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REVISABILITY AND CONCEPTUAL CHANGE IN "TWO DOGMAS OF EMPIRICISM"

W. V. Quine's article "Two Dogmas of Empiricism" is one of the most influential works in twentieth-century philosophy.¹ The article is cast most explicitly as an argument against logical empiricists such as Carnap, arguing against the analytic/synthetic distinction that they appeal to along with their verificationism. But the article has been read much more broadly as an attack on the notion of the a priori and on the program of conceptual analysis.

I will address Quine's article construed as a critique of the notions of analyticity and apriority. I will focus especially on the most influential part of Quine's article: the arguments in the final section concerning revisability and conceptual change. In addressing these arguments, I will adopt a line of response grounded in Carnap's underappreciated article "Meaning and Synonymy in Natural Languages."² I will argue that an analysis inspired by this article, when conjoined with tools drawn from contemporary two-dimensional semantics and from Bayesian confirmation theory, provides what is needed to reject Quine's argument.

I will not give a positive account of the analytic or the a priori beyond the standard definition of analyticity as truth in virtue of meaning and of apriority as knowability with justification independent of experience. I am more inclined to defend the notion of apriority than the notion of analyticity, so I will focus more on the former, but the response that I will develop can be used to defend either notion from Quine's critique.

¹W. V. Quine, "Two Dogmas of Empiricism," *Philosophical Review*, LX, 1 (January 1951): 20–43.

²Rudolf Carnap, "Meaning and Synonymy in Natural Languages," *Philosophical Studies*, vi, 3 (April 1955): 33–47. Reprinted as Appendix D of Carnap's *Meaning and Necessity: A Study in Semantics and Modal Logic* (Chicago: University Press, 1956).

I. THE ARGUMENTS OF "TWO DOGMAS"

In sections I through IV of "Two Dogmas," Quine argues that if one tries to make sense of the notion of analyticity, one ends up moving in a circle through cognate notions (synonymy, definition, semantic rules, meaning), and one cannot break out of the circle. Many philosophers have been unmoved by this worry, as it seems that one finds a similar circle for all sorts of philosophically important notions: consciousness, causation, freedom, value, existence. So I will set these criticisms aside here.

In section V of the article, Quine makes points that specifically address Carnap's logical empiricism, criticizing his construction of physical concepts from phenomenal concepts in the *Aufbau*, and his verification theory of meaning. I will set these points aside here, as I am not concerned to defend Carnap's construction or the verification theory of meaning.

The extraordinary influence of Quine's article can be traced in large part to its short final section. Part of this influence stems from the positive picture that Quine offers in the first paragraph of the section, characterizing the totality of our knowledge as a "man-made fabric which impinges on experience only along the edges," in which "no particular experiences are linked with any particular statements in the interior of the field, except indirectly through considerations of equilibrium, affecting the field as a whole." This picture serves as a powerful alternative to the verificationist picture provided by some logical empiricists, but it does not contain any direct argument against the analytic/synthetic distinction or the related notion of apriority.

The most influential arguments against an analytic/synthetic distinction are found in the second paragraph, which I quote in full:

If this view is right, it is misleading to speak of the empirical content of an individual statement—especially if it be a statement at all remote from the experiential periphery of the field. Furthermore it becomes folly to seek a boundary between synthetic statements, which hold contingently on experience, and analytic statements which hold come what may. Any statement can be held true come what may, if we make drastic enough adjustments elsewhere in the system. Even a statement very close to the periphery can be held true in the face of recalcitrant experience by pleading hallucination or by amending certain statements of the kind called logical laws. Conversely, by the same token, no statement is immune to revision. Revision even of the logical law of the excluded middle has been proposed as a means of simplifying quantum mechanics; and what difference is there in principle between such a shift and the shift whereby Kepler superseded Ptolemy, or Einstein Newton, or Darwin Aristotle?³

³ Quine, *op. cit.*, p. 40.

I will focus on these critical arguments. There are two crucial points.

(Q1) "Any statement can be held true come what may, if we make drastic enough adjustments elsewhere in the system."

(Q2) "No statement is immune to revision."

If (Q1) and (Q2) are read as mere psychological claims, saying that as a matter of fact someone might hold onto or revise any statement, then they are highly plausible, but not much of interest will follow from them. Quine is saying something more than this. We can understand (Q1) as saying that any statement can be *rationally* held true come what may, and (Q2) as saying that that no statement is immune to *rational* revision. These points have interesting consequences.

Many have taken these points to suggest either that no sentences are analytic, or that no distinction can be drawn between analytic and synthetic sentences. One possible connection goes via the theses that analytic sentences are those that can be rationally held true come what may and that all analytic sentences are immune to rational revision. If so, (Q1) suggests that by the first criterion, all sentences will count as analytic. And (Q2) suggests that by the second criterion, no sentence will count as analytic. Either way, there is no useful distinction between analytic and synthetic sentences to be had. Similarly, if we assume that a priori sentences are those that can be rationally held true come what may and that all a priori sentences are immune to revision, (Q1) and (Q2) suggest that there is no useful distinction between a priori and a posteriori sentences to be had.

One common response to the argument from (Q2) is to suggest that revisability is quite compatible with apriority (or analyticity), on the grounds that a priori justification (or the justification we have for believing analytic sentences) is defeasible.⁴ For example, I might know a mathematical claim a priori, but my justification might be defeated if I learn that a leading mathematician thinks that the claim is false. I think that this response is correct as far as it goes, but to rest entirely on it would be to concede a great deal to Quine. On a common traditional conception, at least some a priori justification (and some justification for believing analytic truths) is indefeasible.

⁴ See, for example, Hartry Field, "The A Prioricity of Logic," *Proceedings of the Aristotelian Society*, n. s., xcvi (1996): 359–79. Philip Kitcher, "A Priori Knowledge Revisited," in Paul Boghossian and Christopher Peacocke, eds., *New Essays on the A Priori* (New York: Oxford, 2000), pp. 65–91, defends a conception of the a priori that requires indefeasibility, while Peacocke, *The Realm of Reason* (New York: Oxford, 2004) defends a conception that does not. For present purposes I will remain neutral on whether apriority entails some sort of ideal indefeasibility; the observation about testimony in section vi contains some relevant discussion.

One reasonably might hold that some a priori justification (in logic or mathematics, say) yields not just knowledge but certainty, at least on ideal reflection. These claims are not obviously correct, but they are also not obviously incorrect, and I do not think that Quine's argument establishes that they are false. So I will take another line of response.

The response I will develop takes off from the response given by Grice and Strawson at the end of their article "In Defense of a Dogma." This response holds that (Q1) and (Q2) are compatible with an analytic/synthetic distinction, for a reason quite different from the one given above. Here is a passage addressing the argument from (Q2):

Now for the doctrine that there is no statement which is in principle immune from revision, no statement which might not be given up in the face of experience. Acceptance of this doctrine is quite consistent with adherence to the distinction between analytic and synthetic statements. Only, the adherent of *this* distinction must also insist on another; on the distinction between that kind of giving up which consists in merely admitting falsity, and that kind of giving up which involves changing or dropping a concept or set of concepts. Any form of words at one time held to express something true may, no doubt, at another time, come to be held to express something false. But it is not only philosophers who would distinguish between the case where this happens as the result of a change of opinion solely as to matters of fact, and the case where this happens at least partly as a result of a shift in the sense of the words. Where such a shift in the sense of the words is a necessary condition of the change in truth-value, then the adherent of the distinction will say that the form of words in question changes from expressing an analytic statement to expressing a synthetic statement.... And if we can make sense of this idea, then we can perfectly well preserve the distinction between the analytic and the synthetic, while conceding to Quine the revisability-in-principle of everything we say.⁵

Here the central point is that our judgments about any *sentence*, even an analytic sentence, will be revisable if the meaning of the words change. For example, if 'bachelor' changes from a term for unmarried men to a term for sociable men, then we will no longer judge that 'All bachelors are unmarried' is true. But this observation is just what an adherent of the analytic/synthetic distinction should expect. Analytic sentences instead should be understood as those sentences that are immune to revision while their meaning stays constant. More precisely, they are those that are immune to rational rejection while their meaning stays constant. (There is a sense in which an analytically false sentence might

⁵ H. P. Grice and P. F. Strawson, "In Defense of a Dogma," *Philosophical Review*, LXV, 2 (April 1956): 141–58, at pp. 156–57.

be immune to rational revision, but from here onward I will understand 'revision' as requiring rejection.)

Following standard practice, we can say that when the meaning of a sentence changes, there is *conceptual change*: some expression in the sentence at first expresses one concept and later expresses another. When the meaning of a sentence stays the same, there is *conceptual constancy*: the expressions in the sentence will express the same concepts throughout. Then Grice and Strawson's point could be put by saying that an analytic sentence is one that is immune to revision without conceptual change. More cautiously, the point could be put by saying that the fact that a sentence is revisable under conditions of conceptual change does not entail that it is not analytic. Something similar applies to apriority.⁶

At this point, Quine has two obvious replies. The first is to say that the appeal to meaning in characterizing the class of analytic sentences is circular, as the notion of meaning is as poorly understood as the notion of analyticity. The same could be said for the appeal to concepts and to propositions. This reply would be in the spirit of the first four sections of "Two Dogmas." But then this argument will not be much of an advance on the arguments in the first four sections, and anyone who is not moved by those arguments will not be moved by this one.

The second, more interesting reply is to challenge Grice and Strawson to provide a principled distinction between cases of revision that involve conceptual change and those that involve conceptual constancy. Quine might argue that cases that are purported to be on either side of this division are in fact continuous with each other, and that there is no principled distinction to be had. Something like this thought might even be read into the last sentences of the paragraph from Quine quoted above.

Now one might suggest that Grice and Strawson are not obliged to provide a reductive characterization of the distinction—that is, one that does not use 'meaning' and cognate notions—any more than they are required to provide a reductive definition of meaning or analyticity

⁶We also might allow that there is conceptual change in this sense when the proposition expressed by an utterance of a sentence changes because of a shift in context. For example, 'Someone is bald iff they have no hairs' might be accepted in one context and rejected in another. It is not clear that a mere contextual shift could change the status of a sentence as analytic, as arguably the meaning of such a sentence stays constant throughout. But if we say that a sentence is a priori if it expresses a proposition that is knowable a priori, then it is natural to hold that a sentence might be a priori in one context but not in another. It is for reasons like this that I speak of 'conceptual change' rather than 'meaning change' or 'semantic change'; the latter phrases tend to suggest changes in standing linguistic meaning (thereby excluding mere contextual shifts), but it is changes in the propositions and concepts expressed that matter most for our purposes.

to answer the challenge in the first four sections. Again, this suggestion seems correct as far as it goes. Nevertheless, if Quine's opponent cannot say much to characterize the principled distinction here, he or she is at least in the awkward dialectical position of leaving a challenge unanswered, and of leaving doubts about the distinction unassuaged.

My view is that much can be said to flesh out a principled distinction. I think that the basic tools for doing so can be found in Carnap's "Meaning and Synonymy in Natural Languages."

II. CARNAP ON INTENSIONS

Carnap is Quine's major target in "Two Dogmas of Empiricism." It is not always appreciated that "Meaning and Synonymy in Natural Languages" can be read as a sustained response to Quine, perhaps because Carnap spends little time discussing him explicitly. Nevertheless, Carnap says enough to make clear that a response to "Two Dogmas" is intended.

Carnap's article sets out to analyze the notion of meaning and related notions such as synonymy. His aim is to provide a "scientific procedure" by which meaning and synonymy can be analyzed in broadly naturalistic terms. Importantly, he aims to explicate not only the notion of extension, but the notion of intension (the "cognitive or designative component of meaning"), which he notes has been criticized by Quine as "foggy, mysterious, and not really understandable."⁷

Carnap's key idea is that we can investigate the intension that a subject associates with an expression by investigating the subject's judgments about possible cases. To determine the intension of an expression such as 'Pferd' for a subject, we present the subject with descriptions of various logically possible cases, and we ask the subject whether he or she is willing to apply the term 'Pferd' to objects specified in these cases. If we do this for enough cases, then we can test all sorts of hypotheses about the intension of the expression.

In this article, Carnap takes the term 'intension' as primitive and does not build possible cases into the very nature of intensions. But for our purposes it is useful to adopt a suggestion that Carnap makes elsewhere, and simply define an intension as a function from possible cases to extensions. For a term like 'Pferd', the intension will be a function from possible cases to objects characterized in those cases. For a sentence such as 'Grass is green', the intension will be a function from possible cases to truth-values. Then Carnap's procedure above can be regarded as a way of directly ascertaining the values of the intension that a subject associates with an expression, by presenting the subject with a possible case and noting the extension that the subject associates with the case.

⁷ Carnap, *op. cit.*, p. 36.

Of course one cannot actually present a subject with all possible cases to determine every aspect of an intension. But Carnap suggests that the intension that a speaker associates with an expression is determined by the speaker's linguistic dispositions. For a given expression E used by a given speaker, the speaker will have the disposition to associate a given extension with E , when presented with a possible case. For example, if S is a sentence, the speaker will have the disposition to judge the sentence as true or false of a possible case, when presented with that case. The intension of an expression can then be seen as a function that maps possible cases to the extension that the speaker is disposed to identify, when presented with that case.

In this way, Carnap defines an expression's intension in naturalistic and even operational terms. We can go on to define synonymy: two expressions are synonymous (for a speaker at a time) when they have the same intension (for that speaker at that time). And we can define analyticity: a sentence is analytic (for a speaker at a time) when its intension has the value 'true' at all possible cases (for that speaker at that time).

With this definition in hand, we can go on to provide a principled criterion for conceptual change over time. An expression E undergoes change in meaning between t_1 and t_2 for a speaker iff the speaker's intension for E at t_1 differs from the speaker's intension for E at t_2 . If we accept Carnap's dispositional account of intensions, it follows that E undergoes change in meaning between t_1 and t_2 iff there is a possible case such that the speaker is disposed to associate different extensions with E when presented with the case at t_1 and t_2 .

Of course there are many immediate questions about Carnap's account. What is a possible case? In what vocabulary are these cases specified? How can we determine whether the meaning of this vocabulary has changed? Can speakers make mistakes about intensions? Can they change their mind about a case without a change in meaning? Can meaning really be operationalized this easily? And so on. Carnap's account may need to be modified or at least refined to answer these questions.

Before addressing these matters, I will illustrate how Carnap's account might be used to address the challenge in section VI of "Two Dogmas" directly. In my view, the essential aspects, if not the specifics, of the resulting response are sound. These essential aspects carry over to more refined analyses couched in terms of two-dimensional semantics (section IV) and Bayesian confirmation theory (section V and VI).

III. A CARNAPIAN RESPONSE

In "Meaning and Synonymy in Natural Languages," Carnap does not mention the arguments in section VI of "Two Dogmas"; nor does he

address revisability or conceptual change. Nevertheless, his framework can be used to give a response to these arguments that is broadly in the spirit of Grice and Strawson's response, fleshed out with a principled criterion for conceptual change.

We can start with Quine's observation that any statement can be held true come what may. This seems correct. Even a paradigmatically synthetic sentence such as 'All bachelors are untidy' can be held true in the face of apparently countervailing evidence, if we allow sufficient adjustment of ancillary claims. The question is whether such adjustments will involve conceptual change, and whether we have a principled criterion for determining this.

We might as well start with a case. At t_1 , Fred asserts "All bachelors are untidy." At t_2 , Fred is presented with evidence of a tidy unmarried man. Fred responds, "He's no bachelor! Bachelors must be over 30, and he's only 25." At t_3 , Fred is presented with evidence of a 35-year-old man with a spotless apartment. Fred responds, "He's not tidy! Look at the mess in his sock drawer." In this way, Fred holds the sentence true throughout, and through similar maneuvers he can hold it true come what may.

Does this case involve conceptual change? We can apply Carnap's analysis to see whether Fred's intension for 'All bachelors are untidy' (call this sentence B) changes over the relevant time-span. Suppose that c is a detailed possible case in which there is an unmarried 25-year-old man with a tidy apartment. At t_2 , when Fred is presented with the information that c obtains, he responds that 'All bachelors are untidy' is true with respect to c . By Carnap's criterion, Fred's intension for B is true with respect to c at t_2 .

What about Fred's intension for B at t_1 ? The key question is: if Fred had been presented with a description of c at t_1 , before he had evidence that the case was actual, would he have judged that 'All bachelors are untidy' was true with respect to c ?

If the answer is yes, then Carnap's criterion suggests that there is no relevant conceptual change between t_1 and t_2 . In this case, Fred will simply have had an unusual intension for 'bachelor' all along.

If the answer is no, then Carnap's criterion suggests that there is relevant conceptual change between t_1 and t_2 . The intension of 'All bachelors are untidy' will have changed during this time, probably because the intension of 'bachelor' has changed during this time.

The same applies more generally. If a speaker's judgment concerning a case at t_2 is reflected in the speaker's dispositions to respond to such a case at t_1 , we can say that the speaker's judgment concerning that case is *prefigured*. If a speaker's judgment concerning a case at t_2 is not reflected in the speaker's dispositions at t_1 , we can say that the

speaker's judgment concerning the case is *postfigured*. On Carnap's account, postfigured judgments involve conceptual change, but prefigured judgments do not.

In any case, we have what we need. Carnap's framework allows us to see how any sentence can be held true come what may, while at the same time allowing a principled way to distinguish between those cases of holding-true that involve conceptual change and those that do not. Something similar applies to cases of revisability, though I will not go into the details here.

IV. REFINING CARNAP'S ACCOUNT

Carnap's account of meaning is remarkably simple, and one might reasonably wonder whether such a simple account can be correct. I think that while there are problems with the account, they can be addressed in a way that preserves something of the spirit of the account, if not the letter.

Perhaps the most obvious problem is that subjects can make mistakes. A subject might miscalculate and judge that $36+27=73$, and she might even be disposed to judge this to be true with respect to all possible scenarios. On Carnap's account, it will follow that ' $36+27=73$ ' is analytic for the subject. But this seems the wrong result: on the face of it, the sentence is not even true. Similar mistakes seem possible for nonideal subjects in all sorts of domains.

To handle cases of this sort, we can modify the account to appeal not to what the subject would say in response to the case, but to what the subject should say, or what she would say given ideal reasoning. We might say that the intension of E maps a possible case C to the extension that the subject would identify for E , if she were to be presented with C and were to reason ideally.

Construed this way, the account will no longer yield an operational definition of meaning, at least unless we can find an operational criterion for ideal reasoning. But this is not a bad thing for those inclined to reject behaviorism in any case. It is also far from clear that this account provides a naturalistic reduction of meaning. It will do so only if we already have a naturalistic reduction of ideal reasoning. But the account need not be a naturalistic reduction to be useful.

Someone might suggest that in these cases, facts about meaning determine facts about ideal reasoning rather than vice versa: it is precisely because we mean such-and-such by 'Pferd' that we should say such-and-such. We need not take a stand on these questions about metaphysical priority here. All we need is that in these cases, there are facts about what subjects should say or what ideal reasoning dictates, and that we have some pretheoretical grip on these

facts. Then we can use these facts to help explicate a corresponding notion of meaning, regardless of which of these notions is metaphysically prior. In effect, we are using an antecedent grip on normative notions to help explicate semantic notions. Of course it remains open to a Quinean opponent to reject normative notions entirely. I discuss opposition of that sort later in this article.

Another problem is that on the contemporary understanding, intensions often are inaccessible to a subject, even given ideal reasoning. For example, if Kripke is right, the intension of 'water' picks out H_2O in all possible worlds, even for subjects who do not know that water is H_2O .⁸ Such subjects will not be disposed to identify H_2O as the extension of 'water' when presented with a possible case, so Carnap's definition will get the intension wrong.

To handle this problem, we can take a leaf from two-dimensional semantics, which recognizes two sorts of intension. Even in light of Kripke's insight, Carnap's account still might apply to one sort of intension, though not the other. Kripke's point applies to secondary intensions, which govern possible cases considered as counterfactual: if there had been XYZ in the oceans and lakes, water would still have been H_2O . For the purposes of Carnap's account, though, we can focus on primary intensions and stipulate that subjects consider the possible cases as actual. For example, we can ask them to suppose that XYZ actually is in the oceans and lakes in the actual world and ask for their verdict about the extension of 'water' under that supposition. Subjects plausibly will hold that 'water' picks out XYZ if that hypothesis is correct. This mirrors the familiar suggestion that the primary intension of 'water' picks out XYZ in a Twin Earth scenario, although the secondary intension of 'water' picks out H_2O there. So it is not out of the question that a Carnap-style account might work for primary intensions, which in any case are often held to be the sort of intensions that are tied most closely to apriority and analyticity.

A third issue is the nature of possible cases. For our purposes they should be akin to possible worlds. They might be centered metaphysically possible worlds (that is, worlds marked with an individual and a time), with the centering required to handle intensions for expressions such as 'I' and 'now'. They also might be regarded as epistemically possible worlds, or epistemically possible scenarios, which might be modeled by maximal consistent sets of sentences that cannot be ruled out a priori. I will not try to settle this issue here, but I will use the word 'scenario' as a generic term for the entities involved. In

⁸ Saul Kripke, *Naming and Necessity* (Cambridge: Harvard, 1980).

order to suppose that subjects can reason about entire scenarios, we can once again appeal to the idealization of what the subject would say given ideal reasoning.

A fourth issue is the vocabulary in which a scenario is specified. Such a vocabulary will need to be rich enough that a full enough specification using this vocabulary plus ideal reasoning determines judgments about other expressions' extensions, without being so rich that a specification builds in all those expressions directly. It is a substantive claim that some such vocabulary can be found, but proponents of two-dimensional semantics have offered arguments for this claim along with suggested vocabularies.⁹ The details of such a vocabulary will not matter for our purposes.

A fifth issue is the worry that subjects might change their mind about a possible case without a change of meaning. Here, one can respond by requiring, as above, that the specification of a scenario is rich enough that judgments about sentences are determined by the specification and by ideal reasoning. If so, then if subjects are given such a specification and reason ideally throughout, there will be no room for them to change their mind in this way. Changes of mind about a fully specified scenario will always involve either a failure of ideal reasoning or a change in meaning. Of course this claim requires a version of the substantive claim in the previous paragraph. I return to a version of this issue below.

The model we then reach is something like the following. The (primary) intension of an expression for a subject is a function that maps scenarios to extensions, mapping a scenario w to what the subject would judge to be the extension of E under the supposition that w is actual, were she ideally rational. This is not a perfect definition, but it is good enough for our purposes. This remains very much in the spirit of Carnap's definition, although the invocation of rationality makes it a normative variation on Carnap's account.

Importantly, we can use this account to provide a version of the Carnapian response to Quine's arguments given in the previous section. Conceptual change (of the relevant sort) will occur precisely when an expression's primary intension changes across time. This will happen precisely when the subject's dispositions to judge the expression's extension in a possible case (given ideal reasoning) changes. As in the last section, we can find cases of holding-true

⁹ See, for example, David J. Chalmers and Frank Jackson, "Conceptual Analysis and Reductive Explanation," *Philosophical Review*, cx, 3 (July 2001): 315–60. See also my *Constructing the World* (New York: Oxford, forthcoming).

where the dispositions change in this way, and cases where they do not. What matters is that we have a principled distinction.

A residual issue concerns the meaning of the basic vocabulary. If cases are specified in this vocabulary, then we need to ensure that the basic vocabulary does not change in meaning throughout the process. If we do not require this, the resulting condition for meaning change will be inadequate; a subject's dispositions to judge that *S* obtains with respect to a case specified by *D* might change over time, not because the meaning of *S* changes but because the meaning of terms in *D* change. If we do require this, however, it appears that we need some further criterion for meaning change in the basic vocabulary items used in *D*, as the dispositional method would yield trivial results. So it appears that the dispositional method for determining meaning change, even when idealized, is incomplete.¹⁰

A second residual issue concerns the role of the a priori in characterizing this account. It is natural to suggest that the ideal reasoning in question must be restricted to ideal a priori reasoning. In fact, some two-dimensional accounts use the notion of apriority in defining primary intensions: the primary intension of a sentence *S* evaluated at a world *w* is true precisely if a material conditional 'If *D*, then *S*' is a priori, where *D* is a canonical specification of *S*.¹¹ If we take this route, then we have arrived at a principled distinction only by helping ourselves to the contested notion of apriority along the way.

As before, it is not clear how bad these residual problems are. One still might see the intensional analysis as demonstrating that the Quinean phenomena of holding-true and revisability are quite compatible with the intensional framework and have no power to refute it. Even if one has to assume some independent grip on the notion of apriority and on the meaning of expressions in the basic vocabulary, one can use the framework to provide a reasonably enlightening analysis of relevant cases. Still, we have not broken out of

¹⁰This objection is related to Quine's argument from the indeterminacy of translation in *Word and Object* (Cambridge: MIT, 1960). Quine took Carnap's account to be a serious challenge to his arguments in "Two Dogmas," and the indeterminacy argument can be seen in part as a response to it. There, Quine argues that no dispositional analysis can settle facts about meaning, because multiple assignments of reference will always be compatible with a subject's behavioral dispositions. This applies even to Carnap's account, if we allow multiple potential assignments of reference to the basic vocabulary. In effect, Carnap's account assumes that the meaning of the basic vocabulary is fixed, but it is not clear why such an assumption is legitimate, and it is not clear how this meaning itself might be grounded in dispositional facts. Thanks to Gillian Russell for discussion here.

¹¹See, for example, Chalmers, "Epistemic Two-Dimensional Semantics," *Philosophical Studies*, cxviii, 1/2 (March 2004): 153–226.

the Quinean circle. It would be nice to be able to characterize the relevant distinctions without such a direct appeal to the contested notions.

I think that such a characterization can be found. The key idea is to cast things in terms of conditional probability, rather than in terms of apriority.

An initial observation is that something very much like a primary intension can be characterized without appealing to apriority, by appealing to conditional probability instead. In particular, one can define the intension of a sentence S at a scenario w , for a subject, in terms of the subject's rational conditional credence in S given D $cr'(S|D)$, where D is a canonical specification of w . We can say that the intension of S is true at w iff $cr'(S|D)$ is high, and false at w iff $cr'(S|D)$ is low. Here we require an idealization, so that $cr'(S|D)$ is the conditional credence that the subject would have given ideal reasoning, or something along those lines.

If we do this, then we will have a principled criterion for conceptual change that does not appeal to apriority. On this criterion, a subject's intension for S will change between t_1 and t_2 iff there is a scenario w with canonical specification D such that $cr'(S|D)$ changes from high to low or vice versa. One then could run the arguments of the previous section again using this notion. This will provide a reply to Quine's challenge that gets around the second residual issue above (regarding apriority), though it still may be subject to a version of the first issue (regarding the basic vocabulary).

At this point, however, I think an alternative analysis involving conditional probability is available. This analysis is closely related to the one just mentioned, and is a descendant of the Carnapian analysis in the previous section, but it does not require any of the semantic apparatus used in that section and this one. This analysis proceeds using only standard Bayesian considerations about evidence and updating. In addition to the advantage of familiarity, this approach has other significant advantages in responding to Quine's challenge. By avoiding the need for canonical specifications of complete possible scenarios, it avoids the large idealization needed to handle enormous specifications. It also has the potential to avoid or minimize both residual issues above.

V. A BAYESIAN ANALYSIS OF HOLDING-TRUE

In what follows I develop a Bayesian analysis of Quine's arguments from holding-true and from revisability. For the purposes of this analysis, we can set the framework of scenarios and intensions to one side. All we need are orthodox Bayesian claims about credence and its revision in light of new evidence.

Let us assume a standard Bayesian model on which sentences are associated with unconditional and conditional credences for subjects at times. That is, for a given subject and a given time, a sentence S will be associated with an unconditional credence $cr(S)$, and a pair of sentences S and T will be associated with conditional credence $cr(S|T)$. (These ordinary credences $cr(S|T)$ should be distinguished from the idealized rational credences $cr'(S|T)$ from the previous section.) Credences are standardly taken to be real numbers between 0 and 1, but for our purposes exactitude is not required. It is enough that some credences be high and others low.

I will also assume a version of the standard Bayesian principle of conditionalization: if a subject has credence $cr_1(S|E)$ at t_1 and acquires total evidence specified by the evidence sentence E between t_1 and t_2 , then the subject's credence $cr_2(S)$ at t_2 should be equal to $cr_1(S|E)$. I will give a more precise version of this principle below. The nature of evidence sentences will be discussed later in this article, but for now we can think of them as specifying either that certain experiences obtain or that certain observable states of affairs obtain.¹²

We can start with a typical case whereby an apparently synthetic sentence is held true in the face of apparently countervailing evidence, by appeal to appropriate ancillary theses. As before, suppose that at t_1 Fred asserts, "All bachelors are untidy." At t_2 , Fred acquires evidence indicating that there is a tidy, unmarried 25-year-old man, and responds by denying that the man is a bachelor, as bachelors must be over 30.

Let B be 'All bachelors are untidy', and let E be Fred's total relevant evidence acquired between t_1 and t_2 . Let $cr_1(B)$ and $cr_2(B)$ be Fred's credences in B at t_1 and t_2 respectively. Then $cr_1(B)$ and $cr_2(B)$ are both high.

The crucial question is: What is $cr_1(B|E)$, Fred's conditional credence in B given E at t_1 , before Fred acquires the evidence in question?

If $cr_1(B|E)$ is high, then Fred's judgment at t_2 reflects a conditional credence that he already had at t_1 . In this case, the judgment at t_2 is *prefigured*, in a sense analogous to the sense discussed earlier. Here, Fred's accepting B in light of E accords with the principle of conditionalization.

If $cr_1(B|E)$ is low, then Fred's judgment at t_2 fails to reflect the conditional credence that he already had at t_1 . In this sort of case,

¹²The arguments I present here also can be run using the principle of Jeffrey conditionalization, which allows conditionalization on evidence about which a subject is not certain. See Richard C. Jeffrey, *The Logic of Decision*, 2nd ed. (Chicago: University Press, 1983).

the judgment at t_2 is *postfigured*, in a sense analogous to the sense discussed earlier. Here, Fred's accepting B in light of E appears to violate the principle of conditionalization.

On standard Bayesian assumptions, there are two central ways one can obtain apparent violations of conditionalization for sentences. First, this can happen when the subject is not fully rational throughout the process; perhaps at t_1 Fred has not thought things through properly, or at t_2 he makes some sort of reasoning error. Second, the content of the key sentence B can change between t_1 and t_2 . This can happen in cases involving indexicals, which are not relevant here, or in cases of conceptual change. In these cases, it remains possible that Fred's credences in relevant propositions obey conditionalization, but that his credences in associated sentences do not, because the association between sentences and propositions changes over time.¹³

We might formulate this as a version of the Bayesian principle of conditionalization, for sentences:

- (CS) If a subject is fully rational, and if the subject acquires total evidence specified by E between t_1 and t_2 , and if the content of sentence S does not change between t_1 and t_2 , then $cr_2(S) = cr_1(S|E)$.

Perhaps the most familiar version of the principle of conditionalization is cast in terms of propositions: if a fully rational subject acquires total evidence specified by proposition e between t_1 and t_2 , then $cr_2(p) = cr_1(p|e)$. (CS) follows from this claim in conjunction with the plausible claims that when sentence S expresses proposition p for a subject at that time, $cr(S) = cr(p)$ at that time, and that the content of a sentence is the proposition it expresses.

It follows that if Fred in the postfigured case above is fully rational, then this is a case of conceptual change. Of course it might be that Fred is not fully rational, but this is of no help for Quine. It is unremarkable that irrational subjects might hold on to any sentence or reject any sentence, and this observation has no consequences regarding analyticity or apriority. For Quine's observations about revisability and

¹³A potential third way that conditionalization can be violated arises on views where sentences express certain relativistic contents. Consider a view on which utterances of the sentence 'It is raining' always express the same temporal proposition *It is raining*, which can be true at some times and not at others. On Saturday, I might have a low conditional credence in *It is raining* given *The weather forecast says rain on Sunday*; then on Sunday I might acquire evidence that the weather forecast says rain on Sunday, resulting in high credence in *It is raining*, without irrationality. On a more standard view, on which the content of 'It is raining' uttered at t is *It is raining at t*, this will be classified as a change in content, but on the temporal view the content stays the same. For present purposes, we can either count these as changes in content in an extended sense, or we can require in principle (CS) that the content in question is nonrelativistic content.

holding-true to have any bite, rational subjects are required. So we may as well assume that Fred is fully rational.

If we assume that the relevant subjects are fully rational, we now have a principled criterion for conceptual change in a case of holding-true. Suppose that our subject accepts S at t_1 , acquires apparently countervailing evidence E between t_1 and t_2 , and continues to accept S at t_2 . Then we can say

- (i) If $cr_1(S|E)$ is low, this is a case of conceptual change.
- (ii) If $cr_1(S|E)$ is high, this need not be a case of conceptual change.

One can now ask: is it true that a subject can hold on to any given sentence S come what may, in light of any evidence, without irrationality or conceptual change? By this analysis, this claim requires that for any given sentence S and any evidence E , $cr(S|E)$ is high (or at least is not low). But this claim is obviously false. For rational subjects and most sentences (including most paradigmatically empirical sentences), there will be evidence sentences E such that $cr(S|E)$ is low.

The moral here is that in the general case, Quinean holding-true come what may requires widespread violation of conditionalization, which requires irrationality or conceptual change. But the fact that an irrational subject might reject a sentence is no evidence that it is not analytic or a priori,¹⁴ and the fact that a subject might reject a sentence after conceptual change is no evidence that it is not originally analytic or a priori. So Quine's argument from holding-true fails.

VI. A BAYESIAN ANALYSIS OF REVISABILITY

For our central example of revisability, we can use a familiar case from Hilary Putnam.¹⁵ Let C be 'All cats are animals'. This might seem paradigmatically analytic or a priori. But let E specify evidence confirming that the furry, apparently feline creatures that inhabit our houses are actually remote-controlled robots from Mars, while all the other creatures we see are organic. Putnam argues that if we discovered that E obtains, we would reject C . So let us suppose that Sarah accepts C at t_1 , acquires total evidence as specified by E , and rejects C at t_2 .

Here, the diagnostic question is: What is Sarah's initial conditional probability $cr_1(C|E)$?

If $cr_1(C|E)$ is low, then Sarah's judgment at t_2 reflects a conditional credence that she had at t_1 . In this case, the judgment at

¹⁴ Perhaps there are certain strong conceptions of analyticity on which an analytic sentence cannot be rejected by any subject, rational or irrational. But these conceptions are not standard, and in any case no such constraint applies to apriority.

¹⁵ Hilary Putnam, "It Ain't Necessarily So," this JOURNAL, LIX, 22 (Oct. 25, 1962): 658-71.

t_2 is prefigured. Here, Sarah's accepting C in light of E accords with the principle of conditionalization.

If $cr_2(C|E)$ is high, then Sarah's judgment at t_2 fails to reflect the conditional credence that she had at t_1 . In this sort of case, the judgment at t_2 is postfigured. Here, Sarah's accepting C in light of E appears to violate the principle of conditionalization.

For exactly the reasons given before, the postfigured case requires either that Sarah is not fully rational or that her use of C undergoes conceptual change between t_1 and t_2 . Cases of this sort are of no help to Quine. Again, the fact that an irrational subject might reject a sentence is no evidence that it is not analytic or a priori, and the fact that a subject might reject a sentence after conceptual change is no evidence that it is not originally analytic or a priori.

For Quine's argument to succeed, he needs to exclude cases of this sort. That is, he needs to make the case that any sentence can be rationally revised without a violation of conditionalization. This requires that for all rational subjects and for all sentences S , there exists an evidence sentence E such that $cr(S|E)$ is low.

This claim is not so obviously false as the corresponding claim about holding-true come what may. For this reason, one might regard the argument from revisability as a stronger argument than the argument from holding-true. Indeed, supporters of Quine such as Putnam and Harman have concentrated on the argument from revisability and made claims not far from the claim in question.¹⁶

Still, it is not clear just what the grounds are for accepting the key claim. At this point, a number of observations can be made.

First, Quine's official grounds for the revisability claim involve the ability to revise ancillary claims when necessary. These grounds are the same as for the holding-true claim, and it is clear that Quine sees the two as continuous. These grounds suggest that after obtaining evidence, a subject could use these features to revise a given sentence. But we have seen that revisions of this sort typically involve violations

¹⁶ See Putnam, *op. cit.*; and Gilbert Harman, "Doubts about Conceptual Analysis," in Michaelis Michael and John O'Leary-Hawthorne, eds., *Philosophy in Mind: The Place of Philosophy in the Study of Mind* (Boston: Kluwer, 1994), pp. 43–48. It may be useful to distinguish a pragmatist reading of the arguments in "Two Dogmas," which stresses the freedom to adjust ancillary hypotheses as one chooses, from an empiricist reading, which stresses the role of unexpected evidence in driving us to revise our beliefs. Roughly, where the pragmatist reading turns on the claim that one *may* accept or reject certain statements, the empiricist reading turns on the claim that one *should* (or perhaps that one *would*). A pragmatist reading will put equal weight on the argument from holding-true and revisability, while an empiricist reading will put more weight on the latter. The pragmatist strand is more central in Quine's text, but the empiricist strand has been more influential among later Quineans.

of conditionalization. These grounds do very little to suggest that before acquiring the relevant evidence, a subject's conditional credence $cr(C|E)$ will be low.

Second, almost any claim could be rationally rejected given testimony of an apparent epistemic superior. But this point has no bearing on apriority; that a claim could be rejected in this way is no evidence that it is not a priori. The point also does not establish that any claim is revisable under ideal reflection, as it is far from clear that this sort of revisability applies to ideally rational thinkers. Perhaps these thinkers' grounds for accepting a mathematical claim, for example, will always defeat any evidence concerning an apparent epistemic superior.

Third, even if this sort of consideration applies to many apparent cases of a priori truths, there are a number against which it has no purchase. Some such cases include the material conditionals discussed in the previous section: 'If D , then S ' (equivalently, ' $D \rightarrow S$ '), where D is a lengthy specification of an arbitrary scenario and S is a sentence such as 'Water is H_2O ' such that $cr(S|D)$ is high. Assuming a fully rational subject, it follows that $cr(D \rightarrow S|D)$ is high, so that $cr(D \rightarrow S)$ is also high. We can stipulate that D includes or entails a full specification of evidence that obtains in the scenario, so that D entails E for any evidence sentence E that obtains in the scenario, and that D entails $\sim E$ otherwise (setting vagueness aside).¹⁷ A quick two-case argument now suggests that no evidence E could lead us to rationally reject $D \rightarrow S$. First case: if E does not obtain in the scenario, then D entails $\sim E$. In this case, $cr(\sim D|E) = 1$, so $cr(D \rightarrow S|E) = 1$. Second case: if E obtains in the scenario, then D entails E . Now $cr(D \rightarrow S|E)$ must lie between $cr(D \rightarrow S|E \& \sim D)$ and $cr(D \rightarrow S|E \& D)$. But the former is 1, and the latter is just $cr(D \rightarrow S|D)$, which we have seen is high. So $cr(D \rightarrow S|E)$ is high. Putting the two cases together, $cr(D \rightarrow S|E)$ is high for all E . Importantly, material conditionals very much like these are the a priori truths that are most important in the two-dimensional framework.

Fourth, once one notes that this argument allows some truths S such that $cr(S|E)$ is high for all E , it is clear that there is no longer a sound principled argument that for all S , there is an E such that $cr(S|E)$ is low. As a result, we may expect to find many more exceptions to this claim. Indeed, many Quineans have conceded such exceptions, especially in the domains of mathematics and logic, and there is no reason not to expect many more.

¹⁷ One can understand entailment here in a variety of ways. For present purposes we need only the claim that if D entails E , then $cr(E|D) = 1$ and $cr(\sim D|\sim E) = 1$ for a fully rational subject.

Fifth, it is worth stressing that even if this line of argument succeeded, it would be much more conservative than Quine's original line. It leads naturally to a view on which there is an analytic/synthetic distinction. At worst, it would be the case that most or all sentences previously regarded as analytic (a priori), such as 'All cats are animals', will be reconstrued as synthetic (a posteriori).¹⁸ But one could still use the current framework to characterize Carnapian intensions, once one acknowledges that the intensions for sentences such as 'All cats are animals' will be false at some scenarios. One will still have a principled distinction between cases that involve conceptual change and cases that do not. In this way, advocates of analyticity, apriority, and conceptual analysis will have much of what they want.

In any case, the Bayesian analysis has given us what we wanted: a principled criterion for identifying cases of conceptual change. It has only given us a sufficient condition, rather than a necessary and sufficient condition, but this is good enough for our purposes. With this analysis in hand, it is clear that Quine's arguments from revisability and holding-true fail.

VII. QUINEAN OBJECTIONS

Objection 1: The Bayesian Analysis Begs the Question. It might be suggested that the Bayesian principle (CS) that I have appealed to simply assumes a notion of conceptual change without argument, and therefore begs the question against the Quinean skeptic about this notion. I do not think that this is quite right. (CS) is itself a consequence of the principle of conditionalization for propositions and of two other weak assumptions, none of which say anything about conceptual change. Still, this line of argument assumes a notion of proposition, about which a Quinean might be skeptical.

Now, Quine's doubts about propositions have been much less influential than his doubts about the analytic/synthetic distinction. It is clear that to get off the ground, Bayesian accounts of confirmation require either something like propositions or something like the notion of conceptual change. Bayesian credences will be assigned either to abstract entities such as propositions, events, or sets; to linguistic items such as sentences; or to mental items such as beliefs.

¹⁸ Here we can distinguish between radical Quineans, who hold that there is no analytic/synthetic distinction, and moderate Quineans, who hold that there is such a distinction but that very few sentences are analytic. If the analysis given here is right, we might expect this distinction to correlate to some degree with the distinction between pragmatist and empiricist Quineans mentioned in footnote 16. This seems to be what we find in practice. For example, Quine in "Two Dogmas" takes the pragmatist and radical lines, while Putnam, *op. cit.*, takes the empiricist and moderate lines.

If we take the first route, then we can use these entities just as we used propositions to ground a notion of conceptual change. If we take the second or the third route, we need to require something like conceptual constancy to avoid counterexamples to principles such as conditionalization.

Of course a Quinean might simply reject Bayesianism altogether, along with the associated principle of conditionalization. This would seem rash, however, as Bayesianism is an extremely successful theory with widespread empirical applications. So by a Quinean's own lights, it is hard to reject it. Furthermore, even if one rejects Bayesianism, a successor theory is likely to have corresponding principles of diachronic rationality governing how beliefs should be updated over time in response to evidence. Precisely the same issues will arise for these principles: if they apply to abstract items we can use these to define conceptual change, and if they apply to linguistic items or mental items we will require a notion of conceptual change.¹⁹

I think the deeper moral is that there is a constitutive link between rational inference and conceptual constancy. Issues such as those floated here will arise for any principle of diachronic rationality. If it is a principle that from A and $A \rightarrow B$ one should infer B , and if the premises and conclusions here are sentences or mental items, then to avoid obvious counterexamples the principle should require that A and B have the same meaning on each occasion when they occur. And if the principle applies to abstract objects such as propositions, these can themselves be used to define conceptual change. So if we are not skeptics about principles of diachronic rationality, a notion of conceptual change will be hard to avoid.

Objection 2: Rationality Presupposes Apriority. It might be suggested that in appealing to the notion of rationality, the notion of apriority is smuggled in. For example, someone might hold that all principles

¹⁹ A related objection is that the very idea of a credence or a conditional credence presupposes conceptual constancy. After all, one's credence associated with a sentence arguably is determined by one's dispositions to make certain judgments and decisions involving the sentence, for example, the odds one would take on a bet on that sentence if it were offered. But in considering such dispositions, we have to assume that the meaning of the sentence stays constant from the initial moment to the bet. Likewise, a conditional credence $cr(M|E)$ arguably is determined by one's dispositions to make judgments about M conditional on the supposition of E . This requires conceptual constancy: if meaning changes between the initial moment and the judgment, a high initial credence might go with a negative judgment. Still, any conceptual constancy needed here is at best very local, within an episode of consciousness. In any case, if it turns out that the notion of apriority is as secure as the notion of a credence, so that the Quinean can reject the former only by rejecting the latter, that should be good enough for the defender of apriority. Thanks to Ned Block and Kelvin McQueen for discussion here.

of rational inference depend on underlying principles about the a priori; for example, perhaps an inference from some premises to a conclusion is rational precisely if it is a priori that if the premises obtain, the conclusion is likely to obtain. Or perhaps the distinctive idealization made by the Bayesian involves some tacit assumptions about the a priori. For example, perhaps the Bayesian requirement that rational subjects should have credence 1 in logical truths depends in some way on the belief that logical truths are a priori. If so, the appeal to rational principles here presupposes one of the key notions at issue.

The reply here is straightforward. Whether or not the objector is correct that rationality depends in some way on apriority, the appeal to rationality is innocuous in the current dialectical context. The relevant opponents are those who accept the notion of rationality but who question the notion of apriority. My argument is intended to establish that *if* one accepts certain principles concerning rationality, then one should reject Quine's argument against the a priori. If this objector is correct, then the opponent either should give up on the principles concerning rationality or accept the notion of the a priori. Either outcome is sufficient for my purposes. I am happy to concede that if an opponent rejects the notion of rationality, or rejects all relevant principles of diachronic rationality, then the current argument has no purchase against her.

It is also worth noting that the principles of rationality that I appeal to are principles that many or most opponents of the a priori accept. Conditionalization has no obvious connection to the a priori, for example. I do not know whether the special status that the Bayesian gives to logical truths has a special connection to the a priori, but in any case this status plays no role in my argument. That is, the argument does not require the Bayesian claim that rationality requires credence 1 in logical truths. In fact, the picture I have sketched appears to be compatible with a view on which logical truths deserve rational credence less than 1, and on which they can be revised given relevant evidence. All that is required is that such a revision should obey conditionalization. Nothing here smuggles in any obvious presuppositions about the a priori.²⁰

Objection 3: A Principled Line between Conceptual Change and Irrationality Cannot Be Drawn. A Quinean may suggest that our concept of rationality

²⁰ Of course, my argument appeals to logical claims at various points, but this does not require that logical truths are a priori or that they are unrevisable. It merely requires that they are true. Likewise, my argument does not require that the principle of conditionalization is a priori or that it is unrevisable. It simply requires that the principle is true.

is not fully determinate, and that as a result a clear division between cases of irrationality and cases of conceptual change cannot be found. Some hard cases, such as revising logic in light of quantum mechanics, are not easily classified as either.

However, my reply to Quine's argument does not require drawing a line here. It suffices for the purposes of the argument that the violations of conditionalization involve either irrationality or conceptual change, and we do not have to classify these violations further. In any case, as long as there are clear cases of rational judgment, the existence of unclear cases entails at worst a vague distinction, not a nonexistent distinction.

Objection 4: The Argument Requires Constancy in Evidence Sentences. Recall the first residual issue for the framework of intensions discussed earlier: the framework assumes conceptual constancy in the base vocabulary, so the framework cannot explain this conceptual constancy. One might think that an analogous issue arises with respect to the evidential vocabulary used to specify evidence sentences such as E . After all, conditionalization concerns what to do when one has a certain credence $cr(S|E)$ and then learns E . The conditional credence is in part an attitude to a sentence E , and what one learns is also a sentence E . One might think it is required that the sentence have the same meaning on both occasions. If so, then any apparent failures of conditionalization in a rational subject could be blamed on a change in the meaning of terms in E , instead of a change in the meaning of terms in S , and it is not clear that we have a principled way to choose.

As it stands, this picture is not quite right. Learning E does not typically involve the sentence E at all. Perhaps if learning were always by testimony, and if E were a sentence used in testimony, then the issue would arise. But for our purposes we can assume that the relevant learning is by perception. Here, E will be a sentence characterizing the evidence that one learns, and the learning process need not involve this sentence at all. So there is no use of E at t_2 that needs to be aligned with the use of E at t_1 . At best we need to require that E as used at t_1 correctly applies to the evidence acquired at t_2 . But this is a much weaker requirement, concerning only the extension of E as used at t_1 , with no role for any use of E at t_2 .

Still, it can be argued that acquiring evidence requires having certain *attitudes* to the evidence. For example, the rationality of Bayesian conditionalization on new experiences arguably requires not just that one has the experiences, but that one is certain that one has them. If so, one might suggest that the framework tacitly

requires that at t_2 , one is certain of the evidence statement E (which says that certain experiences obtain). This issue is starker in alternative frameworks such as Jeffrey conditionalization, which accommodate uncertainty about evidence by giving an explicit role to one's credence in evidence statements such as E at t_2 . Does this require some sort of constancy in the meaning of E after all?

The issue is delicate. For the reasons given above, I think that the sentence E as used at t_2 plays no essential role here. However, it is arguable that at t_2 , the subject must be certain of (or have other appropriate attitudes to) the evidential proposition expressed by E at t_1 : the proposition that certain experiences obtain, for example. Or without invoking propositions: subjects must be certain that the relevant evidence obtains (that they are having certain experiences, say), where this is the same evidence concerning which they had conditional credences at t_1 . Without this alignment, one could always respond to an apparent failure of conditionalization by saying that although a subject's initial credence was conditional on evidence e obtaining, and although evidence e later obtained, the subject in fact became certain that some other evidence e^* obtained. If this were so, there would be no violation of conditionalization (the subject would not acquire the evidence e), and there arguably would be no irrationality.

This requirement of alignment provides some room for the Quinean to maneuver, but the room is extremely limited. To eliminate this room altogether, we need only suppose that we have a grip on what it is for a subject to accept or suppose that certain evidence obtains. With this much granted, we can simply stipulate that for our purposes, the conditional credences $cr(S|E)$ relevant at t_1 are credences in S conditional on the evidence that is actually obtained at t_2 . This removes any loophole, and does so without making any assumptions about constancy in the meaning of language across time. At most, we have to assume an understanding of certain beliefs and suppositions about evidence.

The required assumptions can be reduced further by noting that for our purposes, evidence can be limited to experiences, or at least to observational states of affairs. While there is a sense in which empirical knowledge of nonobservational states of affairs can serve as evidence for other claims, it is plausible that this knowledge is grounded in evidence concerning experiential or observational matters. On a Bayesian view, our credences in these states of affairs then must match those determined by conditionalization on experiential or observational matters. I think it is also plausible that credences in observational states of affairs should match those determined

by conditionalization on experiential matters.²¹ If the latter claim is granted, then for present purposes we can restrict the relevant evidence in cases of revisability and holding-true to experiential states. Even without it, we can restrict the relevant evidence to observational states. So to answer the Quinean worry, we need only suppose that we have a grip on what it is for a subject to accept or suppose that certain experiential or observational states of affairs obtain. This is something that Quine's arguments in "Two Dogmas" do not give us reason to doubt.

The upshot of all this is that the residual issues about a base vocabulary are not eliminated altogether on a Bayesian approach, but they are minimized in a way that brings out the severe costs of the Quinean position. A Quinean who rejects the notions of analyticity and apriority along present lines also must insist that there is no objective fact of the matter about whether a subject accepts or supposes that a given observational state obtains. This view goes along with a generalized skepticism about the contents of thought, perhaps in the spirit of Quine's skepticism about meaning developed in his arguments concerning radical translation. It likewise requires a certain skepticism about diachronic rationality, for reasons discussed earlier.

Quine himself argues both for skepticism about meaning (in *Word and Object*) and for a sort of skepticism about norms of rationality (in "Epistemology Naturalized"²²). Few have been prepared to follow him here, and even those who sympathize with the Quine of "Two Dogmas" have tended to reject these later views. Of course Quine's arguments for these views deserve attention in their own right, but it is clear that the arguments in "Two Dogmas" provide little direct support for them. Still, the current analysis suggests a deep linkage between these views. Defending the arguments of "Two Dogmas" against a certain appeal to conceptual change leads naturally to skepticism about diachronic rational principles and about the content of language and thought. Contrapositively, once even minimal claims

²¹ For example, if one is fully rational, one's credence that there is a red square in front of one should match one's antecedent conditional credence that there is a red square in front of one given that one is having an experience as of a red square. (If norms of rationality do not ensure certainty about the experiences one is having, one can move to a Jeffrey-conditionalization analog.) Theses of this sort have been denied by some dogmatists about perception (for example, James Pryor, "Uncertainty and Undermining," URL: www.jimpryor.net/research/papers/Uncertainty.pdf). They also might be denied by some who think that perceptual knowledge is more secure than introspective knowledge (for example, Eric Schwitzgebel, "The Unreliability of Naive Introspection," *Philosophical Review*, cxvii, 2 (April 2008): 245–73).

²² Quine, "Epistemology Naturalized," in *Ontological Relativity and Other Essays* (New York: Columbia, 1969).

about rationality and thought are accepted, the arguments I have considered against analyticity and apriority dissolve.

Objection 5: There Can Be Rational Revision by Resetting Priors. Quineans of a pragmatist stripe often appeal to the underdetermination of theory by evidence: multiple theories are consistent with the same evidence, and we have considerable latitude in choosing between them. In the Bayesian framework, where theory is determined by evidence along with prior probabilities, this underdetermination comes to underdetermination of probabilities that are prior to any evidence. This underdetermination yields a potential way that fully rational subjects might violate conditionalization without conceptual change.

The relevant method here is that of resetting priors. This method stems from the observation that most Bayesians allow that there is some flexibility in one's ultimate priors: the prior probabilities that a subject should have before acquiring any empirical evidence. (Of course these priors are something of a fiction.) For example, on Carnap's framework for inductive logic, equally rational subjects may have different values for λ , the parameter that guides how quickly the subjects adjust their beliefs in light of inductive evidence, and this difference can be traced to a difference in ultimate priors. Two such subjects might acquire exactly the same evidence over time, while being led to quite different posterior probabilities. If G is the thesis that human-caused global warming is occurring, for example, one subject might be led to a high credence in G , while another might be led to a low credence in G .

Now, a subject with a high credence in G might reflect and observe that her high credence is traceable entirely to the value of λ in her ultimate priors, and that this value was quite arbitrary. She may note that it would have been equally rational to start with a lower value of λ and to end up with a lower credence in G . At this point, a bold subject might choose to change her credences wholesale. At least if she has a good enough record of her evidence, she can "unwind" back to the ultimate priors, reset λ to a lower value, and reintegrate all the evidence by conditionalization. She will end up with a new set of credences, including (among many other differences) a lower value for G .

A Quinean might suggest that there is nothing irrational about doing this, and that this method might be exploited in order that a subject could hold on to almost any sentence come what may and also revise almost any sentence. After all, for most nonobservational empirical sentences S and most paths of evidence, there is some ultimate prior that will lead to a high credence in S and some ultimate prior that will lead to a low credence in S . None of this requires

conceptual change. So violations of conditionalization in a rational subject do not provide a sufficient condition for conceptual change after all.

This position requires rejection, or at least revision, of orthodox Bayesianism. On the orthodox view, conditionalization is a constraint on diachronic rationality, and this sort of revision will be irrational. Furthermore, the view tends to lead to an anything-goes view of rational belief. If there are no constraints on ultimate priors, the view entails that at any moment, if $cr(p) < 1$, then one's credence can be rationally revised so that $cr(p)$ is arbitrarily close to zero. And even if there are constraints on ultimate priors, these constraints must be weak enough to vindicate the large violations of conditionalization that the Quinean argument requires, leading naturally to a view on which most beliefs can be rationally revised at any moment into disbelief. Given this much, it is not easy to see how beliefs can constitute knowledge at all.²³

Further, it is far from clear that all beliefs can be revised in this way. For example, given that logical beliefs, mathematical beliefs, and evidential statements are constrained to have credence 1, this method will not yield revisability for these beliefs. More generally, there is not much reason to hold that it will yield revisions to those beliefs usually classified as a priori ('All bachelors are unmarried', say), most of which appear not to depend on ultimate priors. So this response is weakest where it needs to be strongest.

Most fundamentally: as long as we have a conceptual distinction between cases in which beliefs are revised by this process and cases in which they are not, we still have enough to draw a distinction between those violations of conditionalization that involve conceptual change and those that do not. The Quinean will have to insist that we do not have a grip on this conceptual distinction, so that there is no distinction to be drawn between cases of resetting priors and cases of conceptual change. I think there is little reason to accept this. Furthermore, even if this line were accepted, it would lead once again to an across-the-board skepticism about principles of belief updating and other forms of diachronic rationality. So if principles of diachronic rationality are allowed at all—even the liberal principles suggested by the current approach—then the distinction between conceptual constancy and conceptual change remains intact.

²³In addition, this method is a sort of belief revision that is not driven by evidence at all. So although this line of reasoning is perhaps the best way of preserving the pragmatist reading of Quine's arguments in light of the present analysis, it does not sit easily with the more influential empiricist reading.

Objection 6: Subjects Need Not Have Conditional Credences. It might be objected that the Bayesian analysis requires the assumption that for every sentence S used by a subject and every possible evidence sentence E , the subject has a conditional credence $cr(S|E)$. But this is an unrealistic idealizing assumption.

In response: the idealization is not enormous. For most S and most E , the subject will have some relevant dispositions involving S and E , for example, involving her willingness to accept various bets involving S and E . In many cases, these dispositions will line up in a clear enough way that $cr(S|E)$ will be high. In other cases, they will line up in a clear enough way that $cr(S|E)$ will be low. In other cases, the dispositions may be enough of a mix that it is hard to say.

Quineans might suggest that if $cr(S|E)$ is indeterminate in this way, and the subject later rejects S upon learning E , this should not count as a violation of conditionalization. If so, they then might suggest that for any S , there is some E such that $cr(S|E)$ is indeterminate in this way, and such that the subject could later reject S on learning E without violating conditionalization. Perhaps this sort of revisability is enough for their purposes?²⁴

I do not think that this is enough, however. Cases of this sort seem to turn essentially on the subject's not being fully rational. If the subject is fully rational, then her dispositions to accept S on supposing E and on learning E should be the same, assuming no conceptual change. That is, if a fully rational subject rejects S on learning E and thinking things through, then if she were to have been presented initially with the supposition that E and had thought things through, she should have rejected S conditional on that supposition. To fail to meet this condition is a failure of full rationality, just as is an ordinary violation of conditionalization. So at best the Quinean has presented us with a kind of revisability that can be exploited only by subjects who are less than fully rational. Like the sort of revisability that can be exploited only by irrational subjects, this sort of revisability has no bearing on matters of apriority.

VIII. CONCLUSION

Quine is right that any statement can be held true come what may and that no statement is immune to revision. But as Grice and Strawson

²⁴ It is especially likely that ordinary subjects will lack credences $cr(S|D)$ involving the scenario specifications D discussed earlier, due to the enormous size of these specifications. This observation does not affect the use of conditional credences involving D to define intensions, as the credences used there are always idealized rational credences $cr'(S|D)$, for which the current issue does not arise. Where nonidealized credences are concerned, these cases will not yield cases of revisability along the lines in the text, because the subject will be incapable of learning that D .

observe, these phenomena are quite compatible with a robust analytic/synthetic distinction and a robust notion of meaning. A Bayesian analysis reveals that Quine is not right that any statement can be held true come what may without conceptual change or irrationality, and likewise for revision. We can pin down the distinction between cases that involve conceptual change and cases that do not using either the method of intensions or Bayesian analysis.

The method of intensions characterizes intensions in terms of certain idealized dispositions, and uses this notion to distinguish between cases that involve conceptual change and cases that do not. In the central version that I examined, this method assumes the notion of apriority, so it does not ground that notion independently. Still, it shows how a framework involving apriority can accommodate all of Quine's data. And for the same reasons that most philosophers reject Quine's arguments in the first four sections of "Two Dogmas," no independent grounding is required.

The Bayesian analysis takes a step further and defends the a priori on partly independent grounds. This analysis assumes the notion of conditional probability and the normative notion of rationality to provide conditions for conceptual change, but it does not assume the notion of apriority. In effect, constitutive connections between rational inference and conceptual change are used to make inroads into the Quinean circle.

The conclusion should not be too strong. While I have responded to Quine's arguments against the a priori and the analytic, I have not provided a positive argument for the analytic/synthetic or the a priori/a posteriori distinction, and I have not tried to ground these notions in wholly independent terms.

One might be tempted to take things a step further still, and attempt to define apriority in terms of conditional probability and rationality. For example, one might suggest that a sentence S is a priori for a subject precisely when the ideal conditional probability $cr(S|D)$ is 1 (or: is high) for all scenario specifications D . But there will be residual issues. For a start, it is not clear that one can define the class of scenario specifications without using the notion of apriority. In addition, the thesis is subject to various potential counterexamples; for example, one might argue that when S is a mathematical truth and D specifies a scenario in which one is a poor mathematical reasoner, $cr(S|D)$ should be much less than 1. Much more would need to be said to handle these issues.²⁵

²⁵ I address the second issue in *Constructing the World*, arguing that there is an idealization on which $cr(S|D)$ in this sort of case should be 1, where this idealization can be understood without appeal to the a priori. I think that the role of the a priori with respect to the first issue is more robust.

Still, we have seen that these notions can help us at least in diagnosing issues regarding meaning, conceptual change, and the a priori. And we have seen enough to suggest that Quine's arguments in the final section of "Two Dogmas of Empiricism" do not threaten the distinction between the analytic and the synthetic, or the distinction between the a priori and the a posteriori.

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