

DOES "POSSIBLE" EVER MEAN "LOGICALLY POSSIBLE"??*

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One skeptical challenge to our empirical knowledge – in my view the most profound and difficult – stems from the simple possibility that our experience of the world is not an accurate guide to the world around us. Descartes raised the possibility in this way: it is possible that God deceives us about even the most simple and obvious knowledge of the senses and that although we have experience as if there were a world, a sky, an earth and things upon it, there are none of these things, only the experiences placed in our mind by God. A similar but more modest possibility is that any experience of the world, including my present one, may be a hallucination.

Many philosophers have assented to such possibilities, but have denied that it follows from them that our ordinary claims to empirical knowledge and empirical certainty are wrong. Let us call the inference from the possibility of error to the denial of certainty IDC. IDC requires the following principle:

(P) If it is possible that *p*, one doesn't know that *-p*.

In the modern literature there are two prominent objections to IDC. One is that of John Austin in "Other Minds" in the section "If I Know I Can't Be Wrong". There Austin argues that (P) is not literally true; (P) is an improper expression of a pragmatic requirement that one not *say* one knows and at the same time *admit* that we may be mistaken, a requirement that one not *say* one knows and at the same time *admit* that we may be mistaken, a requirement made because of the performative content of "I know." I discuss this claim of Austin's elsewhere.¹

The second objection to IDC is based on the thesis that "possible" is ambiguous. In the sense of "possible" in which the antecedent of (P) is true (logically possible), (P) is not true. In the sense of "possible" in which (P) is true (empirically possible), the antecedent of (P) is not true. Because philosophers have confused these different senses of "possible" they have thought that both (P) and its antecedent were true and thus have mistakenly felt that IDC was warranted.² It is this objection that will be discussed in the present paper.

The claim that "possible" is ambiguous is essential to this objection. Critics of IDC admit that IDC *seems* plausible and say the apparent plausibility stems from a confusion of senses of "possible." What is required, however, is not just that "possible" is ambiguous, but that it is ambiguous *in a single sentence*. If "possible" is ambiguous in different sentential contexts but any given sentence in which it is embedded is univocal, then the apparent plausibility of IDC cannot be explained by claiming that different senses of "possible" are being confused. The inference is made from a sentence, not a single word. The *sentence* from which the inference is made must be ambiguous if confusion of senses is to explain the apparent plausibility of IDC.

What sentence (or sentence form) is claimed to be ambiguous? Skeptical possibilities of error are commonly raised in the following words: "it is possible, after all, that God has placed all these experiences in our minds but that there is no external reality" or "it is possible that you are just seeing things and that there is nothing really there." That is, the sentence form is "it is possible" followed by "that" and a sentence in the indicative. (Hereafter this sentence form is referred to as "possible TI".) The purpose of this paper is to evaluate whether sentences of the form "possible TI" are ambiguous.

The view of the writer is that "possible TI" is not ambiguous and that the objection that skeptics confuse senses of "possible" is not correct. In this paper I argue for the following thesis: an examination of the semantics of "possible" in its ordinary use does not warrant the conclusion that "possible TI" is ambiguous. This paper is part of a project aimed at undermining the objection to skeptical arguments that they involve a confusion of senses of "possible." Here I examine only *one* sort of argument that "possible TI" is ambiguous. I examine other arguments for the ambiguity of "possible" elsewhere.³

THE SEMANTICS OF “POSSIBLE”

To defeat IDC and at the same time explain its plausibility it is necessary to show that “possible TI” is ambiguous. Let us assume that there is a sense of “possible TI” such that (P) is true and necessarily so. We will call this sense of “possible” its epistemic sense. In the epistemic sense of “possible” the result of substituting for “p” in (1) is a deviant sentence:⁴

(1) It is possible that p, but I know that -p.

“Possible TI” has a non-epistemic sense just in case it has a sense such that, on some substitution for “p,” (1) is not deviant (and, presumably, true).

We will use a simpler test for a non-epistemic sense of “possible TI” than the non-deviance of (1) on some substitution for “p.” “S knows that p” entails that p. So it is a *necessary* condition of their being a non-epistemic sense of “possible” that (2) is not deviant when we substitute for “p.”

(2) It is possible that p, but -p.

I will argue that “possible TI” does not have a non-epistemic sense by showing that whenever we substitute for “p” in (2) the result is a deviant sentence; I will develop my discussion of the semantics of “possible” by contrasting “possible TI” with two other complements of “possible”:

possible FT_a: “It is possible” followed by an infinitive verb phrase. (E.g., “It is possible to get through that hole.”)

possible FT_b: “It is possible” followed by “for” and a noun phrase and an infinitive verb phrase. (E.g., “It is possible for a midget to get through that hole.”)

possible TS: “It is possible” followed by “that” and a sentence in the subjunctive mood, signified by “should.” (E.g., “It is possible that the Giants should have won The Pennant.”)

We can now give a necessary condition for non-epistemic senses of “possible TS” and “possible FT” parallel to the condition provided by (2). “Possible TS” has a non-epistemic sense only if (2') is not deviant on some substitution for “a” and “F”:

(2') It is possible that a should F, but a does not F.

And "possible FT" has a non-epistemic sense only if (2'') is not deviant on some substitution for "a" and "F":

(2'') It is possible for a to F, but a does not F.

Moreover, substitution in (1') and (1'')

(1') It is possible that a should F, but I know that a does not F.

(1'') It is possible for a to F, but I know that a does not F.

provides a decisive test for non-epistemic senses of "possible TS" and "possible FT."

In what follows I will show that substitution in (2') and (2'') (and in (1') and (1'')) indicates that there are non-epistemic senses of "possible TS" and "possible FT," but corresponding substitution in (2) fails to turn up evidence that there is a non-epistemic sense of "possible TI."

The most common view that there is a non-epistemic sense of "possible TI" is this: Sometimes "It is possible that p" has the sense "It is logically possible that p" and what this means is that "p" cannot be ruled out *a priori* or on purely "logical" considerations. Of course, if this is *all* it means, it is consistent with its being possible that p in this sense that it is certain that -p or that we know that -p when we take everything that is known into account and not just "logical" considerations. Thus if there is some such sense of "possible TI," then "possible TI" is ambiguous and has a non-epistemic sense, as well as an epistemic sense.

Contrary to the view that "possible TI" is ambiguous and sometimes means "logically possible" I will argue that "possible TI" is not ambiguous and never means just "logically possible." "Possible TS" and "possible FT" are indeterminate in sense. In particular contexts these constructions often take non-epistemic senses, including "logically possible," "physically possible," "technologically possible," "Legally possible" – in fact "possible TS" and "possible FT" may take as many senses as there are definable sets of concerns with respect to which we may wish to assess whether something is possible.

"Possible" can in general be rendered as "consistent with." In the forms "possible FT" and "possible TS" *what* something is said to be consistent with is usually determined by the context of discourse. Sometimes it will include all the factors causally relevant to an occurrence or state of affairs, sometimes only some of them, sometimes all or some of the factors relevant to whether

an occurrence is good, in keeping with the rules, and so forth. When used in these more limited senses, “possible TS” and “possible FT” are non-epistemic.

However, when used with TI the sense of “possible” is “consistent with what is certain.” The following equivalence holds: it is possible that $p \equiv$ it is not certain that $\neg p$.

If we study the semantics of FT, TS, and TI complements with other adjectives, we will get a clue which will be useful in solving the mysteries of “possible.” Such a study shows that FT and TS tend to be used with one set of words and TI with another set and that the adjectives that take FT and TS as complements are generally non-epistemic while those that take the TI complement are epistemic.

We can divide the three complements TS, FT, and TI into two groups, placing TS and FT together. “Permissible,” “necessary,” “desirable,” “right,” and “wrong” all go naturally with FT and TS, but less naturally or quite unnaturally with TI. On the other hand, “probable,” “likely,” “obvious,” “clear,” and “certain” all take TI as a complement but not FT and TS.⁵ A glance at these groups suggests that the groupings are semantic in origin.

Most adjectives complemented by TS and FT imply nothing about the facts or our knowledge of them. Thus all of the following sentences make sense:

- (3)(a) It was necessary for him to lob and because he did he was able to win.
- (b) It was necessary for him to lob and because he didn't he lost.
- (c) Because of his style of play it is desirable for him to have an aluminium racket and because he does he has an advantage.
- (d) Because of his style of play it is desirable for him to have an aluminium racket and because he doesn't he is at a disadvantage.
- (e) It was necessary at that time that he should retire and because he did he saved himself disgrace.
- (f) It was necessary at that time that he should retire and because he didn't he was disgraced.
- (g) It was desirable that he should refuse the offer and because he did he won their respect.
- (h) It was desirable that he should refuse the offer and because he didn't they lost some respect for him.

I will call an adjective “abstract” if it implies nothing about the facts or about our knowledge of them (neither factive nor counterfactive nor epistemic). As a criterion for abstractness we can use the following condition: an adjective \emptyset which takes FT and TS as complements is abstract just in case the sentences in (4) may be true on appropriate substitutions for “a” and “F”:

- (4)(a) it is \emptyset for a to F and a does F.
- (b) it is \emptyset for a to F and a does not F.
- (c) it is \emptyset for a should F and a does F.
- (d) it is \emptyset that a should F and a does not F.

Using this definition we may say that “desirable” and “necessary” are abstract. The same is true of most of the adjectives that TS or FT complements – most but not all:

- (5) *It is wrong for John to berate his parents – so it is good that he doesn’t.

The sentence is deviant. When we say it is wrong for John to berate his parents, we imply that John berates his parents. So “wrong” is not abstract. What is desirable may or may not be the case. On the other hand, only things which are done *are* wrong; things that aren’t done *would* be wrong if they were.

The feature of abstractness is, then, basically a feature of the adjective. However, we can say that FT and TS are usually abstract because they tend to be complements of adjectives which are abstract. On the other hand, the adjectives which take the TI complement are not only not abstract; they are straightforwardly epistemic. Since whatever is abstract is not epistemic, this tendency of FT and TS to be used with adjectives that are abstract and of TI to be used with adjectives that are epistemic is important for the semantics of “possible,” which takes TI as a complement as well as FT and TS. It gives us a clue where to look for non-epistemic senses of “possible.”

“Possible TS” is often not epistemic. Suppose we are trying to explain to someone how the pairings in a tennis tournament limit the possibilities as to who should play against whom in the finals. Showing someone a chart of the pairings, we might say, “So it is possible that Reed should play Laver in the finals, but it isn’t possible that Smith should play Laver – if *they* meet it would have to be in the semi-finals.” In saying this we have *not* said anything about whether it is possible that Reed will play Laver in the finals. There is nothing odd about (6):

- (6) It is possible that Reed should play Laver in the finals, even though he won't.

While (7) is odd:⁶

- (7) *It is possible that Reed will play Laver in the finals, even though he won't.

In (2) and (2') we provided necessary conditions for non-epistemic senses of “possible TI” and “possible TS.” (6) and (7) are the result of substituting in (2) and (2'). So far the evidence is that “possible TS” may have a non-epistemic sense, but that “possible TI” does not.

Let us note as well that (8) is not deviant:

- (8) It is possible that Reed should play Laver in the finals, but I know that he won't.

We can conclude that “possible TS” does have a non-epistemic sense, since (8) is the result of substituting in (1') for “a” and “F.” Hereafter, I will not bother to provide substitutions in (1') and (1'') to show that “possible TS” and “possible FT” meet the necessary and sufficient condition for a non-epistemic sense. I will infer from the meeting of the necessary conditions provided by (2') and (2'') that the necessary and sufficient condition is met. I will leave it to the reader to provide the further examples which prove that “possible TS” and “possible FT” have non-epistemic senses.

The sense of “possible TS” in the tennis example is determined by the context in which the expression is used. In that example, “possible TS” does not mean “logically possible” or “causally possible” or “physically possible.” In fact the sense of that expression in that example does not correspond to any “customary” sense given to “possible.” I suggest that “possible TS” can be rendered as “consistent with” and that the completion “consistent with” is determined by the context of discourse. In this example “consistent with” is to be completed by “the limitations imposed by the pairing procedure.”

That “possible TS” is often non-epistemic is even clearer if we consider sentences in the past tenses. Clearly “It is possible that Boston should have long jumped thirty feet” does not imply that it is possible that he did.⁷ So (9) is a perfectly straightforward sentence.

- (9) It is possible that Boston should have long jumped thirty feet, but he didn't.

But (10) is deviant:

- (10) *It is possible that Boston long jumped thirty feet, but he didn't.

So, once again, "possible TS" is not epistemic, while as yet there is no evidence that "possible TI" has a non-epistemic sense.

Other examples can illustrate that "possible TS" is often not epistemic and that the sense is often determined by context. "It is possible that the court should decide to hear the case" may mean that it is consistent with the law and may not imply that it is possible that the court will decide to hear the case. That is, (11) is not deviant, while (12) is.

- (11) *It is possible that a dropped object will not fall, but it but it won't.
 (12) *It is possible that the court will decide to hear the case, but it won't.

Finally philosophers may say that while it is not possible that an object should fall upward, it is possible that a dropped object should not fall, meaning that it is consistent with what can be known *a priori* that this should happen (this is one common sense of "logically possible"). So (13) is not deviant:

- (13) It is possible that a dropped object should not fall, but it always will.

In contrast, (14) is deviant:

- (14) *It is possible that a dropped object will not fall, but it always will.

As before, substitution in (2') indicates that "possible TS" takes a non-epistemic sense, while corresponding substitution in (2) fails to show that "possible TS" takes any non-epistemic senses.

What I have to say about "possible FT" parallels what has already been said about "possible TS." To go back to the example of the tennis pairings we have (15):

- (15) It is possible for Reed and Laver to meet in the finals, even though Reed will never get there.

where "possible FT" means "consistent with the limitations imposed by the pairing procedure." In (16):

- (16) It is possible to drive to Chicago in four hours, but we will not get there that fast because of the way they patrol the highways.

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"possible FT" means something like "consistent with the limitations imposed by the driver, the machine and the roads." However, it is also indicated in (16) that driving to Chicago in four hours is not consistent with the limitations imposed by the police. In (17):

- (17) It is possible for a human to run a mile in less than 3:50, but not in less than 3:30.

"possible FT" may take the sense "consistent with the limitation imposed by human biology," or "physically possible." In (18):

- (18) It is possible to map the rational numbers onto the integers.

"Possible" means "mathematically possible," or "consistent with the principles of mathematics." However, one can never physically complete the mapping. "Possible FT" does not have the sense "logically possible," meaning "consistent with what can be known *a priori*." But in (19):

- (19) It is possible to derive every valid formula as a theorem of quantification theory.

we could say that the sense of "possible" is "consistent with the principles of quantification theory."

(15) and (16) are basically substitutions in (2") and thus indicate non-epistemic senses of "possible FT." We could also construct non-deviant sentences from (17)-(19) which were substitutions in (2"). However, all of the corresponding "possible TI" sentences are deviant.

- (20) *It is possible that we will drive to Chicago in four hours, but we will not get there that fast because of the way they patrol the highways.
- (21) *It is possible that someone will run the mile in less than 3:50, but no one ever will.
- (22) *It is possible that someone will map the rational numbers onto the integers, but no one ever will.
- (23) *It is possible that someone will derive every valid formula as a theorem of quantification theory, but no one ever will.

Once again, we fail to find a substitution in (2) which yields a sentence which is not deviant. There is no evidence that "possible TI" has a non-epistemic sense.

In order to refute and at the same time explain the plausi-

bility of IDC it is necessary to claim that "possible" has different senses which are confused by skeptics. As we saw, it is necessary to claim that "possible TI" is ambiguous and has a non-epistemic sense. However, a study of the semantics of "possible" fails to warrant either of the last two claims.

What that study does show is that "possible TS" and "possible FT" often have their senses determined by context, may take different senses, and often have non-epistemic senses. However, none of this helps the refutation of IDC, which requires that "possible TI" should be ambiguous and have a non-epistemic as well as an epistemic sense.

The data do not support these claims about "possible TI." Every attempt to find a non-deviant utterance of the form of (2) failed (sentences (8), (10), (12), (14), and (20)-(23) all of which were of the form of (2), were deviant). If "possible TI" is the construction used to raise skeptical possibilities, the evidence does not support the claim that the plausibility of IDC stems from the confusion of senses of "possible." As far as I can tell "it is possible that p" always means "it is not certain that -p."

It may be objected that "possible TI" is not the sentence form relevant to IDC and that *other* sentence forms are ambiguous and are the source of the persuasiveness of skeptical arguments. To this objection there are three replies. (1) Many philosophers have raised the possibility of error using "possible TI" or equivalent forms. (2) Norman Malcolm, the most prominent advocate of the view that "possible" is ambiguous, most often mentions "possible TI" as the sentence form that is ambiguous. (3) To those sympathetic to Cartesian skepticism it does *seem*, on reflection, possible that any given experience of the world is an hallucination, and this intuition about what is possible does not seem to be the product of an inference.

If these three reasons are not felt by the reader to be sufficient for regarding "possible TI" as the key sentence form in which skeptical possibilities are raised and from which skeptical conclusions are drawn, then he must regard the present paper as arguing for a hypothetical thesis: if "possible TI" is the form in which skeptical possibilities are raised and from which skeptical plausibility of skeptical conclusions cannot be explained by the supposition that skeptics have confused senses of "possible." A study of the semantics of "possible" does not show "possible TI" to be ambiguous.

APPENDIX: “POSSIBLE” AND THE MODALS

The purpose of this appendix is to show how the distinction between abstract and epistemic senses applies to the modals and to elaborate somewhat on how the senses of “possible” are determined.

Most of the modals have an epistemic form as well as a form which may be either epistemic or abstract. In the following pairs the second sentence represents that interpretation of the first that is epistemic:

- I. (a) He must take care of his children.
(b) It must be that he takes care of his children.
- II. (a) John should be at the party.
(b) It should be that John is at the party.
- III. (a) Jones could be elected president.
(b) It could be that Jones will be elected president.
- IV. (a) He may take the turn at first.
It may be that he will take the turn at first.

In each pair the (b) sentence is epistemic while the (a) sentence can be interpreted abstractly as well as epistemically. Suppose we are discussing someone’s duties toward his children. We might say

- I. (a') He must take care of his children, but unfortunately he doesn't.

On the other hand the following is deviant:

- I. (b') *It must be that he takes care of his children, but unfortunately he doesn't.

If John likes to bump and this is a bumping party then

- II. (a') John should be at the party even though he isn't.

On the other hand II.(b') is deviant:

- II. (b') *It should be that John is at the party though he isn't.

If the constitution places John among those eligible to be elected president, then:

- III. (a') John could be elected president even though he won't be.

But III.(b') is deviant:

III. (b') *It could be that John will be elected president even though he won't be.

If the manager has instructed the players that they may take a turn at first on this sort of hit, then:

IV. (a') He may take the turn at first, but he won't.

While IV.(b') is deviant:

IV. (b') *It may be that he will take the turn at first, but he won't.

"Can" does not take the (b) forms. "It can be" does not occur with TI. "It can happen" does take TI, but only to make a general statement. Thus (24) is acceptable while (25) is deviant:

(24) It can happen that a player will score from first on a single.

To clarify how I think "possible" is used I suggest the following semantic equivalences:

(26) "It is possible FT" = "...can..."

(27) "It is possible TS" = "...could..." (and "It is possible TS" in its epistemic sense⁸ = "It could be TI")

(28) "It is possible TI" = "It may be TI"

If these equivalences are correct, then "possible" constructions are equivalent to "can," "could," and "may." The "can" and "could" versions of "possible" ("possible FT" and "possible TS") are often used to raise abstract possibilities. These sentence forms are *per se* neither factive nor epistemic. "Possible TI" (= "it may be TI") is epistemic.

The theory of the present paper is that the abstract constructions with "possible" — "possible TS" and "possible FT" — are indeterminate. The meaning of "possible" is "consistent with." The completion of "consistent with" is supplied by context in the abstract constructions of "possible." Here I will develop this analysis somewhat.

Generally the completion of "consistent with" is determined by context, but this is not always the case. There are some uses of "possible TS" where the completion of "consistent with" is contained in the sentence. Suppose after looking for my wallet and finding it on top of the bookcase, my wife should tease me about going down to the car to look for it, since neither of us had seen it there. I might reply, "It is possible that it should have been in

the car without our having seen it.” (This is not the same as saying “It is possible that it was in the car without our having seen it,” which means that it is consistent with what is certain that it was in the car and we didn’t see it.) The meaning of this sentence is that the wallet’s having been in the car is consistent with our not having seen it. The completion of “consistent with” is contained *within* the sentence in this case.

We also should note that there is a use of “possible TS” where the subjunctive “should” is epistemic. In the sentence (29):

- (29) It is possible that the Warriors should win again, but unlikely, considering their shooting.

the word “should” can be replaced by “will” without substantially altering the meaning.

This epistemic sense of “possible TS” can be handled in terms of our general account of “possible TS.” We have said that the use of TS with “possible” allows us to abstract and to comment on the question of whether a particular occurrence is consistent with a limited set of factors: *a priori* knowledge, the law, the pairing procedure, etc. Sometimes we may be discussing whether an occurrence is consistent with *all* the factors causally relevant to its occurrence. In such a context “possible TS” will imply “possible TI” – “It is possible that the Warriors should win” will imply “It is possible that the Warriors will win.” So we can treat the epistemic “should” in keeping with our general account of “possible TS.”

The epistemic “should” requires us to qualify our thesis that “possible TS” and “possible FT” are abstract or non-epistemic constructions of “possible.” The meaning of “possible TS” sentences is underdetermined. Because this is so “possible TS” sometimes takes an epistemic sense and sometimes takes the sense “logically possible,” as well as other abstract senses.¹⁰

Other writers on these subjects, while distinguishing epistemic from logical possibility, have linked logical possibility with epistemic possibility and contrasted both with those uses of “possible” relevant to the moral or practical realm. Thus Hacking distinguishes L-occurrences of “possible” from M-occurrences (see fn. 4). And Karttunen¹¹ introduces his article on “possible” and “must” by saying he will discuss “possible” only to the extent that it expresses “epistemic or logical possibility” and that he “will not discuss the so-called deontic sense of *must* or the permissive use of *may*.” I have argued, on the contrary, that the

study of sentence deviance tends to link logical possibility more closely with legal and other forms of possibility all of which I have labeled "abstract."

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NOTES

¹ See my "Are We Ever Right to Say We Know" *American Philosophical Quarterly* 1978.

² For the most widely known presentation of this objection see Norman Malcolm, "The Verification Argument" in his *Knowledge and Certainty* (Englewood Cliffs, N.J.: Prentice Hall, Inc. 1963) pp. 1-57.

³ See my *The Ambiguity of "Possible" in Skeptical Arguments* (Ph.D. dissertation, Harvard University, 1972), especially chapters III-VI.

⁴ As is currently common I use "deviant" for a wider class of sentences than those that are syntactically deviant. I believe that the deviance under discussion is semantic deviance. I am about to argue that substitutions in (1) are always deviant. They are deviant, I believe, because "I know that -p" entails "it is certain that -p" and "it is possible that p" is equivalent to "it is not certain that -p."

⁵ "Unlikely" and "improbable" do take TS as a complement. This is because there is a subjunctive "should" which is epistemic. (See appendix)

Already my account differs from some traditional ones. While the distinction between "possible TI" and "possible TS" was made long ago by G.E. Moore (see his "Certainty" in his *Philosophical Papers* (New York: Macmillan, 1959)), a follower of Moore, Ian Hacking, has grouped "possible TS" and "possible TI" together and contrasted them with "possible FT" (see "Possibility" in *Philosophical Review* (Vol. 76) 1967)). Hacking says that we have an L-occurrence of "possible" if we can replace "possible" with "probable" without destroying sentencehood; otherwise we have an M-occurrence. He feels that this criterion groups "possible TI" and "possible TS" together and distinguishes them from "possible FT." In contrast, I feel that while *"It is probable for Laver to play Newcombe in the finals" is stranger than *"It is probable that Laver should play Newcombe in the finals," both are deviant. In a more recent article ("All Kinds of Possibility" *Philosophical Review* (Vol.84) 1975)), Hacking corrects his error and agrees with this writer that "possible TS" should be considered as M-occurrence.

⁶ I assume normal stress pattern. (7) is not deviant if "possible" is stressed. One might well wonder *why* (7) is deviant. I suggest the following explanation: in saying that -p one implies that one believes that one knows that -p. It is the implication of belief that one knows that -p combined with the statement that it is possible that p that creates the deviance. (See footnote §4) If this explanation is correct, the deviance is not, strictly speaking, semantic deviance, but pragmatic de-

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viance, created by the *assertion* that *p*. This hypothesis explains why (7) is deviant even though “It was possible that Reed would play Laver in the finals, but he didn’t” is not deviant – in saying that he didn’t I imply that I know that he didn’t, not that I knew that he wouldn’t. The sentence * “It was possible that Reed would play Laver in the finals, but I knew that he wouldn’t” is deviant. I think the tests provided by substitution in (1) and substitution in (2) are equivalent if we keep the present tense.

⁷ Of course this sentence does imply that we do not know that Boston long jumped thirty feet (“It is possible that Boston should have long jumped thirty feet and he did” is odd.) We can explain this implication as follows: if he did it and we know that he did it, it is pointless to discuss whether it is possible that he should have done it. So in saying that it is possible that he should have done it we imply either that we don’t know whether he did it or that we do know and that he didn’t do it. (When it is assumed that we know whether he did it, saying that it is possible that he should have done it carries a counterfactual implication. So counterfactual implications of “possible TS” can also be explained on the view presented here.) So we can explain the epistemic implications of “possible should have” without supposing that the expression is *per se* epistemic. For a similar explanation of the same phenomenon, see Lauri Karttunen, “Possible and Must” in J.M. Kimball (ed.) *Syntax and Semantics*, Vol. I (New York: Seminar Press).

⁸ See page 401 below.

⁹ A similar example is given in Hacking’s “Possibility”, pp. 147-8.

¹⁰ “Must” and “necessary” can be understood similarly. “Must” has both abstract and epistemic senses. “Necessary” is followed only by TS and FT complements and is always abstract. “Must” and “necessary” are relational. What we must do, what must occur, what is necessary is what we must do in order to achieve something, what must occur if something else is to occur, and what is necessary *for* something else. Just as we said the root notion of “possible” is “consistent with,” so the root meaning of “must” and “necessary” is “required by.” In its epistemic sense, “must” means “required by what is certain.” So in its epistemic sense, “must” signifies *derived* certainty. In its abstract uses what does the requiring is determined by context. “It is necessary to brake” may mean that stopping requires braking. The requirement is causal. “It is necessary to care for ones’ children” may mean that morality requires parents to care for their children. Sometimes the requirement is contained within the sentence: “It is necessary for a good swimmer to practice every day” means that swimming well requires daily practice. Often in sentences of the form *If... then... must...* the requirement is contained within the sentence: “If Bill has a diamond ring, then he must have stolen it,” means that his having a diamond ring (causally) requires his having stolen it. Sometimes the requirement is logical, as when we say that if A and B are true, C must be true, meaning that the truth of A and B (logically) requires the truth of C.

The opposite of “it must be” is “it can’t be,” which expresses inferred epistemic impossibility (as noted, “it can be” does not occur). “It must be that *p* \equiv it can’t be that $\neg p$ ” expresses the correct equivalence in cases of *inferred* certainty.

¹¹ See Karttunen, *op.cit.*