J. Warren, *Shadows of Syntax: Revitalizing Logical and Mathematical Conventionalism*. Oxford: Oxford University Press, 2020. xx + 385 pp. \$94. ISBN 9780190086152.

Reviewed by M. Rescorla, *Department of Philosophy, University of California, Los Angeles*. rescorla@ucla.edu

Conventionalism about logic claims that logical truth has its source in linguistic convention. *Conventionalism about mathematics* claims the same for mathematical truth. Conventionalism was popular among the logical positivists, with *Carnap* (1937/2002) its most famous advocate. However, *Quine's* (1951; 1960) influential criticisms cast it into disrepute. In a series of recent articles, Jared Warren has sought to revive it. His outstanding new book, *Shadows of Syntax*, builds upon these articles to provide the most sophisticated development of the conventionalist viewpoint that I have seen. Warren wrestles throughout with Quine's criticisms, contending that they are not nearly as powerful as is commonly supposed. Written in lucid, vibrant prose, this consistently gripping book offers numerous meaty arguments and ingenious gambits that merit sustained reflection.

Warren's position hinges upon *inferentialism* regarding the logical connectives. According to inferentialism, each connective is 'implicitly defined' by inference rules governing its use. Inferentialism emerged in the 1930s through the work of *Carnap* (1937/2002) and *Gentzen* (1934) and has been subsequently explored by many other authors. There is nothing inherently conventionalist about inferentialism. For example, *Peacocke's* (1992) inferentialist theory showcases inferences within thought, making no appeal to linguistic convention. In contrast, Warren develops inferentialism in a conventionalist direction. He holds that linguistic practice features *syntactic inference rules* that govern how speakers accept and reject sentences. Logical truth stems from the syntactic inference rules followed by a speaker (or group of speakers).

To elaborate his inferentialist-cum-conventionalist viewpoint, Warren offers a broadly functionalist account of what it is for an agent to follow an inference rule (pp. 33-51). Roughly, an agent *follows inference rule R* when the agent has appropriate dispositions, such as a disposition 'to infer according to *R* when given a chance and having the disposition to continue to accept the premises' (p. 48). *Accepting a sentence* and *inferring according to inference rule R* are likewise elucidated functionally.

According to Warren, meaning-determining inference rules are automatically valid (p. 58). For example, assuming that modus ponens is a meaning-determining inference rule, it automatically carries true premises to a true conclusion. If an inference rule is *not* meaning-determining, then its validity (or invalidity) is explained by the fact that we can (or cannot) derive it from meaning-determining inference rules (p. 100). So linguistic convention completely explains which inference rules are valid and which are not. Logical truths are provable from the meaning-determining inferences rules without any premises. Since meaning-determining rules are automatically valid, any such proof must issue in a truth. Linguistic convention thereby explains both logical validity and logical truth.

A widely discussed objection to inferentialism is that certain inference rule combinations look highly problematic. For example, *Prior's (1960)* connective 'tonk' has the introduction rule for disjunction and the elimination rule for conjunction. Using these rules together, one can prove any sentence. That seems bad. The usual inferentialist reaction, which Warren calls *restricted inferentialism*, is that we may add a new connective to our language only when its defining inference rules satisfy some condition *C*. For example, *C* might require the expanded language to be a conservative extension of the original language (*Belnap, 1962*). As Warren notes (pp. 90-92), however, restricted inferentialist proposals often lack much intuitive or theoretical motivation. Restricted inferentialism looks especially unappealing for conventionalists, since it suggests that logical truth is grounded not just in our conventions but *also* in the non-conventional fact that our conventions satisfy condition *C*.

Warren's radical solution: *unrestricted inferentialism*. According to unrestricted inferentialism, one can introduce a logical connective using any collection of inference rules, even the rules for 'tonk.' Unrestricted inferentialism finds precedent in the writings of *Carnap* (1937/2002), who responded similarly to the threat of inconsistency-generating inference rules. Historically, unrestricted inferentialism

has been unpopular because it leads to the seemingly disastrous conclusion that tonkers (people who speak a language containing 'tonk') are licensed to assert any sentence. Warren's response is that the conclusion is not actually disastrous: tonkers *are* licensed to assert any sentence. The conclusion only looks disastrous if we mistakenly translate the tonkers' language *homophonically*. (A homophonic translation translates each expression into a syntactically identical expression.) We should instead translate the tonkers' language *non-homophonically*. More specifically, we should translate it so that every sentence expresses a logical truth (pp. 131-137). On Warren's analysis, adding 'tonk' to a language dramatically changes the meanings of all sentences, even sentences not containing 'tonk,' so that all sentences become properly assertible.

Warren's analysis is undeniably inventive and skillfully executed. Still, I was not fully convinced. I doubt that introducing 'tonk' into an established linguistic practice could so dramatically alter the meanings of sentences not containing 'tonk.' I also doubt that Warren's analysis meshes with any plausible psychology of communicative interaction. Suppose tonker Tim asserts a 'tonk'-free sentence, such as 'John has gone fishing.' Why does Tim assert this sentence, if not to communicate that John has gone fishing? Do tonkers really understand Tim as asserting a logical truth, rather than as asserting that John has gone fishing? More generally, it is difficult to see what communicative purpose tonkers might hope to achieve through their utterances if, as Warren has it, all those utterances express logical truths. On the other hand, it would be bizarre to expand a linguistic practice by introducing 'tonk,' so perhaps whatever one says about the expanded practice would sound just as strange as Warren's analysis.

The book's second half shifts attention to mathematics, focusing upon arithmetic. The basic idea is that arithmetical terms (such as "0" and "successor") are implicitly defined by inference rules corresponding to the Peano axioms (p. 200). The inference rules are automatically valid, and their automatic validity explains the truth of any arithmetical statement that can be proved from no premises.

As Warren emphasizes, conventionalism about mathematics faces two huge problems. The first problem is that arithmetic has substantial ontological commitments. How can linguistic convention possibly explain the existence of mathematical objects? In response, Warren supplements his conventionalist treatment with a broadly deflationary treatment of existence (pp. 209-238). He draws inspiration from *Carnap's* (1950) similarly deflationary approach to ontology, along with more recent discussions by *Putnam* (2004) and *Hirsch* (2011).

The second problem concerns the determinacy of arithmetical truth. Rosser's strengthening of Gödel's first incompleteness theorem shows that, assuming PA is consistent, some arithmetical statement is neither provable nor refutable in PA. So conventionalists seem forced to abandon determinacy --- a most undesirable recourse. Again following Carnap, Warren's solution (pp. 261-270) is to add an additional meaning-determining inference rule, the *omega rule*, which infers a universal generalization from its instances:

 $\underbrace{ \begin{array}{c} \varphi(0) \hspace{0.1cm} \varphi(1) \hspace{0.1cm} \varphi(2) \hspace{0.1cm} \dots \\ \hline \\ \hline \\ \hline \\ \forall n(\mathbb{N}n \supset \varphi(n)) \end{array} }$

Carnap's appeal to the omega rule has not found much uptake due to the rule's infinitary character. How can a human, even an idealized human, survey infinitely many premises $\varphi(0)$, $\varphi(1)$, $\varphi(2)$, ...? In reply, Warren invokes his functionalist account of *following an inference rule*. On the functionalist account, a speaker can 'follow' inference rule *R* even if she does not explicitly consider all the premises figuring in an instance of *R*. She can 'accept' a premise *S* in a more implicit way, by exhibiting appropriate dispositions (e.g. a disposition to express surprise if told that *S* is false). She 'infers according to rule *R*' so long as her acceptance of premises causes her acceptance of the *R*-mandated conclusion in an appropriate way. Thus, a speaker can follow the omega rule without explicitly surveying infinitely many premises.

Warren is surely correct in claiming that a speaker can implicitly accept infinitely many premises $\varphi(0)$, $\varphi(1)$, $\varphi(2)$, ... Typically, though, her implicit acceptance stems from antecedent acceptance of

 $\forall n(\mathbb{N}n \supset \varphi(n))$. To show that speakers can infer in accord with the omega rule, we need an example where the speaker arrives at the infinitely many premises *without antecedently relying upon the universally generalization*. Warren seems to agree, as he purports to give such an example (pp. 267-269). The example involves a supertask computation that confirms each instance of Goldbach's conjecture. He also gives a variant example, in which a speaker mistakenly believes that the requisite supertask computation has occurred. Supertask computations seem to me rather disconnected from mathematical practice, as do mistaken beliefs that supertask computations have occurred. Thus, I doubt that examples along these lines can vindicate Warren's heavy reliance upon the omega rule. (Cf. *Nyseth, forthcoming.*)

As I have highlighted, Warren's book contains several echoes of Carnap. At the same time, the book nicely incorporates many subsequent philosophical and logical advances. It also contains some strikingly original elements that improve upon Carnap. In evaluating the book as a whole, a key question is whether these advances and improvements collectively yield a compelling rejoinder to Quine's famous criticisms. While I cannot hope to answer this question in a short book review, I will make a few remarks regarding Quine's most famous criticism: his rejection of the analytic/synthetic distinction.

In the context of Warren's discussion, Quine's criticism surfaces as a worry regarding the distinction between those inference rules that are 'meaning-determining' and those that are not. The Quinean worry is that the distinction is unclear and cannot support systematic theorizing. For example, compare a classical logician who accepts double negation elimination with an intuitionist logician who rejects it. Many authors, including Carnap and Warren, hold that the two logicians attach different meanings to the word 'not.' Quineans want to know the basis for that verdict, and they want a clear explication of what the difference amounts to. As Warren complains (pp. 49-50, 184-85), Quine's exposition of this worry was sometimes marred by his behaviorist proclivities. But versions of the same basic worry have subsequently been pressed by philosophers who definitely do not harbor behaviorist proclivities, including *Fodor* (1998) and *Williamson* (2007).

Laudably, Warren engages with the Quinean worry in a more substantive way than most inferentialists. For example, he energetically rebuts Williamson's presentation of the worry (pp. 192-194; see also *Warren, 2021*). Furthermore, he attempts to delineate a principled distinction between those syntactic inference rules that are meaning-determining and those that are not. He does so by distinguishing between *basic* and *derivative* rules (p. 66):

Roughly, the basic rules are those that speakers accept without any epistemic reason for doing so, while the derivative rules are those that they accept because they accept other rules that allow them to indirectly infer the rule's conclusion from the rule's premises. We might say that speakers accept the basic rules *because they do*, since they don't try to epistemically justify their acceptance on some other grounds.

Speakers follow basic rules 'without any intermediate steps, actions, or activities involved,' whereas they 'are disposed to infer according to [derivative rules] only by way of being disposed to take various intermediate steps' (p. 67). Basic rules, 'the foundational moves in our language game' (p. 66), are meaning-determining. Derivative rules are not.

I doubt that *any* syntactic inference rules are basic in Warren's sense. Consider *conjunction elimination*, which is as good a candidate as any for basicness. Contrary to what Warren suggests, I think that I have excellent and quite structured grounds for drawing sentential inferences in accord with conjunction elimination. To illustrate, suppose I accept the premise 'John is a biologist and Mary is a physicist.' I know that this sentence is true iff John is a biologist and Mary is a physicist, so I also believe that John is a biologist and Mary is a physicist. My belief licenses me to infer that Mary is a physicist, and I form that additional belief accordingly. I know that the sentence 'Mary is a physicist.' My transition from the sentential premise to the sentential conclusion does not rest upon brute acceptance of a syntactic inference rule defined over sentences. I know the truth-conditions of the sentential conclusion. These intermediate steps underlie my transition from the sentential premise to the sentential of thought to infer the sentential conclusion. My disposition to follow conjunction elimination for sentences results from mediating psychological factors:

my knowledge of truth-conditions and my disposition to follow the parallel inference rule at the level of thought. Thus, conjunction elimination does not seem basic in Warren's sense. A similar analysis applies to other purportedly basic inference rules.

I submit that Warren has not defused the Quinean worry. He has not successfully demarcated those syntactic inferences rules that are meaning-determining from those that are not.

Despite my criticisms, *Shadows of Syntax* is one of the most thought-provoking books that I have read in a long time. You should grapple with it yourself. You may come away more persuaded than I was. You will surely find it stimulating.¹

Works Cited

Belnap, N. 1962, 'Tonk, plonk, and plink,' Analysis, 22, 130-134.

- Carnap, R. 1937/2002, *The logical syntax of language*, trans. A. Smeaton, Chicago: Open Court Press.
- ---, 1950, 'Empiricism, semantics, and ontology,' Revue Internationale de Philosophie, 4, 20-40.
- Fodor, J. 1998, Concepts: where cognitive science went wrong, Oxford: Oxford University Press.
- Gentzen, G. 1934, 'Untersuchungen über das logische Schliessen,' *Mathematische Zeitschrift* **39**, 176-210, 405-431.
- Hirsch, E. 2011, *Quantifier variance and realism: essays in meta-ontology*, Oxford: Oxford University Press.
- Nyseth, F. Forthcoming, 'Shadows of syntax: revitalizing logical and mathematical conventionalism, by Jared Warren.' Mind.

Peacocke, C. 1992, A study of concepts, Cambridge: MIT Press.

Prior, A. N. 1960, 'The runabout inference-ticket,' Analysis, 21, 2.

Putnam, H. 2004, Ethics without ontology, Cambridge: Harvard University Press.

Quine, W. V. 1951, 'Two dogmas of empiricism,' The Philosophical Review, 60, 20-43.

---. 1960, 'Carnap and logical truth,' Synthese, 12, 350-374.

Williamson, T. 2007, The philosophy of philosophy, Malden: Blackwell.

Warren, J. 2021, 'Defending understanding-assent links,' Synthese, 199, 9219-9236.

¹ I thank David Kaplan, Jens Lemanski, and Paul Talma for helpful feedback on an earlier draft of this review.