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SYMPOSIUM

Quine's "predilection" for finitism

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Rudolf Carnap's notes of conversations he had in 1940–1941 with Alfred Tarski and W. V. Quine (a German transcription and English translation of which are now available in Frost-Arnold 2013) are packed with fascinating and sometimes puzzling clues about these logicians' views. I shall focus here on just one of these clues: Quine's commitment in the conversations to an austere sort of ontological finitism. Greg Frost-Arnold suggests that Quine's interest in finitism in 1940–1941 was rooted in an epistemological foundationalism that he later recanted (Frost-Arnold 2013, 35–36). I shall try to show, on the contrary, that Quine's interest in finitism in 1940–1941 was an early expression of an attitude toward ontological questions that was integral to his philosophy from the late 1930s on.

Tarski is clearly the leader in the 1940–1941 conversations about finitism. He announces that he "truly understand[s] only a *finite language* S_1; only individual variables, whose values are things; whose number is not claimed to be infinite (but perhaps also not the opposite)." On this view, a number is just one of a finite progression of concrete things. It follows that "many arithmetical sentences cannot be proved here, since we do not know how many numbers there are" (January 31, 1941; 156–157). Tarski rejects Carnap's proposal that we view infinitary mathematics as analytic (March 6, 1940, 139–140) and says he "understands" the language of classical infinitary arithmetic—S_2 for short—*only insofar as he knows the formal rules* (*logical syntax*) *of* S_2; to "truly" understand S_2, according to Tarski, a knowledge of its logical syntax is not enough (January 31, 1941; 157).

Carnap's notes record Quine as saying, in the weeks before Tarski introduces his finitism, that mathematics, like physics, involves "hypostases" that are underdetermined by experience. Quine also stresses that the paradoxes of set theory show that "familiar *common sense* results for finite classes" do not determine a general

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theory of classes; to develop such a theory "one must consciously search for a myth," such as "Russell's myth, Zermelo's." (December 9, 1940; 150) In conversations that occur soon after Tarski announces his finitism, however, Quine starts to voice strong misgivings about infinitary mathematics. One can therefore easily get the impression from the notes that before Tarski announced his commitment to finitism in the conversations in 1940–1941, Quine had no strong predilection for it.

This impression is misleading, however, as is clear from two closely related papers that Quine wrote in 1939. In one paper, he introduces his view that "What entities there are, from the point of view of a given language, depends on what positions are accessible to variables in that language" (Quine 1939a, 201). Some positions accessible to variables are integral to "quantification belonging to the primitive notation of the language"; other positions accessible to variables may be introduced as part of "defined quantification" in the language (Quine 1939a, 200). In an extensional language that "does not, at the primitive level, make use of variables in positions appropriate to statements," for instance, we can introduce the following definitions:

> the quantification[s] "$(p)(\ldots p \ldots)$" and "$(\exists p)(\ldots p \ldots)$," respectively, [are] short for the conjunction:
> $(\ldots 0 = 0 \ldots) \cdot (\ldots 0 = 1 \ldots)$
> and the alternation:
> $(\ldots 0 = 0 \ldots) \vee (\ldots 0 = 1 \ldots)$ (Quine 1939a, 200)

Here it appears as if statements are names and that "propositions—designata of statements—become recognized as entities." But this is an appearance only, "resting on abbreviations"—"we rate the… alleged propositions as fictions" (Quine 1939a, 200). With this distinction in place, Quine writes:

> What entities there are, from the point of view of a given language, depends on what positions are accessible to variables in that language. What are fictions, from the point of view of a given language, depends on what positions are accessible to variables definitionally rather than primitively. Shift of language ordinarily involves a shift of ontology. *There is one important sense*, *however*, *in which the ontological question transcends linguistic convention*: *How economical an ontology can we achieve and still have a language adequate to all purposes of science*? *In this form, the question of the ontological presuppositions of science survives*. (Quine 1939a, 201; my emphasis).

As I read this passage, what it says is at root incompatible with Carnap's approach to clarifying and answering questions about existence.

To see why, it is crucial to recall a number of well-established points about Carnap's and Quine's views. First, according to Carnap (1937, 1939, 1950), there is no legitimate question of "the" ontological presuppositions of science, but only of what existence sentences an inquirer is entitled to accept according to the rules of a language system that she has explicitly decided to adopt or that her utterances can be translated into. Second, as Quine explains in (Quine 1951), but discerned long before, Carnap's dismissal of the traditional problem of ontology rests on his

analytic–synthetic distinction. Third, starting in "Truth by Convention," Quine (1936) developed serious and deepening doubts about the analytic–synthetic distinction, and by 1939 he was not relying on it in his accounts of logic and mathematics. Fourth, Quine knew that to doubt the analytic–synthetic distinction is to doubt Carnap's view that all existence questions are settled either solely by the rules of a given language system or by empirical methods specified by the rules of such a system.

To understand Quine's nascent rejection of Carnap's approach to ontology it helps to study Quine (1939b), an expanded version of (1939a). Quine writes

> We are tempted … to dismiss the whole issue between nominalism and realism as a metaphysical pseudoproblem. But in thus cutting the Gordian knot we cut too deep into the level of common sense. (Quine 1939b, 704)

He then characterizes nominalism not as a *proposal* that has no substantive content and is therefore not in conflict with realism, as Carnap would describe it, but as a *thesis in the philosophy of science*:

> As a thesis in the philosophy of science, nominalism can be formulated thus: it is possible to set up a nominalistic language in which all of natural science can be expressed. The nominalist, so interpreted, claims that a language adequate to all scientific purposes can be framed in such a way that its variables admit only concrete objects, individuals, as values—hence only proper names of concrete objects as substituends. (Quine 1939b, 708)

One might think that Carnap can straightforwardly express Quine's thesis as follows: There is a finitary language in which all of natural science can be expressed. Quine rejects such a Carnapian reading of his thesis, however, as I shall now try to show.

Quine motivates his interest in finitism by casting doubts about the "*transcendent* universe" that results when we accept "concrete individuals of some sort or another, plus all classes of such entities, plus all classes formed from the thus supplemented totality of entitites, and so on" (Quine 1939a, 201). "A transcendent totality," he writes, "is one every combination of whose members determines a further member" (Quine 1939a, 202). The problem is that the notion of "every combination" is vague, as Russell's paradox shows, and any attempt to avoid Russell's paradox is ad hoc, ungrounded in common sense about combinations. In short, a transcendent universe "transcends the controls of common sense." Similarly, as we saw above, in the 1940–1941 conversations Quine says that "familiar *common sense* results for finite classes" do not determine a general theory of classes. "Science is a continuation of common sense," according to Quine, "and it continues the common-sense expedient of swelling ontology to simplify theory" (Quine 1953, 45). For one's ontological presuppositions to "transcend" the controls of common sense is therefore, at best, for those presuppositions to go beyond some of the controls that are integral to scientific method, and, at worst, to lapse into unscientific speculation.

I conclude that Quine's early commitment to nominalism, or finitism, is rooted in two closely related goals:

1. To find the most economical ontology we can achieve while still having a language adequate to all purposes of science and
2. To avoid the sort of ad hoc theorizing that goes with commitment to a transcendent universe—theorizing that transcends controls of common sense that are integral to scientific method.

Taken in isolation, goal (1) may appear compatible with Carnap's philosophy; when it is viewed as of a piece with goal (2), however, this apparent compatibility is at best problematic; a different, doctrinal, sense of nominalism comes into view.

This doctrinal sense of nominalism is both a development of and a departure from Carnap's philosophy of mathematics. Summarizing the work of Cauchy, Weierstrass, Frege, and Russell, among others, Carnap writes that "In the course of the last century, mathematicians found that all mathematical signs can be defined on the basis of the signs of the theory of natural numbers" (Carnap 1939, 48). He notes that this technical work within mathematics "left the more general and fundamental problems unanswered" (Carnap 1939, 48). He then summarizes three main alternative philosophical accounts of the "foundations" of mathematics, namely logicism, formalism, and intuitionism, and argues that when properly formulated, they are not in fact in conflict with each other. Each of the approaches has its attractions, he thinks, but "if we regard interpreted mathematics as an instrument of deduction within the field of empirical knowledge rather than as a system of information, then *many of the controversial problems are recognized as being questions not of truth but of technical expedience*" (Carnap 1939, 50, my emphasis).

In my view, for reasons I sketched above, Quine rejected this part of Carnap's philosophy already in 1939. Quine's motivation is not easy to summarize and was probably not fully clear to him in 1939–1941. In a letter to Carnap in 1943 Quine writes:

> …let us *accept*, provisionally, whatever rudimentary Platonism may be embodied in our regular logic and classical mathematics, and so proceed with our semantics, just as we have in the past been proceeding with our regular logic and mathematics. If independent progress should be made sometime in the way of an epistemologically motivated finitistic substructure, so much the better; it would be a case of resolving the Platonic kink without much altering the existing logical, mathematical, and semantical superstructure, perhaps, just as Weierstrass eliminated the nonsense about infinitesimals without wrecking the differential calculus. (Creath 1990, Letter 97, 295–296)

I propose that we understand Quine's reasoning in this passage as motivated by the twin goals (1) and (2) summarized above. In the writings we have from the period 1939 to 1943, Quine does not say much how these two goals combine to motivate his nominalist project. In a letter Quine wrote Carnap in 1947, however, there is the following revealing comment: "In my own predilection for an exclusively concrete ontology there is something which does not reduce in any obvious way to considerations of mere convenience; viz., some vague but seemingly ultimate standard of intelligibility or clarity" (Creath 1990, Letter 135, 410) This "something" is integral for Quine to what he later calls the doctrinal side of epistemology,

which has to do with "the justification of our knowledge of truths about nature" (Quine 1969, 71). In short, in the period from 1939 to 1947, at least, Quine took finitism to be "epistemologically motivated," in the doctrinal sense, by its clarity and simplicity.

Quine's idea that our common-sense ontological predilections are integral to the doctrinal side of epistemology is further clarified by the following well-known passage from *Word and Object*:

> The same motives that impel scientists to seek ever simpler and clearer theories adequate to the subject matter of their special sciences are motives for the simplification and clarification of the broader framework shared by all the sciences. Here the objective is called philosophical, because of the breadth of the framework concerned; but the motivation is the same. *The quest of the simplest, clearest overall pattern of canonical notation is not to be distinguished from a quest of ultimate categories, a limning of the most general traits of reality*. Nor let it be retorted that such constructions are conventional affairs not dictated by reality; for may not the same be said of the physical theory? (Quine 1960, 161)

In this passage Quine explains his doctrinal conception of ontology and explicitly rejects Carnap's conventionalist alternative.

For Quine, following Carnap 1934, it is only from within science that reality is to be identified and described (Quine 1981, 21). Once Quine gives up Carnap's analytic–synthetic distinction, however, he must also abandon Carnap's view that the question whether to adopt a realistic or a nominalistic language is a question "not of truth but of technical expedience" (Carnap 1939, 50). Science is continuous with common sense, according to Quine—one's choice between realism or nominalism should therefore be guided by "the controls of common sense" that are integral to one's best sense of how to explain natural phenomena. According to Quine, a finitistic ontology, being closer to common sense, is clearer, less puzzling, and hence also more *explanatory* than the infinitary ontology of classical mathematics. This comparison "does not reduce in any obvious way to considerations of mere convenience," but relies on "[a] vague but seemingly ultimate standard of intelligibility or clarity" (Creath, Letter 135, 410). Quine views this "seemingly ultimate standard" as of a piece with "controls of common sense" that are integral to scientific method, the ultimate arbiter of our theory of nature.

It is therefore not surprising that in 1986, long after Quine had concluded that his finitistic project could not succeed, he writes that "[nominalism] would be my actual position if I could make a go of it" (Quine 1986, 26). To "make a go of it" would be to show that "a language adequate to all scientific purposes can be framed in such a way that its variables admit only concrete objects, individuals, as values" (Quine 1939b, 708–709). It is this that Quine despaired of doing by the late 1940s. His failure to "make a go of it" led him to opt for a theory that commits us to a "transcendent" ontology our conception of which is dependent on *ad hoc* decisions about how to avoid the set-theoretical paradoxes. Such a theory is less clear to us than finitism. Unlike finitism, however, a theory that incorporates a transcendent

ontology is adequate to all scientific purposes, and hence on balance preferable to finitism from a scientific point of view.

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