P and Possibly Not-P?

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In a well-known passage from *De Interpretatione*, Chapter 9, Aristotle says that

> With regard to what is and what has been it is necessary for the affirmation or the negation to be true or false. And with universals taken universally it is always necessary for one to be true and the other false, and with particulars too, as we have said .... But with particulars that are going to be it is different....
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> [I]t is necessary for there to be or not to be a sea-battle tomorrow; but it is not necessary for a sea-battle to take place tomorrow, nor for one not to take place. So, since statements are true according to how the actual things are, it is clear that wherever these are such as to allow of contraries as chance has it, the same necessarily holds for the contradictories also. This happens with things that are not always so or are not always not so. With these it is necessary for one or the other of the contradictories to be true or false not, however, this one or that one, but as chance has it; or for one to be true *rather* than the other, yet not *already* true or false.
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> Clearly, then, it is not necessary that of every affirmation and opposite negation that one should be true and the other false. For what holds for things that are does not hold for things that are not but may possibly be or not be; with these it is as we have said. (18a 29-33, 19a 30- 19b 4)

This appears to say that for some statements about the future, where the occurrence or non-occurrence of the event is "as chance would have it" – which I shall take to mean that its occurrence is or depends upon some chance event(s)[1] – that neither the statements nor their denials are either true or false. Just what Aristotle's argument was here is not completely transparent, and there have been differing attempts to reconstruct and assess it.[2] It may be that we haven't got sufficient materials at hand to be sure what the argument was. However that may be, I think that Aristotle's instincts were sound, even if, perhaps, his argument was not. That is, I think it is correct to hold that statements about future events, where the occurrence or non-occurrence of those events depends on chance events,[3] are neither true nor false, but

indeterminate.[4] I shall try to do a little ground-clearing to get the issue in focus, make some terminological distinctions, and present an argument for my conclusion together with addressing some objections.

I. Ground-Clearing

Three points are important in order to be clear about what questions are at issue. First, they must be distinguished from questions about knowledge. Second, something must be said about the sense in which the events in question are or depend upon chance events. (I shall only assume, rather than argue, *that* there are chance events.) Third, something has to be said about the relation between truths and times.

Let's begin with distinguishing the problem from questions about knowledge. One guise in which people have considered the issue is by way of arguments about the relation between God's omniscience and human freedom or responsibility. In some of these arguments – which is where I first encountered the problem – the issue is identical. However, if the problem is posed in this way, it is easy to lose sight of the fact that the issue is one about the truth or falsehood of statements about the future rather than about whether an omniscient being knows it. For the issue I'm interested in, those are irrelevancies. If I am mistaken, there may still be problems reconciling omniscience with human freedom; if I am correct, no assumptions about omniscience are needed. Nor, relatedly, am I interested (for present purposes) in questions about human knowledge. I do not take denying that some statements about the future are either true or false to be equivalent to a denial that we are in a position to know of their truth or falsehood. Of course, if they are not true or false, they cannot be known to be, but the converse does not hold: it may be that they cannot be known to be true or false but nonetheless are.

Second, I need to say something about the sense in which the future events in question may be attributed to chance. I shall take a *deterministic explanation* to be one that explains the occurrence of an event, including all its features, in terms of a sufficient cause. I shall assume that when there is a sufficient cause for the occurrence of an event, then the occurrence of that event can be deduced from (true) statements about antecedent conditions and (true) statements about any relevant natural laws.[5] Then, a chance event will be one for which there is no deterministic explanation, that is, one that lacks a sufficient cause.[6] Given any relevant laws of nature and any set of antecedent conditions, there is at least one alternative possible outcome.[7]

Third, remember that in Aristotle's version of the argument quoted earlier, there was a reference to what was "not *already* true." What is important to note here is that it is assumed that some statements are true at some times, but not at others. In particular, a statement may be true tomorrow that is not today (which does not mean that it is *false* today). Some philosophers have thought that notion problematic: truth must be timeless. I confess I have little sympathy with that (perhaps inadequate exposure to Plato!), but, even if it is correct, it will not affect my argument. For one way of understanding what it means to say that truth is timeless is just to say that a timeless truth is one that holds at all times. Suppose the truth in question is that there is a sea-battle on a certain date. If, under that interpretation, that is timelessly true, then it is true on the day before that date. That's the conception of "truth at a time" that I need for my argument. Suppose, on the other hand, that the timelessness of truth is understood in some other way, so that the inference from "p is timelessly true" to "p is true at time t_0" is disallowed. (I am not at all clear what this other way amounts to. I'm just considering it for the sake of the argument.) In that case, "there is a sea-battle at t_1" does not imply that it is true at any earlier time that there is a sea-battle at t_1. But if it is not true at any earlier time (or, for the same reason, false either, where

"false" means "true that not"), that amounts to acceptance of my thesis (actually, of a broader thesis) in the sense I attach to it. *At* the earlier time, if the event being spoken of is or depends on some chance event, it is neither true nor false that it will occur at the later time.

II. An Initial Formulation

An initial and largely intuitive formulation of the argument might go as follows:

> "There will be a sea-battle tomorrow" is false if the battle doesn't occur. Its denial, "There will not be a sea-battle tomorrow" is false if the battle does occur. But suppose there's *nothing* about the current situation that settles whether there will be a sea battle or not. Whether there will be or not depends on chance events that haven't occurred yet. So, it's possible – really possible, given everything that's true now with all the relevant laws of nature and causal factors taken into account – both that there will and that there won't be a sea-battle. Given that, how can you also say that it's true now that one of them will occur? What does it *mean* to say that it's true that it will happen but also possible that it will not?

Unfortunately, the simple formulation is open to simple objections. It appears to be relying upon some claim to the effect that, if it is true that there will be a sea-battle tomorrow, then it's not possible that there will not be one. But surely, this will not do as it stands. 'Not possibly not-p' is equivalent to 'necessarily p.' It is certainly not true for the general case, however, that 'p' implies 'necessarily p.' If there is a sound argument here, it can't rely upon something like that.

Susan Haack examines a version of the argument and, more formally, diagnoses the same modal fallacy:

> The argument is invalid, I think, because it depends upon a modal fallacy, the fallacy of arguing from:

> Necessarily (if it is now true ... that I shall be in Warsaw at noon on 21 December next year, then I shall ... be in Warsaw at noon on 21 December next year)
>
> which is, of course, true, to:
>
> If it is now true ... that I shall be in Warsaw at noon on 21 December next year, then necessarily I shall ... be in Warsaw at noon on 21 December next year
>
> i.e., of arguing from:
>
> $L (A \rightarrow B)$
>
> to:
>
> $A \rightarrow L B$[8]

Again, if a sound argument is to be extracted, it will have to avoid this.

III. Towards A Re-Formulation

A bit of additional terminology needs to be introduced. When we are speaking of truths (at times) that hold of events, we are not speaking of whether an event is logically possible or not; we are concerned with whether, given what has already happened and any other relevant factors, including laws of nature, it is *settled* that it will occur. From this point forward, I shall use '$\Box$p' to mean 'it is settled that p.' Given antecedent conditions and laws of nature, it is not possible that ~p. If it is not settled that p. then of course it is possible that ~p.

In addition, if we allow for chance events, then not all future events are settled. Suppose we consider the case in which whether or not there will be a sea-battle tomorrow strictly depends upon a chance event that will occur in one of two possible ways, A or B, six hours before the sea-battle will (or won't) occur. That is, if A occurs, then the sea-battle will occur; if B occurs, then

the sea-battle will not occur. If the chance event has not yet occurred, then it is not now settled whether there will be a sea-battle tomorrow. But once the chance event has occurred, it is settled (one way or the other). Thus, since an event can be unsettled at one time and settled at a later time, in order to be clear, temporal indices will have to be attached to the modal operators. For the above story, let 'S' be 'the sea-battle occurs,' 't_1' be the time now, 't_2' be the time of the occurrence of the chance event, and 't_3' the time of the occurrence or non-occurrence of the sea-battle. Suppose further that A occurs at t_2. Then, $t_1 \sim St_3$, but $\Box t_2\ St_3$.

An intuitively appealing way to represent the kinds of relations between events that were just described is to view the temporal sequence of events as forming a branching structure. That is, we will begin with the actual world, α, at a time, t_1, and connect it with an accessibility relation, where the accessibility relation is defined in terms of what is true at t_1, including all laws of nature, to all the future possible worlds consistent with that set of conditions. For any A at t_n (where n>1) that is true in any of the possible worlds accessible from $\alpha\ t_1$, then $t_1\ At_n$. If there is any A at t_n that is true in all possible worlds accessible from $\alpha\ t_1$, then $\Box t_1\ At_n$. And if there is any A at t_n that is false in all possible worlds accessible from $\alpha\ t_1$, then $\underset{\sim}{t_1}\ At_n$. That is, At_n is respectively possible, settled, and it is settled that $\sim At_n$ under the conditions described.

Now we can return to the case of tomorrow's sea-battle. If it is to be both true at $\alpha\ t_1$ that the sea-battle occurs at $\alpha\ t_3$ and also possible at $\alpha\ t_1$ that the sea-battle does not occur at $\alpha\ t_3$, then there will have to be some possible world accessible from $\alpha\ t_1$ in which the sea-battle does not occur at $\alpha\ t_3$. But, of course, there are no such possible worlds. Such a world would be one in which it is both true and false that the sea-battle occurs at t_3. With simple adjustments, a parallel argument can be constructed with respect to the claim that it is both false at $\alpha\ t_1$ that the

sea-battle occurs at αt_3 and that it is also possible at αt_1 that the sea-battle does occur at αt_3.

Note that in the present exposition, I have said nothing so far about the alleged intervening chance event at t_2. As chance events were earlier characterized, there could not be one. I said, that "[g]iven any relevant laws of nature and any set of antecedent conditions, there is at least one alternative possible outcome." In this case, however, there is an antecedent condition, namely, the truth about whether the sea-battle occurs, that precludes the alternative possible outcome. If it is true at αt_1 that the sea-battle will occur at αt_3, and the sea-battle will not occur at αt_3, unless A occurs at αt_2, then A must occur at αt_2.[9] Conversely, if there is a chance event at αt_2 upon which the occurrence or non-occurrence of the sea-battle strictly depends, then it is not true at αt_1 that the sea-battle will occur at αt_3. And again, the parallel holds: if there is a chance event at αt_2 upon which the occurrence or non-occurrence of the sea-battle strictly depends, then it is not false at αt_1 that the sea-battle will occur at αt_3. So, if there are events that are "as chance has it," then some statements about the future are neither true nor false.

This seems a simple argument and I anticipate objection. But first note that I have tried to avoid the earlier objections. I have not argued that there is any generally acceptable inference from a premise p to $\Box$p. Rather, I have argued that in the special case of truths about the future, the accessibility relation is such that the inference goes through for that case. This should also suffice to answer Haack's objection since she did not offer any argument that there could not be an accessibility relation with the feature that she rightly objected to for the general case.

I see two possible objections. First, it might be objected that it is a mistake, in defining

the accessibility relation, to include as a condition upon it the truth about whether there will be a sea-battle. That should not count as one of the facts (or natural laws) obtaining at t_1. But I fail to see why. Admittedly, its being true when (it is claimed that) things could turn out differently is rather strange. In one sense, that is my whole point: I claim that it is not only strange but incoherent. But if it is insisted that it really is true at the earlier time, why may it not be used to infer that there are no accessible worlds in which it turns out to be false, and therefore that (in this special case) the inference from p to $\Box$p goes through?

Second, it might be objected that the claim that it might be true at an earlier time that a sea battle will occur and possible that it will not has been misunderstood. The claim should not have been understood to hold that it is possible that in the actual world the sea battle will not occur. I am not sure what to make of this. It sounds as though it is conceding the point rather than providing an objection. If all that is meant by saying that it is possible that the sea-battle will not occur (though true that it will) is that there is some non-actual world in which it does not occur, I think I can agree and still insist that it is settled for the actual world.

On the whole, I think the argument is sound. And if it is, then we will have to admit either that some statements about the future are neither true nor false or else deny that there are any chance events.

References

Haack, Susan. *Philosophy of Logics.* Cambridge: Cambridge University Press, 1978.

Sorabji, Richard. *Necessity, Cause, and Blame: Perspectives on Aristotle's Theory*. Ithaca: Cornell University Press, 1980.

[1] I am assuming that a chance event is one of two or more possible under exactly the same circumstances. Nothing about the circumstances, including any laws of nature, narrows the set of possible events down to just a single member.

[2] For discussion of some of these, see Sorabji, pp. 91-103.

[3] They may also depend on free choices if those are to be analyzed in a non-deterministic way. I shall speak only of chance events, but what I have to say can readily be extended to free choices.

[4] I am not wedded to the term, "indeterminate" – perhaps, "possible" or some other would do better. I do not mean it, however, to refer only to our inability to determine whether the statement is true or false.

[5] I am not claiming here that this is an adequate *analysis* of sufficient causation. I am inclined to think that causation is more fundamental than natural laws.

[6] This may seem to beg the question against the possibility that there are free choices which are neither chance events nor have sufficient causes. For the present, I will simply say that I am unconcerned with that issue. On some other occasion, it might be worth sorting these out or adopting some term to represent the set of free choices and chance events.

[7] It may be that a probability distribution over a set of outcomes is itself determined by antecedent conditions and laws of nature.

[8] It may be that a probability distribution over a set of outcomes is itself determined by antecedent conditions and laws of nature.

[9] There is a perhaps misleading "must" in here for stylistic reasons. But the argument can be presented without it: It is true at t_1 that the sea-battle will occur at t_3. The sea-battle will not occur unless A occurs at t_2. (And that is true at t_1). So, A will occur at t_2. The occurrence of A rather than B can be deduced from antecedent conditions plus any relevant laws of nature. So A is not a chance event.