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OMNISCIENCE AND THE ARROW OF TIME

Linda Zagzebski

This paper argues that the enduring dilemma of divine foreknowledge and human free will is an instance of a much deeper dilemma in the arrow of time. The assumption that the past has a kind of necessity that the future lacks is inconsistent with the principle that temporal necessity is transferred over entailment and the possibility that a proposition about the past entails a proposition about the future. A closer look at temporal modality leads to the proposal that the causal arrow of time is the underpinning of the modal arrow of time. The idea that propositions about the past and their negations are not causable, whereas propositions about the future (and perhaps some of their negations) are causable is inconsistent with the transfer of causability principle and a variety of metaphysical postulates that imply that a proposition about the future entails or is entailed by a proposition about the past. This dilemma is independent of determinism. No particular way to resolve the dilemma is compelling, but is a matter of metaphysical judgment. Positions on free will, determinism, and omniscience are irrelevant to solving the dilemma in its most general form.

I. The modal arrow of time

One of the ways in which the past and the future are allegedly asymmetrical is that the past has a kind of necessity the future lacks. Events in the past are purportedly necessary simply because they are past, not because of any metaphysical properties other than pastness. So it is said that we can do nothing about spilled milk, and that is meant to contrast with the idea that potentially we can do something about milk that is not yet spilled. This modal asymmetry is sometimes associated with an ontological asymmetry—the past is real, the future is not. The ontological asymmetry can clearly be questioned, but I mention it to call attention to the fact that all of the temporal asymmetries define a property of the past by contrast with the future. The nature of an asymmetry is to be two-sided. So the idea that the past is closed (fixed, necessary) is one side of a single intuition the other side of which is the intuition that the future is open (unfixed, contingent). The Principle of the Necessity of the Past therefore has a correlate: the Principle of the Contingency of the Future.

Perhaps the intuition of the necessity of the past is stronger than the intuition of the contingency of the future. That is possible, but then it is impor-

tant to see that the rejection of either side of the asymmetry threatens the other and suggests that the idea of modal temporal asymmetry is confused. If the kind of necessity possessed by the past is possessed by the future, or even if it is possible that it is possessed by the future, the necessity of the past cannot be something it has simply in virtue of its pastness.

Sometimes when people say that an event in the past is now necessary what they mean is that nobody has any causal power over it. We can lack causal power over an event because it is causally necessary or because it is in the past, and these are not the same thing. Causal necessity and contingency are not temporally asymmetrical. Roughly, a causally necessary event E is one that is such that the conjunction of causal laws and events prior to E are sufficient for E to occur, whereas a causally contingent event E is one that is such that the conjunction of causal laws and events prior to E are not sufficient for E to occur. The causal necessity or contingency of an event has nothing to do with whether it is in our past or our future. An event possesses causal necessity or contingency in virtue of its enduring relations to other events. Assuming the metaphysical law that a cause must precede its effect, an event's causal necessity or contingency is determined by its enduring relations to events previous to it. But whether or not causes must precede effects, the causal modality of an event is not temporally asymmetrical. Even if it is possible for an event to be causally necessary because it is determined by an event later in time, its status as causally necessary never changes. There are causally contingent events in the past as well as in the future, and there are causally necessary events in the future as well as in the past.¹ When an event has the necessity of the past, its temporal status is sufficient to make it beyond the power of anybody to do anything about it. But it can still be causally contingent. Similarly, if an event has the contingency of the future, there is nothing about its temporal status that prevents it from being such that we can do something about it. But it can still be causally necessary. Therefore, it does not follow from the fact that an event is *temporally* contingent that we can do something about it since the event might be beyond our power for some other reason, say, because it is causally necessary. Similarly, it does not follow from the fact that an event is causally contingent that we can do something about it since the event might be beyond our power for some other reason, say, because it is in the past.

So we lack power over causally necessary events and we also lack power over the past. The reason why we lack power over the past is presumably the metaphysical law that causes must precede effects, but the necessity of the past need not depend upon any explanation for our lack of power over the past. We will return to the causal arrow in section II. For this section I will not assume any laws of causality. What I will assume is that the modalities of necessity and contingency apply to the past and the future respectively and are related in standard ways. Let temporal modality be expressed by "now-necessary", "now-possible", "now-impossible", and "now-contingent". I will assume the following relations among the temporal modalities: P is now-necessary if and only if not p is now-impossible. If p is now-necessary, p is now-possible. If p, p is now-possible. To say that p is now-contingent is to say that it is now-possible that p and it is now-possible that not p.

The Principle of the Necessity of the Past can be formulated as follows:

Principle of the Necessity of the Past

If B is a proposition about the past and B is true, then $\text{nec}_t B$.

Given the relation defined above between the now-necessary and the now-possible, when B is a true proposition about the past, it follows that not $\text{poss}_t \text{not } B$.

Systems of modal logic always include a transfer of necessity principle for logical necessity. As applied to temporal necessity, the principle is the following:

Transfer of Necessity Principle (TNP)

$\text{Nec}_t p, \text{Nec} (p \rightarrow q) > \text{Nec}_t q$,

which is logically equivalent to

Transfer of Possibility Principle (TPP)

$\text{Pos}_t p, \text{Nec} (p \rightarrow q) > \text{Pos}_t q$.

TNP has the consequence that logically necessary propositions have the necessity of the past since a logically necessary truth is entailed by every proposition. I find this peculiar, but since nothing in what follows turns on it, I will not modify the principle here in the interests of simplicity.²

Let us say that an essentially omniscient foreknower (EOF) is any being x who satisfies the following condition: Necessarily, for any proposition p and time t at which x exists, x believes p at t if and only if p . Essential omniscience can be shown to be inconsistent with modal temporal asymmetry as described above by the following argument:

1st Dilemma of Foreknowledge and Modal Temporal Asymmetry

Let B = the proposition that I will pour tea at noon tomorrow.

- (1) There is (and was before now) an essentially omniscient foreknower (EOF) [Assumption for dilemma]

The Principle of the Contingency of the Future tells us that

- (2) It is now-possible that B and it is now-possible that not B .

From (1) and the definition of an EOF it follows that

- (3) Necessarily ($B \rightarrow$ The EOF believed before now that B), and necessarily ($\text{not } B \rightarrow$ The EOF believed before now that not B).

By the Transfer of Possibility Principle (TPP), (2) and (3) entail

- (4) It is now-possible that the EOF believed before now that B and it is now-possible that the EOF believed before now that not B .

From (1) and the definition of an EOF we get

- (5) Either the EOF believed before now that B or the EOF believed before now that not B .

From the Principle of the Necessity of the Past we get

- (6) If he did, it is not now-possible that he did not, and if he did not, it is not now-possible that he did.

(5) and (6) entail

- (7) Either it is not now-possible that he did not or it is not now-possible that he did.

But (7) contradicts (4).³

We can formulate a parallel argument using TNP instead of TPP:

2nd Dilemma of Foreknowledge and Modal Temporal Asymmetry

- (1) There is (and was before now) an essentially omniscient foreknower (EOF) [Assumption for dilemma]

(1) and the Principle of the Necessity of the Past tell us that

- (2') Either it is now-necessary that the EOF believed B before now or it is now-necessary that the EOF believed not B before now.

From (1) and the definition of an EOF it follows that

- (3') Necessarily (The EOF believed before now that $B \rightarrow B$), and necessarily (The EOF believed before now that $\neg B \rightarrow \neg B$)

By the Transfer of Necessity Principle (TNP), (2') and (3') entail

- (4') Either it is now-necessary that B or it is now-necessary that not B.

(4') is logically equivalent to

- (5') Either it is not now-possible that B or it is not now-possible that not B.

From the Principle of the Contingency of the Future we get

- (6') It is now-possible that B and it is now-possible that not B.

But (6') contradicts (5').

These arguments have nothing to do with free will. They show that the conflict between an essentially omniscient foreknower and free will rests upon a deeper conflict between essential omniscience and the modal asymmetry of past and future. In short, the following form an inconsistent triad:

(a) The existence of modal temporal asymmetry expressed in the contingency of the future and the necessity of the past [premises (2) and (6), and

(2') and (6')].

(b) The possibility that there is an essentially omniscient foreknower.
[Premise (1)]

(c) The Transfer of Possibility Principle or equivalently, the Transfer of Necessity Principle.

The problem of fatalism is not really about freedom or fate; it is about a type of modality that is temporally asymmetrical and that is transferred over logical entailment. If this type of modality is coherent, it rules out the possibility of essential omniscience. It follows that God could not have "given up" infallible foreknowledge in order to save human freedom since fundamentally the problem is not about free will at all.⁴

But the problem is even more general than this triad illustrates. The reason essential omniscience conflicts with temporal modality and the transfer principles is that the existence of an EOF requires that a proposition about the past entails a proposition about the future. But it straightforwardly follows from TNP that a proposition that is now-necessary cannot entail a proposition that is not now-necessary. So if the past is now-necessary and the future is not, a proposition about the past cannot entail a proposition about the future. Further, it follows from TPP that a proposition that is now-possible cannot entail a proposition that is not now-possible. But false propositions about the past are not now-possible. If the future is contingent, and *p* is about the future, both *p* and not *p* are now-possible. But if *p* is logically equivalent to a proposition about the past, one of either *p* or not *p* entails a false proposition about the past. Hence a proposition that is now-possible entails a proposition that is not now-possible, contrary to TPP. The conclusion is that if asymmetrical temporal modality is coherent, it can obey TNP and TPP, or it can permit a proposition about the past to entail or be logically equivalent to a proposition about the future, but not both.

The root of the problem, then, is that it is impossible for there to be a type of modality that has the following features:

(a) The past and future are asymmetrical in that the past is necessary with respect to this type of modality, whereas the future is contingent with respect to this type of modality.

(b') There are propositions about the past that entail (or are logically equivalent to) propositions about the future.

(c) TNP (or equivalently, TPP) obtains.

For most forms of modality *M*, we simply accept the transfer principles for *M*. But if there is a type of modality that is temporally asymmetrical, that pressures us to resist any principle of temporal modality that results in the past having the contingency of the future or the future having the necessity of the past under pain of reducing temporal modality to incoherence. It might be thought that a way out of this dilemma is to say that the transfer principles need not transfer the same type of necessity or possibility to *q* as is possessed by *p*. We could formulate a principle that transfers a type of necessity to *q* from the type of necessity possessed by *p*, whether or not it is the same type of necessity in both cases. This approach would avoid the incoherence of maintaining that TNP forces us to conclude that the future has the necessity of the past, but it does mean that the future has whatever

type of necessity is transferred from the necessity of the past. This approach faces the same dilemma as the one addressed in this section, only it is more subtle. If the intuitions that undergird the necessity of the past require modal temporal asymmetry, the idea that the future inherits a type of necessity from the past undermines those intuitions. Modal temporal asymmetry is in tension with (b') and (c) whether or not the necessity the future inherits from the past is exactly the same kind of necessity as the necessity of the past.

We have seen that the problem of foreknowledge and free will is not about free will. Now we see that it is not even about foreknowledge. It is about the logic of a modality that expresses a common view of time. Either (a), (b'), or (c) is false. Either the transfer principles are false, it is not possible for a proposition about the past to entail a proposition about the future, or the modal asymmetry of time is confused.⁵ Since the transfer principles are a part of every system of modal logic, the price of denying them is to adopt a non-standard system of temporal modality. But there is also a high metaphysical cost for taking the second option. If it is impossible that a proposition about the past can entail a proposition about the future, much more is ruled out than the possibility of infallible foreknowledge. It is impossible that there is a perfect rememberer, a being who infallibly remembers every one of her past conscious states. It is impossible that there is a perfectly constant lover, someone who necessarily continues to love once he begins to love. It is impossible that matter is indestructible. In fact, it is impossible that anything is indestructible. Each of these metaphysical hypotheses requires that it is metaphysically necessary that if some proposition about the past is true (e.g., matter existed), some proposition about the future is true (e.g., matter will exist next year). I do not find this option very appealing either.⁶

The final option is to reject modal temporal asymmetry as described in this section. Some form of temporal asymmetry is so firmly ingrained in ordinary thinking that it is virtually impossible to give it up, but that does not mean that the temporal arrow has been accurately described using standard modal notions. In order to choose among rejecting (a), (b'), or (c), I propose that we take a closer look at the temporal arrow.

II. *The causal arrow of time*

In describing temporal asymmetry in section I, I made it artificially simple. I also followed common practice in subsuming temporal asymmetry under the standard modalities of necessity and possibility which are assumed to be related in standard ways. This approach may make it seem obvious that the modalities of past and future are describable by the axioms of modal logic, including TNP. But I find it interesting that ordinary people rarely refer to the past as "necessary", and it is even less clear that they assume the standard relations among the modalities in their thinking about time. If a proposition is necessary, it is possible, but do we normally think of the past as possible? The negation of a necessary truth is impossible, but it seems to me that instead of treating propositions about the past and their negations as having contrary modalities, both the actual

past and all alternate pasts are typically put in the category of *what we cannot do anything about*. Perhaps the logical relations among the necessary, the possible, and the impossible are more precise renderings of vague and untutored (and untrustworthy) ordinary intuitions about time. But it is also possible that the relations assumed in the previous section express to some extent a false precision. The idea that we cannot do anything about the past whereas we can in principle do something about (a portion of) the future is part of a network of ideas about time and causality. If there is an inconsistency within the network, the resolution of the conflict ought to do as little damage as possible to the network as a whole.

I will not attempt to identify all the key components of the network of beliefs about time and causation that underly the intuition of modal temporal asymmetry, but I want to call attention to a few features that I think are relevant to resolving the inconsistency identified in the last section. First of all, I suspect that the intuitive basis for modal temporal asymmetry would be badly shaken if certain laws of causality turned out to be false, in particular, the law that causes must precede their effects. If I am right in this conjecture, what leads us to think there is a modal temporal arrow is our beliefs about what accompanies past and future, not pastness and futurity *per se*. The reason why we think we can do nothing about spilled milk may not be the pastness of the spilled milk in itself, but pastness conjoined with the metaphysical principle that the cause must be prior to the effect. If this is the deeper intuition behind the modal asymmetry of time, it would explain the fact that we do not think our power over the future is on a par with our lack of power over the past. The entire past is outside the realm of causal power, but that does not mean that the entire future is within the realm of causal power. We have no causal power over the past because it is too late to either cause it or to prevent it whether or not any of it is causally contingent, but we also have no power to prevent what is causally necessary in the future, although we can cause it. In fact, somebody or something *must* cause it if it is causally necessary. The most interesting category is that which we have both the power to cause and the power to prevent. If there is anything in this category, it has to be in the future. Temporal asymmetry, then, is fundamentally an asymmetry in what is causable. Anything that is either past or causally impossible is not causable. What is neither past nor causally impossible is causable. We can define the causally closed and causally open in terms of what is causable: Proposition *p* is causally closed just in case neither *p* nor not *p* is causable. Proposition *p* is causally open just in case both *p* and not *p* are causable. The entire past is causally closed; some of the future (it is hoped) is causally open.

The modes of causable and not causable as just described do not correspond very well to the standard modes of necessary, possible, impossible, and contingent. The actual past is not causable, but alternative pasts are not causable either. If it is too late to make something have happened, it is too late to make something else have happened instead. So if a proposition *p* is about the past, neither *p* nor not *p* is causable; *p* and not *p* are causally closed. This is one disanalogy with the standard modalities since if *p* is necessary, its negation is impossible. The realm of standard modality is divided into the possible and the impossible. The necessary is a subset of

the possible and the contingent is the possible that is not necessary. In contrast, the modes I am suggesting divide events into the causable and the not causable. There is a set of propositions p which are such that both p and not p are not causable. There is a set of propositions p which are such that both p and not p are causable. And there is a set of propositions p which are such that p is causable and not p is not causable. I am not assuming that none of these sets is empty. The three categories are meant only to describe the logical possibilities of causability.

I propose that the intuition of temporal asymmetry is related to causability in the following way:

(i) If a proposition p is about the past, p is not causable and not p is not causable. Propositions about the past are causally closed. [Principle of the Causal Closure of the Past]

(ii) If a proposition p is about the future and p is true, p is causable. [Principle of the Causability of the Future]⁷

(iii) There are propositions p about the future which are such that both p and not p are causable. Such propositions are causally open.

(iv) There are propositions p about the future which are such that p is causable and not p is not causable. The former are causally necessary and the latter are causally impossible.

These features seem to me to express the intuitive idea that a cause must precede its effect and that some of the future is causally determined, but some of it is not. Even if it turns out that all of the future is causally determined—and that needs to be decided on metaphysical and empirical grounds, not by the logic of cause, the causal arrow as just described recognizes a difference between our causal relation to the past and our causal relation to the future.

A more complicated part of the network of intuitions about time involves the metaphysically necessary conditions for events of certain kinds to occur. There is a time-honored metaphysical principle of causation that nothing can come from nothing. According to that principle, the proposition that something will exist in the future entails the proposition that something existed in the past. If it is metaphysically necessary that no object can come into existence uncaused, then the proposition that some x will exist in the future entails that some y existed in the past that is in the causal chain leading to the existence of x . If it is not metaphysically necessary that an object be caused by its actual causes, then the objects in the causal chain leading to x in one world will not be identical to the objects in the causal chain leading to x in another world. Nonetheless, there is no possible world containing a future x that does not have something existing in the past that is causally necessary for x 's existence in that world.

Let us now consider the transfer principles for causability parallel to those for necessity and possibility:

Transfer of Causability Principle (TCP)

Causable p , Nec ($p \rightarrow q$) > Causable q

Transfer of Noncausability Principle (TNCP)

Not causable p , Nec ($p \rightarrow q$) > Not causable q

These principles are false as stated and must be modified. Since a logically necessary truth is entailed by every proposition, TCP has the consequence

that if q is logically necessary, q is causable. But surely nobody has the causal power to bring about the truth of a logically necessary proposition. To avoid this problem TCP must be amended:

Transfer of Causability Principle 2 (TCP2)

Causable p , Nec ($p \rightarrow q$), & q is not logically necessary $>$ Causable q
 Similarly, since an impossible proposition entails every proposition, TNCP has the consequence that if p is logically impossible, q is not causable no matter what q is. It also needs to be amended:

Transfer of Noncausability Principle 2 (TNCP2)

Not causable p , Nec ($p \rightarrow q$), & p is not logically impossible $>$ Not causable q .⁸

The causal arrow, the assumption that a proposition about the past entails a proposition about the future, and TNCP2 can be shown to be inconsistent. The argument is similar to the second dilemma of section I except that since neither of the propositions *The EOF believed B before now* and *The EOF believed not B before now* are causable, two contradictions follow. A more interesting comparison is the form of the dilemma using TCP2 which is revealingly different from the first dilemma of section I. The causal arrow and TCP2 is inconsistent with the assumption that a proposition about the future entails a proposition about the past. The principle that nothing can come from nothing will suffice to generate the inconsistency. Let us consider the proposition that some human female will exist in the future. If there is more than one future human female, pick one for the sake of the argument and call her Eve. It is not necessary to assume that Eve's existence is open, that is, that both the proposition that Eve will exist and its negation are causable. It is sufficient that either Eve's existence or her non-existence is causable. The dilemma therefore does not assume the falsehood of determinism.

Dilemma of Causal Asymmetry

- (10) Necessarily [(Eve will exist in the future $\rightarrow$ The causally necessary conditions for Eve's existence obtained in the past, & (Eve will not exist in the future $\rightarrow$ the causally necessary conditions for Eve's non-existence obtained in the past)]

The Principle of the Causability of the Future tell us that

- (11) Either it is causable that Eve will exist or it is causable that Eve will not exist.

From TCP2 we get

- (12) Either it is causable that the causally necessary conditions for Eve's existence obtained in the past or it is causable that the causally necessary conditions for Eve's non-existence obtained in the past.

From the Principle of the Causal Closure of the Past it follows that

- (13) It is neither causable that the causally necessary conditions for Eve's existence obtained in the past nor causable that the causally necessary conditions for Eve's non-existence obtained in the past.

But (13) contradicts (12).

If Eve's existence is causally open, (11) will be a conjunction instead of a disjunction, permitting the derivation of two contradictions by the above pattern. The conclusion is that whether or not the future is causally open, the following forms an inconsistent triad:

- (a') The past and future are causally asymmetrical in that the past is not causable whereas the future is causable.
- (b'') There are propositions about the future that entail propositions about the past.
- (c') TCP2 obtains.

I find this a particularly intriguing dilemma because there is an inconsistency in the causal arrow not only when a proposition about the past entails or is equivalent to a proposition about the future, but even when a proposition about the future entails a proposition about the past. Furthermore, the dilemma does not depend upon the openness of the future in the sense that for some propositions p about the future, both p and not p are causable. The only assumption needed to generate the dilemma is that propositions about the future are causable, whether or not their negations are causable as well.

III. *The options*

What are the options for avoiding inconsistency in the causal arrow of time? How do they compare with those for escaping the inconsistency in the modal arrow? The options for escaping the two dilemmas are as follows:

Modal Arrow dilemma

1. The modal arrow is an illusion
2. A proposition about the past cannot entail (nor be logically equivalent to) a proposition about the future.
3. TNP and TPP are false.

Causal Arrow dilemma

1. The causal arrow is an illusion.
2. A proposition about the future cannot entail or be entailed by a proposition about the past.
3. TCP2 and TNCP2 are false.

There is a difference in the plausibility of the first option in the two dilemmas if I am right that the causal arrow as described in section II is more plau-

sible than the modal temporal arrow described in section I. The two arrows are obviously related, but they are not identical and I suggest that the intuitions about causality described in the last section are the underpinnings of the modal arrow of time. If the law that causes must precede effects turned out to be false, the modal arrow would collapse. Furthermore, the belief that there are causally necessary events in the future puts an important limitation on the intuition of temporal asymmetry that explains why the principle of the contingency of the future is weaker than the principle of the necessity of the past. The causal arrow reveals that; the modal temporal arrow does not. Of course, further investigation may reveal that both arrows are illusory, but I think the causal arrow is much less likely to be mistaken. I suggest, then, that whereas the modal arrow may be confused, the first option to escape the causal arrow dilemma is not very appealing and should be taken only as a last resort. In any case, almost all writers on both sides of the debate over theological fatalism assume the causal arrow.

That reduces our options for the causal dilemma to the second and third. Consider next the second option. As we saw in the discussion of the modal dilemma, there is a metaphysical price for taking the second option since it rules out the possibility that a proposition about the past entails a proposition about the future, and hence it is impossible that matter is indestructible, that there is a perfect rememberer, and many others. The second option in the causal dilemma is even more restrictive since it also rules out the possibility that a proposition about the future entails a proposition about the past. So it makes the traditional metaphysical principle that nothing can come from nothing metaphysically impossible. Furthermore, it is likely that there are particular metaphysically necessary conditions that must obtain prior to any given event. If so, the proposition that the event occurs entails a proposition about conditions obtaining previously. A simple way this can occur is when an event is part of a more complex event extended in time, say a baseball game. A necessary condition for the ninth inning to begin is that eight innings have been previously played. So the proposition expressed by "The ninth inning is about to begin" entails "Eight innings were played already." More complex conditions are those required for the exercise of human agency. I am not interested in identifying any particular conditions for human agency here. I merely want to point out that there probably are some. For example, propositions about future human choices probably entail propositions about the past existence of rational beings. More subtle examples involve responses to past events. It is arguably necessary that nobody can forgive someone for a past wrong unless something previously happened that is the object of the forgiveness.⁹ But according to the option we are considering, the transfer principles are permitted to trump all of the metaphysical postulates we have considered: that matter is indestructible, that nothing can come from nothing, that essential omniscience or a perfect rememberer is possible, that the beginning of the ninth inning entails that eight innings have been previously played, etc. Of course, some of these postulates may be quirky or have no basis in a plausible metaphysical theory. The issue, however, is whether their rejection should be decided on metaphysical grounds or whether they should be automatically eliminated because TCP2 and TNCP2 take precedence.

The final option is to reject the transfer principles. TNP and TPP are considered to be indisputable by some writers on fatalism because TNP is an axiom of modal logic, but the same defense cannot be made of TCP2 and TNCP2. Neither is an instance of a standard transfer of modality principle and causability is not a standard modality. TCP2 and TNCP2 need defense. It seems to me that TCP2 and TNCP2 are probably false, but my purpose in this paper is not to argue for their falsehood, but to argue that there are metaphysical costs in adopting TCP2 and TNCP2 that are much more far-reaching than merely denying the possibility of essential omniscience.

Rejecting TCP2 and TNCP2 leaves open the possibility that a proposition about the future entails a proposition about the past and that a proposition about the past entails a proposition about the future. Such possibilities in particular cases would be decided by features of logic and metaphysics that do not automatically give precedence to the transfer principles. This option has the advantage of not ruling out in advance the hypothesis that nothing comes from nothing, that matter is indestructible, that there is an essentially omniscient being, and many others. Whether TNP and TPP are false also is somewhat more problematic because I have already given reasons for thinking that the modal temporal arrow is confused, or at least incompletely described. Since it is not clear to me that the standard modalities apply to time at all, I have no position on rejecting TNP and TPP.¹⁰

I conclude that the logic of modality does not force us to accept the transfer of causability and non-causability principles. It does not even force us to accept the transfer of necessity and the transfer of possibility principles for temporal modality. The way we escape the inconsistency in the causal and modal arrows of time is the result of metaphysical choice.

III. The Tooley defense of TNP

Michael Tooley argues in his critique of my book on foreknowledge that TNP is true for temporally asymmetrical necessity as he defines it.¹¹ He uses the convention of calling the necessity of the past accidental necessity, which he defines as follows:

It is accidentally necessary that *p* at time *t* if and only if *p* is not preventable at *t*.

After a few attempts at interpreting preventability, Tooley settles on the following definition of accidental necessity:

(AN) It is accidentally necessary that *p* at time *t* if and only if no being, either actual or possible, acting at time *t*, could causally bring it about that *p* is false. (220).

By this definition accidental necessity is not the same as the necessity of the past, the modality I addressed in section I. Instead, accidental necessity is close to what I have called causability:

Why might one think that this connection [between accidental necessity and preventability] obtains? The basic reason is that, in the world as it is, we can perform actions that determine, at least in part, how the future is, but we cannot perform actions that determine how the past is, and it seems plausible that it is this fact about the world that leads many people to feel that there is a deep asymmetry between the past and the future, and, in particular, that the past is fixed, or accidentally necessary, while the future is not. For suppose, by contrast, that we *were* able to perform actions now that would determine how the past is. Surely we would no longer view past events as accidentally necessary. (p. 219).

So Tooley thinks of accidental necessity as temporally asymmetrical in that the past has it and some part of the future does not. Further, it is a type of necessity that depends upon the view that we have no causal power over the past. Given that intuition, we can no more bring about the past than prevent it, but it is preventability that Tooley thinks is particularly salient for the foreknowledge dilemma. Tooley says (AN) is very plausible (220).

Notice first that (AN) cannot capture what Tooley intends by accidental necessity since it immediately follows from (AN) that logically impossible propositions are accidentally necessary. (AN) therefore must be modified:

- (AN2) It is accidentally necessary that *p* at time *t* if and only if *p* is not logically impossible and no being, either actual or possible, acting at time *t*, could causally bring it about that *p* is false.

Tooley says that given (AN), it can be shown that the transfer of necessity is true for accidental necessity. His demonstration consists of (AN) and one premise which he asserts is an analytic truth, and which is logically equivalent to the conclusion he wants to prove. His argument is as follows:

- (1) It is accidentally necessary that *p* at time *t* if and only if no being, actual or possible, acting at time *t*, could causally bring it about that *p* is false. (AN)

Tooley follows this with the premise he takes to be analytic:

- (2) If *p* entails *q*, then causally to bring it about that *q* is false is also causally to bring it about that *p* is false.

From (2) it follows that

- (3) If *p* entails *q*, and some actual or possible being, acting at time *t* could causally bring it about that *q* is false, then that being, acting at *t*, could also bring it about that *p* is false.

By contraposition he gets

- (4) If p entails q , and no actual or possible being, acting at time t , could causally bring it about that p is false, then no actual or possible being, acting at time t , could causally bring it about that q is false.

By (AN) he concludes

- (5) If p entails q , and it is accidentally necessary that p at t , then it is accidentally necessary that q at t . (Transfer of Accidental Necessity Principle)

Notice first that (2), which Tooley takes to be an analytic truth, is false. If p is logically impossible, p entails q no matter what q is. Hence, according to (2), to causally bring about that some q is false is to causally bring it about that a logically impossible proposition is false. But surely we do not get causal credit for bringing about the falsehood of every logically impossible proposition whenever we bring about the falsehood of some other proposition. So we must add the qualification that p is not impossible to (2):

(2a) If p entails q and p is not logically impossible, then causally to bring it about that q is false is also causally to bring it about that p is false.¹² But whether or not (2) is modified as (2a), it is just another form of the transfer of necessity principle that Tooley wants to prove. The conclusion is logically equivalent to the premise, as his own argument shows. And if (4) is not analytic, neither is (2), so the argument above is hardly a proof of it.

So Tooley does not have a proof of his transfer principle. Notice also that his transfer principle (5) is not a standard transfer of necessity principle, but is equivalent to the transfer of causability principle (TCP):

causable p , nec ($p \rightarrow q$) > causable q .

The equivalence follows from the fact that to cause p to be true is to cause not p to be false. Hence, TCP is equivalent to

Nec ($p \rightarrow q$), causable not p is false > causable not q is false.

By contraposition and exportation we get

Nec ($\text{not } q \rightarrow \text{not } p$), causable not p is false > causable not q is false,

which by substitution is equivalent to

Nec ($p \rightarrow q$), causable q is false > causable p is false.

By exportation we get

Nec ($p \rightarrow q$) > (causable q is false > causable p is false).

And contraposition yields

Nec $(p \rightarrow q) > (\text{not causable } p \text{ is false} > \text{not causable } q \text{ is false})$, which is the same as Tooley's (4). His (5) is a substitution in (4) of his definition of accidental necessity (AN).

So Tooley accepts TCP. That means he is faced with the dilemma of the causal arrow. Given his acceptance of TCP (suitably modified to TCP2), if he is serious about the assumption of temporal causal asymmetry to which he appeals in explaining accidental necessity, he must reject the possibility of entailments between propositions about the past and propositions about the future, not just the possibility of infallible foreknowledge of the contingent future, as shown in section II.

In explaining his own position, Tooley says, "If, as I have argued in detail elsewhere, the future is not real, then I think it can be shown that it is logically impossible for anyone to have knowledge of future states of affairs unless those states of affairs are causally determined." (223). But if the futurity of the future makes it unreal, then the causally determined future is unreal also. And if unreality is sufficient to make something unknowable, the determined future should be unknowable as well. In any case, the problem is not knowability; it is a problem about logical relations between past and future propositions.

IV. Conclusion

In this paper I have argued that the perennial dilemma of infallible foreknowledge and free will is not unique to either foreknowledge or free will. The problem arises for a multitude of metaphysical hypotheses in addition to the hypothesis of essential omniscience, and it reveals an inconsistency between any of these hypotheses and a common view of the asymmetry of time. No particular solution to the problem is forced. We are neither forced to give up temporal asymmetry nor the possibility that there are entailments between propositions about the past and the future, nor are we forced to give up the principle that the relevant type of temporally asymmetrical modality is closed under entailment. But we are forced to give up one of the three. The choice ought to be made on metaphysical grounds, retaining as much as possible our firmest intuitions about time and causality.

Notice that any approach to the classic dilemma of theological fatalism that is specifically designed to handle essential omniscience, such as the timelessness move or the Ockhamist move, will not help with the dilemmas of this paper. It is, of course, possible, perhaps likely, that there is more than one solution to the foreknowledge/free will dilemma, but whatever solves the dilemmas of this paper will solve the foreknowledge dilemma as well.

Notice also that the problem of this paper is independent of determinism. It is sometimes argued that if determinism is true, there is no problem of theological fatalism because determinism has the consequence that whatever kind of freedom we have is compatible with the inability to do otherwise. But the problem of this paper arises whether or not freedom requires the ability to do otherwise since freedom is not the problem. There is a conflict within a common view of time whether or not the universe is causally determined.

NOTES

1. I am assuming that both causally contingent and causally necessary events exist. If all events are causally necessary, it is obvious that causal necessity is not the same thing as the necessity of the past.

2. I will not distinguish logical and metaphysical necessity in this paper. I assume that a logically or metaphysically necessary proposition is one that is true in all possible worlds.

3. I first presented a form of this argument in the Appendix to *The Dilemma of Freedom and Foreknowledge* (Oxford University Press, 1991). A version close to the one here appears in "Omniscience, Time, and Freedom," *Guide to Philosophy of Religion*, edited by William Mann, forthcoming, Blackwell. In that paper I did not notice that TPP is used in the inference to (4). I thank Ray Elugardo for pointing that out to me.

4. The view called the Open God view or Free Will theism has the position that God takes the risk of not having infallible foreknowledge in order to give humans free will. But if my argument here is right, there is nothing to give up because infallible foreknowledge is metaphysically impossible if time is modally asymmetrical and TNP holds. If time is not modally asymmetrical or TNP is false, giving up infallible foreknowledge is not necessary. For a defense of the open God view see Clark Pinnock, Richard Rice, John Sanders, William Hasker, and David Basinger. *The Openness of God: A Biblical Challenge to the Traditional Understanding of God* (Downers Grove, Ill: InterVarsity Press, 1994).

5. I suggest that the modal asymmetry of time is incoherent in "Omniscience, Time, and Freedom."

6. Notice that the option of rejecting (b') also rules out the possibility that the following propositions are both logically equivalent and have different temporal modalities:

(1) It was true yesterday that X would happen tomorrow.

(2) X will happen tomorrow.

Either (1) and (2) are not logically equivalent or it is not the case that (1) has the necessity of the past whereas (2) does not. Propositions like (1) and (2) are, of course, the ones typically used in arguments for logical fatalism. This shows that the deeper problem of logical fatalism is not a problem about fatalism either.

7. Principle (ii) will need a qualification if there are events that are literally uncaused, such as the decay of an atom of plutonium. I assume that such events do not affect the causability of the ordinary events that are the topic of this paper. I thank Bill Hasker for pointing out this problem with the principle of the causability of the future.

8. These principles are forms of what William Hasker calls "Power Entailment Principles," which he defends in a number of places. See *God, Time, and Knowledge* (Ithaca: Cornell University Press, 1989), and "Zagzebski on Power Entailment," *Faith and Philosophy* 10, #2 (April 1993), 2250-2255, and my rejoinder in the same issue.

9. I thank Dan Speak for this example.

10. Note that TNP and TPP would fail if sentences of the form "It is now-possible that p" and "It is now-necessary that p" are hyper-intensional. A context U is hyper-intensional when logically equivalent propositions are not inter-substitutable in U. For example, belief contexts are hyper-intensional since we cannot substitute "The even prime number is greater than 1" for "2 is greater than 1" in the sentence "Sally believes that 2 is greater than 1." Sally may be a young child who knows that 2 is greater than 1, but has never heard of prime numbers. If contexts of temporally relative modality are hyper-intensional, the

proposition *The essentially omniscient foreknower believed B before now* is not inter-substitutable with the logically equivalent proposition *B* in (2) and (2'). Unlike belief contexts, however, I doubt that we can appeal to our intuitions to settle the issue of whether temporally modal contexts are hyper-intensional.

11. Michael Tooley, "Freedom and Foreknowledge," *Faith and Philosophy* 17. 2 (April 2000), 212-224.

12. Bill Hasker has observed to me that Tooley's (2) is false for another reason. It may be that *p* is false for some reason that is independent of the truth of *q*. For example, *p* might be the proposition *Hasker is short of money and Al Gore is US President*, and *q* is the proposition *Hasker is short of money*. I can cause the falsehood of *q* by giving Hasker money, but I do not thereby cause the falsehood of *p*, which is already false.