C.R.AIPS 4

Proceedings of *the Académie Internationale de Philosophie des Sciences*

Comptes Rendus de l'Académie Internationale de Philosophie des Sciences

Tome IV

The Relevance of Judgment for Philosophy of Science

Éditeur
Jure Zovko

Quine's naturalism: clarification and vindication

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Abstract. Naturalism is the dominant characteristic of Quine's philosophy. This paper presents a more comprehensive and sympathetic clarification of Quine's naturalized epistemology (NE for short), and vindicates its main positions by critically responding to three objections: replacement (that Quine's NE replaces of traditional epistemology), circularity (that Quine's NE is viciously circular), and non-normativity (that Quine's NE lacks normative dimension). It also addresses Williamson's three critics against naturalism (primarily Quine's version). The paper concludes that both the objections and Williamson's critics largely stem from misreading or misinterpretation. It argues that Quine's NE still contains illuminating, reasonable, and valuable insights worthy of further development.

As many Quine scholars agree[1], naturalism is the dominant characteristic of Quine's philosophy. In 1968, Quine delivered a public lecture titled "Epistemology Naturalized" in Vienna. After that, a so-called "naturalistic turn" or "naturalistic revolution"[2] gradually took place in contemporary analytic philosophy. There have also been many objections to Quine's views and arguments. For example, Wrenn mentions two: the problems of circularity and normativity;[3] Rysiew mentions five: being *non sequitur*; being viciously circular; unsatisfactory response to skepticism; stripping away any concern with epistemic normativity; and being self-defeating.[4] Bergström defends Quine's naturalism against most of these objections, and others, in his own way.[5] Maddy traces three earlier versions of naturalism—in Reichenbach, Quine and Arthur Fine—responds to some well-known

[1]See Roger F. Gibson, Jr., *The Philosophy of W. V. Quine* (Tampa, FL: University of South Florida Press, 1982); *Enlightened empiricism: An Examination of W. V. Quine's Theory of Knowledge* (Tampa, FL: University of South Florida Press, 1988); Gary Kemp, *Quine: A guide for the perplexed* (New York: Continuum, 2006); "Quine: The Challenge of Naturalism", *European Journal of Philosophy* 18 (2010): 283–295; Peter Hylton, *Quine* (London and New York: Routledge, 2007); Paul A. Gregory, *Quine's Naturalism: Language, Knowledge and the Subject* (New York: Continuum Press, 2008); Sander Verhaegh, *Working from Within: The Nature and Development of Quine's Naturalism* (New York: Oxford University Press, 2018).

[2]Verhaegh, *Working from Within*, 4.

[3]Chase B. Wrenn, "Naturalistic Epistemology", *Internet Encyclopedia of Philosophy*, (2003).

[4]Patrick Rysiew, "Naturalism in Epistemology", *The Stanford Encyclopedia of Philosophy* (Fall 2016).

[5]Lennart Bergström, "Defense of Quinean Naturalism", in *Naturalism, Reference, and Ontology: Essays in Honor of Roger F. Gibson*, ed. Chase B. Wrenn (New York: Peter Lang, 2008), 25–46.

The Relevance of Judgment for Philosophy of Science, edited by Jure Zovko.
Comptes Rendus de l'Académie Internationale de Philosophie des Sciences 4 (2025).
B. Chen, Quine's naturalism: clarification and vindication, pp. 17–48.

objections (mainly Putnam's) to various loosely naturalist projects, and clarifies her improved version of naturalism.[6] In this paper, I aim to present a more comprehensive and sympathetic clarification of Quine's naturalized epistemology (hereafter NE), and to vindicate his main arguments within the framework of his philosophy by responding to three major objections to NE: replacement, circularity and non-normativity, as well as to Williamson's three critics of naturalism (mainly Quine's version).

1 Concise account of Quine's naturalism

Firstly, I will clarify Quine's characterization of his naturalism.

Although naturalism has a long, rich, and complicate history in philosophy, Quine's advocacy of it is among the most influential in contemporary philosophy. Typically, two kinds of naturalism are distinguished. Metaphysical naturalism asserts that only natural entities and phenomena revealed by our sciences exist—there are no non-or-super-natural ones like gods, ghosts or non-embodied mind in the world. Methodological naturalism claims that in our pursuit of knowledge about nature, we must rely on the achievements, standards, and methodology provided by sciences, and that there is no other kind of reliable methodology, especially not any special philosophical ones. Verhaegh identifies a third kind of naturalism in Quine's NE, namely metaphilosophical naturalism, to the extent that there is no sharp distinction between science and philosophy, since we must work within a growing system into which we are born, and there is no transcendental, distinctively philosophical perspective from which to question this system.[7]

In his John Dewey Lectures, "Ontological Relativity" (1968), Quine first used the term "naturalism", borrowed from Dewey, to describe his philosophical position.[8] However, naturalism runs through his earlier writings—beginning before "Tow Dogmas of Empiricism" (1951)—and continues in his later works such as *Pursuit of Truth* (1990) and *From stimulus to Science* (1995).[9] It is also implicit in many of his well-known theses, including indeterminacy of translation, inscrutability of reference, ontological relativity, underdetermination of theory by evidence, moderate holism, and rejection of analytic-synthetic and a priori-a posteriori distinctions. According to Gibson, in Quine's philosophy

[6]Penelope Maddy, "Naturalism: Friends and Foes", in *Philosophical Perspectives* 15 (2001): 37–67.

[7]Sander Verhaegh, "Setting Sail: The Development and Reception of Quine's Naturalism", *Philosophers' Imprint* 18(19) (2018).

[8]W. V. Quine, *Ontological Relativity and Other Essays* (New York: Columbia University Press, 1969), 26.

[9]W. V. Quine, "Two Dogmas of Empiricism", *Philosophical Review* 60(1) (1951): 20–43; *Pursuit of Truth* (Cambridge, MA: Harvard University Press, 1992); *From Stimulus to Science* (Cambridge, MA: Harvard University Press, 1995).

> [n]aturalism consists of a pair of theses, one negative, one positive. The negative thesis is that *there is no successful first philosophy*, that is, there is neither an a priori nor an experiential foundation outside of science upon which science can be grounded (i.e. justified or rationally reconstructed). The positive thesis is that *science is the measure both of what there is (ontology) and how we know what there is (epistemology)*.[10]

Quine's naturalism is primarily of the metaphilosophical variety identified by Verhaegh (2018), within which the metaphysical and methodological kinds are also included.[11] I agree with Maddy: "Naturalism, as I understand it, is not a doctrine, but an approach; not a set of answers, but a way of addressing questions. As such, it can hardly be described in a list of theses: it can only be seen in action."[12] I prefer to let Quine speak himself in chronological order:

> [...] my position is a naturalistic one; I see philosophy not as an a priori propaedeutic or groundwork for science, but as continuous with science. I see philosophy and science as in the same boat—a boat which, to revert to Neurath's figure as I so often do, we can rebuild only at sea while staying afloat in it. There is no external vantage point, no first philosophy.[13]

> [...] naturalism: abandonment of the goal of a first philosophy. It sees natural science as an inquiry into reality, fallible and corrigible but not answerable to any supra-scientific tribunal, and not in need of any justification beyond observation and the hypothetico-deductive method.[14]

> [...] naturalism: the recognition that it is within science itself, and not in some prior philosophy, that reality is to be identified and described.[15]

In his foreword to Gibson (1988), Føllesdal clarifies Quine's naturalism in a pertinent and illuminating way:

> This core is Quine's naturalism: philosophy is natural science trained upon itself; there is no first philosophy, no external vantage point. In particular, this holds for epistemology: epistemology is contained

[10]Roger F. Gibson, Jr., "Quine's Philosophy: A Brief Sketch", in *The Philosophy of W. V. Quine*, eds. Hahn, Lewis Edwin, and Paul Arthur Schilpp (IL: Open Court; second, expanded edition, 1998), 668.

[11]See Verhaegh, "Setting Sail: The Development and Reception of Quine's Naturalism", 1–24.

[12]Maddy, "Naturalism: Friends and Foes", 37.

[13]W. V. Quine, *Ontological Relativity and Other Essays*, 126–127.

[14]W. V. Quine, *Theories and Things* (Cambridge, MA: Harvard University Press, 1981), 72.

[15]Ibid., 21.

> in natural science, as a chapter of empirical psychology, and yet it is epistemology that provides an account of the evidential bases of natural science, including empirical psychology itself. As Gibson expresses it (using "ontology" for "natural science"): epistemology and ontology contain one another.[16]

Secondly, I will clarify Quine's project of naturalized epistemology.

At the beginning of his *Pursuit of Truth* (1990), Quine states the central question of his NE:

> From impacts on our sensory surfaces, we in our collective and cumulative creativity down the generations have projected our systematic theory of the external world. Our system is proving successful in predicting subsequent sensory input. How have we done it?[17]

In his writings, this question is formulated in different ways: How do we start from "the meagre input", namely, our sensory stimulation from the world, to reach "the torrential output", namely, our overall scientific theories of the external world? Or, how do our overall theories of the world originate from our observation of the world? Quine holds that any meaningful conceptualization is inseparable from language, and that various theories, including our sciences of nature, can be regarded as systems of sentences:

> A theory, it will be said, is a set of fully interpreted sentences. (More particularly, it is a deductively closed set: it includes all its own logical consequences, insofar as they are couched in the same notation.)[18]
>
> [...] I characterized science as a linguistic structure that is keyed to observation here and there.[19]

Thus, the central question of NE becomes the question of accounting for the relationship between observation and our theoretical discourses. This question is divided into two sub-questions: one is how our sensory evidence supports our global theories of the world, referred to as the "evidential support question"; the other is how our scientific theories grow out of our sensory evidence, referred to as the "causal question."

However, the concept of observation poses some difficulties. Since observation occurs at the sensory level, it is subjective; but in the context of language learning and evidence evaluation, observation is required to be socially shared. Moreover, if we take observation not as sensation or perception but as publicly shared environmental situations, we gain nothing, since we cannot assume intersubjective agreement about environmental

[16] Gibson, *Enlightened empiricism*, ix.
[17] W. V. Quine, *Pursuit of Truth*, 1.
[18] W. V. Quine, *Ontological Relativity and Other Essays*, 51.
[19] W. V. Quine, *Quintessence – Basic Readings from the Philosophy of W. V. Quine*, ed. Roger F. Gibson, Jr. (Cambridge, MA: Harvard University Press, 2004), 298.

situations—different subjects may notice different aspects of the same situation. To overcome these difficulties, Quine proposes to talk about observation sentences rather than observation: "No matter that sensations are private, and no matter that men may take radically different views of the environing situation; the observation sentence serves nicely to pick out what witnesses can agree on."[20]

By replacing observation with observation sentences, the central question of NE becomes the question of explaining the relationship between our observation sentences and theoretical sentences. This relationship also has two aspects: one is epistemological—how can one sentence provide evidence for another?—answered by the theory of scientific evidence; the other is semantic—where and how do sentences get their meaning?—answered by the theory of language learning. Quine asserts that there is a close connection between the two: "The channels by which, having learned observation sentences, we acquire theoretical language, are the very channels by which observation lends evidence to scientific theory."[21] Føllesdal rightly asserts, "This is a key point in Quine: Semantics and epistemology are intimately intertwined."[22]

Therefore, NE has two empirical tasks: first, it provides detailed causal explanations for the learning mechanism from sensory input to observation sentences; second, it gives a detailed explanation of the various analogical steps from observation sentences to theoretical language acquisition. Observation sentences typically exhibit the intersubjective observability of the relevant situation in which they are uttered, and play an important role in both epistemological and semantic relations. It is observation sentences that become the entering wedge both to language and to science; and it is language that becomes the entering wedge to Quine's NE:

> We see, then, a strategy for investigating the relation of evidential support, between observation and scientific theory. We can adopt a genetic approach, studying how theoretical language is learned. For the evidential relation is virtually enacted, it would seem, in the learning. This genetic strategy is attractive because the learning of language goes on in the world and is open to scientific study. It is a strategy for the scientific study of scientific method and evidence. We have here a good reason to regard the theory of language as vital to the theory of knowledge.[23]

Quine further argues that the process and mechanism by which humans learn a theoretical language is the same as the process and mechanism by

[20]W. V. Quine, *Roots of Reference*, (La Salle, Ill.: Open Court, 1974), 39.
[21]W. V. Quine, *Quintessence*, 294.
[22]Dagfinn Føllesdal, "Preface of the New Edition of *Word and Object*", in W. V. Quine, *Word and Object* (Cambridge, Mass.: The MIT Press, 2013), xviii.
[23]Quine, *Quintessence*, 294.

which they master a scientific theory: "The paths of language learning, which lead from observation sentences to theoretical sentences, are the only connection there is between observation and theory."[24] Therefore, "to account for man's mastery of scientific theory we should see how he acquires theoretical language."[25] Thus, Føllesdal asserts that the epistemology of evidential support and the semantics of language learning and meaning acquisition are combined in Quine's NE.[26]

In this way, for Quine, epistemology is naturalized to a considerable extent: it is reduced to the empirical research of the actual process and mechanism of language learning—how does a child, based on the stimulation of his sensory receptors by the world, learn theoretical (or referential, or cognitive) language with which he will be able to refer to objects? Epistemology has thereby become a chapter of empirical psychology, and then a book of natural science, and the genetic approach has become the most important method of NE.

2 Unfolding Quine's naturalized epistemology

In this section, I will outline what Quine has done in his NE in order to provide the foundation for further agreement or disagreement.

2.1 Taking for granted: external objects, public language

Inspired by Føllesdal (2011, 2013), I will focus on what Quine takes for granted in his NE, as these assumptions are crucial to a correct understanding of his NE and, more broadly, of his philosophy.

First, Quine maintains that distal objects, rather than proximal stimulation, are what we must confront in language learning and cognition. In other words, before we begin to perceive and recognize this world, external objects are already there, serving as the sources of our perception and recognition. In the beginning of his *Word and Object* (1960), Quine writes,

> Physical things generally, however remote, become known to us only through the effects which they help to induce at our sensory surfaces. [...] Linguistically, and hence conceptually, the things in sharpest focus are the things that are public enough to be talked of publicly, common and conspicuous enough to be talked of often, and near enough to sense to be quickly identified and learned by name; it is to these that words apply first and foremost.[27]

In his 2000 paper, Quine introduces an epistemological triangle consisting of I (the cognizer), you (other people), and it (an object, e.g. an aardvark)

[24] Ibid., 298.
[25] Quine, *Roots of Reference*, 37.
[26] See Dagfinn Føllesdal, "Developments in Quine's Behaviorism", *American Philosophical Quarterly* 48(3) (2011): 273–282.
[27] Quine, *Word and Object*, 1.

as three vertices. Since I and you differ greatly in neural constitution and internal mechanisms of perception, "We thus differ in the proximal causes of our concordant use of the word, but we share the distal cause, the reference, farther out on our causal chains"[28]. Føllesdal[29] reports that Quine wished to develop and expand upon the key idea of this paper in the new edition of *Word and Object* (2013).

Second, Føllesdal notes that "Quine was the first to take the social nature of language seriously and explore its consequences for meaning and communication."[30] In the preface of *Word and Object*, Quine writes,

> Language is a social art. In acquiring it we have to depend entirely on intersubjectively available cues as to what to say and when. Hence there is no justification for collating linguistic meanings, unless in terms of men's dispositions to respond overtly to socially observable stimulations.[31]

For Quine, language is a social and publicly observable activity among speakers, and "meaning" is a characteristic of verbal behavior. It must therefore be clarified in behaviorist terms and can only be acquired through the overt behaviors of interlocutors. When a child learns her native language, or an adult learns a foreign one, she must rely on "the evidence solely of other people's overt behavior under publicly recognizable circumstances."[32]

Third, in my view, the following passage is also crucial to correct understanding of Quine's influential and controversial theses, for example, the indeterminacy of translation, the underdetermination of theory by data, and holism:

> We cannot strip away the conceptual trappings sentence by sentence and leave a description of the objective world; but we can investigate the world, and man as a part of it, and thus find out what cues he could have of what goes on around him. *Subtracting his cues from his world view, we get man's net contribution as the difference. This difference marks the extent of man's conceptual sovereignty*—the domain within which he can revise theory while saving the data.[33]

In both language learning and theory construction, we are constrained by two kinds of elements: those imposed by the world and those arising from our own cognitive activity. There is a tension between them: "[...] we ought to be able to see just to what extent science is man's free creation; to

[28]W. V. Quine, "I, You, and It", in *Knowledge, Language and Logic*, eds. Alex Orenstein and Petr Kotatko (Dordrecht, Holland: Kluwer Academic Publishers, 2000), 1.

[29]Føllesdal, "Preface of the New Edition of Word and Object", xix–xx.

[30]Føllesdal, "Developments in Quine's Behaviorism", 274.

[31]Quine, *Word and Object*, ix.

[32]Quine, *Ontological Relativity and Other Essays*, 26.

[33]Quine, *Word and Object*, 4; my emphasis.

what extent, in Eddington's phrase, it is a put-up job"[34]. We are not wholly passive but retain a degree of freedom, a creational space, in the process of language acquisition and theory formation.

2.2 Stimulation: triggering of sensory receptors

To account for language learning and theory formation, Quine appeals to a series of behavioristic terms—such as shared circumstance, verbal behavior, disposition, pleasure, query, assent, dissent, reward, penalty—as well as to neuropsychological terms such as innateness, among others.

The starting point is stimulation. Since external objects cannot directly enter our processes of learning and cognition, we must begin with the stimulation (triggering) of our sensory receptors (eyes, ears, nose, tongue, and body) by those objects. An episode refers to the state in which we receive stimulation; both reception and perception are forms of received stimulation. In order to use similar expressions in similar situations, our perceptions must exhibit "perceptual similarity:" two episodes should count as perceptually similar if they affect a cognitive subject's behavior in the same way. For a subject, episode a is more perceptually similar to b than to c just in case the subject exhibits the same response to episodes sufficiently similar to a. To account for the fact that different subjects produce similar responses to similar episodes, Quine invokes the pre-established harmony of our standards of perceptual similarity. Perceptual similarity and pre-established harmony are explained by Darwinian natural selection: such standards are partly inherited from our ancestors' genes and have survival value in the world. As Quine writes:

> Perceptual similarity is the basis of all learning, all habit formation, all expectation by induction from past experience; for we are innately disposed to expect similar events to have sequels that are similar to each other.[35]

Stimulus meaning refers to the meaning of a sentence relative to a specific speaker A at a particular time t under a particular situation s. It can be formally defined as follows: the stimulus meaning of a sentence p for A at t and s is an ordered pair of two sets (Σ, Σ'), where Σ is the set of stimuli that causes A to assent to p at t and s, and Σ' is the set of stimuli that causes A dissent from p at t and s.

2.3 Entering language: classification of sentences

Based on stimulus meaning and degree of dependence on concurrent stimuli, Quine classifies sentences uttered or heard in publicly recognizable circumstances into two kinds: occasion sentences and standing sentences. An

[34] Quine, *Roots of Reference*, 3–4.
[35] Quine, *Quintessence*, 277.

occasion sentence elicits assent or dissent only if some prompting (usually nonverbal) stimulus is present. Occasion sentences are further divided into observational and non-observational ones. An observation sentence is an occasion sentence on which speakers of the language can agree outright upon witnessing the occasion—for example, "This is red." A standing sentence elicits assent or dissent each time it is presented, without further prompting by some (usually nonverbal) stimulus—for example, "Today is Friday." Standing sentences are further divided into eternal and non-eternal ones. An eternal sentence is a standing sentence that remains true or false for all time—for example, "Copper conducts electricity."

2.4 Ostensive learning and analogical syntheses

There are two general methods by which a child learns her native language: ostensive learning and analogical synthesis. The former proceeds roughly as follows: in the presence of an object, a mother points to or touches the object and utters some sentences as unstructured wholes—what Quine calls *holophrastically*—thereby teaching her child to associate those sentences with the object, until her child eventually knows how to use them in appropriate situations. This method approximates the psychological schematism of direct conditioning. Quine writes:

> Ostensive learning is fundamental, and requires observability. The child and the parent must both see red when the child learns 'red,' and one of them must also see that the other sees red at the time.[36]

Observation sentences thus form the first batch of sentences a child learns ostensively. However, ostensive learning cannot take the child very far, because most sentences in a natural language are not tied, even derivatively, to fixed ranges of nonverbal stimulation. Consequently, a child must learn the greater portion of her native language by means of analogical synthesis: having acquired some sentences and words, she can replace words in the learned sentences with others, thereby generating new expressions she has not been explicitly taught. For example, having learned 'black dog,' 'black cat' and 'white ball,' the child may say 'black ball' in the presence of a black ball. Similarly, having learned "My finger hurts", she may produce the new sentence "My foot hurts" without instruction. Analogical synthesis accounts for the creativity of language.

2.5 Observation sentences and observation categoricals

Observation sentences possess the following features: (i) they are directly about physical objects and are correlated with sensory stimulation, so they can be learned ostensively; (ii) they do not require collateral information—in order to assent to or dissent from an observation sentence such as "This

[36] Quine, *Roots of Reference*, 37–38.

is red", no further information from other sources is needed, and one can respond immediately in the relevant environment; (iii) they are intersubjective—every witness will give the same assent to or dissent from the same observation sentence; (iv) they are loaded with their empirical content even when considered in isolation. These features make observation sentences the entry point to language learning, the repository of evidence for scientific hypotheses, and the cornerstone of semantics.

An observation categorical is compounded of observation sentences and takes a general form such as "Whenever this, that", expressing something akin to a natural law. As Quine writes, an observation categorical is a "miniature scientific theory"[37]. Consider the following two examples:

(i) Whenever the sun comes up, the birds sing.

(ii) Whenever a willow grows at the water's edge, it leans over the water.

Here, (ii) is a *focal* observation categorical, in which both antecedent and consequent refer to the same object, whereas (i) is a *free* one. An observation categorical is tested by pairs of observations. It is never conclusively verified by conforming observations, but it can be refuted by a pair of observations, one affirmative and one negative. As Quine observes:

> Still the deduction and checking of observation categoricals is the essence, surely, of the experimental method, the hypothetico-deductive method, the method, in Popper's words, of conjecture and refutation. It brings out that prediction of observable events is the ultimate test of scientific theory.[38]

2.6 Referring to objects

For Quine, the central question of epistemology is how we proceed from stimulation to science. A theory of the world is largely a theory of what exists in the world, but what a theory says exists is a matter of reference. Thus, we must account for children's "acquisition of an apparatus for speaking of objects"[39]. In Quine's view, "To be is to be a value of variable"[40]; that is, quantificational constructions constitute the referential apparatus of a language or theory. To learn how to refer to objects, children must acquire "a cluster of interrelated grammatical particles and constructions: plural endings, pronouns, numerals, the 'is' of identity, and its adaptations 'same' and 'other'"[41], together with logical connectives, relational clauses,

[37] Quine, *From Stimulus to Science*, 26.
[38] Quine, *Quintessence*, 280.
[39] Quine, *Roots of Reference*, 81.
[40] W. V. Quine, *From A Logical Point of View* (Cambridge: Harvard University Press, 1953), 15.
[41] Quine, *Ontological Relativity and Other Essays*, 32.

predications, and so on. Moreover, to make the ontological commitments of a theory explicit (i.e., to determine what the theory says there is), we must translate it into the language of first-order logic (its 'canonical notation'). This procedure is called "semantic regimentation." Our scientific theory of the world is formulated in theoretical language; once we have learned this language, we can articulate our theory of the world and thus complete the journey from stimulus to science.

Quine advocates the acceptability criterion of ontological commitment: "No entity without identity"[42]. Here, identity means reification or individuation: if we cannot provide reliable criteria of identity for certain objects, we cannot rationally commit ourselves to their existence in our theory. According to Quine, only physical objects and classes or sets genuinely exist, since they can be afforded stable standards of identity. So-called "intentional entities"—such as meanings, propositions, attributes or properties, and relations—cannot be feasibly individuated; opaque contexts containing propositional attitudes and modalities fall outside the realm of extensionality. Hence, we should, in Quine's words, "take flight" from all such entities in our global theory of the world.

2.7 Some further consequences

From the foregoing account of Quine's NE, several important consequences follow:

(1) Indeterminacy of translation. "[...] manuals for translating one language into another can be set up in divergent ways, all compatible with the totality of speech dispositions, yet incompatible with one another."[43] More importantly, there is no fact of the matter to determine which translation manual is the uniquely correct. This thesis shows that "the notion of propositions as sentence meanings is untenable."[44]

(2) Inscrutability of reference (also called "indeterminacy of reference"). Suppose a linguist hears a native speaker say "gavagai" in the presence of a rabbit. The linguist cannot tell with certainty whether "gavagai" refers to a rabbit, an undetached rabbit part, a temporal stage of a rabbit, or rabbithood, because all these interpretations are compatible with the native speaker's verbal behavior, given appropriate compensatory adjustments elsewhere.

(3) Ontological relativity. The ontology of a theory—that is, the objects whose existence the theory commits us to—is relative to the background language and the translation manual it employs, as well as to the referential

[42] Quine, *Ontological Relativity and Other Essays*, 23.
[43] Quine, *Word and Object*, 27.
[44] Quine, *Pursuit of Truth*, 102.

interpretation of quantifiers. There is no clear-cut, absolute fact of the matter about a theory's ontology. Quine illustrates this primarily through the concept of a 'proxy function,' deducing the surprising conclusion that ontology is, in a sense, indifferent to our scientific theories of the world. This raises a question: is this conclusion compatible with Quine's robust realist commitments?

(4) Underdetermination of theory by evidence. Our theories of the world go beyond all possible observations of it, meaning it is possible to have empirically equivalent but logically incompatible world-systems. This suggests that "there are various defensible ways of conceiving the world"[45]. However, Quine later appears to soften this claim:

> On closer inspection, logical incompatibility on the part of empirically equivalent theory formulations is seen to be a red herring. We are thus left only with empirically equivalent theory formulations that are logically reconcilable. If we subscribe to one of them as true, we can call them all true and view them as different descriptions of one and the same world.[46]

(5) Holism, fallibilism, and rejection of apriority and analyticity. "our statements about the external world face the tribunal of sense experience not individually but only as a corporate body"[47]; each statement shares its empirical content with others in the corporate body. There are no a priori statements completely independent of experience, and no analytic statements with null empirical content. Any statement, including logical and mathematical ones, is in principle revisable in the face of recalcitrant experience. In revising our theories, we must follow the maxim of minimum mutilation, and so on.

I agree with Gibson's assertion that Quine's "philosophy is best understood as a systematic attempt to answer, from a uniquely empiricist point of view, what he regards as the central question of epistemology, namely, 'How do we acquire our theory of the world and why does it work so well?'"[48].

At this point, it is worth briefly consider a well-known objection to Quine's NE from Davidson (1986). According to Davidson, the connection between stimulations and observation sentences is causal and therefore cannot be justificatory, since "nothing can count as a reason for holding a belief

[45]Quine, *Pursuit of Truth*, 102.

[46]W. V. Quine, *Confessions of a Confirmed Extensionalist and Other Essays*, eds. Dagfinn Føllesdal and Douglas B. Quine (Cambridge: Harvard University Press, 2008), 321.

[47]Quine, *From A Logical Point of View*, 41.

[48]Gibson, *Enlightened Empiricism*, 1.

except another belief"[49]. On his view, causation cannot confer justification because epistemic justification must be propositional and logical. Thus, causal relations between beliefs and the experiences that prompt them play no justificatory role. Quine, Davidson claims, confuses causes with reasons, or simply ignores reasons altogether in his NE.

I disagree with Davidson for three reasons: (1) The causal link between stimulation and an observation sentence can indeed provide a reason to believe the truth of the sentence. Why can I not know that John was there because I saw him, or that she was Susan because I recognized her voice? (2) Beyond causal connections, Quine also accounts for the evidential links between observation sentences and theoretical sentences. (3) Because of his holism, Quine does not place great emphasis on the justification of knowledge. For theoretical purposes, he suggests that we abandon the notion of knowledge as a "bad job", since it "does not meet scientific and philosophical standards of coherence and precision"[50]. Thus, his NE is neither knowledge-centered nor justification-centered epistemology. (Further discussion will follow in next section.)

3 Reforming rather than replacing traditional epistemology

Regarding the relation of Quine's NE with traditional epistemology (TE), there are sharply opposed parties with conflicting viewpoints. One party holds that Quine's NE replaces TE, or worse, abandons epistemology altogether: "W. V. Quine is well known for urging the abandonment of epistemology, as traditionally pursued, in favor of the scientific project he calls 'naturalized epistemology'";[51] Quine advocates replacement naturalism—we should abandon epistemology in favor of psychology. "Quine seems to be recommending that we abandon the effort to show that we do in fact have knowledge and that we instead study the ways in which we form beliefs."[52] Another party maintains that Quine does not attempt to replace TE, but rather to reform it—that is, to approach the old questions of TE in a wholly new way: "On my reading, not only does Quine *not* urge abandonment of epistemology as traditionally pursued, *but*, whatever inspirational role 'Epistemology Naturalized' may have played toward 'naturalism in episte-

[49]Donald Davidson, "A Coherence Theory of Truth and Knowledge", in *Truth and Interpretation: Perspectives on the Philosophy of Donald Davidson*, ed. E. LePore (Oxford: Blackwell, 1986), 310.

[50]W. V. Quine, *Quiddities: An Intermittently Philosophical Dictionary* (Cambridge: Harvard University Press, 1989), 109.

[51]Ernest Sosa and Jaekwon Kim (eds.), *Epistemology: An Anthology* (Malden, MA: Blackwell, 2000), 289.

[52]Richard Feldman, "Naturalized Epistemology", *The Stanford Encyclopedia of Philosophy* (Summer 2012).

mology,' its central proposal is actually antithetical to a good deal of what is nowadays done that heading."[53] Haack takes a middle position, arguing that Quine's naturalism has two faces: one modest and reformist, the other scientistic and revolutionary, and thus has a sort of ambivalence. She claims: "Quine offers a sort of composite of three, mutually incompatible, styles of naturalism, of the aposteriorist and the scientistic, the reformist and the revolutionary."[54] In this section, I will address these controversies and argue that Quine's NE is not a replacement but a reformation of TE.

Firstly, I will carefully examine Quine's criticism of TE.

TE seeks a firmer foundation of science than that provided by science itself. It is a kind of transcendental research: it attempts to account for the reliability of science by transcending science. Quine calls this kind of TE "first philosophy", which includes modern rationalism and empiricism, and he criticizes both radically.

Descartes is the founder of modern rationalism. He pursues absolutely certain knowledge about the world and about ourselves. Appealing to the method of universal doubt, he tries to eliminate all doubtful elements from our knowledge and to lay down an unshakable foundation for it. He takes obvious, clear, distinct, and rational axioms like "I think, therefore I am" as the foundation of knowledge, from which he deduces all other parts of our global theory of the world. Quine does not pay much attention to Descartes' project, since even in the field of mathematics it is impossible to accomplish complete deduction of the unobvious principles from the obvious ones—due to Gödel's incompleteness theorem and the failure to reduce mathematics to first-order logic.

Quine turns his attention instead to empiricism, with which he is most sympathetic. Empiricism has a continuous development from Locke, Berkeley and Hume to Russell and Carnap, and takes sensory experience or observation propositions as the solid foundation of human cognition. Its main creed is that all our knowledge originates from sensory experience. Quine calls it "radical empiricism" and argues that it has two main tasks: one is to deduce truths about the world from sensory evidence; the other is to translate (or define) these truths by means of sensory or observational terms plus logico-mathematical auxiliaries. By analogy with study of the foundation of mathematics, he calls the former as the doctrinal side of empiricism, which focuses on using sensory evidence to justify our knowledge of the world; and the latter the conceptual side, which focuses on using sensory vocabulary

[53]Bredo C. Johnsen, "How to Read 'Epistemology Naturalized'", *The Journal of Philosophy* 102(2) (2005): 79; my emphasis.

[54]Susan Haack, "The Two Faces of Quine's Naturalism", *Synthese* 94 (1993): 335; *Evidence and Inquiry: A Pragmatist Reconstruction of Epistemology* (New York: Prometheus, 2009), 180.

to explain or define the concept of body (namely physical objects). Quine argues that both sides of empiricism have suffered disastrous failure.

First, consider the doctrinal side. According to Hume, statements directly concerning current sensory impressions are quite certain. However, general statements about existence and about the future cannot attain any degree of certainty, since even the weakest generalizations of observable objects—such as "Birds fly" or "Grass is green"—involve the logical leap from observed to unobserved items, and from past and present experience to future predictions. Thus, the attempt to logically validate our theory of the world using direct sensory experience cannot succeed. Quine emphasizes: "The Humean predicament is the human predicament."[55]

Next, consider the conceptual side. It appears to have made some real progresses—for example, the shift from Locke's ideas to Tooke's words, the semantic focus shift from terms to sentences (Bentham), and from sentences to systems of sentences (Duhem, Neurath and Quine himself). People can also talk about objects through contextual definitions and set theory. Russell uses this method to study the epistemology of natural knowledge and seeks to interpret external world as the logical construction of sense data. Carnap's *The Logical Structure of the World* (1928) represents the most serious implementation of this program. He acknowledges that it is impossible to deduce science from direct experience, but still maintains that scientific concepts can be defined using observation terms plus logico-mathematical auxiliaries. He devotes himself to the rational reconstruction of scientific discourse, but ultimately fails. Quine explains why Carnap's attempt fails: "[...] the typical statement about bodies has no fund of experiential implications it can call its own. A substantial mass of theory, taken together, will commonly have experiential implications; this is how we make verifiable predictions."[56]

Therefore, the entire project of TE,—whether rationalist or empiricist—must be rejected. It is impossible to deduce the truth of scientific theory from rational axioms, sensory experience, or observational propositions, or to define scientific vocabulary by sensory and observational terms plus logico-mathematical auxiliaries. Moreover, the ideal of searching for absolutely certain knowledge must be abandoned: "The Cartesian quest for certainty had been the remote motivation of epistemology, both on its conceptual and its doctrinal side; but that quest was seen as a lost cause",[57] because, according to Quine's holism, no statement is absolutely certain; any statement is revisable in the face of hard counterexamples. Quine notes that when, following Dewey, we adopt a naturalistic view of language and a

[55]Quine, *Ontological Relativity and Other Essays*, 72.
[56]Ibid., 79.
[57]Ibid., 74.

behavioral conception of meaning, we must give up not only the museum image of language but also the assurance of determinacy concerning meaning, reference, and knowledge. We must recognize that there are no similarity or differences of meaning beyond those being implicit in people's verbal dispositions.

Secondly, I will outline the similarities and differences between Quine's NE and TE as follows.

(1) They investigate the same central issue of epistemology.

All epistemologies share the same central issue: the relation between sensation and theory, or between observation and theory, or between evidence and theory—in Quine's words, between observation sentences and theoretical discourses. Both TE and NE are not exceptional:

> The relation between the meager input and the torrential output is a relation that we are prompted to study for somewhat the same reasons that always prompted epistemology; namely, in order to see how evidence relates to theory, and in what ways one's theory of nature transcends any available evidence.[58]

(2) They have different attitudes toward skepticism.

Skepticism can be divided into two kinds: global and local. Global skepticism (GS) challenges the very possibility of knowing the world and the reliability of our overall theory of the world. Local skepticism (LS), by contrast, targets the reliability of specific epistemic approaches and attainments.

Since TE—whether rationalist or the empiricist—seeks absolutely certain knowledge, skepticism poses a serious threat to its goals., TE must therefore confront skepticism directly and address questions such as: Is absolutely certain knowledge really possible? What makes knowledge possible? How is knowledge possible?

Quine completely dismisses GS, which challenges science from above, prior to, or outside of science itself—from a god's eye or transcendental perspective. GS questions the possibility of science before doing science, which Quine compare to flipping the table before eating. With GS, there is no room for negotiation. However, LS doubts scientific achievements from within science itself, so its "doubts are scientific doubts", and it is "an offshoot of science."[59] With LS, negotiation is possible. (Further discussion will follow in Section 5.)

[58] Ibid., 83.
[59] Quine, *Quintessence*, 287–288.

(3) They adopt different research strategies.

TE is a kind of armchair philosophy, primarily appealing to reflection and speculation, and has the following features: (i) it is*a priori*: "careful reflection, rather than empirical investigation, is taken to be the proper method to arrive at accurate understanding of the true epistemological principles and facts"; (ii) it is *autonomous*: "in terms of both its methods and its subject matter, epistemology is independent of the sciences"; (iii) it focuses on normative matters.[60]

Quine's strategy is radically different. Since he gives up the ideal of pursuing absolutely certain knowledge, and since, according to his holism, there is no a priori statements independent of experience, his NE focuses on a genetic approach to the actual process, mechanism, methodology, and norms of how we proceed from stimulation to science. In other words, his NE wants to defend science "from within":

> The naturalistic philosopher begins his reasoning within the inherited world theory as a going concern. He tentatively believes all of it, but believes also that some identified portions are wrong. He tries to improve, clarify, and understand the system *from within.* He is the busy sailor adrift on Neurath's boat.[61]

(4) They have different concerns and emphases.

The mainstream of contemporary epistemology still largely belongs to the type of TE that Quine criticizes. Truncellito writes, "Epistemology is the study of knowledge." "First, we must determine the *nature* of knowledge"; "Second, we must determine the *extent* of human knowledge";[62] Perhaps we could add: Third, we must establish the *norms* of human cognition. For instance, *Routledge Companion to Epistemology* centers on the concept of knowledge, consisting of ten parts: foundational concepts; the analysis of knowledge; the structure of knowledge; kinds of knowledge; skepticism; responses to skepticism; knowledge and knowledge attributions; formal epistemology; the history of epistemology; and metaepistemological issues.[63]

However, Quine's NE takes a different direction: it does not give much attention to the concept of knowledge, let alone make it the central issue. Quine writes:

> Knowledge, nearly enough, is true belief on strong evidence. How strong? There is no significant cut off point. 'Know' is like 'big': useful

[60]Rysiew, "Naturalism in Epistemology".
[61]Quine, *Theories and Things*, 72; my emphasis.
[62]David A. Truncellito, "Epistemology", *Internet Encyclopedia of Philosophy*, (2007).
[63]Sven Bernecker and Duncan Pritchard (eds.), *The Routledge Companion to Epistemology* (London and New York: Routledge, 2011).

> and unobjectionable in the vernacular where we acquiesce in vagueness but unsuited to technical use because of lacking a precise boundary. Epistemology, or the theory of knowledge, blushes for its name.[64]

Instead, Quine's NE focuses on the empirical investigation of the process of theory formation process and refines normative elements from its scientific findings.

It is worth of emphasizing that we should seriously consider Quine's discussion of the "five milestones of empiricism." Since the first three are irrelevant here, we mention only the fourth and fifth, both introduced by Quine himself. The fourth is methodological monism: the abandonment of the analytic-synthetic dualism. The fifth is naturalism: the abandonment of the goal of a first philosophy prior to natural science.[65] Since his naturalism is a stage in the development of empiricism—and empiricism is at least one kind of TE—his NE is not a replacement but a continuation of TE. He emphasizes:

> [...] epistemology still goes on, though in a new setting and a clarified status. Epistemology, or something like it, simply falls into place as a chapter of psychology and hence of natural science.[66]

His NE "is no gratuitous change of subject matter, but an enlightened persistence rather in the original epistemological problem. It is enlightened in recognizing that the skeptical challenge springs from science itself, and that in coping with it we are free to use scientific knowledge."[67]

4 Working from within rather than outside our science

In this section, I will deal with three objections to Quine's NE mentioned in Rysiew (2021): (1) "Quinean naturalism is viciously circular"; (2) its "response to skepticism is unsatisfactory"; and (3) its "position is self-defeating."[68] All these objections relate to the so-called circularity charge against Quine's NE: "Our scientific theories depend on our sensory experience, and so (says the sceptic or the anti-naturalist) we cannot legitimately appeal to those theories in explaining the possibility or actuality of perceptual knowledge (for example)."[69]

Firstly, I offer a general response to the circularity charge. According to the coherence theory of truth and Quine's holism, a substantive block of our theories about nature as a whole has empirical implications, while any

[64] Quine, *Confessions of a Confirmed Extensionalist and Other Essays*, 322.
[65] See Quine, *Theories and Things*, 67.
[66] Quine, *Ontological Relativity and Other Essays*, 82.
[67] Quine, *Roots of Reference*, 3.
[68] Rysiew, "Naturalism in Epistemology."
[69] Wrenn, "Naturalistic Epistemology."

single statement within it does not have implications in isolation. Therefore, mutual support among parts of the block is necessary—not in a linear fashion, but as a network. We may say that linear circularity is vicious, but network circularity may not be. Gila Sher points out:

> [...] we can distinguish four types of circularity: (1) Destructive circularity, (2) Trivializing circularity, (3) Neutral Circularity, and (4) Constructive circularity... We are responsible for avoiding vicious circularity, but non-vicious circularity is acceptable. Indeed, some forms of circularity are constructive, [...][70]

Therefore, the circularity charge does not generally succeed; whether it holds or not depends on the specific situations.

Secondly, I clarify Quine's concept of "science." He writes:

> In science itself I certainly want to include the farthest flights of physics and cosmology, as well as experimental psychology, history, and the social sciences. Also mathematics, insofar at least as it is applied, for it is indispensable to natural science.[71]

From this, we can see that Quine has a very broad understanding of science. He distinguishes science into two parts: hard sciences, including physics, chemistry, biology, and perhaps mathematics; and soft sciences, including history, economics, sociology, and even some philosophical theories. The core of science is usually called "natural science." Quine repeatedly emphasizes that science is continuous with common sense, and that philosophy is continuous with science. We cannot take any transcendental perspective (such as God's-eye view) to criticize or justify science from above, before, or outside science. Instead, we must investigate the ontology, epistemology, methodology, and norms of science from within: applying the methods of natural science, using its findings, and following its procedures and standards.

Thirdly, I consider Quine's response to skeptical challenges to science. As previously discussed, he directly rejects GS due to its transcendental standpoints, and pays little attention to thought experiments like Descartes' demon and Putnam's brain-in-the-vat, judging them as at least "overreacting": "Epistemology is best looked upon, then, as an enterprise within natural science. Cartesian doubt is not the way to begin."[72] He only seriously considers LS, which doubts scientific claims from within science.

LS usually appeals to illusion and hallucination to challenge our science. In real life, there are phenomena such as mirages, double images, rainbows,

[70]Gila Sher and Chen Bo, "Foundational Holism, Substantive Theory of Truth, and a New Philosophy of Logic: Interview with Gila Sher by Chen Bo", *Philosophical Forum* 50(1) (2019): 16–17.

[71]Quine, *Quintessence*, 275.

[72]Ibid., 288.

dreams, and seemingly bent sticks in water, which we later recognize as not being real. From these facts, LS concludes that we should not trust our sensory organs—eyes, ears and others—and that sensory experience is not a reliable starting point for cognition. In Quine's view, local skeptics overreact by drawing this conclusion. He asks: in what sense are those appearances illusions? He answers:

> In the sense that they seem to be material objects which they in fact are not. Illusions are illusions only relative to prior acceptance of genuine bodies with which to contrast them [...]. Rudimentary physical science, that is, common sense about bodies, is thus needed as a springboard for scepticism [...][73]

Moreover, LS raises further doubts about science from within science itself:

> Science itself teaches that there is no clairvoyance; that the only information that can reach our sensory surfaces from external objects must be limited to two-dimensional optical projections and various impacts of air waves on the eardrums and some gaseous reactions in the nasal passages and a few kindred odds and ends. How, the challenge proceeds, could one hope to find out about that external world from such meager traces? In short, if our science were true, how could we know it?[74]

Here, the local skeptic argument is as follows: in the process of cognition, we accept "meager" and two-dimensional input from the world, but produce "torrential" and three-dimensional output that constitutes our theory of the world. Since the gap between input and output is so large, how can we justify that the process of production is reasonable or even reliable? In this way, local skeptics raise doubts about science from within science.

Quine's response to this kind of skeptical challenges includes three points:

(1) The gap is filled by man's creative contribution: "Subtracting his cues from his world view, we get man's net contribution as the difference. This difference marks the extent of man's conceptual sovereignty—the domain within which he can revise theory while saving the data."[75] This is also the primary reason for the underdetermination of theory by evidence.

(2) No justification beyond observation and method is required: "Our overall scientific theory demands of the world only that it be so structured as to assure the sequences of stimulation that our theory gives us to expect."[76]

[73]Ibid., 287.
[74]Quine, *Roots of Reference*, 2.
[75]Quine, *Word and Object*, 4.
[76]Quine, *Theories and Things*, 22.

As an inquiry into reality, our science does not require justification beyond observation and the hypothetico-deductive method.

(3) We must argue from within science: In Quine's view, the arguments of LS often take this form: science suggests that science is impossible. He does not fault the skeptics for using scientific findings to challenge science—he believes their strategy is valid and the only feasible one. Since there is no vantage point above,before, or outside science—no first philosophy—any scientific findings or currently plausible conjectures may be used in philosophy and elsewhere. When legitimizing science, we must follow the skeptics' own steps and make free use of science: "[. . .] I philosophize from the vantage point only of our own provincial conceptual scheme and scientific epoch, true; but I know no better."[77]

Stroud has made serious efforts to argue that Quine does not really answer the skeptics, and that his NE either fails *as* epistemology or fails *to be* epistemology at all.[78] Quine has responded to Stroud.[79] I do not have sufficient space in this paper to examine Stroud's arguments and Quine's response in detail.

Fourthly, let us observe how Quine makes free use of achievements from different scientific disciplines in developing his NE. To establish his ontological position, he adopts physical objects from common sense and physics, and classes or sets from set theory and mathematics. To expose the ontological commitments of a theory, he employs first-order logic and semantic regimentation: "To be is to be a value of variable"[80], and "No entity without identity."[81] In developing his theory of language learning and the roots of reference, he draws on numerous theoretical achievements from linguistics, psychology (especially behavioristic psychology), anthropology, and logic. To account for expectation formation and induction rationality, he appeals to genetics and Darwinian theory of evolution—natural selection and innate endowment. Quine himself thus *really* make full and free use of science in his NE.

We return now to the charge of circularity in Quine's NE. To respond, we must take seriously Quine's own view: "There is the reciprocal containment, though containment in different senses: epistemology in natural science and natural science in epistemology."[82] Here, following Quine's NE,

[77]Quine, *Quintessence*, 108.

[78]Barry Stroud, "The Significance of Epistemology Naturalized", *Midwest Studies in Philosophy* 6(1) (1981): 455–471.

[79]W. V. Quine, "Reply to Stroud", *Midwest Studies in Philosophy* 6(1) (1981): 473–475.

[80]Quine, *From A Logical Point of View*, 15.

[81]Quine, *Ontological Relativity and Other Essays*, 23.

[82]Ibid., 83.

"epistemology" should be understood as "natural science" in its broadest sense.

Natural science contains NE in the sense that NE is one of its branches. Specifically, NE presupposes the existence of an external world. Sensory receptors—humans' points of contact with the world—are physical entities according to natural science, particularly anatomy and physiology. The two cardinal tenets of NE, namely that (1) "whatever evidence there is for science is sensory evidence" and (2) "all inculcation of meanings of words must rest ultimately on sensory evidence",[83] are themselves findings of natural science. NE contains natural science in the sense that its subject matter is the entire body of natural science: it seeks to understand the general dynamics and structure of science as a whole. Moreover, the ontology of natural science is projected from our epistemological research.

Quine continues: "This interplay is reminiscent again of the old threat of circularity, but it is all right now that we have stopped dreaming of deducing science from sense data."[84] We might add: it is also all right now that we have stopped pursuing absolutely certainty in science. Since there is no Archimedean standpoint external to science, we must settle for understanding and vindicating science from within science. If this is circularity, it is not vicious, but constructive. Constructive circularity is not only acceptable—it is the only viable option left to us, given that science is a connected whole and we are, like Neurath's sailors, afloat on a boat that we must repair from within. I assert that Quine's NE cannot be properly understood without grasping the reciprocal containment of epistemology and natural science, and that the so-called "circularity" charge largely stems from disregarding or misinterpreting Quine's view of this reciprocal relationship.

5 Reinterpreting rather than disregarding normativity of epistemology

A common and persistent criticism of Quine's NE is its alleged non-normativity. This view widely shared among philosophers such as Putnam (1982), Davidson (1986), Kim (1988), Siegel (1990), with Kim critique (1988) being especially influential.[85] Consider the following quotations from two representative sources:

[83] Ibid., 75.

[84] Quine, *Ontological Relativity and Other Essays*, 83–84.

[85] See Hilary Putnam, "Why Reason Can't Be Naturalized", *Synthese* 52(1) (1982): 3–23; Donald Davidson, "A Coherence Theory of Truth and Knowledge", in *Truth and Interpretation: Perspectives on the Philosophy of Donald Davidson*, ed. E. LePore (Oxford: Blackwell, 1986), 307–319; Jaekwon Kim, "What is 'Naturalized Epistemology'?", *Philosophical Perspectives* 2 (1988): 381–405; Harvey Siegel, "Laudan's normative naturalism", *Studies in History and Philosophy of Science* 21(2) (1990): 295–313.

> [I]n recasting epistemology as "a chapter of psychology", Quine is stripping away any concern with epistemic normativity. [...] The complaint here is not merely that normativity is a feature of TE [...]; it is that a concern with normative epistemic matters is essential to epistemology *per se*.[86]

> One of the most resilient global complaints [of Quine's NE] is what may be called the "normativity charge", that naturalized epistemology is a merely descriptive enterprise and therefore unfit to succeed the essentially normative traditional theory of knowledge.[87]

In this section, I will show how Quine himself responds to the non-normativity charge, and what epistemic norms he proposes in his NE. In doing so, I am to do justice to his project and defend it against the non-normativity accusation.

First, Quine explicitly refutes the charge that NE is devoid of normativity. He explains:

> Naturalization of epistemology *does not jettison the normative* and settle for the indiscriminate description of on-going processes. For me normative epistemology is a branch of engineering. It is the technology of truth-seeking, or, in more cautiously epistemic terms, prediction. Like any technology, it makes free use of whatever scientific findings may suit its purpose.[88]

> Traditional epistemology was in part normative in intent. Naturalistic epistemology, in contrast, is viewed [...] as purely descriptive.*I disagree.* Just as traditional epistemology on its speculative side gets naturalized into science, or next of kin, so *on its normative side it gets naturalized into technology, the technology of scientizing.*[89]

Indeed, as Quine claims, epistemic norms are *naturalized* in his NE: they are derived from past success of scientific practice. Certain procedures and methods in science consistently yield results that are efficient and beneficial and thus are taken to be truth-indicative. Accordingly, they should guide future inquiry. In this way, epistemic norms are extracted from and supported by the findings of natural science. Quine offers a clear example:

> What are more distinctively naturalistic and technological are *norms based on scientific findings.* Thus science has pretty well established—subject to future disestablishment, as always—that our information about distant events and other people reaches us only through impact

[86]Patrick Rysiew, "Naturalism in Epistemology".

[87]Wybo Houkes, "Normativity in Quine's Naturalism: The Technology of Truth-Seeking?", *Journal for General Philosophy of Science* 33(2) (2002): 251–267.

[88]Hahn and Schilpp (eds.), *The Philosophy of W. V. Quine*, 664–665; my emphasis.

[89]Quine, *Quintessence*, 282; my emphasis.

> of rays and particles on our sensory receptors. A normative corollary is that we should be wary of astrologers, palmists, and other soothsayers.[90]

Second, Quine proposes several epistemic norms in his NE:

(1) Seek truth! Avoid error!

In 1990, Quine published his penultimate book, *Pursuit of Truth*. This phrase aptly captures the goal of his philosophical endeavor: from his early career to his later years, truth remained central to his work.[91] I reformulate this phrase into an epistemic imperative: "Seek the truth!" Quine writes:

> For me, normative epistemology is a branch of engineering. It is *the technology of truth-seeking*, [...]. There is no question here of ultimate value, as in morals; *it is a matter of efficacy for an ulterior end, truth or prediction.* The normative here, as elsewhere in engineering, becomes descriptive when the terminal parameter has been expressed.[92]

"Seek truth!" should be recognized as a first-class epistemic norm in Quine's NE for two reasons: (1) It is not only our primary cognitive goal but also a crucial means for survival. Without a truthful understanding of our environment, we risk harm and eventual elimination. (2) Truths summarize humanity's priori cognitive achievements and serve as normative guides for future exploration. They illuminate directions, paths, methods, strategies, rules and principles for ongoing inquiry.

A corollary of this imperative is "Avoid mistake and errors!". Quine argues:

> There is some encouragement in Darwin. If people's innate spacing of qualities is a gene-linked trait, then the spacing that has made for the most successful inductions will have tended to predominate through natural selection. *Creatures inveterately wrong in their inductions have a pathetic but praiseworthy tendency to die before reproducing their kind.*[93]

In other words, if we hope to survive and reproduce, we must avoid error and mistakes.

In Quine's NE, then, epistemic normativity is simply a matter of instrumental efficacy—of deploying cognitive means that reliably produce successful predictions. It derives from causal connections between practice and outcome, and from the historical record of scientific achievement.

[90] Ibid., 282; my emphasis.

[91] Chen Bo, "Quine's Disquotationalism: A Variant of Correspondence Theory of Truth", *Philosophical Forum* 51(2) (2020): 93–113.

[92] Hahn and Schilpp (eds.), *The Philosophy of W. V. Quine*, 664–665; my emphasis.

[93] Quine, *Ontological Relativity and Other Essays*, 126; my emphasis.

Though science remains fallible, it is highly unlikely to be wholly mistaken. Thus, normative epistemology "gets naturalized into a chapter of engineering: the technology of anticipating sensory stimulation."[94]

(2) The first cardinal tenet of empiricism.

Quine identifies two cardinal tenets of empiricism, the first being that "whatever evidence there is for science is sensory evidence."[95] He elevates this tenet to normative status in his NE:

> The most notable norm of naturalized epistemology actually coincides with that of traditional epistemology. It is simply the watchword of empiricism: *nihil in mente quod non prius in sensu*. This is a prime specimen of naturalized epistemology, for it is a finding of natural science itself, however fallible, that our information about the world comes only through impacts on our sensory receptors. And still *the point is normative*, warning us against telepaths and soothsayers.[96]

In my view, the watchword of empiricism is identical to its first cardinal tenet. In this passage, Quine emphasizes: (1) the first tenet functions as an epistemic norm; (2) it is shared by both NE and traditional empiricist epistemology; (3) it is supported by empirical findings and thus inherits their reliably. Empiricism itself is "the crowning norm" of NE.[97]

(3) The hypothetico-deductive method and predictive testing.

In Quine's NE, the hypothetico-deductive method (HDM) is virtually synonymous with the scientific method and serves as a central epistemic norm:

> What might be offered *first of all as a norm of naturalized epistemology is prediction of observation as a test of a hypothesis. I think of this as more than a norm: as the name of the game.* Science cannot all be tested, and the softer the science the sparser the tests; but when it is tested, the test is prediction of observation. Moreover, naturalism has no special claims on the principle, which is rather the crux of empiricism.[98]

Quine claims that prediction, made possible through HDM, is essential for testing hypotheses and ensuring their empirical content. It namely links observable predictions with theoretical hypothesis, making the latter testable by experience and thus scientific. He thus emphasizes that the game of

[94]Quine, *Pursuit of Truth*, 19.
[95]Quine, *Ontological Relativity and Other Essays*, 75.
[96]Quine, *Pursuit of Truth*, 19; my emphasis.
[97]Ibid., 21; my emphasis.
[98]Quine, *Quintessence*, 282; my emphasis.

science is *defined* by the strategy of conjecturing within scientific hypotheses. As he puts it: "A sentence's claim to scientific status rests on what it contributes to a theory whose checkpoints are in prediction."[99]

(4) Normative considerations in hypothesis selection.

Beside these major epistemic norms, Quine also acknowledges a range of heuristic norms that guide hypothesis formation and selection in scientific inquiry. He notes:

> For a richer array of norms, vague in various degrees, we may look to the heuristics of hypothesis: how to think up a hypothesis worth testing. This is where considerations of conservatism and simplicity come in, and, at a more technical level, probability. In practice those technical matters spill over also, as I remarked, to complicate the hypothetico-deductive method itself.[100]

When faced with competing hypotheses, scientists must assess their relative merits. Quine proposes several desirable traits of good hypotheses, which might guide us in selecting the best of them. In his paper "Posits and Reality", in addition to correctness of predictions, he lists: simplicity, familiarity of principle, scope, and fecundity.[101] In *The Web of Belief* (1970), coauthored with Ullian, Chapter 6 and parts of Chapter 7 elaborate six virtues of plausible hypotheses: conservatism, modesty, simplicity, generality, refutability, and precision.[102] In *From Stimulus to Science* (1995), he emphasizes just two: "conservatism, or the maxim of minimum mutilation, and simplicity, familiar in ontological contexts as Ockham's razor."[103] Importantly, "[...] as Quine notes, the various virtues can conflict; they must be balanced off against one another in particular cases."[104]

So far, I think we can conclude that the non-normativity charge against Quine's NE is not well grounded. In a conversation with me, Chung-ying Cheng points out that Quine's naturalism is rational naturalism. I agree and consider this a deep insight. In my view, Quine's rational naturalism consists of the following elements: scientific realism, that is, there is a real world which science repeatedly discloses to us; empiricism, namely, our theory of

[99] Quine, *Pursuit of Truth*, 20.
[100] Quine, *Quintessence*, 282.
[101] See W. V. Quine, *The Ways of Paradox and Other Essays* (New York: Random House. 2nd revised and enlarged edition, 1976), 247.
[102] W. V. Quine and Joseph S. Ullian, *The Web of Belief* (New York: Random House, 1970; second edition, 1978).
[103] Quine, *From Stimulus to Science*, 49.
[104] Penelope Maddy, "Three forms of naturalism", In *Oxford Handbook of Philosophy of Mathematics and Logic*, ed. Stewart Shapiro (Oxford: Oxford University Press, 2005), 437–459.

the world ultimately originates from our sensory experience of it; HDM—that is, we formulate hypotheses about the world on the basis of sensory experience and theoretical reasoning, deduce a series of predictions that are confirmable or falsifiable by experience, and thereby gradually progress in our understanding of the world; and naturalism, i.e., there is no tribunal beyond science to which science itself must answer.

Furthermore, consider the following questions: How do we justify epistemic, legal, ethical and other norms? Why do we "must" or "ought" to do something? Why should we do this but not that, or do it this way rather than that way? What is the source of normativity? To answer these questions, I think Hume's "is-ought" division is not a good starting point and should rather be rejected. We should follow Quine's lead in naturalizing normativity. My general idea is this: following the American classical pragmatists, we should place humanity's interests, desires, needs and wants at the forefront. We know what we have to know, and we know what we are able to know. Facts are not completely objective, as they are shaped by human cognition; norms are not entirely subjective, since they have a factual basis in the world and reasons in academics. To justify a variety of norms, we must consider at least three important elements: first, our interests, desires, needs and wants, etc., which set the aims and purposes of our cognition; second, the gap between our purposes and the actual situation; and third, how to bridge this gap between the two according to our best theory about the world. I have developed these ideas in a long Chinese paper.[105]

6 Against Williamson's critics of naturalism

In his short essay "What is Naturalism?" (2016), Williamson expresses skepticism toward naturalism, criticizing both its metaphysical claim—"there is only the natural world"—and its methodological claim—"the best way to find out about it is by the scientific method."[106] Although he mentions Quine only once, I judge that his critics are effectively directed at Quine's naturalism, or at least apply to it. I will respond to his critics in my own order.

Williamson's critic 1 targets the methodological aspect of naturalism: "What is meant by 'the scientific method'? Why assume that science only has one method?" and "One challenge to naturalism is to find a place for mathematics."[107] I think this critic is quite unfair. For Quine, as shown above, HDM is virtually synonymous with the scientific method and

[105]Chen Bo, "Why do we 'must' and 'should'? Bridging the gap from 'Is' to 'Ought'" [in Chinese], *Social Science in China* 11 (2024), 47–65.

[106]Timothy Williamson, "What is Naturalism?" in *The Stone Reader: Modern Philosophy in 133 Arguments*, eds. P. Catapano and S. Critchley (New York: Norton/Liveright, 2016), 243.

[107]Ibid., 243.

functions as a central epistemic norm—not merely "one method" or "a single general method", as Williamson says. For Quine, HDM encompasses a range of procedures and methods: preparing primitive data for a hypothesis, formulating the hypothesis, deducing a series of consequences (including observable predictions), logically or empirically testing the hypothesis, and selecting the best available hypothesis based on the normative considerations discussed earlier. Therefore, HDM serves as an umbrella term for a series of scientific methods—indeed, the totality of methods used in science, possibly including speculation in philosophy.[108] In this sense, HDM and the scientific method are effectively equivalent.

In recent years, Williamson himself strongly endorsed abductive methodology in philosophy, even advocating what he calls "abductive philosophy."[109] For him, "abduction" is also an umbrella term—not a single method but a set of methods, not clearly delineated. In my judgment, his "abduction" is very close to Quine's HDM. Therefore, if critic 1 is applicable to Quine's NE, it is equally applicable to Williamson's own "abductive philosophy."

Now let me clarify the role of mathematics in Quine's NE. In defense of mathematical realism and mathematical truths, Quine constructs his indispensability argument. He contends that mathematical objects are essential to science; the practical success of science confirms not only its assumptions about the material world—including unobservable physical objects—but also its mathematical axioms and objects, even though these do not exist in time and space or causally interact with our senses. He continues:

> In science itself I certainly want to include the farthest flights of physics and cosmology, as well as experimental psychology, history, and the social sciences. Also mathematics, insofar at least as it is applied, for it is indispensable to natural science.[110]

According to the understanding of HDM outlined above, both logical and mathematical methods—especially logical inference and mathematical proof—fall within the scope of HDM. Hence, both logic and mathematics, when employing those methods, belong to the domain of science.

Of course, Quine's naturalist account of mathematical objects and truths is broad-brush, lacking necessary detail and subject to certain internal intensions. Maddy and Sher have made significant efforts to continue and refine Quine's sketchy philosophy of mathematics. By focusing on set-

[108]Ibid., 297.

[109]See Timothy Williamson, "Abductive Philosophy", *Philosophical Forum* 47(3–4) (2016): 263–280.

[110]Quine, *Quintessence*, 275.

theoretical objects and methodology, Maddy first developed her naturalism in mathematics, and later her broader "second philosophy" of mathematics.[111]

In my view, Sher's philosophy of mathematics is more promising. She argues that both logic and mathematics are grounded in the world and in our minds, and that all logical and mathematical truths are based on correspondence with the world. More specifically, mathematical truths correspond to the formal features and structural properties of objects. In her account, Individuals (0-level objects) have formal property of self-identity; properties of individuals (1^{st}-level objects) have formal properties such as cardinality; and relations between individuals (1^{st}-level objects) possess formal properties like reflexivity, symmetry, and transitivity.

Sher uses invariance under isomorphisms to precisely characterize the formality of mathematics and illustrates her correspondence account of mathematical truths as shown in Figure 1.[112]

Composite Mathematical Correspondence

1st-Order Language: "$2 + 7 = 9$" is true

iff

Posits: $+(2, 7) = 9$

iff

Reality: $\text{DISJOINT-UNION}(\text{TWO}, \text{SEVEN}) = \text{NINE}$

[*iff*

$(\forall P1)(\forall P2)((\text{TWO}(P1)\ \&\ \text{SEVEN}(P2)\ \&\ P1 \cap P2 = \varnothing) \supset \text{NINE}(P2 \cup P2))]$

FIGURE 1. Sher's illustration of her correspondence account of mathematical truths.

By outlining Quine's, Maddy's and Sher's philosophy of mathematics, I simply want to show that it is, in principle, possible to develop naturalist explanation of the place of mathematics in the whole of sciences. Therefore, Williamson's comment that "One challenge to naturalism is to find a place for mathematics" is at least answerable.

Williamson's critic 2 targets the naturalistic concept of science. He constructs a "dilemma" for naturalists (mainly Quine) as follows:

[111] Penelope Maddy, *Naturalism in Mathematics* (New York: Oxford University Press, 1997); *Second Philosophy: A Naturalistic Method* (New York: Oxford University Press, 2007).

[112] Gila Sher, "Truth & Knowledge in Logic & Mathematics", in *The Logica Yearbook 2011*, eds. M. Peliš & V. Punčochář (London: College Publications, King's College, 2012), 294.

> If they are too inclusive in what they count as science, naturalism loses its bite. [. . .] But if they are too exclusive in what they count as science, naturalism loses its credibility, by imposing a method appropriate to natural science on areas where it is inappropriate. Unfortunately, rather than clarify the issue, many naturalists oscillate.
>
> When on the attack, they assume an exclusive understanding of science as hypothetico-deductive. When under attack themselves, they fall back on a more inclusive understanding of science that drastically waters down naturalism. Such maneuvering makes naturalism an obscure article of faith. I don't call myself a naturalist because I don't want to be implicated in equivocal dogma.[113]

I do not think this "dilemma" is real for Quine's NE, because I disagree the first alternative: "If they are too inclusive in what they count as science, naturalism loses its bite." This is not true. In Quine's view, even Descartes' dualism of mind and body has both a "scientific" and a "speculative" side. Insofar as its "scientific" side is concerned, "it could as well be reckoned as science, however false. He even had a causal theory of the interaction of mind and body through the pineal gland."[114] Insofar its "speculative" side is concerned—for example, Descartes' quest for absolute certainty and his demon argument, which transcends all the available scientific evidence—it should be rejected as unscientific first philosophy. For Quine, even religion could be regarded either as a part of science or as pure belief. If considered part of science, we must evaluate the rationality of certain religious claims like "God exists", mainly by appealing to empirical evidence and rational arguments. If considered pure belief, religion lies beyond the scope of scientific discourse and cannot be governed by evidence and reason. Therefore, even though Quine's concept of science is very inclusive, it does not lose its bite.

Williamson's critic 3 concerns the metaphysical aspect of Quine's NE. He asks:

> What [. . .] is the natural world? If we say it is the world of matter, or the world of atoms, we are left behind by modern physics, which characterizes the world in far more abstract terms. Anyway, the best current scientific theories will probably be superseded by future scientific developments. We might therefore define the natural world as whatever the scientific method eventually discovers. Thus naturalism becomes the belief that there is only whatever the scientific method eventually discovers, and (not surprisingly) the best way to find out about it is by the scientific method. That is no tautology. Why can't there be things only discoverable by nonscientific means, or

[113]Williamson, "What is Naturalism?", 243–244.
[114]Quine, *Quintessence*, 275.

> not discoverable at all? Still, naturalism is not as restrictive as it sounds.[115]

To answer Williamson' question, we must keep three points in our mind: (i) Quine's concept of science is very broad, so modern physics, as Williamson mentions, is included; (ii) for Quine, "[. . .] it is within science itself, and not in some prior philosophy, that reality is to be identified and described";[116] (iii) scientific conclusions are broadly grounded in evidence and reason. Since we are not able to observe the world from a standpoint outside of science: "the notion of reality is itself part of the apparatus; and sticks, stones, atoms, quarks, numbers, and classes all arc utterly real denizens of an ultimate real world, except insofar our present science may prove false on further testing."[117] Only through science can we know that there are unknown parts of the world. Even such philosophical claims as "there is an external world" or "there are external objects" are summaries and projection of humanity's accumulated experience and cognition. As the ongoing extension of human cognitive boundaries reveals more and more about the previously unknown world, we infer by induction that such progress will continue, and that there is an external world independent of what or how we know.

As for Williamson's question—"Why can't there be things not discoverable at all?"—science itself offers a negative answer, by continuously extending our cognitive boundaries. Science can recognize that unknown things exist in the world, but it does not commit to the idea that there are things in principle unknowable. I myself find it difficult to articulate a scientific reason for the existence of such unknowables.

Regarding the further question—"Why can't there be things only discoverable by nonscientific means?"—Quine's answer might be this: while we cannot deny the possibility of nonscientific discovery, the history of human cognition has repeatedly shown that such methods are typically fraught with error, fallacy, and even absurdity, and are far less reliable than scientific methods. As Quine puts it: "Science reveals hidden mysteries, predicts successfully, and works technological wonders."[118] "[. . .] in our pursuit of truth about the world we cannot do better than our traditional scientific procedure, the hypothetico-deductive method."[119] Even though science is fallible in principle, it is highly improbable that it is completely wrong. Thus, scientific methods remain the most successful, the most reliable, and the best tools we have for understanding the world in which we live.

So far, I think I can conclude that Williamson's three critics against naturalism—particularly Quine's variety—do not hold.

[115] Williamson, "What is Naturalism?", 243.
[116] Quine, *Theories and Things*, 21.
[117] Quine, *Quintessence*, 285.
[118] Quine, *Ontological Relativity and Other Essays*, 133.
[119] Quine, *Quintessence*, 281.

Acknowledgement. My thanks go to Professors Juliet Floyd and Chung-ying Cheng, both of whom provided insightful comments and suggestions on the manuscript of this article, which led to some additions and revisions. Of course, all remaining mistakes are my own. Also thanks to Dr. Jan Vrhovski for his generous help to polish and revise my English writing.