Is tomorrow's sea-battle really necessary?
by Robert Stone

1. Aristotle, in a famous passage (*De Interpretatione* ch 9), raises a question that has exercised philosophers for over 2000 years. He has established that any statement about the past or present must be either true or false (the principle of 'bivalence'). But to extend that principle to statements about the future is not so easy. If the statement 'there will be a sea-battle tomorrow' is true, then it necessarily follows that there will be a sea-battle tomorrow. But it is obvious that the question of whether there will be a sea-battle is not yet determined; either chance or human choice will affect whether it happens; it cannot be one of those things that happen necessarily. So statements about the future must have different rules from those about the present or past.

2. The traditional interpretation of Aristotle's answer is that he tries to suggest some alternative to bivalence, and some modern philosophers, accepting the problem as genuine, have proposed various 'third way' solutions. I shall first take a brief look at some of these, then examine how Aristotle himself asks the question and gives a rather ambiguous response to it. It will emerge that the problem is based on a fallacy which precludes the need to solve it at all.

Possible answers

3. Among those who accept the problem of bivalence in predictions, Łukasiewicz (summarised in SEP, Prior 317-322, MacFarlane 323-4) suggested that, as well as truth and falsity, a proposition can have a third possible truth-value, 'indeterminate'. Thus predictions, which refer to states of affairs that do not yet obtain, are indeterminate. One problem with this scheme is that, in the truth-tables that arise from it, if a proposition 'p' is indeterminate and another proposition 'q' is indeterminate, it follows that 'p or q' is also indeterminate. But that means that, if 'p' and 'not-p' are both indeterminate, then 'p or not-p' is indeterminate; yet it is obvious that 'p or not-p' is necessarily true (MacFarlane 324).

4. A recent refinement of this approach is that of MacFarlane, who prefaces his views with the important observation that we are not discussing whether the world is deterministic: "talk about the future would not be incoherent in an objectively indeterministic world" (323). The problem is the logic of predictions in *any* world. He suggests the idea of 'assessment-contextuality': a prediction is true or false as assessed from the time of *fulfilment*, but neither true nor false as seen from the time of *utterance*. When we assert a proposition about the future, we are claiming not that it is true absolutely, but that we have adequate reasons to think it is true from the utterance context, while being prepared to withdraw it later from the assessment context (334). A problem is that this must be equally true of utterances about the past/present, where we do not yet have the evidence to be sure, and it is hard to understand how we can describe as 'correct' "one and the same historical act [assertion of a fact] at some times and not at others" (Evans 348, quoted in MacFarlane 333). Besides, whether or not the speaker has adequate reasons, he often *is* claiming that his prediction is true absolutely.

5. A similar view is held by Bäck, who says that statements about the contingent future "do not make non-modal, categorical claims" (Bäck 144). He believes, moreover, that this is what Aristotle means; he "in effect is claiming that what a prediction asserts may differ from what the predictor may intend to assert" (142) – though he concedes that "It is certainly not contained, explicitly and unequivocally, in *On Interpretation* 9 or anywhere else" (135). Anscombe, too, focuses on the speaker at the time of the utterance, but in her case on his state of *knowledge*. She attributes to Aristotle a version of 'necessity' which makes all propositions about the past and present *necessarily* true (Anscombe 12): it is our knowledge of the present/past that causes that, while our ignorance of the future leaves predictions *not* necessarily true or false (13-14).

6. The problem with these ideas for Aristotle's text is that he explicitly rules out the state of mind of the predictor as an issue, when he says (*De Int* 18b36) that not only must an event that was truly predicted, even 10,000 years ago, come about "of necessity", but "it makes no difference whether anyone made the assertion/denial or not." So it is *the fact of its being true* that an event will happen that makes it necessary, not the incidental fact that someone actually knew or predicted it. That is the issue on which we need to focus.

Aristotle's formulation of the problem

7. Right at the outset, Aristotle says that there *is* a problem. "With regard to things that *are* and *have been*, it is necessary that the assertion or the denial is true or false . . . that the one is true, the other false" (*De Int* 18a28-31 – my italics, as always in quoting Aristotle). "But with regard to particular things that *will* be, it is

not the same" (18a33-34). That suggests he is intending to *deny* that statements about particular events in the future are either true or false, just as the traditional view believes he does. When the chapter ends by saying that the case of "those things which are not, but are capable of being or not being, is not the same as the case of those things which are, but as has been said" (19b3-4), the clear implication is that he has just explained what he set out to explain, namely how statements about the future differ from those about the present/past. Alas, things are not so simple.

8. Although Aristotle did not think in terms of propositional logic, I will summarise some of his points by using the following propositional symbols: there seems general agreement that the anachronism is not an issue here.

p = a proposition
~p = 'p is false'
T = 'it is true that'
N = 'it is necessary that'
⊃ = 'entails' (if . . . , then . . .)

9. After stating the problem, Aristotle proceeds to see what conclusions follow from the assumption that predictions *are* true or false, and to show that they are absurd. So, if one person says that a certain event will happen, and another that it will not, it is "obvious that it is *necessary* that one of them is telling the truth" (18a36-38): N(Tp or T~p). He then uses an example about the present, where something is either white or not. "If it is *true* to say that it is white or that it is not white, it is *necessary* that it is white or not white; and, if it is white or not white, it was true to assert or deny [its whiteness]" (18a30-18b3). He goes on to say of just one of those propositions, "If [the predicate] does not belong [to the subject], it is false [to say that it does], and if it is false [to say that it does], it does not" (18b3-4). So what is 'necessary' seems to be the logical connection between something being the case and the truth of the statement that it is the case, and equally between its not being the case and the falsity of the statement that it is the case. N((Tp)⊃p) and N((T~p)⊃~p).

10. The next paragraph begins with the apparent conclusion from the above that "therefore nothing either is or comes to be either from chance or contingently, nor will anything be or not be [contingently], but everything is from necessity and not contingently" (18b7-10). How does Aristotle deduce this from the argument described in the previous paragraph? First he extends the argument to past statements predicting present situations: "Again, if [something] is now white, it was true in the past to say that it would be white" (18b10), and what is more it was always true (18b11-12). Now comes the crucial sentence: "If it was always true to say that something is or will be, this cannot not be or not be going to be. And it is impossible for what cannot not happen not to happen; and if it is impossible for something not to happen, it is necessary for it to happen" (18b13-15).

11. Taking all this together, it is clear that Aristotle thinks he has established that (a) it follows necessarily that, if a statement is true, then what it asserts is the case; (b) if statements about the future are true, then – from (a) – what they assert will necessarily be the case. Therefore (c) – from (a) and (b) – all the events of the future will happen of necessity rather than by chance or contingently. Aristotle asserts as an obvious fact, borne out by our experience, that (c) simply is not true (18b26ff, 19a8ff). That is the problem to be solved.

Aristotle's response to the problem

12. There are two possible ways out that Aristotle expressly rejects. (1) Maybe *neither* the statement asserting the future event *nor* the denial is true. But that doesn't work: if the assertion is not true, the denial cannot also be untrue (18b18). Or (2) maybe *both* the denial *and* the assertion are true. But if it is true to say 'it is white' and 'it is not white', the subject would have to be both (18b22). So Aristotle has found that absurd consequences follow from three possible notions about the assertion and denial of some future event: (a) that one must be true, the other false, (b) that neither is true, (c) that both are true. It is hard to follow those who claim that Aristotle, in effect, adopts option (b) when he expressly rejects it (e.g. Bäck 142). But one of the problems in deciphering Aristotle's response to his own question is that the discussion that forms the 'conclusion' (19a8ff) does not, as I see it, really focus on the argument he himself proposes, but rather on *other* arguments that someone might have raised. This leads Fine, who rejects the 'traditional' interpretation of Aristotle as working towards denying bivalence, to write as though Aristotle's aim is to rebut what she calls "the fatalist's arguments" (Fine 23). That was certainly not his declared intention at the start of the passage, but that is no guarantee that he has not changed tack by the end.

13. In 19a24ff, Aristotle discusses the issue of 'necessity'. "It is necessary that what is, is when it is, and that what is not, is not when it is not." There is some dispute over the meaning of the word 'when'. Does Aristotle mean what we would all agree with, namely that it is necessary that any proposition which is true is

true (Fine 24)? Or does he mean that it is necessary for a proposition to be true *only when* it is true (Bäck 145)? The latter would be introducing a temporal element into the idea of truth. I can see that Aristotle *might* have gone on to make the fairly simple point that a proposition is true only at the time when the state of affairs to which it refers obtains. But he does not do that. Instead, he distinguishes between two meanings of necessity: "it is not the same thing for anything, which is, to be of necessity when it is, and for it to be of necessity absolutely" (19a26). That is the same distinction as he makes at *Prior Analytics* 30b31ff. There is nothing to do with time here, just the difference between what we would call 'logical' necessity, as in N(p ⊃ p), and absolute (deterministic) necessity as in Np; the latter would apply to such things as the motions of the heavenly bodies.

14. He then makes a second distinction: "And it is the same reasoning with a contradictory pair: it is necessary that anything either is or is not, and that it will be or it will not be. But it is not necessary to divide and say one or the other" (19a28). He uses the sea-battle as an example: "it is necessary that there will be or will not be a sea-battle tomorrow; but it is not necessary either that there will be a sea-battle tomorrow or that there will not. It is necessary that it either happens or it doesn't." (19a29-32). Here again Aristotle is warning against confusing the logical necessity of a combination of propositions with the absolute necessity of either one of them (hereafter the 'Disjunction Fallacy').

15. How does Aristotle's discussion of necessity contribute to solving the original problem? That was the claim, at 18b13-15, that if a prediction is true, then it is impossible for the event it predicts not to happen – even though we assume the event is contingent. This is the question the modern commentators try to solve with their views about indeterminate or assessment-contextualised propositions, not to mention theories about the future, such as the 'branching future' or the 'thin red line' (SEP). But it seems that, in the argument analysed in paragraphs 10-11 above, Aristotle is making what would strike a modern student of logic as a basic logical error. When he says that the truth of the prediction of an event necessarily entails its occurrence, what is necessary is not the *occurrence* of the event, but the *entailment* of the event from the truth of the prediction. In symbolic terms, we can accept easily (where p = there will be a sea-battle tomorrow) that (a) N(Tp ⊃ p). But that is not the same thing as saying (b) Tp ⊃ Np. The necessity of the *entailment* in (a) has no conceivable bearing on the necessity or contingency of the *proposition*, as claimed in (b). In other words this is a case of Aristotle himself falling into the very trap – the Disjunction Fallacy – that he warns about later in 19a24ff, as explained in paragraphs 13-14 above.

16. Fine agrees that this, which she calls confusion of *necessitas consequentiae* with *necessitas consequentis*, is the flaw in Aristotle's argument; but she claims that Aristotle spots it – as if it had been made by a 'fatalist' – and that his arguments about necessity show this (Fine 38). But, although he clearly explains the flaw in the two particular cases described in paragraphs 13-14 above, he nowhere tackles the truth-to-necessity argument. When he proposes the argument in 18b7-18 (see above, paragraphs 10-11), he does not attribute it to any putative fatalist, but gives it as his own deduction from the bivalence of future statements. He *might* have added a refutation of it as a third warning about statements of logical necessity, but he does not.

17. Aristotle begins the final part of the chapter by reiterating that, when contradictory statements are made about contingent states of affairs, "it is *necessary* that one half of the contradiction [p or ~p] be true or false; not, however, this or that half, but whichever is contingently the case, and that [it is necessary that] one half [may be] more true" (which I take to mean 'true more often' or 'more likely to be true') "but not *ēdē* true or false" (19a37-39). If *ēdē* is used in its normal sense of 'already', Aristotle seems to be suggesting either that predictions are 'not *yet* true/false' or that their truth/falsity is 'not *yet* necessary' – the first clear indication that he is distinguishing between predictions and statements about the past/present, which presumably by contrast *are* already true and/or necessary. "Therefore," he goes on, "it is clear that it is not necessary that, for every assertion and denial, one of the contradictory statements be true and the other false" (19b1-3). This is ambiguous: does he mean (as he said before) that neither Np nor N~p is true, or is he now denying that N(p or ~p) is true – a change of mind on the excluded middle? When he concludes (19b3-4) that the case of "those things which are not, but are capable of being or not being" is different from "those things which are", he seems to be returning to the point with which he started the whole chapter: statements about the future are different from statements about the present/past, in respect of their true-or-false status. And this holds even if one accepts Anscombe's argument (8) that *ēdē* (translated 'already') has a common, *non*-temporal meaning (for which she gives various references). That concluding sentence can refer only to a future vs. present/past distinction.

18. There are huge problems with this 'conclusion'. That predictions may be neither true nor false (yet) contradicts Aristotle's insistence on the excluded middle in 18b18; that statements about the present/past may be necessarily true – presumably because it is necessary that what has happened has happened (Anscombe's view of Aristotle's meaning, p 12) – contradicts his refutation of the Disjunction Fallacy in 19a26. In any

case, the different status for different tenses (whether of truth-value or of necessity) is neither argued for nor follows from the arguments that precede it. As a conclusion, this paragraph seems strangely ambiguous and unattached. No wonder there is disagreement on what Aristotle's view is. Prior can be forgiven for concluding that Aristotle was "muddled" (326).

Conclusion

19. In summary, Aristotle raises the problem that statements about future events, if true, entail that those events will *necessarily* take place. Some have taken the problem as genuine and suggested various ways of exempting the future from bivalence. It is not clear precisely what Aristotle's own 'solution' is, but the bulk of the chapter is spent in denying the necessity of future events and refuting some *other* arguments, based on the Disjunction Fallacy, that might suggest they are. Yet he never counters the original argument – as he could easily have done in the same way. That argument is an example of the Disjunction Fallacy, and so the whole problem of future statements is a non-problem – which may explain why the attempted solutions are unsatisfactory. Yes, it *was* true in 10,000 BC that the Battle of Trafalgar would take place in 1805. But no, it was not therefore *necessary* that it would.

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