

Departmental Boundaries within the Corporate Body of Theory: Quine on the Holistic Foundations of Logic

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ABSTRACT: This article argues that Quine's holistic and naturalized semantics provides an inadequate account of the foundations of logical expressions and misrepresents the internal structure of theories. By considering a Quinean model of theoretical revision, I identify the status and foundation holism provides to the propositions of logic. I contend that a central tenet of Quinean holism—the Revisability Doctrine—cannot be held consistently, and that the inconsistencies surrounding it mark a series of pervasive errors within naturalized holism. In response, I propose that semantic theories must reflect the different linguistic functions of different types of expressions and the specific relationships that individual concepts within a theory or language have to one another.

RÉSUMÉ : Cet article soutient que la sémantique holiste et naturalisée de Quine est inadéquate pour rendre compte des fondements des expressions logiques et qu'elle donne une mauvaise représentation de la structure interne des théories. L'examen d'un modèle quinéen de révision théorique me permet d'identifier le statut et le fondement donnés par l'holisme aux propositions de la logique. J'avance qu'une pièce maîtresse de l'holisme de Quine — la doctrine de la révisabilité — ne peut être soutenue de manière cohérente; les incohérences qui l'accompagnent sont le signe d'une série d'erreurs propres à l'ensemble de l'holisme naturalisé. En réaction, je propose que les théories sémantiques doivent refléter les différentes fonctions linguistiques de différents types d'expressions ainsi que les relations spécifiques qu'entretiennent entre eux les concepts individuels d'une théorie ou d'un langage.

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1. Introduction

Perhaps the most remarkable and controversial feature of Quine's legacy to philosophy is his uprooting of logical propositions as a class of *a priori* necessary truths whose nature and justification are categorically different from the claims of science. Prior to Quine, the idea of analyticity promised to explain the nature and foundation of logical truths. With the idea of analyticity, the propositions of logic could be explained as analytic truths whose foundations were based solely in the meanings of our terms. As such, the propositions of logic were clearly distinguished from other components of theory and were securely insulated from the contingencies of matters of fact. In providing the foundations of logic, analyticity made essential contributions not only to epistemology, but also to our accounts of the structure of theory.

Following Quine's repudiation of the analytic/synthetic distinction, the idea of analyticity, and the semantic theories within which it stood, were disenfranchised and could no longer provide the foundations of logic. Instead, according to Quine's semantic holism, the components of the corporate body of theory cannot be distinguished with respect to subject matter or linguistic function. This view affects not only the organizational structure of the corporate body, but also the status of each member of the corporation itself. In the first place, there are no departmental boundaries within the corporate body of theory; the job of individual members cannot be uniquely determined or specified in relation to other individual members. As a result, there is no unique status associated with having a cornerstone office within the corporate body. Rather, all components of theory stand on the same justificatory grounds. Moreover, these grounds are by no means insulated from the contingencies of experience. According to Quine's Revisability Doctrine,¹ every statement in a theory—including the propositions of logic—is revisable on the basis of a recalcitrant experience. Indeed, the grounds of theory are completely naturalized so that "[e]pistemology . . . is contained in natural science, as a chapter of psychology" (Quine 1969, p. 83). With these claims, Quine drastically altered the outlook of contemporary Western epistemology and the semantic environment in which it is oriented. Such a view not only infiltrates all branches of epistemology, but reverberates throughout our accounts of theories and their internal structure.

In this article, I consider the adequacy of Quine's holistic and naturalistic theory of the foundations of logic. I argue that, while a return to the traditional picture of analyticity may not be feasible, Quine's own semantic model is also unacceptable. Following a brief summary of Quine's model of theoretical revision (§§2-3), I identify the status and foundation holism provides to the propositions of logic (§§4-5). I contend that one of the central tenets of Quine's holism—the Revisability Doctrine—cannot

be held consistently, and further that the inconsistencies surrounding it mark a series of pervasive errors within Quine's semantic theory (§§6-7). Most important among these errors is that Quine's holism fails to account adequately for the linguistic function of logical propositions. Because of this, Quine's holism fails to account adequately for the foundations of logical propositions, and, in doing so, it misrepresents the internal structures of theories. In response to these problems, I propose that our semantic theories must reflect the different linguistic functions of different types of expressions, as well as the specific relationships that individual concepts within a theory or language have to one another. This means that we require an account of the organizational structure of the corporate body of theory which recognizes that there are different departments within the corporate body, and which reflects the different jobs of the members of each department. I speculate as to what some of these departments might be (§8) as a way of leading to the conclusion (§9) that we require a different account of the foundations of logical propositions which reflects their unique function within language and theory.

2. Quine's Holistic Model of Belief Revision

To determine the precise impact of Quine's semantic holism on his account of the foundations of logic, we must consider his model of belief revision and introduce some of the technical language in which he spells out his model. He describes the "characteristic occasion" of belief revision as follows:

It was the situation where a new belief, up for adoption, conflicts somehow with the present body of beliefs as a body. Now when a set of beliefs is inconsistent, at least one of the beliefs must be rejected as false; but a question may remain open as to which to reject. Evidence must then be assessed, with a view to rejecting the least firmly supported of the conflicting beliefs. (Quine and Ullian 1978, p. 16)²

So far, this account seems relatively common sense. In the spirit of Quine's model, we may call our present body of beliefs a theory. (Quine sometimes speaks of sets of theories, though I will use the term "theory" in a more general sense to include everything in the web of belief.) Our theories consist of sentences (Quine 1992, p. 2) which are linked together in specifiable ways. The job of logic is to connect sentences to sentences, but the "initial links in those connecting chains" (ibid., pp. 2-3) are provided by "sentences that are directly and firmly associated with our stimulations" (ibid., p. 3). These initial links are observation sentences.³ "[A]n observation sentence is an occasion sentence on which speakers of the language can agree outright on witnessing the occasion," and an occasion sentence is simply a statement whose truth or falsity depends on the occasion (ibid.).⁴ Observation sentences have a very special function and status in Quine's overall

picture. The important point to note for the moment is that observation statements are the points of contact between theory and the world (Quine and Ullian 1978, p. 28; Quine 1995a, p. 44).⁵ As such, it is ultimately through them that our theory will be tested against experience.

In addition to logic and observation sentences, our theory consists of many other kinds of sentences. Some of these will be theoretical hypotheses, examples of which would include general statements of a speculative, explanatory, or causal nature ranging from laws of nature to rough-hewn generalizations. To determine whether a hypothesis ought to be admitted into the web of belief, it must be tested. And, to test a hypothesis, its observable consequences must be determined. Thus, theoretical claims are ultimately cashed out in terms of observation sentences. Bridging the gap between theory and observation typically involves observation categoricals. Observation categoricals compound observation sentences into generalities, and have the general form of expressing an observable regularity (Quine 1992, p. 10). In general, these observation categoricals do the job of logically linking theory to observation (*ibid.*). Indeed, the logical connection between observation and theory is established linguistically as words in observation sentences “recur in theoretical contexts” (*ibid.*, p. 7). Quine writes, “It is precisely this sharing of words, by observation sentences and theoretical sentences, that provides logical connections between the two kinds of sentences and makes observation relevant to scientific theory” (*ibid.*).

Holism claims that a theoretical hypothesis, when taken on its own, does not have a sufficient fund of observable consequences (consequences which can be expressed as observation sentences, or as conjunctions thereof) that it may be tested against experience. Instead, the testing of a theoretical hypothesis typically relies on a “backlog of accepted scientific theory” (*ibid.*, p. 13). “In order to deduce an observation categorical from a given hypothesis, we may have to enlist the aid of other theoretical sentences and of many common-sense platitudes that go without saying, and perhaps the aid even of arithmetic and other parts of mathematics” (*ibid.*), not to mention logic. So, the second major consequence of holism is that “our statements about the external world face the tribunal of sense experience not individually but only as a corporate body” (Quine 1961, p. 41).^{6,7}

Further, since the statements of a theory are not tested by experience individually, they are not refuted by experience individually. Quine writes:

[T]he falsity of the observation categorical does not conclusively refute the hypothesis [from which it was deduced]. What it refutes is the conjunction of sentences that was needed to imply the observation categorical. In order to retract that conjunction we do not have to retract the hypothesis in question; we could retract some other sentence of the conjunction instead. This is the important insight called *holism*. (1992, pp. 13-14)

In and of itself, this is not a particularly original or controversial insight. It is a logical commonplace that if the antecedent of a conditional is a conjunction of statements, the falsity of the consequent does not falsify any one of those conjuncts in particular. (Unless, of course, the consequent is one of the conjuncts in the antecedent.) This is sometimes called the ambiguity of *modus tollens*. The source of the controversy in Quine's holism lies in two of its more idiosyncratic features. First is the degree of theoretical material Quine requires for the implication of observation categoricals. Second is the role that Quine portrays this material as having not only in the derivation of the categorical, but in the theory as a whole. Ultimately, the controversy of Quine's holism is visible in the kinds of claims that he considers subject to refutation on the basis of experience.

3. Epistemological Consequences of Quine's Holism: Preservability and Revisability

Semantic holism claims that, since individual statements within a theory do not have a sufficient fund of empirically testable consequences on their own, they must face the tribunal of experience as part of a corporate body. Yet, this corporate body is not limited to some part of theory or several threads in the web of belief. Rather, Quine claims, "[t]he unit of empirical significance is the whole of science" (1961, p. 42). That is, it is only when placed alongside the *entire* theory that a hypothesis can generate an observation categorical capable of being empirically tested.⁸ As such, the entire corporate body of statements stands as the antecedent of any empirically falsifiable consequent. Because of this, the arrow of *modus tollens* can fall almost anywhere within the current body of theory.

This is the reasoning behind two of Quine's most controversial epistemological claims. First is the claim that, since the whole of science (i.e., every statement in the theory) is required in generating empirically testable consequences, we may pick and choose which statements we want to revise should those consequences turn out not to be the case. Indeed, there is nothing stopping us from holding any one of them true on any given occasion, since it can never be said that the arrow of *modus tollens* definitely points at any one statement. This I call Quine's Preservability Doctrine [PD], which he expresses as follows: "Any statement can be held true come what may, if we make drastic enough adjustments elsewhere in the system" (Quine 1961, p. 43). Neither, on the other hand, can it be said that the arrow of *modus tollens* does *not* point at any given statement in the theory. This marks Quine's second claim, which I call the Revisability Doctrine [RD]. RD states that "[N]o statement is immune to revision [on the basis of a recalcitrant experience]" (ibid.). According to PD no particular statement in the theory need be sacrificed; according to RD no particular statement in the theory is sacrosanct. Instead, as is indicated by these two doctrines (which Quine takes to be consequences of his holism), all con-

stituents of the theory are on a par with respect to their connection to the observed facts of the world.

4. Holism, Analyticity and the Subject Matter and Function of Logical Propositions

The doctrine of semantic holism is Quine's second route to the deconstruction and subsequent abolition of the analytic/synthetic distinction from semantics and epistemology.⁹ Since, for any given statement within the corporate body (observation statements excluded) no empirically testable consequences can be uniquely attributed to it, one cannot separate the linguistic factors (e.g., meanings) and the extra-linguistic factors (e.g., the obtaining of facts) from one another when determining the truth of the statement in question. Instead, Quine claims,

[I]t is nonsense, and the root of much nonsense, to speak of a linguistic and a factual component in the truth of any individual statement. Taken collectively, science has its double dependence upon language and experience, but this duality is not significantly traceable into the statements of science taken one by one. (1961, p. 42)

As a result of this holism, no statement can be said to be true purely in virtue of the meanings of the terms used within it—that is, no statement can properly be described as analytic. Because of this, the analytic/synthetic distinction should be done away with once and for all. Furthermore, analyticity cannot be used as an explanation of the nature of the propositions of logic. Since the contribution of an expression's meaning to its truth cannot be specifically isolated, the foundation of the truths of logic cannot be cast exclusively in meaning.

Before moving to consider the foundations on which Quine attempts to place the propositions of logic and arithmetic, two additional observations should be made regarding his holistic argument against the analytic/synthetic distinction.

The first observation concerns the net effect of Quine's abolition of the analytic/synthetic distinction. According to the Revisability Doctrine, any statement can be repudiated on the basis of a recalcitrant experience, and as such the truth of every statement depends on something more than the meanings of the terms used in it.¹⁰ Because the-way-the-world-is plays a role in determining the truth of all statements, all statements are like synthetic statements. All statements in the theory are contingent; no statement may be viewed as necessarily true, or knowable *a priori*. So, the net effect of Quine's abolition of the analytic/synthetic distinction is to abolish the analytic, the *a priori*, and the necessary, replacing them with the synthetic, the *a posteriori*, and the contingent.

Further, Grice and Strawson proceed to identify a series of related distinctions, tied to the analytic/synthetic distinction, which must also be surrendered as a consequence of accepting Quine's argument. For instance, to accept Quine's conclusion is to surrender the notion of *logical impossibility* (Grice and Strawson 1956, p. 150) and admit that we cannot distinguish between statements which are merely profoundly unlikely, and those which are *a priori* impossible (ibid., pp. 150-51). (In the former case, we can imagine some circumstance—however improbable—which, if it in fact obtained, would establish the truth of the statement. By contrast, in the latter case, the only conceivable way that the statement could be made true would involve imagining a contradiction or changing the usual meanings of the terms involved.) This yields the related point that the acceptance of Quine's argument relieves us of 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” (ibid., p. 157). Ultimately then, Quine's demand that we surrender the concept of analyticity is a demand that we abandon the idea that there is any difference between conceptual and factual change.¹¹

The second observation to be made at this juncture concerns Quine's account of definition. According to Quine, definitions do not have a special or unique function within theory. Rather, definitions are to be seen as a class of statements which report “prior relations of synonymy” (1961, p. 27). As such, definitions are descriptive statements which may be true or false depending on their descriptive accuracy. Indeed, like any other kind of statement in the theory, definitions are subject to the Revisability Doctrine [RD]; definitions are empirically justified and may be revised when they are not consistent with observed usage.

Similarly, according to RD, the propositions of logic and mathematics may be revised just like any other component of the theory. As with definitions, one of the reasons for this is that Quine's holism provides no special function for logical and mathematical laws. According to Quine's holism, “logical laws [are] simply certain further *statements* of the system, certain further elements of the field” (ibid., p. 42; emphasis added). The laws of logic are statements, and as such are on a par with all other components of a theory. As statements, the laws of logic must be seen as functioning like descriptions (or as something like descriptions). They do not have a special normative, stipulative, constitutive, or regulative relationship with their subject matter. It is partly because of this that the laws of logic are contingent upon how things are with the world, and subject to the Revisability Doctrine.

So, just as Quine's holism deprives logic of a special status on the grounds that it treats a unique subject matter (meanings instead of facts), so does it deprive logic of a special status on the grounds that it has a unique function or relationship to that subject matter (stipulative rather

than descriptive). Instead, each element of a theory is on a par not only with respect to its subject matter (which always has partly to do with the observed world), but also with respect to its pragmatic function in the system. It is a combination of these two features that permits Quine to hold that even the laws of logic are subject to the Revisability Doctrine. Indeed, Quine's doctrine of semantic holism really amounts to the claim that there is no difference in kind between the components of a theory.

5. Quine's Holistic Foundations of Logic: Minimum Mutilation and Entrenchment

Having seen Quine's repudiation of the positivistic account of the nature and foundation of logic (according to which logical propositions are analytic truths), it remains to consider Quine's own holistic account of the foundations of logic. We have seen that Quine's holism does not allow that the propositions of logic differ from any other component of the theory. Logic cannot be distinguished from other elements of the theory either in respect of its subject matter or in terms of the relationship it has to that subject matter. As such, the foundations of logic under holism are no different from the foundations of any other component of a theory.

How, then, does holism explain the foundations of the components of a theory? The answer to this question is to be found in considering those principles employed in determining whether, and when, the truth value of a statement ought to be revised on the basis of a recalcitrant experience. Here, there are two principles: (1) the maxim of minimum mutilation, and (2) the idea of entrenchment.¹²

The basic idea behind minimum mutilation is that we want to accommodate a new observation (i.e., the truth of the new observation statement) into the existing theory with as little disturbance as possible to the remainder of the theory (Quine 1992, pp. 14-16). Colloquially, the idea is "not to rock the boat more than need be" (ibid., p. 15), and according to Quine this maxim reflects "our natural tendency to disturb the total system as little as possible" (1961, p. 44).

Importantly, the maxim of minimum mutilation alone cannot guide us in our selection of statements to be revised in light of a recalcitrant experience. After all, if the degree of mutilation to a theory is measured quantitatively, then there is an obvious choice for revision in the face of any particular recalcitrant experience. Any recalcitrant experience can be accommodated in any theory merely by revising one statement: the law of non-contradiction. Indeed, by giving up the law of non-contradiction, we would solve *all* problems concerning theoretical revision at once! Yet, Quine does not suggest that we simply surrender the law of non-contradiction. So, there must be some qualitative criteria which also inform our choice of statements to revise.¹³

Since the maxim of minimum mutilation, quantitatively understood, would act as a constant cognitive pressure to surrender the law of non-contradiction, the criteria involved in the qualitative selection of statements for revision must be equally steadfast in anchoring it in place. Minimum mutilation is counterbalanced by the principle of entrenchment which recognizes that “[some] statements may be thought of as relatively centrally located within the total network, meaning merely that little preferential connection with any particular sense data obtrudes itself” (Quine 1961, p. 44). Since mathematics, for example, “infiltrates all branches of our system of the world . . . its disruption would reverberate intolerably [throughout the entire theoretical system]” (Quine 1992, p. 15). So, the revision of other statements—statements closer to the peripheries of the theory—are to be preferred over the revision of statements, such as those of mathematics and logic, located at the core of the theory.

So, the general principle that experience should rock the theoretical boat as little as possible has both a qualitative and a quantitative aspect to it. But there is more to the principles guiding theoretical revision than just this. Even more important, perhaps, is this: the degree to which the theoretical boat is rocked is not an absolute measure, but can only be made relative to the overall purpose of the theory. For instance, if the purpose of theory is merely to accommodate any and all observations, then even entrenchment would not securely anchor the law of non-contradiction.

What, then, is Quine’s view on the purpose of theory? In describing the principles guiding theoretical revision, Quine claims that “the ultimate objective is . . . to choose the revision [so] as to maximize future success in prediction” (1992, p. 15; cf. Quine 1961, p. 44).¹⁴ In so doing, he posits that the purpose of a theory is to accurately predict future observations (presumably while remaining consistent with all past observations). Yet, this is not the only purpose which a theory may have: Quine has simply chosen a theoretical goal that suits his larger project. Recall that, following Quine, the term “theory” is used in a very broad sense to indicate not only the body of knowledge and conjecture employed in scientific disciplines like physics, but as a general term for someone’s web of belief. In this context, any given theory can have a multitude of sorts of purposes (from scientific, to religious, to psychological). Further, not only might the goals of the theory be mutually inconsistent, but the holder of the theory might not even be consciously aware of these goals.

The point of this objection is not to take issue with Quine’s posited objective, i.e., his statement of the goals of science.¹⁵ Rather, it is to observe that, according to Quine’s holism, there are no logical reasons to insulate some statements from revision over others; there are only instrumental reasons. That is, the entrenchment of a statement in a theory is not a logical property of it. Rather, as Creath writes, entrenchment is better understood as “reflect[ing] our relative willingness to abandon the various

beliefs under consideration” (1990, p. 28). Admittedly, our willingness in this regard may be relative to our overall goals, but it may also be relative to a number of other things as well. And, there can be no unequivocal statement of *the* goal of theory. (Nor does Quine’s holism seem to provide us with an objective perspective from which we may evaluate competing theoretical goals.) Indeed, the Preservability Doctrine allows that one may choose to insulate *any* statement in the theory over any others. An immediate consequence of this is that the law of non-contradiction is not necessarily the most entrenched claim in a theory. (In some theories certain religious or psychological claims can be even more entrenched.) So, in the final analysis, the entrenchment of a statement is explained in terms of the psychological attachment thinkers have to it, as manifested by their willingness (or unwillingness) to abandon that claim for others through the experiences of life.

In summary, according to Quine, the ultimate forces of stability within a theory are a combination of minimum mutilation and entrenchment. But, since the rocking of the theoretical boat can only be understood instrumentally, there are no absolute principles which hold it stable in the waters of experience. Rather, choices regarding revision and preservation are the result of instrumental reasoning made in the context of one’s overall goals and attachments. For Quine, the truths of logic and mathematics are founded on policy decisions made in the practical context of maximizing future predictive success. Since the propositions of logic and mathematics are merely further statements in the theory, indistinguishable in both function and subject matter, they stand on exactly the same foundation as all other statements in the theory. For Quine, the stability of any statement in the theory is ultimately determined by the interplay of minimum mutilation and entrenchment.

So, it is ultimately the notion of entrenchment that explains any necessity logic and mathematics have in Quine’s holism. One might be tempted to say that the laws of mathematics and logic are deeply entrenched in a theory because they are necessary—that their necessity explains their entrenchment. But this is not so on Quine’s view; indeed things are quite the other way around. According to Quine, “[h]olism . . . accounts for mathematical necessity by freedom of selection and the maxim of minimum mutilation” (1992, p. 56; cf. Quine 1988, p. 4).¹⁶ In elaboration of this point, Quine writes the following:

If asked why he spares mathematics, the scientist will perhaps say that its laws are necessarily true; but I think we have here an explanation, rather, of mathematical necessity itself. It resides in our unstated policy of shielding mathematics by exercising our freedom to reject other beliefs instead. (1992, p. 15; cf. Quine 1995b, p. 257)

So, according to Quine, the necessity of logic and mathematics is the result of an unstated policy that we should hold logical and mathematical propositions as more firmly entrenched in our theory than statements of other kinds. While they are, in principle, refutable on the basis of experience, we simply choose to revise other statements instead because it is more efficient to do so in light of the overall scientific goals of our theory.

6. The Shallow Inconsistency of Quine's Revisability Doctrine

One of the most radical and controversial features of Quine's epistemological position, what I have called his Revisability Doctrine (RD), is the claim that "no statement is immune to revision [on the basis of a recalcitrant experience]" (Quine 1961, p. 43). RD, which Quine asserts as a consequence of holism, is the claim that most directly threatens the character of logical laws as expressing necessary truths. As was previously observed, the net effect of Quine's criticisms of analyticity (and his semantic holism) is to characterize *all* statements as contingent (true in some cases but not in others), and to remove necessity from all statements. To accept the Revisability Doctrine is to accept that all statements (that is, all components of theory) are synthetic.

The preliminary objection to the Revisability Doctrine, which marks the shallow inconsistency inherent in Quine's overall position, is that even Quine does not maintain such a position consistently. That is, Quine (and all other adherents to RD) do not—and cannot—consistently believe that any statement is revisable on the basis of a recalcitrant experience. There has to be at least one exception—even for Quine. While for most of the rest of us this exception would be the law of non-contradiction, for Quine it would appear that the statement is the Revisability Doctrine itself.¹⁷ To see this, consider the question: what experience would serve as a suitable refutation of the dictum that every statement is revisable on the basis of a recalcitrant experience? More generally, what evidence would Quine accept as establishing (or even contributing towards establishing) that the Revisability Doctrine is false? It is no simple oversight that Quine does not provide *any* criteria for the refutation of RD *anywhere* in his writings. Why? Because Quine does not see RD as refutable, let alone refutable on the basis of a recalcitrant experience.

A possible response to my objection that Quine does not take RD to be revisable is to claim that RD is *in principle* revisable, it is just that we never actually revise it. Indeed, the fact that Quine never actually revises RD is not sufficient evidence for the claim that he does not hold it to be revisable. But consider the rather precarious position of Quine's theory. Either RD is revisable or it is not. If it is not revisable, then it is false, and Quine must abandon it along with significant aspects of his holistic theory. So, suppose that RD is revisable; now, either RD gets revised (in fact), or it does not. Yet, if RD actually is revised, Quine must again surrender it as well

as significant tenets in his semantic holism. So, the only way that Quine can consistently hold his Revisability Doctrine is to hold that the doctrine itself is revisable, but it just so happens that it never gets revised.

One way Quine might try to explain why it is that we never seem to revise RD is to claim that it is true. But, this move raises some important questions: what is it about RD that makes it true? What are its truth conditions? Answering these questions is crucial because the claim that RD is true is not entirely sufficient to support the precarious position it occupies in Quine's theory. For RD to be acceptable, it must not only be true *but it must also be possible that it be false*. Paradoxically, if RD does not meet this condition—that is, if it is held to be necessarily true, or true *a priori*—then it is self-refuting and cannot be held consistently.

So, according to Quine, under what conditions would RD be false? Under what circumstances is RD to be revised? More to the point, what recalcitrant experience would count as (sufficient) evidence for establishing the falsity of RD? Problematically, Quine never provides us with any such truth or revisability conditions for RD.

So, that we do not ever, in fact, revise RD is no challenge to Quine's theory, so long as it always remains possible that we do so. Yet, my claim that Quine does not take RD to be revisable *in principle* is not based merely on the claim that we do not, in fact, revise it. Rather, it is based on the claim that Quine never provides RD with any revisability conditions. And, given the importance of RD to Quine's overall theory, I think that Quine is under considerable obligation to provide us with these revisability conditions.

Seeing that Quine does not meet this obligation, I will speculate upon what such a condition might look like. The only obvious revisability condition for RD seems to be this: our attitude to RD should be revised when we are presented with a statement that is not revisable on the basis of a recalcitrant experience, that is, a statement whose truth conditions are completely independent of any matter of fact. (To me, RD seems like a promising candidate, and might be considered as first in the queue!) Yet, under Quine's holism, there are no such statements. Moreover, that there are no such statements is no mere contingent truth for Quine. Rather, it is *a priori* impossible to provide one, since, according to Quine, there is *always* a factual component to the truth conditions of *every* statement. So, no counter-example we could ever produce would convince Quine to revise RD. This situation should produce a serious question as to whether Quine does indeed hold that RD is in principle revisable, and true only as a matter of fact. Instead, it appears that, in Quine's system, it is simply not possible that RD is false. Yet, as I stated above, the impossibility of RD's falsehood is alone sufficient to refute RD, and shows that RD cannot be consistently held.

Lastly, it is no defence of Quine's semantic holism, and naturalistic epistemology, to claim that the only reason we never revise RD is that it

is just one of those propositions we shield with the Preservability Doctrine and stubbornly hold onto in the face of any and all experience. At this point, the normative epistemologist may rightly argue with Quine: while you *do* hold on to RD, you *ought to* give it up.

I take the shallow inconsistency of the Revisability Doctrine to be more than an interesting reversal, or an anomalous self-referential paradox. Indeed, it points to a much deeper problem in Quine's thinking. Recall that RD is a consequence of holism, and, according to Quine, observation is the ultimate checking point for a theory. As such, the only way of testing Quine's theory is to falsify its consequences (Quine 1969, p. 75). But, RD is not falsifiable; it is not a testable consequence. This is an indication that Quine's overall semantic theory is itself not empirically testable. The *apriority* of Quine's RD does not merely establish that Quine's semantic theory supports certain inconsistencies. More importantly, it would seem that Quine has not set up the theoretical tenets of his own semantic theory as scientifically falsifiable.

While this should not prompt us to immediately abandon Quine's theory, it should provoke our asking some rather pressing questions of Quine. For instance, what evidence would Quine accept as counting towards the falsity of his semantic theory? For, at this point, it would seem that Quine's Revisability Doctrine, as well as his overall theory of semantic holism, "is an unempirical dogma . . . a metaphysical article of faith" (Quine 1961, p. 37). This marks the shallow inconsistency of Quine's Revisability Doctrine.

7. The Deep Inconsistency of Quine's Revisability Doctrine

There is, though, another, deeper inconsistency inherent in Quine's Revisability Doctrine. According to RD, no statement is immune to revision on the basis of a recalcitrant experience, and the law of non-contradiction is itself included within the scope of the doctrine. Yet, I contend that it is absurd to say that the law of non-contradiction can be revised *on the basis of* a recalcitrant experience.¹⁸

The absurdity involved in revising the law of non-contradiction on the basis of a recalcitrant experience arises from the very nature of a *recalcitrant* experience. What is the nature of a recalcitrant experience? A recalcitrant experience is an experience which, on its own, provides sufficient evidence to establish a proposition (an observation statement, in Quine's terms) that *contradicts* at least one of the statements in a theory. In other words, an experience can only be a *recalcitrant* experience on the assumption that the law of non-contradiction holds.¹⁹ The proposition justified by the recalcitrant experience can only contradict some other proposition in the theory if the law of non-contradiction applies. Hence the absurdity involved in revising the law of non-contradiction on the basis of a recalcitrant experience: one must accept the law in order to revise it.

This is not to say that one cannot abandon the law of non-contradiction, or even that one could not give up the law of non-contradiction in the face of some experience or other. But one cannot do so *on the basis* of some recalcitrant experience. *To give up the law of non-contradiction is to abandon the notion of recalcitrance with it.* The moral of the story here is that the notion of contradiction is bundled together with the very notion of recalcitrance. We cannot use one as the grounds for abandoning the other.

As with the shallow inconsistency of RD, I do not take this paradox to mark a superficial exception to Quine's Revisability Doctrine. Rather, I take it to mark the source of a pervasive series of errors in Quine's holistic account of belief revision.

According to Quine's model, some observation sentence (O) is justified exclusively by experience, and it stands on its own against the body of theory which it contradicts. Moreover, the entire theory itself stands together as a corporate body, as an undifferentiated mass of statements with none of its constituents having any special standing in relation to any of the others. Only the two policies of entrenchment and minimum mutilation determine which of the statements in the theory ought to be revised or preserved, and these two policies are not founded on any epistemological or logical principles.

Yet, we have just seen that the observation statement (O) does not stand on its own against the body of theory which it contradicts. Rather, it stands together with the law of non-contradiction (as a meta-linguistic principle), and without this principle there would be no contradiction to speak of. Putting this point in more Quinean terms, it might be said that non-contradiction is entrenched not only in the mass of theory; it is also entrenched in the observation sentence. Nor is this the only component of the theory with which the observation statement must stand in order to occasion a theoretical revision. Rather, other statements are also required in order that O contradict some other statement (\sim O) in the theory.

Specifically, there is a whole series of semantic principles that establishes and fixes the meaning of the observation statement and its constituent terms. For instance, the meta-linguistic claim that the signs used in O have the same meanings as the corresponding signs used in the theory is also required in order that O be interpreted as contradicting \sim O.²⁰ For, by Quine's own admission, the link between theory and observation is established by the recurrence of the same terms in theoretical and observation sentences (1992, p. 7). Yet, if these terms are simply seen as signs (graphemes) with different meanings in different instances, no contradiction occurs. Moreover, any expressions which give the meanings of these signs stand together with O in enabling it to contradict \sim O. As with the principle of non-contradiction, it does not make sense to say that any of these principles will be revised *on the basis of* a recalcitrant experience, for they are themselves partly responsible for the recalcitrant nature of the

experience in the first place. Without these principles, there would be no recalcitrance to speak of. So, it is simply false to suggest that these propositions may be revised (especially in respect of their truth value) on the basis of a recalcitrant experience. Quine's explanation that such semantic and logical propositions are deeply entrenched in the theory, and as such are not *suitable* candidates for revision, misses the larger point that such propositions are *not candidates for revision whatsoever*. Nor is this Quine's only error on this point.

Not only does Quine's picture misrepresent the relation such propositions have to the theory and the epistemological role they have in theoretical revision, but in so doing it also misconstrues the nature of theoretical revision. Laudan argues that the idea that we may accommodate a recalcitrant experience by changing the meanings of our terms is "surely a Pickwickian sense of 'holding onto a theory come what may,' since what we are holding onto here is not what the theory asserted, but the (redefined) string of words constituting the theory" (1998, p. 326). This would seem to indicate that Quine misconstrues the Preservability Doctrine also.

So, certain truths of logic, as well as certain semantic principles, stand behind any observation sentence, not only when the results of observation are reported back to theory, but also when observation meets with experience in the first place. Indeed, the list I have proposed here may appear short. Depending on the content of the observation statement, many other components of the theory must also be in place in order that the observation statement contradict some other statement in the theory. For instance, insofar as the observation statement involves numbers or quantities, the truths of mathematics will be required to stand along with the observation statement. Further, certain statements about the reliability of our powers of observation also stand behind our acceptance of the observation sentence. *In general, any statement or set of statements which, if supposed to be false, would discount our acceptance of the observation sentence (as opposed to revising some feature of our theory) stands along with the observation sentence when it engages with experience and reports back to the corporate body.*

So, the first pervasive error in Quine's holistic model of belief revision marked by the deep inconsistency of the Revisability Doctrine is that observation statements stand on their own against a theory on the occasion of theoretical revision. No observation statement stands on its own. Rather it stands together with an entire set of logical, semantic, and even theoretical principles which are required in order that the observation statement meet with experience, relate to a theory, potentially contradict that theory, and so occasion a revision of it.

The second pervasive error in Quine's picture is his claim that "the unit of empirical significance is the whole of science" (1961, p. 42). As I noted above (see note 6), Quine backs away from this claim with his recognition

that some constituents of the theory will be unaffected by a recalcitrant experience. For instance, Quine concedes that “[a]ny purely logical truth is thus exempted, since it adds nothing [substantive] to what . . . [the theory] would logically imply anyway, and sundry irrelevant sentences . . . will be exempted as well” (1992, p. 14). As a concession, Quine amends his holistic model of theoretical revision to claim that it is not the entire corporate body which stands before the tribunal of experience, but rather “some middle-sized scrap of theory [which] usually will embody all the connections that are likely to affect our adjudication of a given sentence” (1960, p. 13). The issue of how much theory is required in any given case “is a question only of critical [semantic] mass: a big enough fragment of science to imply what we expect from some observation or experiment” (1988, p. 4; cf. Quine 1991, p. 268). However, this is only a minimal concession on Quine’s behalf, and one which does not properly do justice to the reasons actually requiring the amendment in the first place. That purely logical truths are exempt from revision on the basis of a recalcitrant experience does not merely mark a degree of attrition among the members of the corporate body facing the tribunal of experience. Rather, it marks the fact that not all members of the corporate body are held in place by entrenchment and minimum mutilation.²¹ Since the principle of non-contradiction remains unaffected by *any* recalcitrant experience, whatever holds it in place cannot be explained by the interplay of entrenchment and minimum mutilation. The source of logical and mathematical necessity cannot be explained by an “unstated policy of shielding mathematics [and logic] by exercising our freedom to reject other beliefs instead” (Quine 1992, p. 15). No policy is required to shield mathematics or logic from experience; rather, it is the very function of logic and mathematics in the theory that serves to insulate them from the contingencies of experience. Yet, even while making the apparent concession that there are logical features of statements in the theory which may exempt them from revision, Quine does not question—let alone revise—either his Revisability Doctrine or his account of those principles that anchor any and all statements in a theory. This marks the third pervasive error in Quine’s holistic model of belief revision which is drawn to light by recognizing the deep inconsistency of the Revisability Doctrine.

Recognizing that some statements in a theory are not held in place by entrenchment and minimum mutilation makes visible the fourth pervasive error in Quine’s holistic model. On Quine’s model, our web of belief only bumps up against the external world as a whole, undifferentiated mass of theory. As a result, the external world is the only effective constraint on the system. Experience does not just mark the “boundary conditions of our body of beliefs” (Quine and Ullian 1978, p. 32), it marks the *only* boundary conditions on our beliefs. Since there is no internal structure to the system, there are no internal constraints on it. The web of belief never

bumps up against the limits of logic; it only ever bumps up against the limits of the world.²² Yet, as we have just seen, some constituents of belief systems are not merely anchored in place by the policies of entrenchment and minimum mutilation. Some constituents of a theory provide it with the very structure through which it can have a boundary with experience. As such, there are internal (e.g., logical) constraints on any theory which provide a different set of boundary conditions for the changes occurring therein. The changes which we make to our system of belief are constrained not only by experience, but by logic also.

The fifth pervasive error in Quine's account of belief revision is found in his claim that a theory consists of an undifferentiated mass of statements, none of which have any special standing in relation to any of the others beyond that which can be supplied by the application of minimum mutilation and entrenchment. Indeed, this is the error which is perhaps best seen as the source of the other errors in Quine's model. Quine is absolutely insistent that all components of the theory function as statements, refusing to allow that any propositions might have a constitutive, stipulative, regulative, or otherwise normative function. Definitions are considered as reports of "prior relations of synonymy" (Quine 1961, p. 27), while logical laws are portrayed as "further statements of the system" (*ibid.*, p. 42). This position is simply untenable. As Quine discovered when trying to articulate a non-circular definition of the concept of analyticity, concepts do not function independently of one another; they work as part of a group. For example, the law of non-contradiction is partly constitutive of the nature of recalcitrance. Expressions specifying the relations between concepts mark departmental boundaries within the corporate body. They have a categorically different function from statements that apply those concepts to the world of experience.

8. Departmental Boundaries within the Corporate Body

Over the course of this article, we have seen many of the problems inherent to Quine's picture of the corporate body of theory. Quine's view that observation statements stand on their own ignores the role that logical, semantic, and theoretical principles play in establishing the content of observation statements, and connecting them to experience and to theory. Quine's claim that the constituents of a theory meet the tribunal of experience as a single corporate body misrepresents the unique roles of individual constituents in that encounter. Further, Quine's claim that the only things holding any of these constituents in place are the policy decisions resulting from the interplay of minimum mutilation, and entrenchment ignores the fact that some constituents of a theory are secured in their positions completely independently of any such policy decisions. In addition to this, Quine's claim that the boundaries of change within the system are marked only along its frontier with experience obscures those con-

straints imposed by the very structure of the theory itself and by the special place that some constituents hold within it. Finally, Quine's view that all members of the corporate workforce are statements that cannot be categorically distinguished from one another according to their subject matter or function misrepresents the real jobs which many of the constituents of a theory actually perform. These pervasive errors should provoke a considerable institutional restructuring of Quine's picture of the corporate body of theory.

What is missing in Quine's picture of the corporate body is the idea that not all members of the corporation perform the same function. In order for the corporation to work properly, different members must perform different functions, and these different functions provide for categorically different positions within the institution of theory.

We might think of these differences in terms of different departments within the corporate body of theory. While I have not conducted a corporate audit to determine what, precisely, these departments are, or ought to be, here are some of the departments we might expect to find within the institution of theory. One department might be responsible for setting the goals or objectives of the corporation, and perhaps setting out its core values. Another department could be responsible for providing the conceptual infrastructure with which the corporation will begin to produce testable claims. Still another department might be given the responsibility of creatively generating speculative hypotheses about the nature of things and how they work. The production end of the corporation might be in charge of testable hypotheses; members of this department are the real temporary labour of the theoretical workforce. Lastly, there will be some department—or perhaps some set of members within each department (a meta-department if you will)—which prescribes the relations and connections each department (member) has to other departments (or departmental members). This might be thought of as the department of interdepartmental relations. Investigation will surely show that there are more (and perhaps other) departments than the few I mention here.

Notice, though, some of the vistas offered by this new perspective on the corporate body of theory. First, each department has a unique function that distinguishes it from other departments within the corporation; thus we may recognize the different jobs performed by different constituents of a theory. Secondly, the departments are related to one another in ways that reflect their different jobs. As such, no member of the corporation stands on its own, but stands as a representative of the theory—as a node within the corporate body. Constituents work as members of a group, and their place in the group is reflective of the work they do. Further, interdepartmental relations within the corporate body are not uniform. Members of different departments respond in categorically different ways to changes affecting the corporation. Moreover, not every constituent is even subject

to the effects of certain types of change. Indeed, entire departments are insulated from changes of certain types. This is not the result of some corporate policy, but rather is explained by the very structure of the institution itself. The position of these constituents within the corporation is not established by some policy, but rather by the nature of their job. Thus, the internal structure of the institution itself places certain constraints on the ways in which the corporation of theory can respond to changes of different sorts. So, by recognizing that different constituents of a theory perform different jobs within the corporate body, we can overcome several of the pervasive problems inherent in Quine's naturalized holistic model of theory and of belief revision.

9. Conclusion: Returning to the Foundations of Logic

I have not been arguing here for the rehiring of a positivistic account of analyticity, and a return to the positivistic account of the foundations of logic. Before we can determine whether there are any linguistic expressions whose truth value is solely a function of their meaning (or the meanings of the terms occurring in them), we must first provide an adequate account of meaning for those linguistic expressions. What I claim here is that Quine's semantic holism cannot provide such an account. By failing to recognize the different linguistic functions of different expressions and the individual relationships concepts have to one another, Quine's semantic holism cannot serve as an explanation of our use of language. Insofar as this contributes to linguistic meaning, Quine's account fails as a theory of meaning also. As such, Quine's dismissal of the concept of analyticity from our theories is unjustified and premature, and it remains to be seen whether analyticity has any meaningful job to perform in the corporate body of theory.

Just as importantly, whatever account we end up providing for the status and foundation of logical propositions, we require something that cannot be found within Quine's holism. For starters, we require some account that begins by recognizing the linguistic function of logical principles such as non-contradiction, and the particular relationships that these principles have to other concepts within the language or theory. Because the principle of non-contradiction is partly constitutive of the notion of recalcitrance, it is simply not possible to revise the principle of non-contradiction on the grounds of a recalcitrant experience. Rather, whatever justification we have for this principle, it must be completely independent of any evidence gained by observation. Indeed, it would appear that the foundation of the principle of non-contradiction is to be explained in terms of the constitutive relationship it has to other concepts and expressions in our theory. If this is correct, what we require is a functional account of the concept of non-contradiction that is sensitive to the local relationships it has with other individual concepts.

More generally, we require some account that accurately reflects the internal structure of languages and theories and the variety of different linguistic functions which expressions have within them. As part of this, we will need some way of preserving and explaining the difference between conceptual and factual change. As an approach for providing such an account, I suggest that we begin by looking to the use of linguistic expressions as a means of explaining their meaning.²³

Notes

- 1 Cf. §3.
- 2 Interestingly, given Quine's mature naturalism, the status of his claim that we *must* reject as false at least one of our beliefs when faced with an inconsistency provokes some rather pressing questions. For instance, is this claim an analytic statement? Alternately, is this an empirical claim, or a description of past epistemological practice? If so, it is obviously false. Many religious examples can be found where the contradiction is simply accepted, accompanied by an appeal to the mysteries of God. But, if it is not an empirical claim then what is the force of the necessity behind the claim that we *must* give up one of them? It would seem that a full statement of Quine's naturalistic theory relies on—indeed requires—modal operators. Yet, what resources can Quine's naturalism supply in accounting for such modal operators? (Similar sorts of questions can be raised for the normative claim that we *ought* to give up one of the inconsistent beliefs.)
- 3 Quine further seeks to naturalize the concept of observation by explaining it in terms of stimulation (1992, p. 2; cf. Quine 1960, p. 17), going so far as to say that “whatever evidence there *is* for science *is* sensory evidence. . . . The stimulation of his sensory receptors is all the evidence anybody has to go on, ultimately, in arriving at his picture of the world” (Quine 1969, p. 75).
- 4 Interestingly, Quine's occasion sentences bear a strong resemblance to contingent statements (e.g., they appear to be co-extensional concepts). Yet, Montgomery and Routley (1966) argue that accepting the notion of contingency into our logic brings with it a full, normal modal lexicon, since the other modal operators can be defined in terms of the primitive notion of contingency. But it is precisely such modal notions as necessity that pose explanatory problems for Quine's naturalism.
- 5 In point of fact, observation statements are merely the points where witnesses agree. Quine must add the metaphysical assumption that what the witnesses are agreeing on is the way the world is, or that there are causal factors reflecting the nature of the world which explain the agreement of the witnesses.
- 6 Crucially, the move from the claim that some set of propositions is required to derive an observation sentence (even a set that is considerably larger than what we might at first think) to the grand holistic claim that all statements of the theory are required for such a derivation is a patent *non-sequitur*. Further, I recognize and acknowledge that Quine later revises this assertion (cf. Quine 1960, p. 13; Quine 1988, p. 4). But part of my argument against Quine is to

show that he does not revise his initial position as much as he should (cf. §7) and that to demonstrate this one must understand why it is that Quine's initial position needs to be revised in the first place.

- 7 Importantly, there is one exception to this rule of holism: the observation statement itself. Quine writes, "[t]he beliefs face the tribunal of observation not singly but in a body. But note now that the observation sentence itself, the sentence that reports or predicts a present or imminent observation, is peculiar on this score. It does face the tribunal singly, in the usual case, and simply stands or falls with the observation that it reports or predicts" (Quine and Ullian 1978, p. 22). According to Quine then, observation statements do not require a "backlog of accepted theory" (1992, p. 13) to be meaningful; rather they "wear their meanings on their sleeves" (1960, p. 42). Each observation sentence on its own has enough semantic mass to stand against experience individually.
- 8 See note 6.
- 9 The first is Quine's argument that no theoretically rigorous, non-circular explanation of analyticity is possible (Quine 1961).
- 10 The Preservability Doctrine has no counterbalancing effects in this regard, since it does not deny that any statement may be repudiated on the basis of a recalcitrant experience. Rather, it claims only that we may choose to insulate the truth value of some statements from revision on the basis of particular experiences on a case-by-case basis. The truth value of any such statement remains, in principle, subject to revision on the basis of a recalcitrant experience. To be consistent with holism more generally, PD must allow that the-way-the-world-is contributes to the truth conditions of *every* statement, including the ones we *choose* to insulate on any given occasion. As such, even insulated statements remain, in principle, synthetic.
- 11 I do not put this forward as a *reductio* for Quine's position; rather, I mention it to clarify and to make explicit the full consequences of Quine's holistic semantics. Needless to say, I find these consequences objectionable.
- 12 Frequently, Quine uses the phrase "minimum mutilation" to indicate both of these principles. I separate them in an attempt to mark the quantitative and the qualitative criteria required in the choice of revision.
- 13 Clearly, when viewed over the course of several occasions for belief revision, the impact of revising the law of non-contradiction (or any proposition deeply entrenched in the theory) might be explained quantitatively. Revising the law of non-contradiction would permit many more changes in the theory than revising, e.g., the claim that "all swans are white." In this sense, it might be feasible to explain entrenchment quantitatively in terms of possible future changes. But, on the occasion of any single theoretical revision, the degree of theoretical change that will result from the revision of one statement rather than another must somehow be explained in terms of connections between statements holding on that occasion. It is for this reason that I think entrenchment must be considered qualitatively.

- 14 At points, Quine backs away from this claim, saying that “prediction is not the main purpose of science, but only the test” (1995b, p. 256). Instead, he claims that “[t]he purpose of science is to be sought rather in intellectual curiosity and technology” (ibid.). Quine’s broadening of the purpose of science only reinforces the point I make here that minimum mutilation and entrenchment are only instrumental standards measured in relation to the purpose of a theory and that, as such, Quine’s holism provides no logical reason for insulating some statements from revision.
- 15 This is not to say that Quine’s statement of the goals of science is unobjectionable, only that I will accept it for the purposes of argument.
- 16 Here Quine uses the expression “freedom of selection” as another label for the Revisability Doctrine.
- 17 In many respects, the basic point here about the shallow inconsistency of RD bears a resemblance to Putnam’s “cheap-shot” objection to the anti-apriorist position that there are no *a priori* truths. The “cheap shot” objection “consists in arguing that the anti-apriorist position is self-refuting because if it were correct then there would still be one *a priori* truth, namely, that there are no *a priori* truths” (Putnam 1983a, p. 98). Putnam goes on to claim that this objection does not work against a more moderate anti-apriorist doctrine such as “there are no truths which it would never be rational to give up” (ibid.). My argument here makes the further claim that, if Quine is to avoid the “cheap-shot” objection, then it is incumbent on him to specify when it would be rational to give up RD—i.e., to provide revisability conditions for it. Yet, this is something he never does, and it is not obvious how one could go about doing so.
- 18 On the surface, it might appear that my argument here is similar to one put forward by Putnam in his 1983 article, “There Is at Least One *a priori* Truth.” There Putnam argued, “there is at least one *a priori* truth in exactly the sense that Quine and I [Putnam] denied; i.e., at least one truth that it would never be rational to give up” (1983a, p. 100). Putnam does this by advocating a “minimal principle of contradiction” which “is simply the principle that *not every statement is both true and false*” (ibid., p. 101). As Putnam observes, “[t]he denial of this principle is, of course, the claim that *every statement is both true and false*” (ibid.), and a theory in which the minimal principle of contradiction given up would be a theory which contains every statement and its negation (ibid.). Yet, Putnam quite rightly argues that any such theory would mark a complete breakdown of rationality: “By *our* lights, to believe that all one’s beliefs are both true and false (or whatever) is to give up *both* the notions of *belief* and *truth* (or warranted assertibility). In short, to believe *all* statements are correct (which is what we are talking about) would be to have no notion of rationality. At least *one* statement is *a priori*, because to deny that statement would be to forfeit rationality itself” (1983b, p. 129). As such, Putnam argues that every rational person must be committed to the minimal principle of contradiction.

I share with Putnam the view that there must be at least one *a priori* truth; indeed I hold that any logical truth is *a priori*. The argument I put forward in

this section differs from Putnam's in a number of important respects. First, I argue that Quine's view of theory commits him not to the weak minimal principle of contradiction, but to the stronger law of non-contradiction, $\sim(A \& \sim A)$. Further, I claim that the principle of non-contradiction is inherent in the very notion of recalcitrance and it is for this reason that the law of non-contradiction shows RD to be false. Finally, I attempt to outline the specific consequences of this claim within a Quinean theory of holistic naturalism. Specifically, I claim that holism must be modified to respect the local semantic relationships obtaining between individual terms and concepts in the theory, and to reflect the epistemic consequences of the different functions that expressions of different types have within a theory.

- 19 This is not to say that the tautology " $\sim(O \& \sim O)$ " must act as a premise in any argument where some observation statement, O , contradicts some hypothesis of the theory, $\sim O$, and so prompts revision of the theory. Rather, it is to say that the meta-linguistic principle " $\sim(\alpha \& \sim \alpha)$ " (where " α " is a meta-language variable ranging over all sentence names) must be accepted, and recognized as informing the very semantics of our truth-functional calculus, as for instance in the valuation rules for negation (" \sim "). Indeed, it might be said that the law of non-contradiction is partly constitutive of our very notion of truth. After all, it is only in accepting the usual semantics for negation that " $\sim(O \& \sim O)$ " is a tautology in the first place. More specifically, non-contradiction certainly seems partly constitutive of our notion of *recalcitrance*.
- 20 Again, this meta-linguistic claim is not required as a premise in that argument of the object language. Nevertheless, it must be accepted in order that the object language argument work properly.
- 21 Indeed, realizing its connection with RD and PD, Quine maintained that his claim that "[t]he unit of empirical significance is the whole of science" (1961, p. 42) "is true enough in a legalistic sort of way" (1991, p. 268) even in his later writings.
- 22 In this context, it is remarkable that Quine would claim that "a sentence does not even need to be testable in order to qualify as a respectable sentence of science. A sentence is testable, in my liberal or holistic sense, if adding it to previously accepted sentences clinches an observation categorical that was not implied by those previous sentences alone; but much good science is untestable even in this liberal sense" (1995b, p. 256). Problematically, many non-respectable sentences will be able to slip into a theory if neither testability nor some other evaluative measure is invoked as a constraint on admitting claims to it. Yet, since Quinean holism does not provide any evaluative measure for theory other than testability, Quine's concession here raises significant problems for his overall naturalized holistic account.
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