world semantics or any other semantic theory for that matter. Moreover, as we argue in the subsequent paragraph, such vetting is most plausibly explained in terms of consistency verification, as opposed to other sources. For without some such test there is a burden to show by other means that it is not possible to conceive inconsistencies. We do not believe that this is possible, and we refer those respondents who believe that we can conceive inconsistencies to our discussion in f.n. 7 and to Chalmers [24]. In any case, the view that inconsistencies are conceivable is at best controversial and we believe it can thus be set to the side in the absence of any good reason to accept such a radical view of conceivability.

So it follows from EA″, DA, and WCA that A cannot meaningfully use P to communicate if the individual members of S are inconsistent, and it seems plausible to believe that A must at least be able to verify, if not *know*, this about the members of S if she is to successfully communicate information using P.[10] Again, for each P, A must be able to check, or verify, the consistency of each member of the S-set of P if A is to be able to use P successfully in communication where that is understood to involve transmitting information contained in the S-set.

One might be tempted to respond that the ersatzer is not exactly committed to EA″ and its consequences and this kind of response might take one of two predictable forms. First, one might reject EA″ and hold that meanings are not "in the head" and so the cognitive accessibility requirement that EA″ imposes on speakers is just false. Alternatively, one might simply argue that ersatzists should reject EA″ altogether in a more basic manner on the basis of deflationary concerns, and simply adopt something like a pseudo-Quinean eliminativism about meanings. In doing so, the ersatzer might just reject cognitive accessibility requirements like EA″ lock stock and barrel. These responses to EA are unconvincing for various reasons, and, as we shall see in section 5.2, they do not appear to be viable ways *for the ersatzer* to avoid the main objections to ersatzist semantics that we can now turn our attention to. But first, to sum up, we have seen that in the context of the communicative function of language the conjunction {EA″ & Def. 1 & Def. 2} entails at least that $iB_{A,T}(\oplus\text{S})$ & $\Diamond J_{A,T}B_{A,T}(\oplus\text{S})$ & $\oplus$S.

4. *The Finitude Thesis*

The second condition necessary to derive the objection to ersatzist semantics raised here is *the finitude thesis*. The finitude thesis is a general and well-verified empirical/mathematical claim concerning our finitude and the resulting limitations on our cognitive abilities that follow from our finitude, and, more specifically, in this application, the finitude thesis has radical implications concerning our inability (1) to verify the logical consistency of large sets of particular sentences in computationally feasible times, and (2) to do so for large numbers of sets of sets of sentences.

Although it is somewhat difficult to formalize the finitude thesis itself in a general manner, the basic concept is that the computational powers of actual epistemic agents are finite and radically constrained by available computational resources. In other words, we are not omniscient, we do we have infinite available time in which to execute computations, and we do not have

[10] Otherwise, P would not be a signal in the sense that signals carry *coherent* information.

unlimited computational resources at our disposal to manage information. In essence, what we would like the finitude thesis to express is the epistemic correlate of the 'ought implies can' principle of ethics. So, informally, we might regard this assumption as being constituted by the claim that:

> (FT) Epistemic requirements for actual epistemic agents must be such that they are in principle possible for agents to satisfy.

Interestingly, it turns out that the requirement that we be able to determine the consistency of the members of any given S that follows from Def. 1, Def. 2, and EA$''$ far exceeds the computational abilities of any human, thus violating FT, and, in point of fact, far exceeds the computational resources available *in the universe* for sets of sentences that are of surprisingly small size. In a related manner the requirement that we be able to check the consistency of large numbers of S-sets that would reflect the linguistic competence of normal language users far exceeds available computational resources. So we will find that FT entails $\neg C_{A,T}$S for most S, because we cannot verify that the members of most S are consistent; in other words it will be demonstrated that $\neg\Diamond J_{A,T}B_{A,T}(\oplus$S) is true. So, if it is not physically possible for any actual epistemic agent to satisfy the requirements that ersatzist possible world semantics imposes on epistemic agents when that view is conjoined with EA$''$, then that view of semantics cannot be correct if we are successful in communicating.

5. *Feasible Epistemological Tasks and Semantics*

Christopher Cherniak [13, 14] has emphasized the point that, even assuming ultra-fast but physically possible instruction execution times, consistency checking problems using truth tables for sets of sentences with as few as 138 independent atomic propositions cannot be effectively solved in times that fall within reasonable estimations of the duration of the universe from its genesis up until now, a time period of approximately 2 x 10^{10} years.[11] As Cherniak notes,

> Given the difficulties in individuating beliefs, it is not easy to estimate the number of logically independent atomic propositions in a typical human belief system, but 138 seems much too low — too "small-minded". Yet suppose that each line of the truth table for the

[11] See Thagard [15], chapter 2, for detailed consideration of the difficulties involved in computing coherence/consistency.

> conjunction of all these beliefs can be checked in the time that it takes a light ray to traverse the diameter of a proton, an appropriate cycle time for an ideal computer. At this maximum speed, a consistency test of this very modest belief system would require more time than the estimated twenty billion years from the dawn of the universe to the present (755–756) [13].

If this is true, then possible world semantics and ersatzism *cannot* be a remotely realistic model-theoretic account of the semantics of ordinary languages and even of most artificial languages as no finite agent could *ever* then, as a matter of physical necessity, meaningfully use virtually any linguistic expression of any realistic language in our world, for no such agent could ever, using truth tables, verify the consistency of any model, of any world, the description of which involves even very few independent atomic propositions. This implication, drawn out from the conjunction of possible world semantics and ersatzism, seems to blatantly contradict the facts concerning our ability to meaningfully employ language in spite of the truth of FT, and so by *reductio* either linguistic ersatzism, possible world semantics, or both must be rejected, for surely the *maximal* and consistent state descriptions of the sorts that the ersatzer proposes to identify possible worlds with will contain at least 138 independent atomic propositions. In practice, however, S-sets will be massively larger, and, hence, utterly beyond our cognitive grasp.

Of course, one might immediately object by pointing out that the truth-table method is not the only method available to us for consistency checking. To be sure, if the base logic of L_i includes the predicate calculus, then we can be sure from Church's [16] and Turing's [17] famous results that there exists no general proof procedure that could accomplish consistency verification in our language in any case; there is no such decision procedure. Other methods, e.g. natural deduction, based on the concept of theoremhood which are not algorithmic, and, hence, not undermined by the Church-Turing thesis, might appear to allow epistemic agents to verify the consistency of particular possible world candidates that are the members of given S-sets. For inconsistent formulas such procedures will never terminate, but there are methods by which we can verify that a given formula is consistent if it is consistent. However, such procedures are typically very inefficient. Moreover, in such cases we cannot reliably distinguish non-terminating proofs from long but terminating proofs.

In any case, we might ask what would be required of epistemic agents if they were to employ such procedures to verify the consistency of the ersatzer worlds that are the meanings of the sentences they competently use. For any meaningful sentence P that we consider, its S-set will be constituted by a set

of sets of sentences each of which is composed of a maximal conjunction of n negated or un-negated atomic sentences of L_i, thus there will 2^n such conjunctions that A must believe and each of which A must be able to prove to be consistent by some proof method other than the truth table method. With only a little bit of imagination one ought to be able to see that, for any ordinary language and even most artificial languages, n will be extremely large, and so A will be required to be able to construct a vast number of such consistency proofs. For a language with only 50 atomic propositions, knowing the meaning of a given P would require A's being able to constructing perhaps as many as 10^{15} such proofs, supposing that we could distinguish non-terminating proofs from long but terminating proofs (so that we could move on to the next proof).

This result is so absurd that little additional commentary seems required to conclude that such proof methods will not suffice to meet the requirements for A to be justified in believing the members of S, but consider the possibility that A could complete 1,000,000 such proofs each day (including reliably rejecting non-terminating proofs). If A could meet this exceptionally high standard, then it would require approximately 3 x 10^5 years to accomplish the task of verifying the consistency of the S-set of one simple sentence of this semantically impoverished language! Considering that the average linguistic competence of speakers of ordinary languages exceeds the correct use of one sentence by many, many, orders of magnitude and that most languages, natural and artificial, are far less impoverished, it would appear that it is not even remotely possible that finite agents can meet the requirements possible world semantics of the ersatzer sort impose on us when conjoined with EA$''$. So, barring the availability of other considerably more powerful and less time consuming consistency checking methods, FT entails that we cannot be justified in believing that the members of S-sets for virtually any P are consistent as the conjunction {EA$''$ & Def. 1 & Def. 2} requires, because actual A's cannot meet the basic requirement WCA.

5.1. *Rejecting Maximality*

In accord with suggestions made by Stalnaker [18], Hintikka [19] and Barwise and Perry [20] one might immediately respond that there is no reason that the ersatzer should not be able to appeal to incomplete or small worlds rather than maximal, or complete, worlds. This would reduce the complexity of the members of the S-sets associated with each P of L_i. The suggestion is that we need not treat world descriptions as maximal, or complete, and one might intuitively suppose that this sort of strategy would be desirable in that it would save the ersatzer from the conclusions about the incompatibility of possible world semantics and linguistic ersatzism demonstrated above. If the ways things could have been need not be complete descriptions, then

perhaps the descriptions of worlds which meanings are to be identified with could be simplified to the degree that they would be epistemically feasible for us to grasp, and hence ersatzer semantics would be able to satisfy EA″ and FT. But, the conclusion concerning how small worlds would have to be in order to be computationally tractable in the manner described above would rob most languages of their expressive power by limiting many world descriptions to far less atomic components than the 50 or 138 distinct atomic propositions noted in the examples above. There is no doubt that ordinary languages and most artificial languages far exceed such expressive power. So, the suggestion that the fact that some world descriptions are incomplete, plausible as it may seem, will not help the ersatzer to deal with the problems raised here concerning computational feasibility. Moreover, it would not appreciably reduce the number of S-sets needed for a complete semantics for a given language L_i, and so would still require of A that she be capable of checking the consistency of the members of vast numbers of S-sets; far more than any agent could even in principle possibly ever produce. So, if the ersatzer cannot legitimately reject EA″, then, by *reductio*, either Def. 1 or Def. 2 or both must be rejected.

5.2. *Why the Ersatzer Cannot Just Reject EA″*

This problem should be taken quite seriously by the ersatzer, and its gravity is accentuated in virtue of the fact that, despite appearances to the contrary, EA″ is an extremely plausible, albeit strong, epistemic constraint of theories of meaning. However, as we saw in section 4, the ersatzer might argue that his position has been saddled with a view that he rejects. However, this is not really the case. More importantly, there are good reasons to believe that EA″ is *indispensable* for those who would accept Def. 1 and Def. 2. If this is so, then it is not the case that the ersatzer can avoid the problem by simply rejecting EA″. But why might one even suspect that this is the case?

Recall that there are two more or less obvious ways in which an ersatzer might try to avoid the computational problems that afflict ersatzer worlds noted above. First, the ersatzer might reject EA″ and hold that meanings are not "in the head" and that the minimal cognitive accessibility requirement that EA″ imposes on speakers is just false. This is just the sort of externalist tactic defended by Putnam and others. Alternatively, the ersatzer might simply reject EA″ altogether on the basis of deflationary concerns, and simply adopt something like a pseudo-Quinean eliminativism about meanings. In doing so, the ersatzer might just reject cognitive accessibility requirements like EA″ lock stock and barrel by rejecting the view that there are meanings at all.

First, in response to the Putnam-inspired externalist suggestion, it should be obvious that the ersatzer cannot really appeal to this tactic without ceding ersatzism itself. One of the chief motives behind the introduction of ersatzism was to avoid accepting externalistic realism about possible worlds like the view defended by David Lewis [21]. For the ersatzer's to respond against EA″ in this manner would simply be a case of giving up Def. 2. So, rejecting EA″ by claiming that meanings are not "in the head" but that meanings exist does not work. The sentences that constitute the meanings must be somewhere, and they must be such that they are cognitively accessible to language users (even if only implicitly so). The second, Quinenan, response, that there are no meanings at all, similarly cannot be coherently adopted by the ersatzer as that also would also require directly ceding Def. 2. If there are no meanings, then meanings certainly cannot be maximal and consistent sets of sentences.

Note that the ersatzer's commitment to EA″ is not a matter of meaning internalism alone, although it does seem that most ersatzers are committed to some form of that view. Rather, the ersatzer is committed to a form of realism, albeit an unusual one. They appear to be linguistic realists in some manner or other, but cannot by their own lights plausibly be Platonists or naturalistic externalists. So if ersatzers are not semantic internalists, then it is hard to see how their view does not just turn out to be a form of eliminativism, and this does not make sense given Def. 2. So, the ersatzer does seem to be committed to EA″, and there does not seem any obvious way around this that preserves the ersatzer's deflationary motives while retaining Def. 2. Even if these metaphysical worries that derive from the ersatzer's deflationary motives could be adequately resolved, it seems that rejecting EA″ while retaining Def. 2 entails that Def. 1 is irrelevant to natural language semantics because of the FT, and so the conjunction of Def. 1 and Def. 2 cannot be a part of a realistic theory of communication. Following Davidson [22], this appears to a serious criticism of such theories, as if it is true, then ersatzer possible world semantics is irrelevant to real cases of communication.

5.3. *Grasping Some Worlds and Linguistic Competence*

Another possible manner in which linguistic ersatzers might plausibly try to avoid the results derived above is by claiming that linguistic competence requires only that one grasp *some* of the possible worlds that are elements of the meaning of a given declarative sentence as per the relevant definitions noted above. This would obviously reduce the number of consistency verifications that a competent speaker would need to perform. However, it should be clear that this is essentially to concede the spirit of Def. 1. This is the case because then there is nothing that corresponds to *the* meaning of a sentence. There will be many meanings for any declarative sentence, many of which —

presumably — would be adequate for understanding. Each of these would be constituted by a sub-set of the possible worlds at which the sentence is true. Nevertheless, there is some intuitive plausibility to this suggestion. If one needs only to grasp *some* of the possible worlds at which a sentence is true in order to communicate adequately using a given sentence, then the epistemic task required for linguistic competence is of course reduced. The problem, however, with this suggestion is that it is quite clearly intolerably vague. Absent some principled suggestion concerning which and how many worlds must be grasped in order to use a sentence competently this suggestion cannot even be seriously evaluated. Certainly, one must suspect that linguistic competence would require grasping at least a large number of possible worlds in order to know when uses of a given sentence are appropriate and that it must involve grasping some reasonable number of canonical worlds corresponding to typical usages. However if this is true, then even if the vagueness of this line of response could be eliminated it is not clear that it would solve the ersatzer's problem because as long as competence requires grasping even reasonably large numbers of possible worlds the view will be unrealistic due to the sorts of computational restrictions discussed above.

6. *Conclusion*

Given these modest results, one might be tempted to accept that possible world semantics ought to be given up so that linguistic ersatzism could be retained, but then it is hard to see what purpose the ersatzist's doctrine is to serve, for the main aim of appealing to possible worlds in the first place was to provide a philosophical analog for the models of formal model-theoretic semantics in the context of various languages, natural and otherwise. So, it would seem that the ersatzer's view seems doomed to failure as a realistic theory of semantics due to our finitude. Perhaps ersatzer's might claim that their view is not meant to be a cognitively realistic theory of semantics, but then one must wonder what it is useful for.[12] In any case, it seems that neither that doctrine nor possible world semantics may, in point of fact, be worth salvaging as anything but an overly complex abstraction. As the

[12] Ersatzer's might do well to look at Fox and Lappin [23] as a possible way to avoid some of the problems of computational tractability they appear to face. We are not hopeful that this will eliminate the main problems noted here, but that is a discussion requiring another paper. Also, it would be interesting to examine the issue of whether the worries raised about computational complexity here apply or do not apply to model-theoretic semantics in general.

finitude thesis enjoys considerable support from both empirical and mathematical sources and EA″ is implicitly assumed in ersatzer semantics this result appears to be a resilient one.

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