

# Metaphysics and Logic: an Observation in Metametaphysics

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## 1 Introduction

I've never been particularly clear what metametaphysics is supposed to be. Much of what goes on under that title strikes me as Good Old Fashioned Metaphysics. Nearly all the great metaphysicians of the past—Plato, Nāgārjuna, Hume, Kant, Heidegger, to name but a few of the most obvious—have been centrally concerned with the things that are now taken to go under that rubric. But if the name means anything, I guess it means reflecting on what metaphysics is, and how it goes about its business. At any rate, it is one aspect of this to which this essay is devoted.

I wish to point out a central connection between metaphysics and logic. I'm not sure how best to define *metaphysics*. However, for the present audience, I don't think much explanation is necessary. *Logic* needs a bit more clarification. Logic, as contemporary logicians understand the word, is about what follows from what, and why. That is, its central concern is validity. However, that still leaves the matter ambiguous. Consider the word *dynamics*. This can mean a theory of how things move, as in *Newtonian Dynamics*; or it can mean how things actually move, as in *the dynamics of the Moon*. A similar ambiguity besets *logic*. This can mean a theory about what follows from what, as in *Aristotelian logic*; or it can mean what actually follows from

what, as in *the logic of the conditional*.<sup>1</sup> In what follows, I shall be talking about logic *qua* theory.

The connections which I have in mind between logic, in this sense, and metaphysics, is, I think, pretty obvious once one sees it—though as far as I know, no one who currently self-identifies as a metametaphysician has noted it. Perhaps this is because few of them are interested in the foundations of logic, and even fewer in the history of philosophy. The bulk of what follows comprises a series of vignettes from the history of philosophy. A comprehensive discussion of the matter would contain many more. However, the ones I give are sufficient for present purposes. Their import on matters at hand largely speaks for itself. So, having explained them, all that it will be necessary to do is simply make the implicit explicit.

## 2 Some Historical Episodes

### 2.1 Aristotle and the Open Future

In Chapter 9 of *De Interpretatione* Aristotle argued that if all statements about the future were already true or false (the Principle of Bivalence), then fatalism would follow. On this ground he rejected the Principle. Most commentators now take Aristotle's argument to be flawed.<sup>2</sup> However, whether or not this is so, Aristotle's picture of the future as open has a certain intuitive attraction. Facts about the past and the present now exist; and these make statements about the past and present determinately true or false. By contrast, the future does not yet exist, and since there are as yet no facts about the future, statements about the future—at least about things that could go either way—are neither true nor false, though they will become so in due course.

If something like this picture is right, then the correct logic will be one in which the Principle of Bivalence fails. That is, statements may be neither true nor false. Aristotle never pursued the topic of what such a logic might be like. But over 2,000 years later, in 1920, it motivated the Polish logician Jan Łukasiewicz to construct the first modern propositional many-valued logic.<sup>3</sup>

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<sup>1</sup>For further discussion, see G. Priest, *Revising Logic*, ch. 12 of P. Rush (ed.), *The Metaphysics of Logic*, Cambridge University Press, Cambridge 2014.

<sup>2</sup>For a discussion, see ch. 4 of S. Haack, *Deviant Logic*, Cambridge University Press, Cambridge 1974.

<sup>3</sup>See J. Łukasiewicz, *Philosophical Remarks on Many-Valued Systems of Propositional*

In this, there are three truth values: *true*, *false*, and *neither*. An account of how the logical connectives (such as conjunction and negation) work, and a definition of validity as truth preservation in all interpretations, delivered Łukasiewicz’ logic  $L_3$ .<sup>4</sup>

The picture of the future as open does not determine a unique logic. We now know that there are many logics in which some statements are neither true nor false, that is, in which some statements are “gaps”.<sup>5</sup> However, it is clear that the metaphysical picture requires some logic of this kind.

## 2.2 Jainism and Perspectival Reality

Moving East a few thousand kilometers, Jainism is an Indian philosophy (and religion) which appears to have been founded by Māhāvira about the 6th Century BCE. It endorses a very distinctive metaphysical picture of the world. Reality is multi-faceted. Different accounts (which may contradict one another), can be equally right, in that each holds in one of the facets; but as far as reality as a whole goes, each is only partial. This is the doctrine of *Anekānta-Vāda* (non-one-sidedness).<sup>6</sup>

The metaphysical picture delivers a very distinctive view concerning truth. Given any statement,  $A$ , and facet,  $\varphi$ ,  $A$  maybe true ( $t$ ) in  $\varphi$ , false ( $f$ ) in  $\varphi$ , or have some third value,  $i$ . How, exactly, to think of  $i$  is less than clear. Some Jain philosophers seem to suggest that it means *neither true nor false*; some seem to suggest that it means *both true and false*. (The thought that there can be values other than straight truth and falsity seems to be fairly standard in Vedic thought.) But when we take all the facets into account, things become more complicated. Given the three values, there are two possibilities concerning each: that it holds in some facet; that it holds in no facet. This gives us  $2^3 = 8$  possibilities. Since there must be at least one facet, one of these can be ruled out—namely that each holds in no facet. Hence we arrive at a logic with 7 possibilities (one corresponding to each non-empty subset of  $\{t, i, f\}$ ). This is the Jain *Saptabhaṅgī* (seven-fold division).

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*Logic*, ch. 3 of S. McCall (ed.), *Polish Logic, 1920-1939*, Oxford University Press, Oxford 1967.

<sup>4</sup>For details, see ch. 7 of G. Priest, *Introduction to Non-Classical Logic*, 2nd edn, Cambridge University Press, Cambridge 2008.

<sup>5</sup>*Ibi*, chs. 7, 8, 9.

<sup>6</sup>See B.L. Matilal, *The Central Philosophy of Jainism, Anekānta-Vāda*, L. D. Institute of Indology, Ahmedabad 1981.

The Jains did not work the *Saptabhaṅgī* into a formal logic; but this can be done in several different ways.<sup>7</sup> One simple way is to use the world-semantics of contemporary modal logic. Each world is thought of as a facet, and the values of formulas at each world are delivered by a suitable three-valued logic. Validity is then defined in terms of the preservation of *truth at some world* (in every interpretation). Whatever the exact details of the formal logic, it is clear that it is driven by the underlying metaphysical picture.

### 2.3 Hegel and Motion

Let us now skip forward a couple of thousand years, and back to Europe. At issue here will be one aspect of the philosophy of Georg Hegel: his account of motion. This is explained at various points in Hegel's work, notably in the *Logic* and the *Philosophy of Nature*.<sup>8</sup>

What is it to be in motion? A natural thought is that for an object to be in motion at a time  $t$  is for it to be at some place at  $t$ , but at different places at times immediately before or after  $t$ . But that is not clearly correct: that situation is compatible, after all, with the object having zero velocity at  $t$ . Hegel's account is different. To be in motion at  $t$  is to be at some place,  $p$ , and some *other* place as well; that is, to both be and not be at place  $p$  at time  $t$ . The thought is that since the object is in motion at  $t$ , it is not only where it is, but it has already gone a little beyond that, or perhaps has not quite reached there yet.<sup>9</sup>

As is clear, Hegel takes motion to be contradictory, in that, for an object to be in motion is for a certain contradictory state of affairs to hold. Clearly, then, he is rejecting the Principle of Non-Contradiction: that no contradiction can true. In other words, he was a dialetheist about motion.<sup>10</sup>

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<sup>7</sup>See, e.g., J. Ganeri, *Jaina Logic and the Philosophical Basis of Pluralism, History and Philosophy of Logic* 23 (2008), pp. 267-81, and G. Priest, *Jaina Logic: a Contemporary Perspective, History and Philosophy of Logic*, 29 (2008), pp. 263-278.

<sup>8</sup>Thus, see A.V. Miller (trans.), *Hegel's Science of Logic*, Allen and Unwin, London 1969, p. 440, and A. V. Miller (trans.), *Hegel's Philosophy of Nature: Being Part Two of the Encyclopaedia of the Philosophical Sciences*, Oxford University Press, Oxford 1970, p. 43. For some discussion, see M.J. Inwood, *Hegel*, Routledge and Kegan Paul, London 1983, pp. 448 f.

<sup>9</sup>Hegel's account is partly driven by his understanding of the infinitesimal calculus. See G. Priest, *Motion*, Vol. 6, of D. Borchert (ed.), *Encyclopedia of Philosophy*, 2nd edn, Macmillan, London 2006, pp. 409-11.

<sup>10</sup>On dialetheism, see G. Priest, *Paraconsistency and Dialetheism*, Vol. 8, of D. Gab-

Using the tools of modern logic, Hegel’s account of motion can be given a quite precise formal model. In the model, the location of a moving object is “non-localised”. That is, given the place of an object, there is a small neighbourhood around it such that the object is at all places in the neighbourhood, even though at some of these places it is not.<sup>11</sup> Clearly, the formal account must permit contradictions to hold; that is, it must accommodate truth value “gluts”. Consequently, the underlying logic of the model must be a paraconsistent logic. In such logics, contradictions do not entail everything. (That is, the principle *ex contradictione quodlibet sequitur* fails.)<sup>12</sup> Hegel did not, after all, take it that an object in motion was *everywhere*.

The importance of contradiction for Hegel’s philosophy is much more important than simply for his account of motion, which is a special case of something much more general. However, this is not the place to go into this matter.<sup>13</sup> It suffices here to note that Hegel’s account of the metaphysics of motion requires, in order to make logical sense, the deployment of a paraconsistent logic.

## 2.4 Wittgenstein and the Structure of the World

For the next vignette, let us wind the clock forward again, to the early 20th Century; and specifically to Ludwig Wittgenstein’s *Tractatus Logico-Philosophicus*. Wittgenstein took over the new logic developed by Gottlob Frege and Bertrand Russell, and used it to deliver a metaphysics of reality. Frege/Russell logic is expressed in a certain formal language; and when one gets the language right (and so has a logically perfect language) the structure of reality can be read off from it.<sup>14</sup>

Language is composed of propositions. All propositions are formed out of atomic propositions, with truth functions and quantifiers. Hence, the issue of truth can be reduced to that of the truth of atomic propositions. What

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bay and J. Woods (eds.), *Handbook of the History of Logic*, Dordrecht: North Holland, Dordrecht 2006, pp. 129-204

<sup>11</sup>See G. Priest, *In Contradiction*, 2nd edn, Oxford University Press, Oxford 2006, ch. 12.

<sup>12</sup>For an account of such logics, see G. Priest, *Paraconsistency and Dialetheism*, *cit.*

<sup>13</sup>For some discussion, see G. Priest, *Dialectic and Dialetheic, Science and Society* 53 (1990), pp. 388-415.

<sup>14</sup>Full discussions of the matter can be found in E. Stenius, *Wittgenstein’s Tractatus: a Critical Exposition of its Main Lines of Thought*, Basil Blackwell, Oxford 1960, and R.J. Fogelin, *Wittgenstein*, Routledge and Kegan Paul, London 1976.

corresponds to these in reality are states of affairs. Atomic propositions are configurations of names.<sup>15</sup> What names correspond to in reality are objects. States of affairs are configurations of these. An atomic proposition corresponds to a state of affairs if the names in the proposition refer to the objects in the state of affairs, and they are configured in the proposition in exactly the same way in which the objects are configured in the state of affairs: that is, the proposition and the state of affairs have the same *form*. A proposition is then true if the corresponding state of affairs exists.

There is, of course, much more to the *Tractatus* than this. However, the important point for present is that Wittgenstein's adopted logic is being used to generate a metaphysical picture of the nature of reality, as composed of states of affairs which are configurations of objects.

## 2.5 Heidegger and Being

Let us now wind the clock forwards a few years and look at Martin Heidegger.<sup>16</sup> At the beginning of *Sein und Zeit* Heidegger asks his *Seinsfrage*: what is being, what is it to be? And he immediately tells us that, whatever it is, it is not itself a being, that is, not itself an object. It is whatever it is that makes objects objects. The *Seinsfrage* and his constraint on an answer to it were to drive Heidegger's thinking for the rest of his philosophical life.

And it doesn't take much to see that there is a problem here. To answer the question of being, one has to say something like 'Being is such and such'. And this is precisely to treat it as a object. One cannot, then, answer the question of being. But one cannot even ask it: to ask what *it* is is, again, to treat it as an object. Indeed, one can say nothing about it: to say anything about *it* is to treat it as a being. As a casual inspection of the works of Heidegger will show, however, these are full of remarks about being.

Heidegger was well aware of the problem, and he struggled with it in much of his writing after *Sein und Zeit*, trying many stratagemes, such as writing under erasure, and appealing to poetry. But none of these works, since Heidegger says many things about being that are not of this kind. He was finally forced to conclude that being both is and is not an object. In other words, he became a dialetheist about the matter, rejecting the Principle

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<sup>15</sup>Modern logicians distinguish between names and predicates. These are all names in the sense of the *Tractatus*.

<sup>16</sup>For the next couple of paragraphs, see ch. 15 of G. Priest, *Beyond the Limits of Thought*, 2nd edn, Oxford University Press, Oxford 2002.

of Non-Contradiction. The Principle may hold for beings, but not for this singular (non-)object, being.<sup>17</sup>

Heidegger never wonders what a dialetheic logic, which allows something to be both a being and not a being, might be like. Indeed, he tends to suggest that this state of affairs goes beyond logic. That is because he still thinks of logic as Aristotelian logic; paraconsistent logic is still a few decades into the future. But it can be done. To be an object is to be something, which is equivalent to being self-identical; not to be an object is not to be something, which is equivalent to not being self-identical. Objects that are not objects can therefore be analysed in a paraconsistent logic which allows identity statements to be contradictory.<sup>18</sup>

There is much more to be said about all these matters. But for present purposes, the bottom line is simply that Heidegger's metaphysics, and his distinction between being and beings, engenders a paraconsistent logic according to which there can be contradictory identity statements.

## 2.6 Modal Logic and Possible Worlds

Modal logic—the behaviour of words such as *necessary*, *possible*, *impossible*—was studied extensively in Ancient Greek logic and Medieval logic.<sup>19</sup> In contemporary logic, its study was initiated in the teens of the 20th century by C. I. Lewis. In his work, various systems of modal logic were given a purely axiomatic presentation: there was no indication of a suitable semantics.<sup>20</sup> Things changed dramatically when possible-world semantics for modal logics were developed in the 1960s. Several people contributed to this, but undoubtedly the major developments were due to Saul Kripke.<sup>21</sup>

In the first instance, possible world semantics are a technical device which

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<sup>17</sup>This is not a standard interpretation of Heidegger, but the remarks on the matter in his *Beiträge* are hard to gainsay. The interpretation is forcefully defended in F. Casati, *Being. A Dialetheic Interpretation of the Later Heidegger*, PhD Thesis, University of St Andrews, 2016.

<sup>18</sup>See G. Priest, *Objects that are not Objects*, to appear.

<sup>19</sup>See the entries under *modal logic*, in W. Kneale and M. Kneale, *The Development of Logic*, Oxford University Press, Oxford 1962.

<sup>20</sup>See C.I. Lewis and C.H. Langford, *Symbolic Logic*, The Century Company, New York 1932.

<sup>21</sup>See R. Ballarín, *Modern Origins of Modal Logic*, in E. Zalta (ed.), *Stanford Encyclopedia of Philosophy*, <https://plato.stanford.edu/entries/logic-modal-origins/>, 2017.

brought order into the unruly world of modal logic. Mathematically speaking, possible worlds are just a bunch of objects furnished with a binary relation called an *accessibility relation*. A statement is necessarily true at a world if it is true at those worlds accessible to it, and possibly true at a world if it is true at some world accessible to it.<sup>22</sup>

However, the semantics strongly suggested a metaphysical picture: reality comprises one actual world, but a whole raft of merely possible worlds—worlds where, say, things are much as in the actual world, except that there is no planet Jupiter, or that Clinton won the 2016 US presidential election. Modal metaphysics was thrown onto centre-stage by Kripke’s *Naming and Necessity*, where he reads off a metaphysics from the semantics of modal logic, in just the way that Wittgenstein read off a metaphysics from his logic.

There are still many different views about how, exactly, to understand the notion of a possible world.<sup>23</sup> The details do not matter here, though. The important point is just that the developments in modal logic generated possible-worlds metaphysics.

## 2.7 Intuitionism and Meaning

Brisbane is in Australia, and molecules are composed of atoms. What makes these claims true? A natural (though not uncontroversial) thought is that they are made so by objectively existing things in the physical world. But what of ‘11 is a prime number’, and ‘the equation  $x^2 = 1$  has roots  $\pm 1$ ’? What makes these true? Some have thought that they are made true, similarly, by objectively existing things in some non-physical world. This is sometimes called *mathematical platonism*.

In the early years of the 20th Century, the Dutch mathematician L. E. J. Brouwer rejected this metaphysical picture. A realm of such objects was just mysticism. Mathematical objects are mental constructions. For a mathematical object to exist is simply for us to be able to construct it. With a nod in the direction of Kant, Brouwer called his view *intuitionism*.

Intuitionism has immediate implications for logic. Goldbach’s Conjecture is the claim that every even number greater than 2 is the sum of two prime numbers. It is not presently known whether or not this is true. We have

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<sup>22</sup>For an account of possible-world semantics, see G. Priest, *Introduction to Non-Classical Logic*, *cit.*, chs. 2, 3.

<sup>23</sup>See the essays in J. Loux (ed.), *The Possible and the Actual*, Cornell University Press, Ithaca 1979.



no way of constructing a counter-example to the conjecture; nor have we a way of showing that it is not possible to construct one. In other words, the Conjecture is (at least presently) neither truth nor false. The Principle of Excluded Middle then fails. The casualties amongst standard logical principles do not end there. Suppose we want to show that there exists a number satisfying some condition,  $\exists xA(x)$ . We assume for *reductio* that there is no such number,  $\neg\exists xA(x)$  and deduce a contradiction. We have shown that  $\neg\neg\exists xA(x)$ , but the proof gives us no way of constructing such an  $x$ . Hence we have not established that  $\exists xA(x)$ . The Principle of Double Negation also therefore fails. On the basis of thoughts such as this, Brouwer set about reconstructing mathematics.<sup>24</sup>

Brouwer's view is a form of verificationism. Truth in mathematics is not correspondence to some mind-independent reality; it is provability—which is what verifiability in mathematics comes to. Brouwer's view was about mathematics; he did not generalise it to other areas. Some 50 years later, however, Michael Dummett did. Deploying a bunch of arguments concerning meaning in general, Dummett, in a number of places,<sup>25</sup> extended Brouwer's verificationism about mathematics to all matters.

Brouwer did not formulate an explicit logic for intuitionism—indeed, he was not sympathetic to the idea that logic could be formalised—but one was formulated by Arend Heyting and others in the 1920s. And Dummett made frequent appeals to intuitionist logic in his arguments. As one would expect, intuitionist logic is a logic weaker than Frege/Russell logic. In particular, the Principles of Excluded Middle and Double Negation (in one direction) are not valid. A possible-world semantics for intuitionist logic was given some 40 years later by Kripke. In this, what is true at a world can be thought of as what is provable in that situation; and moving down the accessibility relation can be thought of as finding more and more proofs.<sup>26</sup>

### 3 Drawing the Threads Together

We have now seen a number of historical instances of connections between metaphysics and logic. Moreover, this is no isolated phenomenon. I have

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<sup>24</sup>For an introduction to intuitionism, see S. Haack, *Deviant Logic*, ch. 5.

<sup>25</sup>Such as M. Dummett, *What is a Theory of Meaning?*, pp. 97-138 of S. Guttenplan (ed.), *Mind and Language*, Oxford University Press, Oxford 1975.

<sup>26</sup>See G. Priest, *Introduction to Non-Classical Logic, cit.*, chs. 6 and 20.

given several examples to show that it is a phenomenon which appears at many different times, and in many different traditions.<sup>27</sup>

The connection between logic and metaphysics can manifest in different ways. For a start, in all our examples save two (2.4 and 2.6), a metaphysical picture delivered, or at least put important constraints on, logic. One might well take this as an important argument for that logic (or those constraints). That is certainly the way that the metaphysicians in each of our cases took it. But of course, one can turn the matter on its head. If one takes it that logics of the kind in question are ruled out, simply as matters of logic—if, for example, logical gaps and/or gluts are thus ruled out—we may turn this situation into an argument against the metaphysics in question.

In the other two examples, the direction of influence went the other way: a logic delivered a metaphysics.<sup>28</sup> In such cases one may take this to be an argument for the metaphysics in question. That is certainly the way that the logicians in each of our cases took it. Of course, though, one can turn this picture on its head as well. This if, for example, if one has Quinean scruples about modal metaphysics, one might take this as an argument against modal logic.

Whether one should take metaphysics to be more fundamental than logic, or whether one should take logic to be more fundamental than metaphysics, or whether it should be sometimes the one and sometimes the other, or whether one should strive to find a dialectical rapprochement between the two, is a matter I have not broached here. However, it is an important question—perhaps the most important thrown up by the above considerations. Suffice it for the present to have shown a fundamental fact of metametaphysics: that metaphysics is intimately entangled with logic.<sup>29</sup>

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<sup>27</sup>I note that I am not suggesting that metaphysical systems *invariably* have logical ramifications, or *vice versa*; merely that this is a common and important connection. Nor am I suggesting that there might not be similar interactions involving other areas of thought. Arguably, the possibility of a connection between metaphysics and physics, or logic and physics, comes to mind. In the case of metaphysics and logic, however, the connection is so obvious that there is nothing much to argue about.

<sup>28</sup>It is interesting to note that both of these examples came after the rise of modern logic.

<sup>29</sup>A talk based on this paper was given to the Department of Philosophy of the University of Lisbon. I am grateful to the audience there for their helpful comments and questions.