

Epistemology Naturalized

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[A selection from "Epistemology Naturalized", with summaries of omitted sections written by me. Originally published in *Ontological Relativity and Other Essays*, by W. V. Quine (New York: Columbia University Press).]

Quine begins his paper by discussing the attempt to reduce mathematics to symbolic logic. The effort wasn't fully successful, he says, as it proved necessary to use concepts from set theory as well as logic, and set theory is (if anything) less clear than most of math to begin with.

The reduction of math to logic has two components:

1. "Conceptual". The *meaning* of each mathematical sentence must be explained or defined in logical terms.
2. "Doctrinal". After the meaning of a mathematical statement has been defined, it must then be *proved* as well, using the resources of logic.

The case of mathematics isn't Quine's real target in the paper though. He wants instead to discuss 'natural knowledge', i.e. knowledge of the natural world, including scientific knowledge. Since Quine is an empiricist (of the most radical kind) he wants to reduce all natural knowledge to sense experience. This reduction, like the reduction of mathematics to logic, has both a 'conceptual' and 'doctrinal' component.

Just as mathematics is to be reduced to logic, or logic and set theory, so natural knowledge is to be based somehow on sense experience. This means explaining the notion of body in sensory terms; here is the conceptual side. And it means justifying our knowledge of truths of nature in sensory terms; here is the doctrinal side of the bifurcation.

What does such a reduction of natural knowledge to sense experience amount to? On the conceptual side, it means something very much like the *phenomenalism* that we discussed (or rather, dismissed!) earlier in the course. For example, Hume took a view along these lines:

[Hume's] handling of the conceptual side of the problem, the explanation of body in sensory terms, was bold and simple: he identified bodies outright with the sense impressions. If common sense distinguishes between the material apple and our sense impressions of it on the ground that the apple is one and enduring while the impressions are many and fleeting, then, Hume held, so much the worse for common sense; the notion of its being the same apple on one occasion and another is a vulgar confusion.

On the 'doctrinal' side, of justifying scientific claims on the basis of experience, Hume of course ran into the problem of induction, and concluded that it couldn't be done. As Quine puts it, "Here, Hume despaired."

Quine thinks that the problem of induction today is more-or-less where Hume left it. But on the phenomenalist's project, of reducing external objects to sense experience, "there has been progress".

There follows a lengthy description of two technical innovations that made this progress possible, namely contextual definitions, and the use of set theory.

When defining a term contextually,

... we do not need to specify an object for it to refer to, nor even specify a synonymous word or phrase; we need only show, by whatever means, how to translate all the whole sentences in which the term is to be used. ... One could undertake to explain talk of bodies in terms of talk of impressions by translating one's whole sentences about bodies into whole sentences about impressions, without equating the bodies themselves to anything at all.

Moreover, by using the resources of set theory,

The epistemologist who is willing to eke out his austere ontology of sense impressions with these set-theoretic auxiliaries is suddenly rich: he has not just his impressions to play with, but sets of them, and sets of sets, and so on up. ... Thus equipped, our epistemologist may not need either to identify bodies with impressions or to settle for contextual definition; he may hope to find in some subtle construction of sets upon sets of sense impressions a category of objects enjoying just the formula properties that he wants for bodies.

Then we come to Rudolf Carnap. In 1928 Carnap published *Der logische Aufbau der Welt*, (“the logical construction of the world”). What? Is the world something that we build out of logic? Yes! according to the phenomenalist. Statements about external objects are to be given meaning by translating them into observation statements, using logic and set theory along the way.

Quine notes that while Carnap “came nearest” to carrying out such an ambitious construction, he didn’t succeed. And on the ‘doctrinal’ question, i.e. the problem of induction, “the Humean predicament remained unaltered.” There was simply no way to *prove* statements about external objects from observation sentences.

The hopelessness of grounding natural science upon immediate experience in a firmly logical way was acknowledged. 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. To endow the truths of nature with the full authority of immediate experience was as forlorn a hope as hoping to endow the truths of mathematics with the potential obviousness of elementary logic.

According to Quine, despite the failure of Carnap’s radical empiricist program in the *Aufbau*,

Two cardinal tenets of empiricism remained unassailable, however, and so remain to this day. One is that whatever evidence there *is* for science *is* sensory evidence. The other, to which I shall recur, is that all inculcation of meanings of words must rest ultimately on sensory evidence. Hence the continuing attractiveness of the idea of a *logischer Aufbau* in which the sensory content of discourse would stand forth explicitly.

Then comes a key move in Quine’s argument. Carnap was aiming at a ‘rational reconstruction’ of the external (natural) world, based on observation statements. But, according to empiricism, *the brain is doing this very thing all the time*. The brain’s visual processing system, for example, is constantly turning nerve signals into a visual field of 3D coloured objects. So rather than trying to figure out, logically, how this is possible, why not just see how the brain actually does it?

Why not just see how this construction really proceeds? Why not settle for psychology? Such a surrender of the epistemological burden to psychology is a move that was disallowed in earlier times as circular reasoning. If the epistemologist’s goal is validation of the grounds of empirical science, he defeats his purpose by using psychology or other empirical science in the validation. However, such scruples against circularity have little point once we have stopped dreaming of deducing science from observations. If we are out simply to understand the link between observation and science, we are well advised to use any available information, including that provided by the very science whose link with observation we are seeking to understand.

Quine says however that, for empiricists like himself, it would still be nice to have a ‘rational reconstruction’ of the natural world from sense-data. Why is that? It’s because science and metaphysics include reference to all kinds of entities, such as *electrons*, and *objective states of affairs*, that aren’t observable. How can we know of such things, if all knowledge comes from experience? Well, if we can translate all sentences involving such dubious entities into proper and kosher observation statements, then it becomes clear how they’re supported by experience.

we want to establish the essential innocence of physical concepts, by showing them to be theoretically dispensable.

Unfortunately, Carnap was unable to provide such a strict translational reduction that would have “eliminated” external objects, i.e. made them dispensable. At best, we would have to settle for a looser kind of reduction that didn’t eliminate external objects.

To relax the demand for definition, and settle for a kind of reduction that does not eliminate, is to renounce the last remaining advantage that we supposed rational reconstruction to have over straight psychology; namely, the advantage of translational reduction. If all we hope for is a reconstruction that links science to experience in explicit ways short of translation, then it would seem more sensible to settle for psychology. Better to discover how science is in fact developed and learned than to fabricate a fictitious structure to a similar effect. ... In giving up hope of such translation, then, the empiricist is conceding that the empirical meaning of typical statements about the external world are inaccessible and ineffable.

Quine *explains* the impossibility of such a translational reduction by means of another of his famous views, known sometimes as the “Duhem-Quine thesis”.

Pierre Duhem had noted that, while scientists talk naively of theories being refuted by experiment, this isn’t really possible as a matter of logic. For, in order to refute a theory, first you need to derive an ‘observational consequence’ of the theory – an empirical prediction. But such a prediction can never be derived from the theory alone, in isolation from the rest of our scientific knowledge. One always needs additional beliefs and assumptions in order to make a prediction. But, that being so, when a prediction contradicts experience we can’t be sure that the theory is to blame. It could instead be due to some false ‘auxiliary assumption’.

Quine summarises this ‘DQ thesis’ as the problem that “the typical statement about bodies has no fund of experiential implications it can call its own.”

I’ll hand over to Quine now, for the rest of the paper, and just insert a comment here and there ...

A substantial mass of theory, taken together, will commonly have experiential implications; this is how we make verifiable predictions. ... Sometimes also an experience implied by a theory fails to come off; and then, ideally, we declare the theory false. But the failure falsifies only a block of theory as a whole, a conjunction of many statements. The failure shows that one or more of those statements is false, but it does not show which. The predicted experiences, true and false, are not implied by any one of the component statements of the theory rather than another. The component statements simply do not have empirical meanings, by Peirce’s standard; but a sufficiently inclusive portion of theory does.

If we can aspire to a sort of *logischer Aufbau der Welt* at all, it must be to one in which the texts slated for translation into observational and logico-mathematical terms are mostly broad theories taken as wholes, rather than just terms or short sentences. The translation of a theory would be a ponderous axiomatization of all the experiential difference that the truth of the theory would make. It would be a queer translation, for it would translate the whole but none of the parts. We might better speak in such a case not of translation but simply of observational evidence for theories; and we may, following Peirce, still fairly call this the empirical meaning of the theories.

For an uncritical mentalist, no such indeterminacy threatens. Every term and every sentence is a label attached to an idea, simple or complex, which is stored in the mind. When on the other hand we take a verification theory of meaning seriously, the indeterminacy would appear to be inescapable. The Vienna Circle espoused a verification theory of meaning but did not take it seriously enough. If we recognize with Peirce that the meaning of a sentence turns purely on what would count as evidence for its truth, and if we recognize with Duhem that theoretical sentences have their evidence not as single sentences but only as larger blocks of theory, then the indeterminacy of translation of theoretical sentences is the natural conclusion. And most sentences, apart from

observation sentences, are theoretical. **This conclusion, conversely, once it is embraced, seals the fate of any general notion of propositional meaning or, for that matter, state of affairs.** [my emphasis. Wow! Pretty high cost of being a verificationist!]

Should the unwelcomeness of the conclusion persuade us to abandon the verification theory of meaning? Certainly not. The sort of meaning that is basic to translation, and to the learning of one's own language, is necessarily empirical meaning and nothing more. A child learns his first words and sentences by hearing and using them in the presence of appropriate stimuli. These must be external stimuli, for they must act both on the child and on the speaker from whom he is learning.⁴ Language is socially inculcated and controlled; the inculcation and control turn strictly on the keying of sentences to shared stimulation. Internal factors may vary *ad libitum* without prejudice to communication as long as the keying of language to external stimuli is undisturbed. Surely one has no choice but to be an empiricist so far as one's theory of linguistic meaning is concerned.

...

Let me link up, in a different order, some of the points I have made. The crucial consideration behind my argument for the indeterminacy of translation was that a statement about the world does not always or usually have a separable fund of empirical consequences that it can call its own. That consideration served also to account for the impossibility of an epistemological reduction of the sort where every sentence is equated to a sentence in observational and logico-mathematical terms. And the impossibility of that sort of epistemological reduction dissipated the last advantage that rational reconstruction seemed to have over psychology.

Philosophers have rightly despaired of translating everything into observational and logico-mathematical terms. They have despaired of this even when they have not recognized, as the reason for this irreducibility, that the statements largely do not have their private bundles of empirical consequences. And some philosophers have seen in this irreducibility the bankruptcy of epistemology. Carnap and the other logical positivists of the Vienna Circle had already pressed the term "metaphysics" into pejorative use, as connoting meaninglessness; and the term "epistemology" was next. Wittgenstein and his followers,

mainly at Oxford, found a residual philosophical vocation in therapy: in curing philosophers of the delusion that there were epistemological problems.

[Here's the most famous section of the paper.]

But I think that at this point it may be more useful to say rather that 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. It studies a natural phenomenon, viz., a physical human subject. This human subject is accorded a certain experimentally controlled input—certain patterns of irradiation in assorted frequencies, for instance—and in the fullness of time the subject delivers as output a description of the three-dimensional external world and its history. 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.

Such a study could still include, even, something like the old rational reconstruction, to whatever degree such reconstruction is practicable; for imaginative constructions can afford hints of actual psychological processes, in much the way that mechanical simulations can. But a conspicuous difference between old epistemology and the epistemological enterprise in this new psychological setting is that we can now make free use of empirical psychology.

The old epistemology aspired to contain, in a sense, natural science; it would construct it somehow from sense data. Epistemology in its new setting, conversely, is contained in natural science, as a chapter of psychology. But the old containment remains valid too, in its way. We are studying how the human subject of our study posits bodies and projects his physics from his data, and we appreciate that our position in the world is just like his. Our very epistemological enterprise, therefore, and the psychology wherein it is a component chapter, and the whole of natural science wherein psychology is a component book—all this is our own construction or projection from stimulations like those we were meting out to our epistemological subject. There is thus reciprocal containment, though containment in different senses:

epistemology in natural science and natural science in epistemology.

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. We are after an understanding of science as an institution or process in the world, and we do not intend that understanding to be better than the science which is its object. This attitude is indeed one that Neurath was already urging in Vienna Circle days, with his parable of the mariner who has to rebuild his boat while staying afloat in it.

One effect of seeing epistemology in a psychological setting is that it resolves a stubborn old enigma of epistemological priority. Our retinas are irradiated in two dimensions, yet we see things as three-dimensional without conscious inference. Which is to count as observation—the unconscious two-dimensional reception or the conscious three-dimensional apprehension? In the old epistemological context the conscious form had priority, for we were out to justify our knowledge of the external world by rational reconstruction, and that demands awareness. Awareness ceased to be demanded when we gave up trying to justify our knowledge of the external world by rational reconstruction. What to count as observation now can be settled in terms of the stimulation of sensory receptors, let consciousness fall where it may.

The Gestalt psychologists' challenge to sensory atomism, which seemed so relevant to epistemology forty years ago, is likewise deactivated. Regardless of whether sensory atoms or Gestalten are what favor the forefront of our consciousness, it is simply the stimulations of our sensory receptors that are best looked upon as the input to our cognitive mechanism. Old paradoxes about unconscious data and inference, old problems about chains of inference that would have to be completed too quickly—these no longer matter.

In the old anti-psychologistic days the question of epistemological priority was moot. What is epistemologically prior to what? Are Gestalten prior to sensory atoms because they are noticed, or should we favor sensory atoms on some more subtle ground? Now that we are permitted to appeal to physical stimulation, the problem dissolves; A is epistemologically prior to B if A is causally nearer than B to the sensory receptors. Or, what is in some ways better, just talk explicitly in terms of causal proximity to sensory receptors and drop the talk of

epistemological priority.

The dislodging of epistemology from its old status of first philosophy loosed a wave, we saw, of epistemological nihilism. This mood is reflected somewhat in the tendency of Polanyi, Kuhn, and the late Russell Hanson to belittle the role of evidence and to accentuate cultural relativism. Hanson ventured even to discredit the idea of observation, arguing that so-called observations vary from observer to observer with the amount of knowledge that the observers bring with them. The veteran physicist looks at some apparatus and sees an x-ray tube. The neophyte, looking at the same place, observes rather "a glass and metal instrument replete with wires, reflectors, screws, lamps, and pushbuttons."⁶ One man's observation is another man's closed book or flight of fancy. The notion of observation as the impartial and objective source of evidence for science is bankrupt. Now my answer to the x-ray example was already hinted a little while back: what counts as an observation sentence varies with the width of community considered. But we can also always get an absolute standard by taking in all speakers of the language, or most.⁷ It is ironical that philosophers, finding the old epistemology untenable as a whole, should react by repudiating a part which has only now moved into clear focus.

Clarification of the notion of observation sentence is a good thing, for the notion is fundamental in two connections. These two correspond to the duality that I remarked upon early in this lecture: the duality between concept and doctrine, between knowing what a sentence means and knowing whether it is true. The observation sentence is basic to both enterprises. Its relation to doctrine, to our knowledge of what is true, is very much the traditional one: observation sentences are the repository of evidence for scientific hypotheses. Its relation to meaning is fundamental too, since observation sentences are the ones we are in a position to learn to understand first, both as children and as field linguists. For observation sentences are precisely the ones that we can correlate with observable circumstances of the occasion of utterance or assent, independently of variations in the past histories of individual informants. They afford the only entry to a language.

The observation sentence is the corner-stone of semantics. For it is, as we just saw, fundamental to the learning of meaning. Also, it is where meaning is firmest. Sentences higher up in theories have no empirical

consequences they can call their own; they confront the tribunal of sensory evidence only in more or less inclusive aggregates. The observation sentence, situated at the sensory periphery of the body scientific, is the minimal verifiable aggregate; it has an empirical content all its own and wears it on its sleeve.

The predicament of the indeterminacy of translation has little bearing on observation sentences. The equating of an observation sentence of our language to an observation sentence of another language is mostly a matter of empirical generalization; it is a matter of identity between the range of stimulations that would prompt assent to the one sentence and the range of stimulations that would prompt assent to the other.⁸

It is no shock to the preconceptions of old Vienna to say that epistemology now becomes semantics. For epistemology remains centered as always on evidence, and meaning remains centered as always on verification; and evidence is verification. What is likelier to shock preconceptions is that meaning, once we get beyond observation sentences, ceases in general to have any clear applicability to single sentences; also that epistemology merges with psychology, as well as with linguistics.

This rubbing out of boundaries could contribute to progress, it seems to me, in philosophically interesting inquiries of a scientific nature. One possible area is perceptual norms. Consider, to begin with, the linguistic phenomenon of phonemes. We form the habit, in hearing the myriad variations of spoken sounds, of treating each as an approximation to one or another of a limited number of norms—around thirty altogether—constituting so to speak a spoken alphabet. All speech in our language can be treated in practice as sequences of just those thirty elements, thus rectifying small deviations. Now outside the realm of language also there is probably only a rather limited alphabet of perceptual norms altogether, toward which we tend unconsciously to rectify all perceptions. These, if experimentally identified, could be taken as epistemological building blocks, the working elements of experience. They might prove in part to be culturally variable, as phonemes are, and in part universal.

Again there is the area that the psychologist Donald T. Campbell calls evolutionary epistemology.⁹ In this area there is work by Hüseyin Yilmaz, who shows how some structural traits of color perception could

have been predicted from survival value.¹⁰ And a more emphatically epistemological topic that evolution helps to clarify is induction, now that we are allowing epistemology the resources of natural science.¹¹

NOTES

1. A. B. Johnson, *A Treatise on Language* New York, 1836; Berkeley, 1947).
2. *Philosophy of Science* 3. (1936), 419-471; 4 (1937), 1-40.
3. See W. V. Quine, "Speaking of objects," *Ontological Relativity and Other Essays* (New York: Columbia University Press, 1969) p. 2 ff.
4. See W. V. Quine, "Ontological relativity," *Ontological Relativity*, p. 28.
5. Carnap and Neurath in *Erkenntnis* 3 (1932), 204-228.
6. N. R. Hanson, "Observation and interpretation," in S. Morgenbesser, ed., *Philosophy of Science Today* (New York: Basic Books, 1966).
7. This qualification allows for occasional deviants such as the insane or the blind. Alternatively, such cases might be excluded by adjusting the level of fluency of dialogue whereby we define sameness of language. (For prompting this note and influencing the development of this paper also in more substantial ways I am indebted to Burton Dreben.)
8. Cf. Quine, *Word and Object*, Cambridge, Mass.: MIT Press, 1960, pp. 31-46, 68.
9. D. T. Campbell, "Methodological suggestions from a comparative psychology of knowledge processes," *Inquiry* 2 (1959), 152-182.
10. Hüseyin Yilmaz, "On color vision and a new approach to general perception," in E. E. Bernard and M. R. Kare, eds., *Biological Prototypes and Synthetic Systems* (New York: Plenum, 1962); "Perceptual invariance and the psychophysical law," *Perception and Psychophysics* 2 (1967), 533-538.
11. See "Natural Kinds," Chapter 5 of *Ontological Relativity*.