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Mathematical, Astrological, and Theological Naturalism

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Penelope Maddy's recent *Naturalism in Mathematics* contains a persuasive argument for the claim that we ought to regard mathematics in the same way that a Quinean scientific naturalist regards science; that is, we ought to evaluate mathematics from a mathematical point of view and reject extra-mathematical standards. Maddy considers the objection that her arguments leave it open for an 'astrological naturalist' to make an analogous claim: that we ought to reject extra-astrological standards in the evaluation of astrology. In this paper, I attempt to show that Maddy's response to this objection is insufficient.

1. Mathematical Naturalism

In her explanation of mathematical naturalism, Maddy says:

To judge mathematics from any vantage-point outside mathematics, say from the vantage-point of physics, seems to me to run counter to the spirit that underlies all naturalism: the conviction that a successful enterprise, be it science or mathematics, should be understood and evaluated on its own terms, that such an enterprise should not be subject to criticism from, and does not stand in need of support from, some external, supposedly higher point of view. What I propose here is a mathematical naturalism that extends the same respect to mathematical practice that the Quinean naturalist extends to scientific practice... Where Quine takes science to be independent of both first philosophy and naturalist takes mathematics to be independent of both first philosophy and natural science... in short, from any external standard. (Maddy [1998], p. 184)

For the purposes of this paper, I will adopt Maddy's characterization of naturalism as the rejection of supra-theoretic or external evaluations and/or criticisms.¹ This may be a fairly non-standard characterization of naturalism, but I wish to address Maddy's arguments on their own terms.

The question arises as to why mathematics is so special—why is it that mathematical methods and practices should not be subject to criticism

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¹ Maddy equates this with the Quinean rejection of first philosophy, but, of course, for Quine first philosophy is traditional epistemology.

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from any external standpoint, but other 'non-scientific' methods and practices should be so subject? Why, for example, can an astrologer not embrace astrological naturalism and defend that view with the same sort of arguments that Maddy uses to defend mathematical naturalism? Maddy responds to this objection by saying that there are 'good reasons, from the *scientific naturalist's* point of view—that is, from the point of view of natural science—to treat mathematics differently from other non-scientific disciplines' (*Ibid.*, p. 204. *Emphasis mine*).

First of all, according to Maddy, it is illegitimate for an astrologer to make the naturalist move because astrology deals with the same realm as natural science. After all, 'the domain of natural science includes all spatio-temporal reality, the entire causal order... [and] astrology posits new causal powers and makes new predictions about spatio-temporal events' (*Ibid.*). Thus, astrology should not be viewed as a separate discipline, independent of natural science, which has its own criteria of evaluation. Rather, astrology is, in a sense, part of natural science and astrological claims are themselves subject to *scientific* evaluation and correction. Mathematics, on the other hand, 'has *nothing* to say about [the] domain [of natural science]' (*Ibid.*, *Emphasis mine*).

The disanalogy between astrology and mathematics—namely, that astrology deals with events in space-time and mathematics has nothing to say about such events—is supposed to ground the difference between mathematical naturalism and astrological naturalism. Maddy realizes that one could reinterpret astrology so that it treats of 'certain supernatural vibrations that don't interact causally with ordinary physical phenomena' (*Ibid.*). Her earlier response would be blocked by this interpretation, since astrology would no longer be seen as dealing with events in space-time. Astrology would seem to be analogous to mathematics in this case, and it would seem that astrological naturalism is on a par with mathematical naturalism.

Again, however, Maddy thinks that there is a significant disanalogy between mathematics and astrology: 'mathematics is staggeringly useful, seemingly indispensable, to the practice of natural science, while astrology is not' (*Ibid.*, pp. 204–5). So the defense of mathematical naturalism ultimately rests on indispensability considerations. Without the indispensability claim, mathematical naturalism and non-causal astrological naturalism would be on equal footing from the point of view of natural science. Thus, a scientific naturalist who wanted to accept mathematical naturalism would have no grounds to reject non-causal astrological naturalism, which 'might be welcome to the pluralist or the relativist, but is unlikely to sit well with the scientific naturalist' (*Ibid.*, p. 203).

The casual reader of *Naturalism in Mathematics* might balk at Maddy's use of indispensability considerations, because earlier in the book she had

rejected the indispensability arguments. However, on closer inspection, one can see that Maddy did not deny the indispensability considerations constitute science, but rather the view that indispensability considerations constitute an argument for mathematical realism. Her claim is that the use of mathematics in science does not give us a good reason to accept the *objective existence* of mathematical entities. Nonetheless, I think Maddy's use of indispensability considerations in the defense of mathematical naturalism ultimately either (1) undermines mathematical naturalism itself, leaving us with only scientific naturalism, or (2) leaves open the possibility of other unpalatable naturalisms.

2. Indispensability and Mathematical Naturalism

If the usefulness of mathematics in science is the reason a scientific naturalist ought to accept mathematical naturalism but not non-causal astrological naturalism, then we only have reason to accept the methods and practices of those portions of mathematics that *are* applied and used. In a footnote, Maddy seems to anticipate this objection; she says:

A naturalist with lingering Quinean sentiments might conclude that we have reason to study that part of mathematics that is actually or potentially applied, not that we have reason to study all of contemporary mathematics. In contrast, my mathematical naturalist sees mathematics as a unified undertaking which we have reason to study as it is, and the study of the actual methods of mathematics, which includes pure mathematics, quickly reveals that modern mathematics also has goals of its own, apart from its role in science. (*Ibid.*, p. 206, n15)

But her argument in this section is that a scientific naturalist has reason to accept mathematical naturalism. There is no reason given here as to why a scientific naturalist ought to accept those methods and practices of mathematics that have no application; *i.e.*, there is no argument for the mathematical naturalism explained following the 'in contrast' in the above quote. Maddy merely asserts the mathematical naturalist position; she does not defend it. If the motivation for accepting mathematical naturalism and not non-causal astrological naturalism is *just* that mathematics is, staggeringly useful and astrology is not, then we, as scientific naturalists, only have reason to accept those portions of mathematics that *are* staggeringly useful. But then the result is not mathematical naturalism, it is merely scientific naturalism.

3. Other Unpalatable Naturalisms

Recall that Maddy claimed that mathematics has *nothing* to say about the spatio-temporal realm; it is for this reason that mathematics differs so greatly from (causal) astrology, and astrological methods and practices are subject to scientific correction whereas mathematical methods and practices

are not. But if mathematics is so useful in natural science, then it must have *something* to say about the spatio-temporal realm. And if mathematics literally has *nothing* to say about that realm, how can it be 'staggeringly useful, seemingly indispensable' to the practice of natural science? At first glance, it would seem that the second disanalogy between mathematics and astrology is undermined by the first disanalogy. This initial conclusion may or may not be warranted; I will return to this point shortly.

Consider someone who takes a stand on theology analogous to Maddy's stand on mathematics; call this person a 'theological naturalist'. Our imagined theorist studies God's ways, but does not posit any new causal powers or make new predictions about spatio-temporal events. She advocates naturalism with regard to theology—she claims that the methods and practices of theology are to be evaluated by theological methods alone, and any extra-theological standards are to be rejected. Our question is: given Maddy's arguments for mathematical naturalism, would she have grounds to reject theological naturalism?

Our theological naturalist makes claims analogous to the non-causal astrological naturalist, so she can easily avoid Maddy's first response: theology is not just a part of natural science. Furthermore, one can imagine that theology could be extremely (even staggeringly) useful in natural science. Anything we could not explain could be attributed to God.

But have I not just contradicted myself? Is it not inconsistent to claim (a) that theology does not posit any new causal powers or make new predictions about spatio-temporal events, and (b) that God can figure in explanations? Not obviously. Theology may posit a new causal agent, but it does not necessarily follow that this agent has 'new causal powers' or that new predictions will flow from the theory. As long as the workings of God are consistent with the claims of natural science, we seem to have no problem.

I imagine that many will be unconvinced by the foregoing paragraph. Undoubtedly, many will think that (a) and (b) are inconsistent. But notice that if they are, then it looks as though Maddy's defense of mathematical naturalism is inconsistent as well, since she makes parallel claims: *i.e.*, she claims that mathematics is useful in—seemingly indispensable for—natural science even though it has *nothing* to say about spatio-temporal events. Whether the theological naturalist is on equal footing with Maddy's mathematical naturalist on this issue (from the standpoint of scientific naturalism) depends on the following: (1) Why mathematics is useful in natural science; and (2) Why mathematical methods and practices are not subject to scientific correction. If the answer to either of these questions points to a relevant difference between mathematical and theological naturalism, then Maddy's response may be salvageable. I will examine each of the questions in turn.

(1) Why is mathematics useful in natural science? One might claim that mathematics is useful in natural science because particular mathematical structures are exemplified in physical reality and we can use mathematics to study those structures. However, Maddy cannot say this because (apart from the fact that it would undermine her first disanalogy) she has said that 'it could turn out that all applications of continuum mathematics in natural science are actually instances of idealization' (*Ibid.*, p. 152). In fact, for Maddy, it looks as though mathematics is just a tool for scientists. (See especially pp. 152–157.) Scientists merely use mathematics to make predictions, to assist in explanations, etc. Now, this may mark a significant disanalogy with theology. But if mathematics (for scientists) is just a tool, then it seems that it is not really *indispensable*, it is just useful. Furthermore, even if it is an *indispensable* tool, it looks as if the only portion of mathematics that scientific naturalists are obliged to accept are those that are useful; in other words, those portions of mathematics that are applied.² So we seem to be back with merely scientific naturalism.

On the other hand, if mathematics is *more* than just a useful tool, then it seems that it must have something to say about spatio-temporal events. This would undermine Maddy's first disanalogy between mathematical and astrological naturalism, since mathematics would have *something* to say about the domain of natural science. Furthermore, it would allow for the possibility of mathematics figuring substantively in explanations. But then the disanalogy with theology collapses. Perhaps Maddy could claim that the way theology figures in explanations differs from the way mathematics figures in explanations, but if she is going to rest her defense on this, then we are owed some account of the difference that (a) is not *ad-hoc*, and (b) does not undermine the first disanalogy with astrology. In the absence of such an account, the analogy between mathematical and theological naturalism is sustained, and we have no grounds to reject theological naturalism.

In short, mathematics either is just a useful tool or it is not. If it is, then this may undermine the theological naturalism analogy, but it also undermines mathematical naturalism. All we end up with is scientific naturalism. If it is more than just a tool, then Maddy cannot say that mathematics has *nothing* to say about the domain of natural science, and we have no grounds to reject theological naturalism. Hence, regardless of whether mathematics is just a tool, we (as scientific naturalists) have no argument for mathematical naturalism that can withstand theological naturalism. At least not yet.

(2) Why are mathematical methods and practices not subject to scientific correction? Maddy devotes a great deal of space in the book to showing that

² Recall that Maddy's response to the astrological naturalism objection comes from the standpoint of a scientific naturalist.

mathematicians do not take philosophical considerations into account when determining their methodology. Presumably, they would not take scientific criticisms to heart either. Of course, these are descriptive claims. One might think that although mathematicians do not take these things into account, they should. But that is just the position that Maddy's naturalism rejects. If one is a mathematical naturalist, one evaluates the methods and practices of mathematics from the point of view of mathematics, not from some extra-mathematical vantage point.

However, one can imagine a theological naturalist who refuses to evaluate the methods and practices of theology from an extra-theological standpoint. In fact, the imagination does not have to stretch very far. I am sure we are all familiar with people who remain steadfast in their beliefs no matter what, and revise other parts of their theory when philosophical or scientific criticisms seem to undermine those beliefs. For many, God and creationism are just as unquestionable as simple mathematical statements. Again, these are descriptive claims, but a theological naturalist would reject evaluative claims that come from an extra-theological standpoint.

Of course, Maddy's response to the astrological naturalism objection comes from the standpoint of a *scientific naturalist*, not a mathematical naturalist. She claims that from the point of view of a scientific naturalist, mathematics is not subject to scientific correction. But is she right? Is it the case that mathematical methods and practices are not subject to scientific evaluation and correction from the standpoint of scientific naturalism? This is a difficult question to answer. It is true that mathematical claims that occur within science are not typically subjected to correction. If a hypothesis is disconfirmed, it is the empirical portion that is corrected, not the mathematical part. But, again, this is relevant only to applied mathematics. There is no evidence for the claim that a scientific naturalist does or ought to regard the methods and practices (and claims) of unapplied mathematics as immune to correction.

So, from the point of view of a *scientific naturalist*, we only have grounds to accept the methods and practices of applied mathematics. From the point of view of a mathematical naturalist, we have reason to accept the methods and practices of all of mathematics, but no legitimate grounds to reject the methods and practices of a theological naturalist, for both view *themselves* as immune to philosophical and scientific correction. From this standpoint, mathematical naturalism and theological naturalism are on equal footing.

4. Conclusion

In conclusion, I hope to have shown that Maddy's response to the astrological naturalism objection is insufficient, for it either (a) undermines mathematical naturalism, leaving us with only scientific naturalism, or (b)

allows theological naturalism—the view that theology is not subject to extra-theological evaluation and criticism.³

References

- MADDY, PENELOPE [1998]: *Naturalism in Mathematics*. Oxford: Oxford University Press.

ABSTRACT. Penelope Maddy's recent *Naturalism in Mathematics* contains a persuasive argument for the claim that we ought to evaluate mathematics from a mathematical point of view and reject extra-mathematical standards. Maddy considers the objection that her arguments leave it open for an 'astrological naturalist' to make an analogous claim: that we ought to reject extra-astrological standards in the evaluation of astrology. In this paper, I attempt to show that Maddy's response to this objection is insufficient, for it ultimately either (1) undermines mathematical naturalism itself, leaving us with only scientific naturalism, or (2) leaves open the possibility of other unpalatable naturalisms.

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