

## BIVALENCE, DETERMINISM, and REALISM

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1. A number of philosophers have followed Aristotle in holding that the principle of bivalence implies determinism.<sup>(1)</sup> By 'determinism' is meant the doctrine that every event which occurs has to occur; non-events are impossible events. By 'the principle of bivalence' is meant the doctrine that every sentence of the appropriate syntactic kind and with a determinate meaning is either true or false; or — accepting assumptions I won't challenge — that every such sentence or its negation is true. Lukasiewicz, for instance, has argued that determinism, formulated as «If X occurs at  $t$ , then 'X will occur at  $t$ ' is true at all times before  $t$ » (for any arbitrary X), can be derived from the principle of bivalence together with certain obviously acceptable principles (like that of Hypothetical Syllogism).<sup>(2)</sup> If he's right, either the principle of bivalence is a mistake or determinism is true.

Most critics have not challenged the move from the principle to the conclusion that if X occurs at  $t$  then it was true before  $t$  that X would occur. What they have challenged is the idea that this conclusion is at all deterministic. Typically they have treated this idea as involving a crude error in modal thinking.<sup>(3)</sup> Lukasiewicz, it seems, must be supposing that if a sentence 'p' is true then it has to be the case that p. Taken one

<sup>(1)</sup> On the most favoured of the several interpretations of Aristotle, that is.

<sup>(2)</sup> 'On Determinism', in *Polish Logic 1920-1939*, edited by S. McCall. Oxford University Press 1967.

<sup>(3)</sup> For the most recent example, see Susan Haack's *Deviant Logic*, Cambridge University Press 1974, where she writes: «(Aristotle's) argument would work only if the inference from

$$L(p \supset q) \text{ to } p \supset Lq$$

were valid. But it is not — it is a straightforward modal fallacy». p. 78.

way this supposition is correct; taken another way it isn't. It might mean either:

- (a) Necessarily, if 'p' is true then p
- or
- (b) If 'p' is true, then it is a necessary fact that p.

Determinism requires (b) to be true, whereas (a), which is acceptable, is all that is needed to do justice to the principle that if 'p' is true then p has to be the case. There is nothing deterministic about (a); it is merely explanatory of the meaning of 'true' — or, better, it places a constraint which any such explanation must obey.

2. I don't know, but rather doubt, that Lukasiewicz and others have been guilty of confusing (a) and (b). Certainly, though, the case for saying that determinism is implied by bivalence need not rest upon the confusion. <sup>(4)</sup> Let's grant that there is no *obvious* move from its being true before *t* that X will occur at *t* to the conclusion that X is necessary. In granting this, are we doing more than reporting what our actual practice is — that of assigning Truth and Falsity to future-tense sentences we allege to be contingent? That this *is* our actual practice was scarcely unknown to Aristotle or Lukasiewicz. While it is not insignificant to show that a practice is our actual one, the challenging task surely is that of justifying the practice. The question should be: Is it possible to provide a truth semantics which will justify the bivalent assignment of truth-values to sentences descriptive of what we regard as future contingencies?

3. What will such an account of truth have to be like? For a start it must be a Realist one — an account, that is, according to which sentences are true or false independently of our knowing which. For suppose the account is not a Realist one;

<sup>(4)</sup> So Ms. Haack, *op. cit.*, is rash to conclude without further ado that «since Aristotle's argument is invalid, no change of logic is in fact called for». p. 90.

suppose that «'p' is true» is held to have sense only when we know that p or know that not-p. In that case we shall have to admit there are future-tense sentences that are neither true nor false; for certainly it is not the case for every X, that we know that X will occur or know that it will not occur. On this view, we couldn't hold that a future-tense sentence is true or false, but also that it describes a possible rather than a necessary event. The reason for this is *not* that «I know that X will occur» entails that X's occurrence is a necessary one; that would involve the same modal confusion exhibited in section (2). The reason is rather that if Truth could only be assigned to sentences known to be true, there would be no room for the distinction in question to be made. There would, that is, be no room for distinguishing between what is and what might be true about the future — since the extension of 'true' coincides with that of 'known to be true'. It couldn't occur to anyone to say «it might not come about that X, but either it's true or it's false that it will come about».

4. So the account which could justify our actual practice must be a Realist one. But not every brand of Realism will do. And, indeed, I want to argue that the most plausible version of Realism cannot warrant an attitude which is both non-determinist and bivalent. Plausible Realism is an account in which the connection between truth and falsity on the one hand and our knowledge on the other is not entirely severed. It holds that sentences are only true or false if they are in principle verifiable — where, following Dummett's proposal, 'in principle' is interpreted very generously, so that even if a sentence is not verifiable by *us* it could still be assigned a truth-value if regarded as verifiable «by some suitably placed hypothetical being with sufficiently extended powers». <sup>(6)</sup>

I won't try to justify my contention that this is the most plausible brand of Realism beyond mentioning two seeming merits it has; these will be relevant later. First, it provides an account of truth and falsity that renders these notions in-

<sup>(6)</sup> Frege: *The Philosophy of Language*, Duckworth 1973, p. 467.

telligible extensions of what we learn when we originally learn how to use 'true' and 'false'. For we learned, presumably, to attach 'true' to sentences we had verified and 'false' to those we had found incorrect. From the beginning, so to speak, we understood 'true' and 'false' in terms of verification and falsification. Second, and more important, plausible Realism makes it possible to see how assigning truth-values can have the point and interest that it does — by relating it to human activities whose conduct presupposes certain considerations. Truth-value assignments to sentences derive their point from the fact that we use these sentences for certain purposes — in particular, for making assertions. Asserting is an intentional activity whose possibility depends on a general background of speakers' trustworthiness. Without such a background, speakers could not succeed in those intentions that asserting necessarily involves — nor, indeed, could they even *have* those intentions.<sup>(6)</sup> A background of trustworthiness in turn presupposes the *general* possibility of checking and verifying speakers' assertions. Were truth-value assignments in no way dependent on the possibility of verification, it is unclear why they should interest us; and it is unclear how we should recognize those acts — assertions — which provide sentences with the role that makes such assignments of some purpose.

5. Let's suppose, then, that we adopt the plausible Realist account of truth and falsity. The consequence, if we also take a bivalent attitude towards future-tense sentences, will be commitment to determinism. On this account, «X will occur at *t*» is true or false; hence it is verifiable in the generous sense intended. But in what could its verifiability consist except the identifiability of events or states of affairs which will bring about X's occurrence or non-occurrence at *t*? If the causes of X's occurrence or non-occurrence at *t* exist to be identified at all times before *t*, then either X's occurrence or its non-occurrence is causally determined. The conclusion can be

<sup>(6)</sup> So I have argued, at any rate, in chapter 6 of my *Presupposition*, Mouton 1974.

avoided by denying that «X will occur at  $t$ » is verifiable at all times before  $t$ ; but this entails, if we are to remain plausible Realists, rejection of the sentence's bivalence. Either it is truth-valueless or it must be assigned a value other than True or False. (7)

6. An obvious rejoinder to what I've just said seems available. Why should verification of a future-tense sentence have to be contemporaneous with its utterance or possible utterance? Why should it not take place at the time of, or later than, the event whose future occurrence the sentence asserts? (8) Then, provided that «X is occurring» is verifiable at  $t$ , or «X occurred at  $t$ » is verifiable after  $t$ , «X will occur at  $t$ » can be regarded as verifiable. Hence, on plausible Realist grounds, it can be assigned True or False. Such an assignment will in no way be deterministic; for the sentence will be true or false even if there was no way before  $t$  of telling which, and no identifiable causes of the event were available. Bivalence, plausible Realism, and scepticism about or rejection of determinism, once more become compatible so it seems.

Let us grant that an acceptable sense of a future-tense sentence's being verifiable is provided by a rule to the effect that «X will occur at  $t$ » is verifiable provided that «X is occurring» or «X has occurred at  $t$ » is verifiable at or after  $t$ . Still, we can ask if this rule provides the sense the plausible Realist

(7) Obviously I have taken a good deal for granted in this section — particular, that knowledge of what will happen can only be based upon grasp of causal regularities. Both precognitivists and those who think that while human actions are predictable they are not causally explicable would beg to differ. I could defend my view, but won't do so here. I am primarily concerned with the implications of a certain view of truth; and it will be of considerable interest to show that this view, when linked with the principle of bivalence, commits us either to determinism or to precognition and a non-causal account of action. Neither disjunct is going to appeal to those who see logical principles as metaphysically neutral.

(8) Dummett, *op. cit.*, would, I think, offer such a rejoinder. For he suggests that the verifiability at or after  $t$ , of future-tense sentences about  $t$ , dissolves the problem such sentences are supposed to pose for bivalentists.

requires in justifying the assignment of True and False to future-tense sentences. It is surely worth stressing the considerable difference between the two senses of 'verifiable' so far encountered. In the first sense, «X will occur at  $t$ » is verifiable only if there are identifiable causes, before  $t$ , of X's occurrence or non-occurrence. In the second sense, it is verifiable provided that the corresponding present- and past-tense sentences can be verified at or after  $t$ . Let's dub these the 'Sooner' and 'Later' senses of a future-tense sentence's being verifiable.

I want to argue that it is only if the sentences are 'Sooner'-verifiable that there is justification, on plausible Realist grounds, for assigning True and False to them. Since this is the kind of verifiability assumed in section (5), bivalence will after all commit us to determinism.

7. If we are to take seriously the idea that 'Later'-verifiability warrants the assignment of truth-values to future-tense sentences, we must take the following seriously: that in a world in which 'Sooner'-verification is always impossible (even in principle), then 'Later'-verification would still justify the significant assignment of True and False to future-tense sentences.<sup>(9)</sup> (*Ex hypothesi*, of course, no one would know at the time of utterance which value such sentences had). But that, I suggest, cannot be taken seriously.

Consider this: in English, and probably every language, we have at least these two metalinguistic devices for saying that X will or will not occur at  $t$ , namely:-

- (I) «X will occur at  $t$ » is true or false.
- (II) «X is occurring» will be true or false at  $t$ .

Now, if all verification is 'Later' (i.e. at or after  $t$ ), then device (II) must be thought of as basic and primary. For «X will oc-

<sup>(9)</sup> I don't think it matters that perhaps such a world could not, when the pressure is put on, be coherently imagined. It is only an inessential heuristic device for drawing attention to the inadequacy of 'Later'-verification as a warrant for assigning truth-values to future-tense sentences.

cur at  $t$ » can only be considered true (false), in retrospect, because «X is occurring at  $t$ » has been found to be true (false) at or after  $t$  — and never vice-versa. In the imagined world one could never say anything like «X must be occurring now, since I'm sure he was telling the truth when he said it would». (I) must then be regarded as a device generated by a rule allowing us to transformationally derive it from (II). The whole sense of «'X will occur at  $t$ ' is true or false» will consist in its being a transformational variant of the primary and basic form «'X is occurring' will be true or false at  $t$ ». The trouble here is that we have no explanation of why we should have device (I) as well as device (II). The rule which generates it would, on the given assumptions, appear no less quirkish than one which allowed us to transform «John will be happy tomorrow» into «Today, John is a successful happy-tomorrow candidate». There might have been a rule like this in English, but it would be no more than an idiosyncrasy that we should not expect to find replicated in other languages. <sup>(10)</sup>

The Realist set out to *justify* assigning True and False to future-tense sentences; but if such assignments result from the 'Later'-verifiability of such sentences, we shall merely have been referred to an *ad hoc*, idiosyncratic rule. A *justification* would have to account for why we, and speakers of all languages, find reason for having device (I) as well as device (II).

8. There will not, in our imagined world of 'Later'-verification, be any accounting for our truth-value assignments as a natural extension of what we learned when we originally learned to use 'true' and 'false'. *Ex hypothesi*, no future-tense

<sup>(10)</sup> Ockham, I think, exemplifies the view that device (II) is the primary one. For, arguing against Aristotle, he insists that we can have power over such past states of affairs as that it was the case that «X will occur at  $t$ » was true. Surely, though, we have power over that only in the sense that we have power, at  $t$ , over X's occurrence — over, that is, the truth of «X is occurring». Sense is given to the former power in terms of the latter. See A. Prior, 'Logic, Many-Valued', in *The Encyclopedia of Philosophy*, edited by P. Edwards, Collier-MacMillan 1967, Volume 5, p. 2.

sentences are verified or falsified by speakers while they are appropriately utterable (i.e. before the events they refer to). Hence one of the seeming merits of plausible Realism mentioned in section (4) will be lost to it on the present assumptions. Nor, on these assumptions, will plausible Realism retain its other seeming merit — that of displaying how truth-value assignments can have a point. In a world where only 'Later'-verification is possible, future-tense sentences could not be used to make assertions: for the background of speakers' trustworthiness, which is essential to the possibility of assertion, and which can only come from a history of checking and verifying, will be missing. Speakers could not seriously assert that X will occur, since they know — and their listeners know, and the speakers know the listeners know etc. — that there is no strong reason for thinking X will occur. Assignment of True and False to future-tense sentences will have lost its point.

9. If only 'Later'-verification were possible, there could be no justification within the plausible Realist framework for assigning True and False to future-tense sentences. This means that, in the actual world, it cannot be 'Later'-verifiability alone that warrants this practice: The assumption of 'Sooner'-verifiability must be part of the warrant. But 'Sooner'-verifiability, presupposing as it does the identifiability of causes of future events, presupposes a deterministic attitude towards those events. We can only remain sceptical about determinism by doubting the 'Sooner'-verifiability of some sentences. By doubting that, though, we doubt the principle of bivalence. At any rate, we do so if we wish to remain plausible Realists. Aristotle and Lukasiewicz may have been too quick in their inferring of determinism from bivalence; but they are justified to the extent that a plausible truth semantics can only incorporate bivalence if it also incorporates the deterministic world-view. Logic is not, after all, metaphysically neutral.