

AGAINST LOGICAL INFERENCE:
STIPULATION, RULES
AND THE MUSHROOM OMELETTE OBJECTION

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ABSTRACT

I argue against inferentialism about logic. First, I argue against an analogy between logic and chess, before considering a more basic objection to stipulating inference rules as a way of establishing the meaning of logical constants. The objection—the Mushroom Omelette Objection—is that stipulative acts are partly constituted by logical notions, and therefore cannot be used to explain logical thought. I then argue that the same problem also attaches to following existing conventional rules, since either those rules have logical contents, or following those conventional rules is done for logical reasons. Lastly, I compare this argument with other arguments found in Quine’s early work, and consider two attempts to reply to Quine.

Inferentialism about logic is the view that we should understand logical constant thought and talk in terms of rules of inference—those corresponding to introduction and elimination rules for each logical constant. I begin by scrutinizing an alleged analogy between logic and chess, which quickly falls apart in an anti-inferentialist direction, before turning to consider explicit stipulation, which, on probing, reveals a difficulty of principle with its application to logic. This difficulty I call ‘the Mushroom Omelette Objection’. There is no general problem with stipulating meanings, just its application to logic and logical rules, in particular. I then consider rules that are not explicitly stipulated—rules that we find as already existing social conventions that we follow. I argue that the Mushroom Omelette Objection also afflicts inferentialism if it appeals to such conventional rules. Following these rules shares the problematic feature of explicit stipulative acts, which means that we cannot understand logical thought and talk in terms of them. The conclusion is simple: inferentialism is hopeless and should be abandoned.

§1. Logic and Chess

One pro-inferentialist argument, or rather strategy, is to claim an analogy between the discipline of logic and the game of chess. Chess pieces are plausibly defined by stipulating rules governing what may be done with them, and, if logic is relevantly similar, that would seem to support inferentialism. The idea is that logic is like chess in that the logical constants are like chess pieces that are exhaustively defined by rules governing their use, such as “Bishops move diagonally”. In particular, there is supposed to be an analogy between rules for chess pieces, and the introduction and elimination rules that define logical constants. Many find such an analogy attractive (for example, Peregrin 2018 and Warren 2020).

An initial objection to the analogy is that it begs the question against realism about logic. In a realist framework, the meaning (or function) of logical constant thought and talk is referential—where that means that logical constant concepts or words have the typical function of referring to logical constituents of complex states of affairs (Zangwill 2015). Moreover, independent of their role in referring to elements of specific complex states of affairs, the realist thinks that logical constant concepts or words function to refer to the real structure of everything, abstract and non-abstract. In this respect, logical constant concepts and words are completely unlike chess pieces, which lack referential functions. They lack any such ambitions, never mind the megalomaniac ambitions of logical constant concepts and words. There is no knight or bishop in the sky. If so, the analogy is weak. (For similar reasons, the same seems to be true of Michael Dummett’s analogy between truth and winning a game (Dummett 1959).) There are games and there is the world. We can stipulate rules for games to our hearts content (so long as we do not disrespect logical consistency too much), since we are constructing something, not describing or representing the world. That is why game thought and language is unlike logical thought and language. The game game is just a game. But when we represent the world, by contrast, we cannot make it up. We must be true to the way things are.

Putting logical constant realism to one side, what can we say about the chess analogy? Let us accept that the rules for moving chess pieces embody norms. Now, consider the very plausible principle of normative dependence—that if things have normative properties, they have them in virtue of non-normative properties (Zangwill 2005, Zangwill 2008, Zangwill 2017). In the case of the game of chess, that in virtue of which the rules hold, presumably, is either acts of explicit stipulation or pre-existing social conventions. That is, the rules hold in virtue of individual mental acts or social facts—that someone, or some people intended such and such, or that certain social conventions obtain. The former are individualistic mental facts, while the latter are social facts, in John Searle’s sense (Searle 1995). In the absence

of stipulative intentions, or participation in social conventions, there are no games. Therefore, there were no games before human life evolved, with its intentions and conventions. But it is obvious that logical facts pre-existed the evolution of conscious life. That $[A \& B \text{ entails } A]$ was a fact over one billion years ago. So, understanding logic in terms of intentions or conventions is unpromising, to say the least.

§2. Individual Explicit Stipulation: The Content Problem

Having got the chess (dis)analogy out of the way, let us first focus on the contents of explicit stipulative acts by individuals. We will see that the problem for explaining logic in those terms carries over to explaining logic in terms of the thoughts of those who knowingly participate in conventions that have evolved culturally without explicit stipulative acts.

What are the *contents* of acts of stipulation? Consider children's games. Children define what it is to be 'It' when playing 'chase', for example. They say, in effect: "By an X, let us mean something bound by these rules...", and thereby being an 'x' comes to consist in being something bound by those rules. But notice that children may think logically complex stipulative thoughts. When playing grandmother's footsteps, for example, one rule is: "If the person who is 'grandmother' sees you move, then you must go back to the beginning." That is a conditional. Another example is the rule for castling in chess, which is logically complex. And children inventively stipulate new rules and invent new games as they go along, deploying logical constants with abandon.

Given this, the anti-inferentialist argument is that if logical constant concepts or words figure as constituents of the contents of stipulative thoughts or statements, then stipulation cannot explain the meaning or function of logical constant concepts or words. By contrast, logically complex stipulation *is* fine for games, since there is no problem with deploying logical concepts in stipulative acts that give the meaning of chess pieces, or 'grandmother', or 'It', or other game rules. But logically complex acts of stipulation cannot be deployed to give the meaning of logical constant contents and thoughts, because the acts of stipulation presuppose them—they are constituents of those very stipulative acts because the acts have logical contents. In particular, acts of stipulative via introduction or elimination rules for logical constants are conditional in form—for example, that if you believe $A \& B$ then you can infer the belief A ; or that if you believe $A \vee B$ and you also believe $\neg B$, then you can infer the belief that A . Since such stipulative acts have logical constituents, those acts cannot constitute logic. If the content of stipulative acts is logical, then logic, as it were, precedes stipulation, and cannot be explained in terms of it.

Imagine someone who tried to explain what mushrooms are in terms of mushroom omelettes. That is a problem. Mushroom omelettes contain mushrooms within them. Mushrooms are parts of, or ingredients in, or constituents of mushroom omelettes. Therefore, mushrooms cannot be explained in terms of mushroom omelettes. Likewise, stipulative acts contain logical notions within them, as parts, ingredients or constituents. Logic is part of, an ingredient in, or a constituent of, stipulative acts, in that stipulative acts have logical content. Therefore, stipulative acts cannot explain what logic is.

The Mushroom Omelette Objection for stipulating rules for logical constants is not an objection to stipulating rules for games. The cases are entirely different. We must deploy logical constant concepts or words in order to stipulate rules for chess pieces or grandmother's footsteps. But—obviously!—there is no need to deploy chess or grandmother's footsteps concepts or words in order to stipulate, use or understand rules for logical constants.

Someone might reply that logical rules are just more general than chess and grandmother's footsteps rules, but otherwise similar. But the point is not one about generality but about content: that logic figures in the contents of stipulative acts—and that is unlike chess and grandmother's footsteps.

§3. The Scope of Constructive Stipulation

As should be clear from the example of games, we should not be generally hostile to implicit definitions, which are widely used in mathematics and elsewhere. The issue is whether they could give meaning to logical constant contents: there may be special problems with logic that do not apply in other areas of thought.

When we stipulate a meaning, we say something to the effect: "Let 'x' be". What we stipulate, when we do so, is an identity. For example, a number, x , might be stipulated to be identical with $y+2$. Or, in the children's game of chase, 'It' is stipulated to be identical with the person who chases other people and tries to touch them, at which point the toucher stops being It and then other touched person becomes It. But identity is a logical notion. Therefore, once again, it seems that stipulation helps itself to logic and cannot be used to define it.

In reply, it might be said that we can and do stipulate a sense for "=". That—the reply would be—is what Leibniz's Law, and transitivity, reflexivity and symmetry do: they serve to characterize identity and give its meaning. The idea is that identity is indeed stipulated to be (identical with?) a relation that has these features. However, as Colin McGinn pointed out, Leibniz's law cannot be used to define identity, since it helps itself to that

notion when it characterizes the identity of objects in terms of the identity of properties (McGinn 2002: 8-9). Furthermore, transitivity, reflexivity and symmetry are all logical notions, in a sense. We might define some logical notions in terms of others, but not the whole family in terms of something else. Therefore, the problem remains that stipulation is too logically rich to be an explanatory basis for logic. These problems for stipulating a sense for identity do not carry over to the project of stipulating senses in games, mathematics and other activities. There is a special problem with logic.

Stipulation occurs legitimately in the empirical sciences. One kind of case is Saul Kripke's Neptune example, where a planet called "Neptune" was stipulated to be the one causing certain perturbations in the orbit of Uranus (Kripke 1980: 96). There is no problem about deploying logical machinery in these kind of stipulations. Such cases are very different from what is envisaged for logic, for neither Neptune itself nor the meaning of "Neptune" can be exhaustively defined in terms of its causes and effects. The planet Neptune might indeed be the thing that plays some specified role with respect to Uranus, perhaps that it how we can pick out Neptune in our thoughts, and perhaps that is how the reference of the word "Neptune" is established. But that is not what it is to *be* Neptune, and it does not exhaust the *meaning* of "Neptune". Neptune is a thing in its own right, which plays its role—that is, it stands in causal relations to other things—but it is not reducible to those roles. The trouble for logical inferentialism is that the situation looks uncomfortably similar for logic. Even if introduction and elimination inference rules are (semantically or epistemically) useful in fixing some logical meaning, or distinguishing one logical meaning from another, the Mushroom Omelette Objection shows that logical constant meanings are more than rules for their use. Even if logical constants have inferential roles, they are no more reducible to them than Neptune is reducible to its causal roles.

§4. Rule-following and Reasons

Thus far we have considered the inferentialist's appeal to explicit stipulation. An alternative inferentialist strategy is to appeal to established social rules or conventions that we find in place among our fellows; and we then follow the rules that we find. (For accounts of such conventional rules, see Searle 1995, Zangwill 2021.) It might be thought that things somehow go better for inferentialists there. However, the problem turns out not to be so different from the problem for explicit stipulation.

The problem with stipulation came from the logical contents of mental acts of stipulation. The problem is similar for following established social rules or conventions, for people still *knowingly* follow those pre-existing

rules or conventions. That means that we can ask about the contents of their minds as they do so knowingly, and for the reasons for their knowing activity.

One theoretical dialectical possibility would be to deny that inferences and rule-following embody knowledge of any kind. But that would make these acts like involuntary spasms. This would be an unrecognizable description of inferences, and not a good basis for an inferentialist program. In particular, introduction and elimination rules are supposed to be rules that we follow because we understand them. (Contrast Boghossian 1997: 352, where he embraced a purely dispositional conception in which the contents of the states of mind of rule-followers was not in question.)

Someone might object in reply: is not inference or rule-following usually an automatic ('computational') process with no content at all, even though it operates on states with content? (Jerry Fodor defends this idea in many books, such as Fodor 1990.) Is this not what the science of cognitive psychology tells us? It is true that many models of inference in cognitive psychology postulate 'information' that is processed by systems that are 'sub-doxastic', lacking conscious or other mental reality. There is no denying that *some* of our mental life is like this; for example, the kinds of inferences involved in perceptual knowledge are of this automatic sort. But that is a relatively weak and impoverished conception of inference. It cannot be all there is to it, except in more automatic cases. To appropriate Kant's language, there are many *other* inferential acts that are not merely performed *in accordance with* our logical duties but also *out of respect for* our logical duties. Hence, *these* mental acts either have logical contents or are done for logical reasons, where these reasons are other mental states that are thought to justify the inferences. This kind of inference is not like day-dreaming or dreaming, where one contentful thought merely causes another in virtue of ('qua') its content (Zangwill 2006). There are reasons as well as causes of inferential acts, just as there are for decisions. Whether or not logical inferences are themselves mental acts that contains logic within them, they are subject to norms that a person *respects* in those logical inferential acts. They are their reasons for their inferences.

Ludwig Wittgenstein made a point rather like this in 1931 when he says that although we may not have a "rule running in our heads" we might justify what we have done by citing the rule (Wittgenstein 2016: 115). This seems right. The rule was followed for reasons. But that does not mean that we need to be conscious of following the rule. Likewise in inference, we need not be conscious of enacting the changes out of respect for the reasons. Nevertheless, since we would in retrospect cite the rule or reasons as justification for following the rule or for the change of mind, the rule or reasons must previously have been operative in our minds. In particular, they were the reasons for which we followed the rule or for which we

inferred. (We may wonder how this idea fits with Wittgenstein's idea that rule-following is 'blind', in Wittgenstein 2009, section 219; I suspect that what he means there is that although rule-following is done for reasons, it is not done for *further* reasons besides those embodied in the rule.)

A motorist may stop at a red light without consciously thinking about it. Nevertheless, the motorist had reasons that might retrospectively be probed in a legal case. Stopping at the lights is an act with a content. Furthermore, it is the act it is partly in virtue of the reasons for which it is done. An act done for other reasons would not be that very act. This holds just the same for logical inferences as for stopping at red lights. Logical inferences are done for reasons, even if they seem automatic; and if questioned, those reasons can be cited as explanations or justifications. There is an essentialist claim here. A logical inference is the act it is because it is done for logical reasons. Those logical reasons, therefore, are internal to the logical inference. But once logical reasons are admitted, a Mushroom Omelette Objection goes through.

§5. Propositional Reasons

In reply, it might be objected: "Alright, inferential acts and rule-following have content, but what kind of content it is not obvious." In order for the Mushroom Omelette Objection to go ahead, there must be states with *propositional* logical content. Propositional attitude *states* are often considered to be prime bearers of content. But acts of will also have contents: we will one thing rather than another, and these are not propositionally structured. Likewise, it seems, for inferential acts and rule-following. We will one change of mind rather than another, and the things that we will need not have a propositional structure—so it might be argued. Now, the ultimate nature of inferential acts and rule-following is a very difficult issue. The good news is that whether or not the acts themselves are propositional, they clearly are done for reasons, and those *reasons* must have propositional contents. When we reason, we change our mind in a way that seems appropriate to us. For example, we decide to do something or form a belief because it seems right to do so from our point of view. And when we infer, we think of the changes in our minds as having epistemic, practical or other normative properties, and we enact the change because the change has those normative properties (Korsgaard 2006, Korsgaard 2009, Korsgaard 2018). That means that the intentionality of those *reasons*, at least, is propositional—typically something possessing a normative property. The epistemic, practical or other normative properties hold of something, and that amounts to a normative state of affairs that the proposition represents. Irrespective of whether inferential acts themselves are propositional, it is clear

that the *reasons* for those acts are propositional. Even if logical inference and rule-following are a matter of practical rather than theoretical reason, the actions are still done for reasons. Riding a bicycle might be a non-propositional skill, but it is still something we do for reasons, reasons that have propositional content. Likewise for logical inference and rule-following.

There is an analogy with one of the main problems for the divine command theory. The problem is not that the normative contents of God's commands means that divine commands cannot be the source of those very norms. For the Divine Command Theory is just that theory that God stipulates or creates what is right and wrong. So—of course—His stipulations or commands have normative contents, since norms are what is being stipulated or commanded. The real problem is that God must have reasons for His acts of stipulation or commanding. (They are not 'arbitrary whims'.) But if He has reasons, and those reasons are moral reasons, it means that stipulations or commands cannot be the source of the moral wrongness of killing, for example (see Zangwill 2015: 519-520; and Zangwill 2012). In that case, the reasons would be the source, not the stipulations themselves. (The only way out for God would be for Him to have non-moral reasons for issuing moral stipulations and commands.)

Every action has its reasons essentially. It would not be that very action with different reasons. The same goes for inferential acts. The reasons for logical inferences are constitutive of them; at least, the reasons are essential properties of the inferences. That suffices to generate a reasons version of the Mushroom Omelette Objection, given that those reasons have propositional logical content. The 'reasons' point is a cousin of the 'logical content' point that was operative in the case of stipulative acts.

Thus, I need not take a position on the question of whether or not acts of inference themselves have content. For, either way, they are done for reasons—logical reasons. The act itself might or might not have logical contents, and that content might or might not be propositional. It does not matter, for if we consider the content of the reasons for these acts, the reasons are propositional with logical contents. So, a Mushroom Omelette Objection goes through. Either inferences or their reasons have logical contents. If so, inferences cannot be used to explain what logic is, just as mushrooms cannot be explained in terms of mushroom omelettes.

Could someone object that the Mushroom Omelette Objection is merely an accusation of 'circularity' which can be easily met by accusing it of being question-begging? (Jaroslav Peregrin makes this move in Peregrin 2018.) In fact, the Mushroom Omelette Objection is not particularly directed at attempts at conceptual or linguistic definition; it is the complaint that a thing (logical content) cannot be explained in terms of a wider whole (inference) in which the thing is a constituent or part. It is true that if the appeal to wholes with constituents or parts were all there was to the objection,

it could perhaps be resisted by claiming that it is question-begging. But the real problem stems from the fact that it is logical *content* that is supposed to be explained in terms of logical inferences, which either have logical contents or are done for logical reasons that have contents. The problem is that the wholes in question are logical inferences and the constituents or parts in question are the logical contents that figure either in those very logical inferences or in the reasons for those inferences.

§6. Logical Inferentialism and Moral Expressivism

A revealing comparison is between logical inferentialism and expressivism in moral philosophy. One kind of expressivism understands moral value judgements in terms of emotions such as guilt or anger. But this variety of expressivism is standing on a lame foot because guilt and anger are both emotions with moral contents—that I have done something wrong, or that something a wrong has been done to me. This is not a good basis to explain moral content, for these emotions themselves already have moral content. The view is subject to a Mushroom Omelette Objection. A much more promising form of expressivism appeals to thinner sentiments which are positive or negative feelings with non-moral contents. Given such sentiments, the expressivist idea is that moral contents can be constructed on such a basis (Blackburn 1998, Zangwill 2022). (Such sentimentalists would be well-advised not to say that we have moral reasons for sentiments—reasons that have moral contents—even though they might say that certain sentiments or combinations of sentiments can be better or worse than others.) The trouble for logical inferentialism is that nothing parallel to the thinner expressivism is available for logical thinking. A parallel position would be that logical propositional thought is explained in terms of mental states that altogether lack logical contents. But there is no getting away from the fact that acts of stipulation and inferential norms have logical contents, and inferential acts either have logical contents or are done for logical reasons. An inference cannot be merely the manifestation of some disposition to move between mental states (as Boghossian thought at one point). That would just be thought association, not rational causation (Zangwill 2006). Even if such dispositions somehow tracked logical relations, they would still not amount to acts of inference or reasoning. As I said, logical inferences are not merely done in accordance with logical relations, but out of respect for them. Acts of inference are justified by appeal to logical relations. Anything less is a pathological reflex, and not a suitable basis for any serious disciple, never mind logic. But once logical content, or at least logical reasons, are granted, then a Mushroom Omelette Objection goes through.

As a project, logical inferentialism is analogous to moral expressivism in that both aspire to explain a content, logical or moral, in terms of propositional attitudes that lack such content. The idea is to get something from nothing—in the sense that the disputed content is manufactured from undisputed propositional attitudes and contents. But this project is hopeless if there are no candidate propositional attitudes lacking the disputed contents on which to build. In this respect, logical inferentialism is in a markedly worse position to moral expressivism.

§7. Quine, Azzouni and and Warren

Did not W. V. O. Quine argue something not so far from the Mushroom Omelette Objection many years ago in his famous 1936 paper “Truth by Convention” (Quine 1966). Well, almost, but not quite—or at least it is not clear. In fact, that paper contained more than one argument. One much celebrated argument emphasised the infinitude of the consequences that we may draw by means of logic, by contrast with the finitude of conventions. This is not the Mushroom Omelette Objection that we have pursued here. However, Quine also seems to have a more basic argument that drawing *any* consequences from conventions requires logic, which means that logic cannot depend on conventions. (He writes: “... if logic is to proceed *mediately* from conventions, logic is needed for inferring logic from the conventions” (Quine 1966: 104, his emphasis.) This may be a cousin of the Mushroom Omelette Objection. I want to end this paper by commenting on two attempts to evade the arguments of Quine’s paper in order to point out where they fail to address the Mushroom Omelette Objection.

Jody Azzouni attempted to criticize Quine’s criticisms, and to defend conventionalism (Azzouni 2014). He has two main thoughts. The first is that the conventionalist needs to rehabilitate the general notion of a tacit convention. However, rehabilitating tacit convention does not remotely help to rehabilitate the idea of *truth by convention* or *logical truth by convention*. (I make this point in Zangwill 2021: 149.) For one thing, it does not address the problem of how conventions can have consequences. Azzouni’s other idea is that conventionalism about logic is somehow supported by the fact that logical principles are controversial and have been disputed. But realists about logic can allow divergence and justified divergence in logical beliefs; and conventionalists, echoing moral expressivists, may insist that some theories are better than others. It is difficult to see why this consideration should be thought to support conventionalism about logic.

A more substantive challenge to the force of Quine’s arguments has been mounted by Jared Warren (Warren 2017). He focuses mostly on Quine’s

arguments concerning the infinitude of implications—separating an infinite task (‘supertask’) argument from a regress argument. However, there is also the simpler argument in Quine’s paper just mentioned—that we need logic to make deductions, infinite or not, from conventions.

Warren argues in reply to Quine’s infinitude argument that conventions may be infinitely iterated; so, we do not need logic that is not conventionally defined in order to draw infinite conclusions from the conventions that allegedly define logical constants (Warren writes: “...grammatical rules ... are recursive: the output of some of our grammatical rules can be fed back in as input to the same rule.” Warren 2017: 130). It might also be said—and Warren may also suggest this—that it is because conventions are inherently general that they can be adapted to explain deductions from conventions: conventions can apply to themselves, and thus conventions can be used to derive infinitary logical consequences. The conventionalist story, as Warren illustrates, can be more complex than might initially appear in such a way that it addresses some of Quine’s concerns.

Nevertheless, a problem remains for Warren: yes, perhaps some linguistic rules are iterable or self-applicable. But *why* is that? They are iterable and self-applicable, surely, in virtue of being logically constituted. Therefore, even if Warren can somehow appeal to iterable or self-applicable conventions, the problem remains that conventions for logical concepts and words themselves contain logical elements or are followed for logical reasons. That means that they cannot explain logic. Warren’s suggestion that conventions may be iterated, or self-applied, is not implausible, but it does not address the Mushroom Omelette Objection. If linguistic conventions or inferences had no contents, perhaps like twitching movements, then those conventions could have no implications, infinite or finite. That would also be a problem for basing logic on them. But if the conventions or inferences for logical thought and talk have logical contents, as they must do if they are to be iterable or self-applicable, then either they have logical contents or are done for logical reasons; and in either case the Mushroom Omelette Objection looms.

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Stipulating the meaning of logical constants by means of introduction and elimination rules would be a conscious mental act with logical contents, whereas following established social conventions or inferring according to rules, often is not conscious. Nevertheless, following social conventions or inferring according to introduction and elimination rules, either has logical contents, or else is done for logical reasons, which are other states with logical contents. Whichever path the inferentialist chooses, it is skewered

on the Mushroom Omelette Objection. Is it not time that inferentialism faded away like a bad dream?*

* Many thanks for helpful comments from Jared Warren, representing the opposition.

References

- Jody Azzouni 2014: "A Defense of Logical Conventionalism," in Penelope Rush (ed.) *The Metaphysics of Logic*, Cambridge: Cambridge University Press: 32-48.
- Paul Boghossian 1997: "Analyticity" in Hale and Wright (eds.): *A Companion to the Philosophy of Language* (Oxford: Basil Blackwell, 1997), pp. 331–368.
- Michael Dummett 1959; "Truth", reprinted in *Truth and Other Enigmas*, London: Duckworth, 1978.
- Jerry Fodor 1990: *A Theory of Content and Other Essays*, Cambridge, MA: MIT Press.
- Christine Korsgaard 2006: "Morality and the Distinctiveness of Human Action", in Frans De Waal, *Primates and Philosophers: How Morality Evolved*, Princeton: Princeton University Press.
- Christine Korsgaard 2009: *Self-Constitution*, Oxford: Oxford University Press.
- Christine Korsgaard 2018: "Rationality", in *Critical terms for Animal Studies*, edited by Lori Gruen, University of Chicago Press.
- Jaroslav Peregrin 2018: "Is Inferentialism Circular?", *Analysis* 78: 450–454.
- Willard V. O. Quine 1966: *Ways of Paradox*, Cambridge, Mass.: Harvard University Press.
- John Searle 1995: *The Construction of Social Reality*, Harmondsworth: Penguin.
- Jared Warren 2017: "Revisiting Quine on Truth by Convention", *Journal of Philosophical Logic* 46:119-139.
- Jared Warren, 2020: *Shadows of Syntax: Revitalizing Logical and Mathematical Conventionalism* Oxford: Oxford University Press.
- Ludwig Wittgenstein 2009: *Philosophical Investigations*, 4th edition, 2009, P.M.S. Hacker and Joachim Schulte (eds. and trans.), Oxford: Wiley-Blackwell.
- Ludwig Wittgenstein 2016: *Cambridge Lectures 1930-1933, From the Notes of G.E. Moore*, Cambridge: Cambridge University Press.
- Ludwig Wittgenstein 2009: *Philosophical Investigations*, 4th edition, 2009, P.M.S. Hacker and Joachim Schulte (eds. and trans.), Oxford: Wiley-Blackwell.
- Nick Zangwill 2005: "Moore, Morality, Supervenience, Essence, Epistemology", *American Philosophical Quarterly* 42: 125-130.
- Nick Zangwill 2006: "Daydreams and Anarchy in the Philosophy of Mind", *Philosophy and Phenomenological Research* LXIII: 253-289.
- Nick Zangwill 2008: "Moral Dependence", in *Oxford Studies in Metaethics* 3: 109-127.
- Nick Zangwill 2012: "A Way Out of the Euthyphro Dilemma", *Religious Studies* 48: 7-13.

- Nick Zangwill 2015: "Logic as Metaphysics", *Journal of Philosophy*. CXII: 517-550.
- Nick Zangwill 2017: "Moral Dependence and Natural Properties", *Aristotelian Society Supplementary Volume*, 2017: 221-243.
- Nick Zangwill 2021: "The Philosophical Interpretation of Language Game Theory", *Journal of Language Evolution* 6: 136-153.
- Nick Zangwill 2022: "Expressivism, Inferentialism and the Simulation Game", *Philosophy and Phenomenological Research*.

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