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Freedom, foreknowledge, and the necessity of the past.

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FREEDOM, FOREKNOWLEDGE,

AND

THE NECESSITY OF THE PAST

A Dissertation Presented

By

Larry Wayne Hohm

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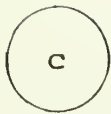
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To My Parents

Arnold and Lillian Hohm

ABSTRACT

Freedom, Foreknowledge, and

the Necessity of the Past

(May 1984)

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There is an ancient puzzle about divine foreknowledge
and human freedom. If God has already known that you will
do a certain thing tomorrow, then it must already be a
settled fact that God has known this. Since knowledge
entails truth, it must also be a settled fact that you
will do it. In that case, you really cannot avoid doing
it. If so, then when you do it tomorrow, you won't do it
freely.

This dissertation consists of a careful statement of
the puzzle and an examination of its principal solutions.
These are (a) fatalism, the view that nothing about the
past, present, or future is open, (b) eternalism, the view
that God exists outside of time, (c) semantic indeter-
minism, the view that some propositions are neither true
nor false, and (d) Ockhamism, the view that some things
about the past are open.

In Chapter I the puzzle is stated carefully and its

solutions are sketched.   Chapters II   through V each dis-
cuss one of the principal solutions.   It is argued that
fatalism and semantic indeterminism are not adequate solu-
tions to the puzzle.   These positions cannot accommodate
or adequately explain away our intuition that there is
something someone can but will not do.   Eternalism is seen
to be a formally coherent view, but it also does not pro-
vide a satisfying solution to the puzzle.   It is argued
that Ockham's solution succeeds where the others fail.
Finally, it is argued that although Ockham denies the
necessity of the past, endorsing his solution does not
force one to hold that we can literally change the past.
It is concluded that Ockham's solution accommodates our
intuitions about freedom and the future without charging
a price.

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THE PUZZLE

1. <u>Introduction</u>

There is an ancient puzzle about divine foreknowledge and human freedom. If God has already known that you will do a certain thing tomorrow, then it must already be a settled fact that God has known this. Since knowledge entails truth, it must also be a settled fact that you will do it. In that case, you really cannot avoid doing it. If so, then when you do it tomorrow, you won't do it freely.

This puzzle has been stated in a variety of ways. In <u>De Veritate</u>, Aquinas formulates it as an argument for the conclusion that everything God knows is necessary.

> 7. In every true conditional, if the antecedent is absolutely necessary, then the consequent is ab-solutely necessary. But this conditional is true: if something was known by God, that will be. There-fore, since this antecedent, namely, this was known by God, is absolutely necessary, the consequent will be absolutely necessary. Therefore, it is necessary that everything known by God exists absolutely. That this is absolutely necessary, namely, this was known by God, is proved thus: this is something said about the past, so if it is true, it is necessary; because what was cannot not have been. Therefore, it is absolutely necessary.[1]

Jonathan Edwards uses essentially the same conclusion in his detailed formulation.

1.   I observed before, in explaining the nature of necessity, that in things which are past, their past existence is now necessary: having already made sure of existence, 'tis too late for any possibility of alteration in that respect: 'tis now impossible, that it should be otherwise than true, that that thing has existed.

2.   If there be any such thing as a divine fore-knowledge of the volitions of free agents, that foreknowledge, by the supposition, is a thing which already _has_, and long ago _had_ existence; and so, now its existence is necessary; it is now utterly impos-sible to be otherwise, than that this foreknowledge should be, or should have been.

3.   'Tis also very manifest, that those things which are indissolubly connected with other things that are necessary, are themselves necessary.   As that proposition whose truth is necessarily con-nected with another proposition, which is neces-sarily true, is itself necessarily true. To say otherwise, would be a contradiction; it would be in effect to say, that the connection was indissoluble, and yet was not so, but might be broken.   If that, whose existence is indissolubly connected with something whose existence is now necessary, is itself not necessary, then it may _possibly_ _not_ _exist_, notwithstanding that indissoluble connection of its existence.--Whether the absurdity ben't glaring, let the reader judge.

4.   'Tis no less evident, that if there be a full, certain and infallible foreknowledge of the future existence of the volitions of moral agents, then there is a certain infallible and indissoluble con-nection between those events and that foreknowledge; and that therefore, by the preceeding observations, those events are necessary events; being infallibly and indissolubly connected with that whose existence already is, and so is now necessary, and can't but have been.[2]

The conclusion of Edwards's argument seems to be that

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1. Thomas Aquinas, _De_ _Veritate_, qu. 2, art. 12. I thank Robert Sleigh for this translation, which is from _Opera_ _Omnia_, ed. Stanislai Eduardi Fretté, vol. 14 (Paris: Ludovicum Vivès, 1889), p. 376.

since God has full, certain, and infallible foreknowledge of future events, those future events are necessary.

The puzzle can also be stated as an argument for the conclusion that divine foreknowledge is incompatible with human freedom.[3] If such an argument were successful, it would deal a serious blow to the Jewish and Christian religions. These religions teach that God is omniscient; many versions of them also teach that at least some human actions are free. Presumably, if God is omniscient then God has knowledge of the future. Thus, if divine foreknowledge is incompatible with human freedom, it would appear that many versions of these religions are inconsistent.

This dissertation consists largely of a careful statement of the puzzle, and an examination of its principal solutions. In this introductory chapter, I clarify the puzzle and survey the responses that could be given. Later chapters consist of detailed discussions of the solutions.

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2. Jonathan Edwards, "Freedom of the Will," (1754), sec. 12; where reprinted as "Foreknowledge Inconsistent with Contingency," in Readings in the Philosophy of Religion, ed. Baruch A. Brody (Englewood Cliffs, N.J.: Prentice-Hall, 1974), pp. 393-94.

3. See Nelson Pike, "Divine Omniscience and Voluntary Action," Philosophical Review 74 (1965): 27-46.

The puzzle can be seen to rest upon six assumptions.

A.   Some propositions about the future are contingent.

B.   God has always been omniscient.

C.   Every proposition about the future is either true or false.

D.   All true propositions about the past are necessary.

E.   Knowledge entails truth.

F.   Whatever follows from something necessary is itself necessary.

A is a consequence of human freedom. If you freely do a certain thing tomorrow, then as of now, it is a contingent matter that you will do it. B and C together imply that God has always had foreknowledge. D says that the past is necessary; in the words of Aquinas, "what was cannot not have been." E and F seem to be beyond question. These assumptions are plausible; and yet, we shall soon see that they are inconsistent.

In sections one and two of this chapter, I discuss the salient concepts that appear in the puzzle: necessity, contingency, the past, and the future. In section three I state the puzzle carefully, and in section four I sketch its principal solutions. Each of these consists in denying one of the above assumptions. In the final section I briefly describe my view.

2. <u>Necessity</u> <u>and</u> <u>Contingency</u>

Essential to the puzzle is the notion of necessity. Necessity can be treated either as a <u>property</u>, or as a <u>modality</u>. Treating it as a property, we would ascribe necessity to· statements or propositions in much the same way as we ascribe properties to material objects. We might say that the proposition, <u>everything is self-identical</u>, is necessary. Thus a statement ascribing necessity to a proposition p might be symbolized best in first order logic; for example, as Np, where 'N' is a predicate letter and 'p' is a constant.

On the other hand, if necessity is treated as a modality, then we would express it by prefacing statements with some such phrase as 'it is necessary that'. We might say, "it is necessary that everything is self-identical." Prefaced statements such as these are perhaps symbolized best within modal logic; for example, as []P, or LP, where '[]' and 'L' are sentential operators.

So far as I know, none of the issues surrounding the puzzle with which we are concerned turns upon our choice between these alternative treatments. When the discussion is informal, I shall use whichever treatment is more con-venient; but when the discussion calls for precision, I shall treat necessity as a modality.

There are, of course, many senses of 'necessary'. For example, a given proposition might be logically necessary, metaphysically necessary, physically necessary, or temporally necessary. The strongest of these senses is logical necessity, which applies to all and only the truths of classical logic. It is <u>logically</u> <u>necessary</u>, for instance, that every puzzle is a puzzle. A moment's reflection will show that this sense of 'necessary' does not give us an interesting interpretation of the puzzle. If we interpret the fourth assumption with this sense of 'necessary', then it asserts that all true propositions about the past are logically necessary. That claim is not true: although Descartes invented analytic geometry centuries ago, that he did is no truth of classical logic.

A weaker sense of 'necessary' is metaphysical necessity. The basic idea here is that a proposition is <u>metaphysically</u> <u>necessary</u> if it "could not have been false," or if it is "true in all possible worlds." All logically necessary propositions are metaphysically necessary, but others are too. For example, it is metaphysically necessary that no one is taller than oneself. This sense of 'necessary' also fails to produce an interpretation of our puzzle that is worthy of detailed discussion. Interpreted with this sense, the fourth assumption says that all true propositions about the past are metaphysically necessary.

But it is also not metaphysically necessary that Descartes invented analytic geometry; Mersenne could have invented it instead.

Another sense of 'necessary' is physical necessity. To say that a proposition is _physically necessary_ is to say, roughly, that it is required by the laws of physics. For instance, it is physically necessary, and not surprising, that my car never travels faster than the speed of light. This sense of 'necessary' also yields an unsatisfying interpretation of our puzzle, as can be seen via the same example. The laws of physics do not entail that Descartes invented analytic geometry.

Temporal necessity provides another interpretation of the fourth assumption. A proposition is _temporally necessary_ if it is, always was, and always will be, true. It is easy to see, however, that this sense of 'necessary' also produces an implausible interpretation of the fourth assumption. Although it has been true since Descartes's time that he _invented_ analytic geometry, it was not true before then.

These observations about various senses of 'necessary' are obvious, but important. The puzzle isn't puzzling without a suitable sense of 'necessary'--a sense in which it is plausible to assume that the past is necessary. There is such a sense of 'necessary', which I call

<u>unalterability</u>. Roughly, the idea is this: it is <u>unalter-</u>
<u>able</u> that P as of a time, t, if there is nothing any group
of people can do as of t such that, were that group of
people to do it, it would not be true at t that P. (I
assume here that a group may contain only one member. I
also assume that the quantifier, 'any group', is
restricted to groups that do not contain any omnipotent
members.) It is unalterable as of now, for example, that
the sun will set tomorrow, that you are now reading this
sentence, and that I grew up in Omaha. Saying that a
proposition is unalterable, in this sense, is similar to
saying that it is unpreventable, irrevocable, inevitable,
or unavoidable.

More will be said about unalterability in sections
five through seven of chapter five. For now I want merely
to point out that unalterability will provide a plausible
interpretation of the fourth assumption of our puzzle. It
is natural to assume that the past is unalterable. What's
done is done. Descartes invented analytic geometry, and
no one can take that distinction away from him now. I
planted my tomatoes too early this year, and they were
killed by a late frost. Nothing can be done now to save
them.

For each sense of 'necessary' we mentioned, there are
corresponding senses of 'possible' and 'contingent'.

Unalterability is the sense of 'necessary' in which we are interested; I call the corresponding sense of 'possible' _accessibility_. Roughly, it is _accessible_ that P as of t, if there is something some group of people can do as of t such that, were that group to do it, it would be true at t that P. Thus unalterability and accessibility are duals of each other. It is accessible that P as of t if and only if it is not unalterable as of t that -P; it is unalterable as of t that P if and only if it is not accessible as of t that -P. The corresponding sense of 'contingent' is what I call _openness_. It is _open_ that P if and only if it is accessible as of t that P and accessible as of t that -P. Presumably, it is accessible as of now that you will read the rest of this chapter. There is something (reading the rest of this chapter) that some group (your singleton) can do such that, were that group to do it, you would read the rest of this chapter. Presumably, it is also accessible as of now that you do not read the rest of this chapter. If so, then it is open as of now that you will read the rest of this chapter. If it is not open that P then I say it is _fixed_ that P.

3. <u>About</u> <u>the</u> <u>Past</u> <u>and</u> <u>the</u> <u>Future</u>

The puzzle is concerned with propositions about the past, and propositions about the future. I know of no way to delimit precisely these classes of propositions. However, we will never have need in this dissertation to delimit them precisely. The notions of "about the past" and "about the future" can be made clear enough for our purposes by way of examples. By and large, sentences in the past tenses express propositions about the past, and sentences in the future tenses express propositions about the future. That the sun set yesterday is a proposition about the past; that it will set tomorrow is a proposition about the future. Other examples abound.

Propositions about the past need not mention any time in the past. For example, the following are all propositions about the past: Sam sailed; Sam sailed yesterday; Sam sailed in 1975. (I write this in 1983.) Similarly, propositions about the future need not mention any time in the future. The following propositions are all about the future: Sally will sail; Sally will sail tomorrow; Sally will sail in 1995.

Some propositions that are about the past have not always been about the past. For example, consider the proposition that I plant, planted, or will plant peppers in 1975. As of now (1983), this proposition is about the

past; but ten years ago, in 1973, it was about the future. Likewise, some propositions that are about the future will not always be about the future. For example, consider the proposition that I plant, planted, or will plant peppers in 1995. As of now (1983), this proposition is about the future; but after 1995 it will be about the past. Strictly speaking, then, we should speak of propositions being about the past as of a given time, or being about the future as of a given time. When I say simply that a proposition is about the past, I will mean that it is about the past as of now. Likewise, when I say simply that a proposition is about the future, I will mean that it is about the future as of now.

It will be easier to state the puzzle clearly if I first introduce the notion of a temporally stable proposition. Some propositions are true at some times but not at others. An example is the proposition that it is raining in Omaha. Other propositions never change their truth values; these are the temporally stable ones. Some examples are:

There is, was, or will be a time at which it rains in Omaha.

I plant, planted, or will plant peppers at noon on May 1, 1984.

Two is less than three.

Something exists.

Either there are some living things, or there are no living things.

If a temporally stable proposition is ever true, then it is always true. Likewise, if such a proposition is ever false, it is always false.

4. The Puzzle

The puzzle can now be stated carefully. This is done by showing that the following six assumptions are inconsistent.

A. Some propositions about the future are open.

B. God has always been omniscient.

C. Every proposition about the future is either true or false.

D. All true propositions about the past are unalterable.

E. Knowledge entails truth.

F. Whatever follows from something unalterable is itself unalterable.

The inconsistency of these assumptions is established by the following argument.

1. There are some open propositions about the future that are temporally stable; let 'Q' express one of them, and let '-Q' express its negation. (from A)

2. Either it was true yesterday that Q, or it was true yesterday that -Q. (from C)

3. If it was true yesterday that Q, then God knew yesterday that Q. (from B)

4. If God knew yesterday that Q, then it is unal-
   terable that God knew yesterday that Q. (from D)

5. If it is unalterable that God knew yesterday that
   Q, then it is unalterable that Q. (from E,F)

6. If it is unalterable that Q then it is not open
   that Q. (def.)

7. Thus, if it was true yesterday that Q then it is
   not open that Q. (from 3-6)

8. If it was true yesterday that -Q, then God knew
   yesterday that -Q. (from B)

9. If God knew yesterday that -Q, then it is unal-
   terable that God knew yesterday that -Q. (from D)

10. If it is unalterable that God knew yesterday that
    -Q, then it is unalterable that -Q. (from E,F)

11. If it is unalterable that -Q then it is not open
    that Q. (def.)

12. Thus, if it was true yesterday that -Q then it is
    not open that Q. (from 8-11)

13. It is not open that Q. (from 2,7,12)

Assumption (1) says that it is open that Q, but that con-
flicts with (13). Hence A through F are inconsistent.

Steps (1), (5), and (10) need some explanation.
Regarding (1), it is important to note that if there are
any open propositions about the future ("future contin-
gents"), then some of them are temporally stable. Let p
be an open proposition about the future, and let t_1 be now
(noon on June 2, 1983). Then "p is, was, or will be true
at t_1" is temporally stable, and open. And if p is about
the future as of now, then so is "p is, was, or will be
true at t_1." Thus, A entails (1).

To see that (5) follows from E and F, assume the antecedent of (5): it is unalterable that God knew yesterday that Q. We need to show the consequent, namely, that it is unalterable that Q. From E we can infer that if God knew yesterday that Q, then it was true yesterday that Q. By hypothesis, Q is temporally stable. Hence, if it was true yesterday that Q, then it is still true that Q. Putting these two claims together, we can conclude that (a) if God knew yesterday that Q, then it is true that Q. From F, (a), and our initial assumption (that it is unalterable that God knew yesterday that Q) it follows immediately that it is unalterable that Q.

A similar argument will show that (10) follows from E and F. Simply replace each occurrence of 'Q' in the preceding paragraph by '-Q'.

The puzzle could be cast as an argument against any one of the six assumptions upon which it rests. For example, we could assume for reductio that some propositions about the future are open. By taking assumptions B through F as premises, we could then derive a contradiction. From that it would follow that no propositions about the future are open.

The argument can be shown to be valid using no more than propositional logic. Thus the only way to avoid inconsistency here is to reject at least one of the as-

sumptions. I assume without argument that it is pointless to deny E or F. Thus, we are left four solutions to our puzzle: one could reject A, B, C, or D. Each of these solutions will be developed in detail in a later chapter. In the remainder of this chapter I will sketch these solutions to the puzzle. No arguments for or against any one of them will be considered until later chapters.

5. The Solutions

The first solution is based on the idea that no propositions about the future are open. This view is commonly called *fatalism with respect to the future*, and is a consequence of the more general fatalistic doctrine that no propositions are open. In simple terms, *fatalism* is the view that no person or group of persons can do anything about the past, the present, or the future. What happens is never up to us. Every proposition is fixed; no proposition is open.

Among the early proponents of fatalism is Diodorus Cronus, who taught after Aristotle and before the Stoics.[4] It is doubtful that Diodorus ever considered the puzzle

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4. Richard Sorabji, *Necessity, Cause, and Blame: Perspectives on Aristotle's Theory* (Ithaca: Cornell University Press, 1980), p. 64.

about divine foreknowledge with which we are concerned. But he offered an apparently fatalistic argument, known as the Master Argument, which bears important similarities to our puzzle. Its principal premises are:

a. What is past and true is necessary.

b. The impossible does not follow from the possible.

The conclusion is:

z. Nothing else is possible other than what is or will be true.

Diodorus took the conclusion as his definition of possibility. Thus the argument is sometimes construed as a defense of his definition. Hintikka reports that "this is virtually all the direct information we have concerning the Master Argument."[5] On the basis of this information, many philosophers have tried to reconstruct the argument. Chapter two contains a discussion of the attempts by Eduard Zeller, Jaakko Hintikka, Nicholas Rescher, and Arthur Prior.

Perhaps the foremost recent proponent of fatalism is Richard Taylor. Taylor advances an argument for fatalism which is based upon some assumptions that he takes to be beyond question. His argument is also discussed in

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5. Jaakko Hintikka, Time and Necessity (Oxford: Oxford University Press, 1973), p. 181.

chapter two.

The second solution consists in rejecting the idea that God has always been omniscient. This is the response one would expect from an atheist. It should be noted that it is not essential to the puzzle that it be cast in terms of the knowledge God had yesterday--any time in the past will do. Thus the puzzle could be reformulated with the weaker assumption that there was at least one time at which God was omniscient. Anyone who adopts the second solution must be prepared to deny that God was ever omniscient. The atheist, of course, is prepared to do that.

It is initially surprising that this solution was also endorsed by many medieval philosophers, including Augustine, Boethius, Anselm, and Aquinas. These philosophers did not, of course, deny that God exists. Nor did they deny that God is omniscient. They denied that strictly speaking, God has always been omniscient. On their view, God is eternal. By this they do not mean that God exists now, always has existed, and always will exist. To say that would be to say that God is everlasting, or sempiternal. The medieval concept of eternity is more radical than that. By claiming that God is eternal, the medievals mean to assert that God is not a temporal being; God exists outside of time. I call this view eternalism. According to eternalism, God's knowledge is not subject to

time in the way that ours is. On this view, it is not proper to say that God has foreknowledge. For God's knowledge of an event does not happen before the event. On the view in question, God's knowledge is atemporal.

Medieval philosophers who hold this position insist that God is both omniscient and eternal. Somehow, God knows everything that is true, but God's knowledge is eternal. To distinguish between temporal knowledge like ours, and eternal knowledge like God's, the medievals invoke a distinction between knowing as future and knowing as present. Their solution turns upon this distinction, and the medieval view of eternity upon which it is based. These topics are taken up in chapter three.

The third solution consists in denying that all propositions about the future are either true or false. To accept this solution is to commit oneself to the view that some propositions are neither true nor false--a view that I call semantic indeterminism. This solution is consistent with divine omniscience; if open propositions about the future are not true, then of course an omniscient being need not know them.

What has come to be called the "traditional" interpretation of Aristotle characterizes him as a semantic indeterminist. Richard Taylor expresses this view succinctly:

> Aristotle believed that any statement which asserts or denies, concerning a contingent event, that it is going to occur, is neither true nor false, the world being as yet indeterminate with regard to the existence or nonexistence of such things.[6]

Taylor naturally bases this claim on Aristotle's De Interpretatione, chapter nine, where Aristotle says things that suggest this interpretation. He offers some arguments to establish that if of every pair of contradictory propositions, one must be true and the other false, then everything takes place of necessity and is fixed (18b 4-31). He then describes the consequent of that claim as an awkward result. This suggests that he may have concluded, via modus tollens, that it is not necessary that affirmations or denials must be either true or false. Also, he concludes the chapter by saying, "it is therefore plain that it is not necessary that of an affirmation and a denial one should be true and the other false" (19a 39-b 2). On this interpretation, then, Aristotle accepted indeterminism because he wanted to escape fatalism.

Richmond Thomason is a contemporary proponent of semantic indeterminism. He has proposed a semantic theory of tenses according to which future contingents are neither true nor false. His theory is an application of

6. Richard Taylor, "The Problem of Future Contingencies," Philosophical Review 66 (1957): 1.

van Fraassen's supervaluations to tense logic. Thomason's theory is the topic of chapter four.

The fourth solution consists in denying that every proposition about the past is unalterable. On this view, some propositions about the past are open. In particular, some propositions about what God knew in the past are open. Suppose that Sam will sail tomorrow, but that it is accessible to him as of now that he refrains. Thus, it is open that Sam will sail tomorrow. According to the fourth solution, it is also open that God believed in the past that Sam will sail tomorrow.

William of Ockham is among the earliest proponents of the fourth solution to our puzzle. He presents the fundamental idea of this solution in <u>Predestination</u>, <u>God's Foreknowledge</u>, <u>and</u> <u>Future</u> <u>Contingents</u>:

> Some propositions are about the present as regards both their wording and their subject matter (<u>secundum</u> <u>vocem</u> <u>et</u> <u>secundum</u> <u>rem</u>). Where such [propositions] are concerned, it is universally true that every true proposition about the present has [corresponding to it] a necessary one about the past--e.g., 'Socrates is seated,' 'Socrates is walking,' 'Socrates is just,' and the like.
> Other propositions are about the present as regards their wording only and are equivalently about the future, since their truth depends on the truth of propositions about the future. Where such [propositions] are concerned, the rule that every true proposition about the present has [corresponding to it] a necessary one about the past is not true.[7]

And again in <u>Ordinatio</u>:

> And suppose one says that a proposition true at some time of the present has [corresponding to it] a necessary proposition about the past--e.g., if 'Socrates is seated' is true at some time, 'Socrates was seated' will be necessary ever afterwards; therefore if 'A is true' is true now (A being such a contingent proposition), 'A was true' will always be true and necessary. In that case it must be said that when such a proposition about the present is equivalent to a proposition about the future or depends on the truth of a future [proposition], it is not required that a necessary proposition about the past correspond to the true proposition about the present. And this is the case in the matter under discussion.[8]

Consider a proposition about the present as regards both its wording and its meaning: Socrates is seated. If this is true now, says Ockham, it will be necessary ever afterwards that Socrates was seated. By contrast, consider a proposition that is about the present as regards its wording only, but which is equivalently about the future: it is now true that Socrates will be seated at t, say, sometime next week. According to Ockham, this may be true now, but if so, it is not necessary that from now on, it was true that Socrates will be seated at t. As of tomorrow, for example, it still will be a contingent matter that Socrates will be seated at t; on Ockham's view

7. William Ockham, Predestination, God's Foreknowledge, and Future Contingents, ed. Marilyn McCord Adams and Norman Kretzmann (New York: Appleton-Century-Crofts, 1969), pp. 46-47.

8. Ibid., p. 92.

it still will be a contingent matter that it was true that Socrates will be seated at t. Ockham's solution to the puzzle is developed in chapter five.

6. My View

I argue in this dissertation that fatalism, eternalism, and semantic indeterminism are not adequate solutions to our puzzle. These positions cannot accommodate, or adequately explain away, our intuition that there is something someone can do but will not do. I argue further that Ockham's solution succeeds where the others fail. Finally, I argue that although Ockham denies the necessity of the past, endorsing his solution does not force one to hold that we can literally change the past. Ockham's solution accommodates our intuitions about freedom and the future without charging a price.

C H A P T E R   II

FATALISM

1. Introduction

According to the first solution to our puzzle, there
are no open propositions about the future. This solution
is based upon fatalism, which is the more general view
that. no propositions are open. Fatalism entails a view
that I call underlineabilism: whatever is true is unalter-
able; or, whatever is accessible is true.[1]

Fatalism is an initially unattractive view. It seems
obviously true, for example, that you can read the rest of
this chapter; but it is equally obvious that you can
refrain from reading the rest of it. Which alternative
will become actual is up to you. So, consider the
following claims:

You will read the rest of this chapter.

You will not read the rest of this chapter.

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1. Unalterabilism is easily confused with a view that
I call determinism. Determinism is the view that
everything that happens is caused (or perhaps, causally
determined). This is different from unalterabilism--the
view that everything that happens is unalterable. This
terminology is unfortunately not used uniformly in the
literature.

Neither is unalterable, and both are accessible. Hence, it is open that you will read the rest of this chapter.

From time to time I encounter striking examples of such propositions. I have never been one to plan ahead. I often realize that dinner time has arrived without warning, and that I have no plans for dinner. On such occasions, the question inevitably arises, "where should I eat?" I am soon overcome by indecision. I could eat at home, or I could eat out; I could have pizza, or Mexican food, or Chinese food. After running down the usual list, I eventually make a decision. But no matter where I decide to go, it is as clear as could be that I could have gone elsewhere. Friday night I went to Joe's for pizza. But I could have gone to Bub's instead. On Friday afternoon, it was accessible to me that I would dine at Joe's that night, and also accessible to me that I would dine at Bub's. Thus it was open that I would dine at Joe's that night; it was also open that I would dine at Bub's.

With such apparent counterexamples at hand, one wonders why anyone would accept fatalism. The question naturally arises: what can be said in favor of fatalism? Is there good reason to suppose that these examples only appear to be counterexamples? Two arguments for fatalism will be examined in this chapter. They are the ancient

Master Argument of Diodorus Cronus, and a recent argument put forth by Richard Taylor.

2. The Master Argument

Diodorus Cronus was a logician and philosopher who taught after Aristotle and before the Stoics. His "Master Argument" was famous in antiquity, and again has become popular.[2] Unfortunately, the entire argument is not known to us. What we do know of it comes to us from Epictetus:

> The Master Argument seems to have been formulated with some such starting points as these. There is an incompatibility between the three following propositions, "Everything that is past and true is necessary", "The impossible does not follow from the possible", and "What neither is nor will be is possible". Seeing this incompatibility, Diodorus used the convincingness of the first two propositions to establish the thesis that nothing is possible which neither is nor will be true.[3]

Relevant to this argument are Diodorus' definitions of

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2. See Herbert Guerry, "Rescher's Master Argument," Journal of Philosophy 64 (1967): 310-312; Jaakko Hintikka, Time and Necessity (Oxford: Oxford University Press, 1973), chap. 8; Martha Kneale, "Logical and Metaphysical Necessity," Proceedings of the Aristotelian Society 38 (1937-38): 253-68; Martha Kneale and William Kneale, The Development of Logic (Oxford: Clarendon Press, 1962), pp. 117-123; Frederick Seymour Michael, "What is the Master Argument of Diodorus Cronus?" American Philosophical Quarterly 13 (1976): 229-35; Arthur Prior, "Diordoran Modalities," Philosophical Quarterly 5 (1955): 205-213; idem., "Diodorus and Modal Logic," Philosophical Quarterly 8 (1958): 226-36; Nicholas Rescher, "A Version of the 'Master Argument' of Diodorus," Journal of Philosophy 63 (1966): 438-45.

various modal terms, which are recorded by Boethius:

> Diodorus defines the possible as that which either
> is or will be (_quod aut est aut erit_), the impossi-
> ble as that which, being false, will not be true
> (_quod cum falsum sit, non erit verum_), the necessary
> as that which, being true, will not be false (_quod
> cum verum sit, non erit falsum_), and the nonneces-
> sary as that which either is already or will be
> false (_aut jam est aut erit falsum_).[4]

Benson Mates observes that the definitions of 'impossi-
ble', 'necessary', and 'nonnecessary' "show clearly that
the definition of 'possible' was slightly elliptical; it
should have been, 'The possible is that which either is or
will be true.'"[5] Thus we know that the Master Argument had
the following propositions as two of its premises.

> a. Every true proposition about the past is neces-
>   sary.

> b. An impossible proposition never follows from a
>   possible one.

Its conclusion was:

> z. No proposition which neither is nor will be true
>   is possible.

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3. Epictetus, _Dissertationes ab Arriano Digestae_, ed.
H. Schenkl (Leipzig, 1898), ii, 19, 1; quoted in Kneale
and Kneale, p. 119.

4. Boethius, _Commentarii in Librum Aristotelis ...,
Secunda Editio_, ed. Meiser, C. (Leipzig, Teubner, 1877),
p. 234; quoted in Kneale and Kneale, p. 117.

5. Benson Mates, _Stoic Logic_, University of
California Publications in Philosophy, vol. 26 (1953;
reprint ed., Berkeley and Los Angeles: University of
California Press, 1961), vol. 26, p. 37.

This means that every possible proposition is or will be true. To put it yet another way, only what is or will be true is possible. And we also know from Boethius that Diodorus accepted the following definitions.

p is possible =df either p is true or p will be true

p is impossible =df p is false and never will be true

p is necessary =df p is true and never will be false

p is nonnecessary =df either p is false or p will be false

The contemporaries of Diodorus did not question the validity of his argument. Cleanthes, a Stoic, rejected the first premise, while Chrysippus, another Stoic, denied the second.[6]

In the words of Jaakko Hintikka, "this is virtually all the direct information we have concerning the Master Argument. On the basis of this information alone, it seems rather difficult to say very much concerning the argument."[7] One thing we can say safely is that it is not obvious that the argument is valid. Thus, many philosophers have asked, what plausible assumptions, if any, could be added to Diodorus' premises so as to entail the

6. Mates, Stoic Logic, p. 38.

7. Hintikka, Time and Necessity, p. 181.

conclusion?

It would be improper to add Diodorus' definitions as premises, because the conclusion is tantamount to his definition of possibility. Indeed the purpose of the Master Argument, according to Alexander, is to establish this definition.[8]

Essentially the same point can be made by asking, which senses of 'necessary' and 'possible' are relevant to the argument? If the argument is to be understood with Diodoran necessity and possibility, then the conclusion is trivial. For it would say that no proposition which neither is nor will be true is or will be true. Thus understood, we should not waste our time searching for an argument to support it. If the argument is to be interesting, Diodoran modalities must not be used. Moreover, if the argument is to be relevant to fatalism, as we have defined it, then unalterability and accessibility must be used.

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A. <u>Zeller's Reconstruction</u>. Eduard Zeller states the Master Argument as follows:

"From something possible nothing impossible can proceed.* Yet it is impossible that something past be different than it is. Thus, had this been possi-

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8. Mates, <u>Stoic Logic</u>, p. 38, n. 53.

..

ble at an earlier point of time, an impossibility
would have proceded from a possibility. It was thus
never possible. It is consequently quite impossible
that something will happen that does not really
happen."

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   *This is how I translate $\overset{\text{'}}{\alpha}\varkappa o\lambda o\upsilon\vartheta\varepsilon\overset{\text{`}}{\iota}\nu$, in order to
capture in the German the ambiguity of the Greek
expression, which indicates not only temporal order,
but also the logical and causal sequence.[9]

And again:

   "'If something were possible, which neither is nor
will be, then an impossibility would follow from a
possibility; but no impossibility can follow from a
possibility; thus, nothing is possible which neither
is nor will be.' This presupposition, that from a
possibility no impossibility can follow, is consid-
ered a granted assumption [als anerkannt
vorausgesetzt]. The hypothetical consequent, on the
other hand, requires further justification, and it
gets this by means of the statement that everything
past is necessary. For, when of two mutually
exclusive states of affairs the one obtains, the
possibility of the other is thereby cancelled, [and
thus] since that has once taken place cannot be
altered [$\pi\hat{\alpha}\nu \ \pi\alpha\rho\varepsilon\lambda\eta\lambda\vartheta\grave{o}s \ \overset{\text{'}}{\alpha}\nu\alpha\varkappa\alpha\hat{\iota}o\nu$], this second
state of affairs is now impossible; had it thus been
possible earlier, so would it have been the case, as
Diodorus believes, that an impossibility had
proceeded from a possibility."[10]

Zeller states the argument as a reductio that proceeds

roughly as follows. Suppose for reductio that there is a

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   9. Eduard Zeller, <u>Die Philosophie der Griechen in</u>
<u>iherer geschichtlichen Entwicklung</u>, 6th ed., vol. 2, pt. 1
(Hildesheim, 1963), pp. 269-70. I thank Wendy Wegener for
this translation from the German.

   10. Eduard Zeller, "Uber den $\varkappa\upsilon\rho\iota\varepsilon\acute{\upsilon}\omega\nu$ des Megarikers
Diodorus," in <u>Sitzungsberichte der Koniglichen</u>
<u>Preussischen Akademie der Wissenschaften</u> (Berlin, 1882),
pp. 151-59; quoted in Mates, <u>Stoic Logic</u>, p. 38, n. 53.
Again I thank Wendy Wegener for this translation.

proposition which is possible, but which neither is nor will be true. Then its negation is true and always will be true. As soon as the present becomes past, the negation of the proposition will become necessary (according to Diodorus' first premise). But if its negation becomes necessary, the proposition itself becomes impossible. Thus a proposition which was possible will have become impossible, in violation of Diodorus' second premise.[11]

Mates finds this version of the Master Argument unsatisfying.

> It rests, in the first place, on the notion that Diodorus confused temporal succession with logical consequence. But this hardly seems likely, for Diodorus himself was in the center of a very sophisticated debate over the nature of logical consequence. The word used in Epictetus' account is ἀκολουθεῖν, which is the same word used by Diodorus for "is a consequent of" in this debate. Further, it seems unlikely that Chrysippus would have overlooked so elementary a confusion; indeed, he objected to Diodorus' second proposition, but not on the grounds that it did not refer to logical consequence.[12]

In addition to these historical difficulties, Zeller's reconstruction also faces serious philosophical

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11. This summary of Zeller's reconstruction is essentially the same as Mates's summary in Stoic Logic, pp. 38-39.

12. Mates, Stoic Logic, p. 39.

problems. His argument is a reductio for the conclusion
that no proposition which neither is nor will be true is
possible. Thus his assumption for reductio must be simply
that there is such a proposition, say, p. He cannot
strengthen this assumption by also assuming, say, that p
is about the present, or that it's negation is about the
past, without either weakening the conclusion or losing
validity.   Nonetheless, Zeller presumes, a few steps
later, that when the present becomes past, -p will become
a proposition about the past.   This presumption is
unwarranted. To be sure, some propositions behave in the
appropriate manner. If p is the proposition that today is
sunny, or perhaps, the proposition that June 2, 1983 is
sunny (I write this on June 2, 1983), then by tomorrow, -p
will become a proposition about the past. But other prop-
ositions behave otherwise. If p is the proposition that I
will drink tea on New Year's day in 1995, then -p will not
become a proposition about the past as soon as the present
becomes past. It will remain a proposition about the
future for a long time. Hence the argument is invalid.
From the assumption that p is possible but neither is nor
will be true, it does not follow that as soon as the
present becomes past, -p will become a proposition about
the past.

There is a further problem with Zeller's reconstruction. He interprets Diodorus' second premise as follows:

c. No possible proposition ever becomes impossible.

Given a natural assumption, (c) is inconsistent with the conclusion of the Master Argument. It is natural to assume that there is a proposition that was true but neither is nor will be true. For example,

d. Diodorus is alive.

(d) was true in 308 B.C., and hence was possible at that time. But if (d) was possible, then by (c) it still is possible. Hence by the conclusion of the Master Argument, namely (z), it either is or will be true. This contradicts our hypothesis that (d) neither is nor will be true. According to Zeller's reconstruction, then, the second premise of the Master Argument is inconsistent with the conclusion.

B. Hintikka's Reconstruction. According to Jaakko Hintikka, the modes of reasoning that Diodorus used are likely to have been similar to those of Aristotle. He believes, furthermore, that they shared some of the tacit presuppositions of the logical and philosophical enterprise.[13] For these reasons Hintikka tries to reconstruct the Master Argument using Aristotle as a guide. The details of the argument, admits Hintikka, "may

be impossible to reconstruct, but the main trend is obvious enough."(191) The main trend, with Hintikka's numbering system, proceeds as follows.

(10) It is possible that p. (assumption for reductio)

(11) It is not the case that p nor will it be the case at any later moment of time. (assumption for reductio)

(1)* Any true statement concerning the past in necessary. (premise)

(2)* If a possibility is assumed to be realized, no impossible conclusions follow. (premise)

(10)* [There is a time t_0 later than now such that] at time t_0 it will be true that p. (from 10)

(12) [There is a time t_1 one day later than t_0 such that] at time t_1 it will be true that p was the case yesterday. (from (10)*)

(11)* At time t_0 it will be false that p. (from 11)

(13) At time t_1 it will be false that p was the case yesterday. (from (11)*)

(13*) At time t_1 it will be true that it is impossible for p to have been the case yesterday. (from (1)* and 13)

But (13)* shows that (12) is impossible. Hence the original set of premisses is inconsistent.[14]

It appears initially that the conclusion of this argument

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13. Hintikka, _Time and Necessity_, p. 181. Further references to this book are made in the text of this section by enclosing page numbers in parentheses.

14. These steps are collected from sec. 8, pp. 191-92.

is that the original set of premises, presumably comprised of (10), (11), (1)*, and (2)*, is inconsistent. However, Hintikka often speaks as if the conclusion is that

(4) the possible is that which is or will be true.[15]

Since we know from Epictetus that that was Diodorus' conclusion, I shall assume it is also Hintikka's. Moreover, Hintikka thinks of the Master Argument, and presumably his reconstruction, as a reductive proof.(179,188) Since accepting (4) is tantamount to denying that both (10) and (11) are true, we may think of (10) and (11) as assumptions for reductio, as indicated above.

Hintikka intends his reconstruction to be interpreted with the Diodoran sense of 'possible'. This is not obvious from Hintikka's discussion, but in sections eleven and twelve he says things that appear to imply it. He there argues that when criticizing the Megarians,

> Aristotle presupposed a concept of possibility on which a statement of the form 'it is impossible that p' (with a temporally unspecified sentence p) implied that it is false to say that p at the time the statement is made and that it will remain false to say so at all later times.... When in our reconstruction of the Master Argument we made the step from (10) to (10)*, we in effect assumed that something like this notion of possibility is used in (10). The fact that we have now found this notion in Aristotle serves to justify our step ex post facto.(198)

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15. See pp. 181, 182, and esp. 202.

And on the following page:

> The concept of possibility which we have just
> found in Aristotle was not employed quite
> consistently by him. However, it was employed
> consciously by Diodorus: it was exactly the way we
> know he defined the notion (his notion) of possibil-
> ity.(199)

Apparently it is the Diodoran sense of 'possible' that is relevant to the argument.

Hintikka's use of Diodoran possibility makes his reconstruction uninteresting. When interpreted with that sense of 'possible', (10) says that p either is or will be true. This makes the argument obviously invalid, because Hintikka infers from (10) that p will be true at some time in the future (step (10)*). Clearly it is consistent with this interpretation of (10) that p is true now, but will never be true in the future. Furthermore, (11) immedi- ately contradicts (10) so interpreted; hence the desired inconsistency is at hand and the rest of the argument is superfluous. Moreover, when interpreted with Diodoran possibility, the conclusion becomes the trivial claim that no proposition that neither is nor will be true, is or will be true. Thus Hintikka's reconstruction, when condensed, amounts to the following.

Assume for reductio that

a.   -[(p v Fp) --> (p v Fp)]

This is tantamount to the following two claims.

b.   p v Fp (Hintikka's 10 interpreted with Diodoran

possibility)

c. -p & -Fp (Hintikka's 11)

but (c) implies that

d. -(p v Fp)

This contradicts (b). Thus by reductio

e. (p v Fp) --→ (p v Fp)

Hintikka's reconstruction can be improved by using a different sense of 'possible', for instance, metaphysical possibility or accessibility. Unfortunately this move will improve but not save the argument. For in either of these senses of 'possible', from the fact that p is possible it does not follow that p will be true at some later time. Hence the inference from (10) to (10)* is still invalid.

Hintikka's remarks suggest another attempt to salvage his argument. Perhaps he intended (10)* to be an assumption for reductio, just as (10) and (11) are. This is suggested in his remarks that motivate the introduction of (10)*:

> Because of (2)*, Diodorus could replace assumption (10) by the assumption that the possibility in question is or will be realized. (Cf. section 5 above.) If the original premiss (10) leads to no impossibilities, the new one will not do so either.
> More accurately, because of the assumptions discussed in section 7, Diodorus thought he could assume that the possibility in question is realized at some particular moment of (future) time. In other words, he thought he could move from (10) to [(10)*].(191)

If we think of the argument in this manner then there is no need to invalidly infer (10)* from (10). Unfortunately this revision is unsuccessful. Suppose that the assumptions for reductio are (10), (11), and (10)*, and that a contradiction is extracted from them. It would not follow that the conclusion is true, i.e., that if p is possible then it either is or will be true. The conclusion says, roughly, that either (10) is not true or (11) is not true. What would follow from the proposed revision is only that either (10), or (11), or (10)* is not true. Hence the argument would be invalid.

Furthermore, if (10), (11), and (10)* were the assumptions for reductio, then the rest of the argument would be superfluous. (10)* says that p will be true sometime in the future, but that contradicts (11). It is thus immediately evident that at least one of the assumptions for reductio is not true.

Perhaps Hintikka is aware of the weaknesses of his reconstruction. It is difficult to tell because it is not clear that he ever evaluates it. He does, however, evaluate another argument whose premises are alleged to be "very closely related" and "essentially tantamount" to the assumptions of the above reconstruction.(205-206) To present this argument, let 'Tp,t' represent 'p is true at t', let 'MA' represent 'it is possible that A', and let t

range over moments of present or future time. What seems to be Hintikka's second reconstruction of the Master Argument, again with his numbering system, is as follows.

(18) M∃tTp,t (assumption for reductio)

(21) Ɐt-Tp,t (assumption for reductio)

(20) Ɐt(-Tp,t --→ -MTp,t) (premise)

But these assumptions are inconsistent. Therefore

(19) ∃tTp,t

Hintikka explains that

> (18) is clearly very closely related to assumption (10) of our reconstruction of the Master Argument, and (21) is essentially assumption (11). The use of the original premiss (1)* was to give us (20).

It is not clear that (20) follows from (1)*. Nor is there a premise in Hintikka's original reconstruction that is analogous to (20). Thus his second reconstruction is substantially different from his first. Does it fare any better?

On Hintikka's assessment, the above reductio is invalid because (18), (21), and (20) are consistent.

> On the most natural assumptions concerning modal notions that we can make, it can be shown that the set of formulas (18), (20), (21) is consistent. Intuitively, the way in which the three can be compatible may be explained by saying that although under the actual course of (future) events p is never true and although it therefore follows that at each moment of time during the actual course of events it is true to say that it is impossible that p should be the case, some alternative course of (future) events may still be possible under which p would have happened.(206)

Hintikka seems to have something like the following in mind. Let α be the actual course of future events, and suppose that p never becomes true in α. Suppose that there are some alternative courses of future events still possible as of now in which p is or will be true. Suppose further that in any such alternative course of events, β, p becomes true for the first time at some time, t, next week. Finally, suppose that as of t (next week), no such alternative course of events, β, will be a possibility. In this situation, (18) is true, because in some relevant β, p is true next week at t. (21) is also true, because p never becomes true in α. Finally, (20) is true, because in any relevant β, there is never a time at which p is true in β and at which β is still possible relative to α. What this shows is that (18), (21), and (20) are at least consistent. It follows that the reductio which depends upon their inconsistency is invalid. Thus Hintikka is correct: what I have called his second reconstruction of the Master Argument is invalid.

Before concluding his discussion, Hintikka suggests what seems to be yet another reconstruction of the Master Argument. He notes that Diodorus "could have derived a contradiction if he had instead of (18) the closely related premiss [(18)* $\exists tMTp,t$]."(206) The argument is this: let t_o be some moment of time satisfying (18)*.

Thus we have MTp,t_o. From (20) we get $-Tp,t_o \dashrightarrow -MTp,t_o$, and from (21) we have $-Tp,t_o$. An application of modus ponens gives us $-MTp,t_o$, which contradicts our first step. From this it is concluded that (19) $\exists tTp,t$.

We should note that as stated, this reductio is invalid. The conclusion, (19), is equivalent to the claim that (21) is not true. If the argument is to be valid, the conclusion must say only that at least one of the two assumptions for reductio is not true. (19) should be replaced by something equivalent to the denial of the conjunction of (18) and (21). I suggest the following:

(19)* $M\exists tTp,t \dashrightarrow \exists tTp,t$

Given the restricted range of t, this is similar to Diodorus' conclusion that if p is possible then p either is or will be true. With this conclusion, the argument is valid.

Hintikka's criticism of this argument is that Diodorus was not justified in making the transition from (18) to (18)*, because the claim that they are equivalent is unacceptable.(207-209)

> It is true that it has been accepted by certain modal logicians;[42] it is even true that it is provable in some formal systems logicians have devised;[43] but a closer analysis of the assumptions that underlie systems of modal logic shows that there is no general justification for it.(209)[16]

The "closer analysis" is presented in Hintikka's "Modality

and Quantification,"[17] to which he refers the reader in footnote 44.

This criticism appears to miss the point. Diodorus may simply grant that the equivalence does not hold; he can point out that his argument, as characterized by Hintikka's third reconstruction, does not presuppose otherwise. Rather than assuming (18) and inferring (18)*, the argument simply assumes (18)*. Thus the question remains, is this valid reconstruction convincing or sound?

My answer is no. I have three objections to Hintikka's third reconstruction. The argument depends upon assumption (20) which says that if p is not true at some moment of present or future time, t, then it is impossible that p is true at t. My first objection is that this assumption is false. If there are any possible propositions that are not true, then (20) is false. This premise was first introduced in section 13, where Hintikka says that both the Master Argument and a similar argument from Aristotle

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16. In footnotes 42 and 43 Hintikka lists examples of the modal logicians and formal systems to which he refers.

17. Reprinted in his Models for Modalities (Dordrecht, Holland: D. Reidel Publishing Co., 1969), pp. 57-70.

turn essentially on an additional premiss (or lemma)
which says that whenever it is not the case that p
at some particular moment of time t_o then it is im-
possible that p should have been the case at t_o
(except of course in the sense in which 'possibly p'
when asserted at t_o simply means that p happens at
some--future or present--moment of time).(202-203)

The parenthetical comment suggests that the sense of 'pos-
sible' relevant to (20) is not Diodoran possibility. Let
us consider the other senses of 'possible' that were
discussed in chapter one. If (20) is interpreted with
either logical, metaphysical, or physical possibility, it
is easy to find counterexamples. Consider the proposition
that my bicycle is red. This is logically, metaphysi-
cally, and physically possible; but it is not true. That
leaves accessibility. Are there any accessible proposi-
tions that are not true?

I suggested at the beginning of this chapter that
such propositions are easy to find. I gave an example
about Joe's and Bub's in which I claimed that as of Friday
afternoon, it was accessible that I would dine at Bub's on
Friday night. In that example, however, it was not true
that I would dine at Bub's on Friday night. In my view,
that example proves that there are accessible propositions
that are not true.

Although I am convinced by my first objection, I
realize that some readers may not be as easily persuaded.
A serious fatalist with his wits about him will surely

realize that his position forces him to deny my claim about Bub's. To maintain his position, the fatalist must insist that it was not accessible as of Friday afternoon that I would dine at Bub's on Friday night. Although I think this view is mistaken, I do not protest against those who hold it; all are entitled to their opinions. However, the Master Argument is not a mere assertion of fatalism and its consequences. It is intended to be an argument in support of fatalism. Hintikka's reconstruction of the argument employs (20) as a premise. I object to this use of (20), because (20) is quite implausible. Even the fatalist will admit, perhaps reluctantly, that it _seems_ as if some things about the future are accessible but not true; he insists, of course, that such appearances are illusions. But (20) is initially implausible; if a fatalist uses it to support his position, he needs either to give an argument for it, or at least to explain away its implausibility. Hintikka does neither on behalf of the fatalist. So, my second objection is that without some sort of defense of (20), it is inappropriate in this context.

My third objection is that (20) has a distinctively fatalistic flavor. If everything that's not true is impossible, then only what is true is possible. Hintikka describes it as a form of determinism, and argues that the

Master Argument turns essentially upon it.[18] But the Master Argument is supposed to be an argument _for_ determinism, or what I have called fatalism. Thus Diodorus cannot gracefully use (20) as a premise.

Hintikka concludes his article by saying that the Master Argument "fails even if we grant the deterministic assumption, for it involves too narrow a view of the relation of possibility to time."(213) We have seen that what I have called Hintikka's third reconstruction is valid, and its only premise is the deterministic assumption to which Hintikka refers, namely (20). Thus if we grant that assumption then the argument succeeds.

Hintikka has suggested several reconstructions of the Master Argument, of which some are complicated and others are relatively simple. Like Hintikka, we have been unable to find a successful argument among them.

C. _Rescher's Reconstruction_. Nicholas Rescher has offered a sophisticated and clever reconstruction of the Master Argument.[19] To facilitate his exposition, Rescher introduces the following "chronologized" modalities:

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18. Hintikka, _Time and Necessity_, sec. 13, esp. p. 202.

Tt(p) FOR p is true at the time t

Pt(p) FOR p is possible at the time t

Nt(p) FOR p is necessary at the time t

To indicate the present, we set t = n (for "now"). The variable 'p' ranges only over "chronologically definite statements"--statements that do not change their truth value with the passage of time. Rescher's example is, "it rains in Athens on January 1, 1966." Presumably, 'rains' is intended to be "tenseless." A somewhat clearer example might be, "it is, was, or will be, raining in Athens on January 1, 1966." Rescher's reconstruction uses the following premises.

(1a) ∀t∀t'{[Tt(p) & t < t'] --> Nt'(p)}

What is past and true is necessary thereafter.

(2) ∀t∀t'{[Pt(p) & t < t'] --> Pt'(p)}

What is once possible is always possible thereafter.

EM: ∀t[Tt(p) v Tt(-p)]

(The Law of the Excluded Middle.)

The conclusion is:

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19. Nicholas Rescher, "A Version of the 'Master Argument' of Diodorus," <u>Journal of Philosophy</u> 63 (1966), 438-45. Further references to this article are made in the text of this section by enclosing page numbers in parentheses.

Pn(p) --→ ∃t[n ≤ t & Tt(p)]

Whatever is possible either is or will be true.
The first assumption is the generalized version of the Diodoran premise that what is past and true is now necessary: Ɐt{[Tt(p) & t < n] --→ Nn(p)}.(440) The second assumption is Rescher's temporal interpretation of the Diodoran premise that the impossible does not follow [from? after?] the possible.(439,440) The third assumption is an additional premise which is needed for the argument.(442)

The reconstruction can be divided into two stages. The first stage consists of the following sequence of maneuvers. (1a) is equivalent to

(A) ɐtɐt'{[-Nt'(p) & t < t'] --→ -Tt(p)}
     What is not necessary was never true.

By uniformly substituting '-p' for 'p' we obtain

(B) ɐtɐt'{[-Nt'(-p) & t < t'] --→ -Tt(-p)}
     If it is not necessary that not-p, then it was
     never true that not-p.

By the usual equivalence of P with -N- we obtain

(C) ɐtɐt'{[Pt'(p) & t < t'] --→ -Tt(-p)}
     If it is possible that p, then it was never true
     that not-p.

This together with EM yields

(D) ɐtɐt'{[Pt'(p) & t < t'] --→ Tt(p)}
     Whatever is possible has always been true.

The second stage is a reductio that proceeds as follows. Suppose something is possible that neither is

nor will be true:

(3) $Pn(p_0)$ & $\forall t[n \leq t \rightarrow -Tt(p_0)]$ for some p_0

This leads to a contradiction as follows.

(a) $Pn(p_0)$ by (3)

(b) $-Tn+_\Delta(p_0)$ by (3)

(c) $Pn+2_\Delta(p_0)$ from (a) by (2)

(d) $Tn+_\Delta(p_0)$ from (c) by (D)

But (d) contradicts (b), thus

(e) $Pn(p) \rightarrow \exists t[n \leq t$ & $Tt(p)]$

(e) says that whatever is possible either is or will be true. Pictorially, we have the following situation.

$$P(p_0) \qquad \begin{array}{c} T(p_0) \\ -T(p_0) \end{array} \qquad P(p_0)$$

$$n \qquad\qquad n+_\Delta \qquad\qquad n+2_\Delta$$
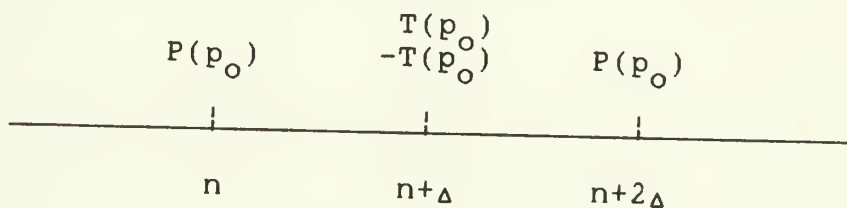
Rescher's reconstruction is valid, it uses both Diodoran premises, and it has Diodorus' conclusion. Furthermore, the only additional assumption required by the reconstruction is the eminently plausible Law of the Excluded Middle. Does it succeed?

Rescher suggests that the "most convenient" exit from the deterministic conclusion is

the denial of the applicability of the Law of the Excluded Middle in the context of a temporally relativized conception of truth. We would be able to maintain "$Tt(X\text{-at-}t_0)$" whenever $t \geq t_0$, but reject both this and "$Tt(Not:X\text{-at-}t_0)$" whenever $t < t_0$, avoiding the deterministic consequences at

issue and making room for a doctrine of "future contingency."(444)

I believe, however, that the argument is unsuccessful even if we grant EM. Rescher doesn't say explicitly which senses of necessity and possibility are relevant to his reconstruction. Some of his remarks suggest, however, that he has something akin to Diodoran modalities in mind. He claims that "given the chronologized concept of necessity operative within the context of the discussion," the principle

$$Tt'(p) \dashrightarrow \forall t Tt(p)$$

leads to

$$Tt'(p) \dashrightarrow \forall t Nt(p)$$

He doesn't explain the chronologized concept of necessity that he has in mind. His remark at least suggests that he accepts the principle

$$\forall t Tt(p) \dashrightarrow \forall t Nt(p)$$

That in turn suggests that he thinks $Nt(p)$ means simply $\forall t'Tt'(p)$, or perhaps $\forall t'[n \leq t' \dashrightarrow Tt'(p)]$. If so, then $Pt(p)$ means $\exists t'Tt'(p)$, or perhaps $\exists t'[n \leq t' \& Tt'(p)]$. However, the conclusion becomes trivial when interpreted with these modalities. So interpreted, (e) becomes

(f) $\exists t'Tt'(p) \dashrightarrow \exists t[n \leq t \& Tt(p)]$

or perhaps

(g) $\exists t'[n \leq t' \& Tt'(p)] \dashrightarrow \exists t[n \leq t \& Tt(p)]$

(f) is trivial in light of the fact that the range of p is restricted to chronologically definite propositions. If such a proposition is true at any time, then it is true at all times. Thus if there is a time at which p is true, then there is a time in the present or future at which p is true. (g) is also trivial.

Perhaps I have read more into Rescher's remarks than he intended. Perhaps he did not intend to use anything like Diodoran modalities. Rescher may have wanted to leave necessity and possibility as undefined notions that are relativized to times. This would be similar to our treatment in chapter one of logical, metaphysical, and physical necessity, and of accessibility and unalterability. If so, then my criticism above does not apply. How does the argument fare with any of these modalities?

If we interpret the argument with either logical, metaphysical, or physical modalities, then the first premise is totally implausible. It says that for any chronologically definite statement p, if p is true once then it is necessary thereafter. But consider the statement

(4) Descartes invents, invented, or will invent analytic geometry in 1637.

This statement was true in 1637, and is still true today. But it does not follow that it is now logically, metaphysically, or physically necessary. It is not a law of

logic, nor is it true in all possible worlds, nor is it required by the laws of the natural sciences. Thus on any of these interpretations the argument fails.

This leaves unalterability and accessibility. How does the argument fare when interpreted with these modalities? Not well. The first premise does become plausible. It now says that once a chronologically definite statement is true, it is thereafter unalterable. Although this sounds plausible, we know by Rescher's own maneuver that it is equivalent to

(h) ∀t∀t'{[Pt'(p) & t < t'] --> -Tt(-p)}

Interpreted with accessibility, this means that if a chronologically definite statement p is accessible at a time, then it was never true earlier that -p. But it seems that we are always letting opportunities pass us by. As I suggested at the beginning of this chapter, it was once accessible that I would dine at Bub's last Friday night; but I ate at Joe's instead. Let q be the proposition that I am dining, was dining, or will be dining at Bub's at 8:00 on Friday evening, June 3, 1983. As of Thursday June 2, q was accessible. Nonetheless, -q was true at earlier times. Hence when P is interpreted as accessibility, (h) is false, as are (1) and (1a).

Furthermore, if we interpret the argument with accessibility and unalterability then the second premise is

also suspect. So interpreted, (2) says that if a chronologically definite statement p is accessible at a time, then it remains accessible from then on. Again, we are always letting opportunities pass us by. Last week q was accessible; now it is not.

It is worth noting again that a staunch fatalist might deny that q was ever accessible. It is also worth replying again that the Master Argument is intended to be an argument supporting fatalism. If the argument rests upon assumptions such as (h) or (2) that are as implausible as fatalism itself, then it will not be a convincing argument.

Rescher's reconstruction of the Master Argument is concise and valid; but it is not convincing. If interpreted with temporal modalities, the conclusion becomes trivial. If interpreted with non-temporal (though time-relativized) modalities, then at least one of the premises becomes implausible and false. It fails to provide good reasons either for accepting the Diodoran conclusion or for giving up the Law of the Excluded Middle.

D. <u>Prior's Reconstruction</u>. Arthur Prior has produced the most plausible reconstruction of the Master Argument.[20] He restates the two Diodoran premises as follows.

(a) When anything has been the case, it cannot not
    have been the case.

(b) If anything is impossible, then anything that
    necessarily implies it is impossible.

To fill out the argument he adds two premises.

(c) When anything is the case, it has always been
    the case that it will be the case.

(d) When anything neither is nor will be the case,
    it has been the case that it will not be the
    case.

From these he deduces the conclusion:

(z) What neither is nor will be true, is not possi-
    ble.

The argument can be formalized by introducing the
following symbols.

    Mp for It is (now) possible that p
    Lp for It is (now) necessary that p
    Fp for It will be the case that p
    Pp for It has been the case that p
    Hp for It has always been the case that p

Hp is defined as an abbreviation for -P-p, "it has not
been the case that not p." The four premises then become:

(a) Pp --→ -M-Pp

(b) -Mq --→ (L(p --→ q) --→ -Mp)

(c) p --→ HFp

(d) (-p & -Fp) --→ P-Fp

And the conclusion becomes:

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    20. Prior, "Diodoran Modalities." See also his,
"Diodorus and Modal Logic."

(z) (-p & -Fp) --→ -Mp

These strings of symbols are to be regarded not as formulas but as schemata. This is clear because Prior treats 'p', 'q', 'r', etc. as schematic letters (not as atomic formulas), replaceable by any formula we please. They ultimately represent propositions, and it is assumed that the same proposition may be true at one time and false at another.[21] Prior explains the argument by considering an example in which it is contended that there is a shell at the bottom of the sea that can be seen, although in fact it is not being seen and never will be seen. Letting p be the proposition that the shell is being seen, we can present the argument as a reductio.

1. The shell is not being seen and never will be
   seen.
   -p & -Fp   (assumption for reductio)

2. The shell can be seen.
   Mp   (assumption for reductio)

3. It has been the case that it will not be seen.
   P-Fp   (1,d)

4. It cannot (now) not have been the case that it
   has been the case that it will not be seen.
   -M-P-Fp   (3,a, substituting -Fp for p)

5. That the shell is now being seen entails that it
   has always been the case that the shell will be
   seen.
   L(p --→ -P-Fp)   (c, by the law of
                               necessitation)[22]

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21. Prior, "Diodoran Modalities," p. 205.

6. The shell cannot be seen.
    -Mp   (4,5,b, substituting -P-Fp for q)

But 6 contradicts 2, thus

(z) What neither is nor will be true, is not possible.
    (-p & -Fp) --→ -Mp   (1--6)

Like Rescher's reconstruction, this argument is valid, it uses the Diodoran premises, and it has the Diodoran conclusion. Furthermore, the only additional premises, (c) and (d), are reasonable. Does the argument succeed?

Prior does not present a full evaluation of this argument. He is content to note that an exponent of three-valued logic may escape the Diodoran conclusion by rejecting (d). He suggests two reasons that can be given for denying that statements of the form (-p & -Fp) --→ P-Fp are in all cases true. First, "if it is indeterminate whether p is or will be the case, the assertion that it has been the case that p will not be the case is false, so that ... we shall have an implication with a neuter antecedent and a false consequent, making the whole not true but neuter."[23] He assumes, of course,

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22. For our purposes, we can state the law of necessitation as follows: if a broad statement about the past and future, such as (c), is true at all, then it is necessarily true.

23. Prior, "Diodoran Modalities," p. 213.

that an implication with a neuter antecedent and a false consequent is itself not true but neuter. This assumption holds in the three-valued logic of Lukasiewicz which Prior presents in "Three-Valued Logic and Future Contingents."[24]

This objection to (d) is based upon the assumption that propositions admit of three truth-values. Prior writes as if his readers have reasons to be sympathetic to three-valued logic, but he makes no attempt to supply such reasons. In "Three-Valued Logic and Future Contingents," Prior attempts to remove the initial repugnance that most of us--including Prior--have to three-valued logic.[25] In that article he lucidly presents the three-valued logic of Lukasiewicz, and relates it to the problem of the truth-value of propositions about contingent future events, as raised in Aristotle's De Interpretatione--a problem which motivated Lukasiewicz's development of a three-valued system. But only two reasons for admitting three truth-values are presented in the article. First, Prior claims that "Aristotle speaks of some propositions about the future as being neither true nor false when they are uttered, on the ground that there is as yet no

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24. Arthur Prior, "Three-Valued Logic and Future Contingents," Philosophical Quarterly 3 (1953), 317-26.

25. Ibid. This goal is made clear on page 317.

definite fact with which they can accord or conflict."[26]

Second, Prior observes that

> Lukasiewicz's three-valued logic is admirably
> adapted to the expression of this way of regarding
> statements about contingent future events. The
> value '1', of course, attaches to statements which
> are definitely true, either because they refer to
> timeless relations (e.g. '2 + 2 = 4') or because
> that of which they speak has already come to pass or
> is already coming to pass, or because its coming to
> pass is already determined; the value '0' to state-
> ments which are definitely false for analogous
> reasons; and the value '1/2' to statements about the
> undetermined future.[27]

These are not convincing reasons to believe that proposi-

tions admit of three truth values. They are based upon

the assumption, which Prior attributes to Aristotle, that

propositions about future contingent events are neither

true nor false. That assumption is just as implausible as

the intended conclusion that propositions admit of three

truth-values. Consider Aristotle's example:

7. There will be a sea battle tomorrow.

Common sense suggests that this proposition is either true

or false. Afterall, there seem to be only two

possibilities for tomorrow's events: either they include a

sea battle or they don't. The proposition in question

seems to be true if they do, and false otherwise.

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26. Ibid., p. 322.

27. Ibid., p. 323.

Of course common sense cannot always be trusted.   If it   could   be shown that the assumption that (7) is either true or false leads to   a   contradiction,   or   perhaps   to fatalism,   then   perhaps   we   should think seriously about giving it up.   In that case, three-valued logic may   begin to   look   attractive.   Perhaps   arguments   similar to the Master Argument can be used to establish that the   assumption   of   exactly   two truth-values leads to trouble.   But until that has been established, Prior's first reason   for doubting (d) is weak.

In   his   book,   <u>Past</u>,   <u>Present</u>,   <u>and</u>   <u>Future</u>,   Prior presents a further reason to doubt (d).   He first observes that (d) can be defended by reasoning that   if   p   is   now false   and   always will be false, then "it was the case at least at the moment just gone   that   it   would   be   always false thereafter."[28]   Assumption   (d),   however,

had begun   about   1960   to   strike   me   as   dubious. Theses   which   appeal,   in   order   to gain intuitive plausibility, to what was the case   at   'the   moment just   past',   are   liable   to commit one to the view that time is discrete.   What if there is <u>no</u>   'moment just   past',   but   between   any past moment, however close to the present, and the present itself,   there is   another moment still past?   On this supposition, [d] in fact fails....   It could be   that   p   is   now false   for   the   first time, though it will never be true again; and in this case it <u>has</u> always been true that   p   will   be   true; even in the very near past,

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28. Arthur Prior, <u>Past</u>, <u>Present</u>, <u>and</u> <u>Future</u> (Oxford: Clarendon Press, 1967), p. 33.

bringing us as close as we like to the first moment of its falsehood, 'it will be true' must still have a tiny interval to verify it.[29]

Prior's second reason for doubting (d) is much stronger than the first. Consider a proposition such as

8. No American is or has been the World Chess Champion.

This proposition was true for a very long time. Sometime during 1972, however, it became false due to the efforts of Bobby Fischer. It has been false ever since, and will remain false forever. If we accept this example, and if we assume that time is uniform and connected and that there is at least one moment of time before Fischer became the world champion, then (d) implies that time is discrete--that is, (d) implies that time is isomorphic to some subset of integers. To see this, let p be the proposition (8), and let t be the moment at which Fischer became the world champion. Hence at t, we have -p & -Fp. By (d) we have P-Fp. Let s be a moment of time prior to t, at which -Fp holds. Assume for reductio that time is not isomorphic to any subset of integers. From this, and the assumption that time is uniform,[30] we know that there is no moment directly preceding t. Thus there are some moments (indeed infinitely many) between s and t. Since

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29. Ibid., p. 49.

-Fp holds at s, -p must hold at all moments between s and t. But This contradicts our assumption that t is the first moment at which Fischer became champion (and hence at which p became false). We may conclude that (d) is true only if time is discrete.

Is it reasonable to think that time is discrete? It is true that we often speak, for example, of "the moment just preceding this one," or "one moment after midnight," etc. But upon reflection it is clear that in principle, for each pair of moments there is a third inbetween them. No matter how close together a pair of moments are, they mark an interval of time. No matter how short the interval, it is always in principle possible that some event begins when that interval begins, and ends before the interval ends. For instance, it seems to be in principle possible for computers to make calculations at ever increasing speeds. What takes a computer dozens of nanoseconds to do today might be accomplished in fractions of a nanosecond tomorrow. It is hard to imagine an interval so short that it cannot, even in principle, be divided.

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30. I assume that if time is uniform, then if the whole of time is not isomorphic to any subset of the integers then neither is any substantial segment of time. A substantial segment of time includes more than one moment.

I think this objection is strong and convincing. Accordingly, I follow Prior and reject (d).

There is another objection to Prior's reconstruction of the Master Argument, an objection which I think is more serious than the two presented by Prior. According to the first premise, what is past is necessary: $Pp \longrightarrow -M-Pp$. This plausible assumption lies at the heart of the Master Argument, and it is also essential to the puzzle presented in chapter one. In spite of its initial plausibility, I think it is false. I shall argue in chapter five that if any part of the future is open then so are at least some parts of the past. I argue also that some parts of the future are indeed open.

3. Taylor's Argument

Richard Taylor describes the consequences of adopting a fatalistic attitude towards life:

> The consequences of doing so are obviously momentous. To say nothing of the consolation of fatalism--a consolation which enables one to view all things as they arise, with the same undisturbed mind with which he contemplates even the horrors of remote history--the attitude of fatalism relieves one's mind of all tendency toward both blame and approbation of others and of both guilt and conceit in himself. It promises one that a perfect understanding of everything is at least possible, even if never actually possessed. This thought alone, once firmly grasped, yields a sublime complacency toward everything that life offers, whether to oneself or to his fellows; and while it thereby reduces one's pride, it simultaneously

enhances the feelings, opens the heart, and enormously broadens one's understanding.[31]

Perhaps some thinkers--unable to resist such enticement-- have become fatalists due to considerations such as these. We need not pause to dispute the accuracy of Taylor's alluring description. He does not base his argument for fatalism upon the consequences of accepting it.

Instead, he bases his argument upon six claims, "each of which recommends itself to the ordinary understanding as soon as it is understood, and hardly any of which have very often been doubted even by the most critical philosophical minds, many of whom, however, have failed to see their implications."(57) For a list of all six, I refer the reader to Taylor. The most important ones are the first, third, and fifth. So far as I can tell, they are the only ones used in the argument. The others are used to meet various objections.

His first supposition is that "any proposition or statement whatever is either true, or, if not true, then false."(57) This is simply the law of excluded middle. His third supposition is that "if any change or state of affairs is necessary for some other change or state of

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31. Richard Taylor, Metaphysics (Englewood Cliffs, N.J.: Prentice-Hall, 1963), p. 57. Further references to this book will be made in this section by enclosing page numbers in parentheses.

affairs at the same or any other time, then the latter cannot occur without the former occurring too, even though they are logically unconnected."(58) By making this supposition, Taylor means to introduce the notion of one state of affairs, q, being necessary for another state of affairs, p. He adds,

> A perhaps clearer way of saying the same thing is that if one state of affairs is <u>essential</u> for another, then the latter cannot occur without it. Oxygen, for instance, is essential for life, which means that we cannot normally live without it, even though it is not logically impossible that we should.(58)

When he says that q is necessary for p, or alternately, that q is essential for p, he does not mean that q is logically necessary for p, which is to say that p entails q. Rather, he seems to mean something like, "q is physically necessary for p," which is to say that it is physically necessary that if p then q. We said in chapter one that a proposition is physically necessary, roughly speaking, if it is required by the laws of physics. A slightly broader notion may be useful here. A proposition is physically necessary in a broader sense, if it is required by the laws of any of the natural sciences. Propositions required by the laws of biology or chemistry, for instance, are physically necessary in this broader sense. Taylor does not mention this notion, nor does he ever explain what sense of "cannot occur without" he has

in mind. But his remarks suggest this interpretation. I think Taylor is suggesting, for example, that it's a law of biology that if there is life then there is oxygen. Hence, the proposition that there is oxygen is, in our sense, essential for the proposition that there is life.

Taylor's fifth assumption is that "no agent can perform any given action if there is lacking, at the same or any other time, some condition or state of affairs necessary for the occurrence of that act."(58)

A. The Argument. With these assumptions in the background, Taylor describes a hypothetical situation upon which his argument for fatalism is based.

> Now let us imagine that I am a naval commander about to issue my order of the day to the fleet. We assume, further, that within the totality of other conditions prevailing, my issuing of a certain kind of order will ensure that a naval battle will occur tomorrow, whereas if I issue another kind of order this will ensure that no such battle occurs.
> Now then, I am about to perform one or the other of these two acts; namely, one of issuing an order of the first sort or one of the second sort. We shall call these alternative possible acts O and O' respectively. And let us call the two propositions "A naval battle will occur tomorrow" and "No naval battle will occur tomorrow," Q and Q' respectively. We can now assert that if I do act O, then my doing such will ensure that there will be a naval battle (i.e., that Q is true), whereas if I do O' my doing that will ensure that no naval battle will occur (or, that Q' is true).(61)

Taylor then sets forth the following argument.

1. If Q is true, then it is not within my power to do O' (for in case Q is true, then there is, or

will be, lacking a condition essential for my doing O', the condition, namely, of there being no naval battle tomorrow).

2. But if Q' is true, then it is not within my power to do O (for a similar reason).

3. But either Q is true or Q' is true.

4. Either it is not within my power to do O, or it is not within my power to do O'.
. . . .

In view of the fact that probably everything anyone does, and certainly everything of any significance that anyone ever does, has consequences for the future, so that, his act being sufficient for those consequences, they are in turn necessary conditions of his act, we can generalize upon this conclusion by saying that, for any such act A, either it is not within one's power to do A, or it is not within his power to refrain from doing it, depending of course on which consequences are in fact going to ensue.(61-62)

B. <u>An Objection</u>. The first premise of Taylor's argument says that if a naval battle will occur tomorrow, then it is not within Taylor's power to issue an order of the second sort. At first glance this premise is as implausible as fatalism itself. It seems obvious that he can issue an order of the first sort, and also that he can issue an order of the second sort. Even if he in fact will issue one of the first sort, and even if doing so will result in a naval battle tomorrow, he still could issue an order of the second sort. It appears, then, that (1) is simply false.

We cannot, however, dismiss Taylor's first premise so easily, because he offers an argument to support it. His first premise is based upon these two assumptions:

a. There being no naval battle tomorrow is essential for Taylor's issuing an order of the second sort.

b. If q is essential for p, and q is not true, then p is not within anyone's power.

Although assumptions (a) and (b) entail Taylor's first premise, neither is true. Taylor speaks of "a certain kind of order," and "another kind of order," though he doesn't say what kinds he has in mind. It is natural to assume that he had in mind some garden-variety kinds of order, paradigms of which are, 'Batten down the hatches!', 'Hoist the mainsail!', 'Attack!', and 'Retreat!' If he had these kinds of command in mind, or any kinds of command likely to be used by a naval commander, then surely (a) is false. For any ordinary kind of command, k, there being no naval battle tomorrow is not essential for Taylor's issuing an order of kind k. No matter how despotic Taylor is as a naval commander, and no matter how obsequious is his fleet, it is still not physically necessary that if he gives an order of a certain kind then there will be no naval battle tomorrow. The laws of physics, chemistry, and biology do not rule out the possibility that his fleet will disobey his order. Nor do they rule out the possibility that his fleet obeys but screws

up, or obeys but is unable to engage in battle, etc.

Even if we set aside this difficulty, a deeper one remains. Assumption (b) appears to be a more careful statement of Taylor's fifth supposition, namely "that no agent can perform any given action if there is lacking, at the same or any other time, some condition or state of affairs necessary for the occurrence of that act."(58) This is one of the claims that, according to Taylor, "recommends itself to the ordinary understanding as soon as it is understood."(57) But, if we interpret this claim as (b), there is little to recommend it. If there is one proposition that is within someone's power, but is not true, then (b) is false. For let r be such a proposition. It is clear that r is essential for r. Thus, if we replace both p and q in assumption (b) by r, the anteced- ent is satisfied. Yet, the consequent is false because by hypothesis r is within someone's power.

Are there any propositions that are within someone's power, but are not true? I suggested at the beginning of this chapter that such propositions are easy to find. I gave an example about Joe's and Bub's in which I claimed that on Friday afternoon it was accessible that I would dine at Bub's on Friday night, even though I in fact dined at Joe's. Although I described that example in terms of accessibility, essentially the same point can be made in

terms of power. As of Friday afternoon it was within my power to dine at Bub's on Friday night, although it was not true that I would do so. Perhaps in Taylor's imaginary situation, it is within his power to issue a command of the first sort, but false that he will do so.

If I am correct about these examples, then (b) is false. From the facts that q is essential for p, and that q is not true, it does not follow that p is not within anyone's power. It does follow, however, that p is not true, and hence that no one has in fact seen to it that p is true. Thus, if anyone has it within their power to see to it that p, that power will remain unexercised.

Once again, the staunch fatalist could simply refuse to accept my examples. Taylor could insist that on Friday afternoon it was not within my power to eat at Bub's on Friday night. But Taylor is using (b) in an argument to support fatalism. He tries to pass it off as an assumption that is obvious, or self-evident. If his argument is to be convincing, he must either give an argument for (b), or at least attempt to explain away its implausibility. He owes us an explanation of (b).

I have argued that (b) is false; however, it is not the only interpretation of Taylor's fifth supposition. That supposition could also mean,

    c. If q is essential for p, then it is not within anyone's power to see to it that both -q and p.

Given our sense of 'essential', this assumption does indeed recommend itself to the ordinary understanding as soon as it is understood. It is natural to assume that none of us can change the laws of nature. If so, then if it is physically necessary that if p then q, then no one can see to it that p and -q. If we interpret Taylor's fifth assumption as (c), then it's true, but it won't help his argument. Assumptions (a) and (c) are not strong enough to entail the first premise, namely,

> 1. If there will be a naval battle tomorrow, then it is not within [Taylor's] power to issue an order of the second sort.

They do entail that if there will be a naval battle tomorrow, then it is not within Taylor's power to see to it that both there is a naval battle tomorrow and Taylor issues an order of the second sort. But that result is of no use to the argument.

To summarize my objection, Taylor's first premise is false. No matter which sort of order Taylor will in fact issue in the hypothetical situation he describes, he could just as easily issue an order of the other sort. Moreover, the argument he offers in support of (1) does not help him, because both of its premises are false. If the second premise, (b), is replaced by (c), then the argument supporting (1) becomes invalid.

C. <u>Taylor's Reply</u>. Taylor is aware of criticisms such as
mine.

> The most philosophically sophisticated criticism
> of fatalistic arguments of the kind here presented,
> and one which is centuries old, amounts essentially
> to denying our fifth datum, to the effect that no
> agent is able to perform any given act in the
> absence of some condition necessary for its
> accomplishment. It is often claimed that all this
> means, really, is that it is impossible, as a simple
> matter of logic, <u>both</u> that an agent should perform a
> certain act, <u>and</u> that there should be lacking some
> condition necessary for his doing that act. From
> this it does not follow, it is claimed, that the
> agent is <u>unable</u> to do that act, but only, that he
> <u>does</u> not do it--and this is perfectly consistent
> with his still having the ability to do it.
> Thus, a gymnast does not lift a weight if he has
> no weight to lift, but the absence of this necessary
> condition for lifting a weight does not diminish his
> strength or his ability to lift weights. Indeed, if
> the absence of a weight were a necessary condition,
> not merely of his lifting it, but of his <u>ability</u> to
> lift it, then it would logically follow that his
> mere ability to lift it would be a sufficient
> condition for a weight's being present, that his
> strength would by itself guarantee the perpetual
> presence of a weight! Gymnasts are sometimes able
> to lift weights even when none are present, just as
> musicians are able to make music even when they are
> not doing so, and horsemen are able to ride horses
> even when they are walking. The argument for
> fatalism is, then, it is suggested, a simple <u>non
> sequitur</u>.
> Now all this is true in the usual sense of
> ability, which consists in having the skill,
> strength, equipment, or knowing how. But to make
> that point is really to miss the point. If there is
> lacking some condition C, necessary for my doing a
> certain act A, or which is such that A cannot occur
> without it, then not only do I not do A, I <u>cannot</u> do
> it, no matter what my natural or acquired abilities
> might be. This is perfectly obvious when one
> considers necessary conditions which are lacking in
> the past. It should be no less obvious when one
> considers necessary conditions which are lacking in
> the future.(64-65)

In the first paragraph, Taylor isolates the objection which I have raised against (b). In the second he elaborates upon it, and in the third he presents his reply. His response is best understood as having two parts. First, he draws attention to the sense of ability or power upon which he thinks the objection rests. Then he replies to the objection, understood with that sense of ability or power.

What Taylor calls the "usual sense of ability" is different from our notion of accessibility. Taylor's sense of ability "consists in having the skill, strength, equipment, or knowing how." The differences between Taylor's sense of ability and our sense of accessibility can be drawn out by using examples. Suppose that George is a gymnast of sound mind and body, who is sunbathing at the beach at time t. There are no weights at this beach. In Taylor's sense, presumably, it is within George's power as of t to lift a weight at t. The absence of weights "does not diminish his strength or his ability to lift weights." Or suppose that no naval battle occurred yesterday, and no headline describing a battle appears in today's paper. In Taylor's sense of ability, nonetheless, "I have the ability to read a certain kind of headline--my vision is all right, I know how to read, and so on--and hence am able to do something sufficient for the

occurrence of a naval battle yesterday, even though there was no such battle, and therefore some condition is lacking, necessary for there being any such headline for me to read."(65) Taylor apparently places little weight on the notion of equipment. George the gymnast has the ability, in this sense, to lift a weight at t, even though some necessary equipment--a weight--is lacking. Taylor has the ability, in this sense, to read a headline of a certain kind, even though some necessary equipment--a newspaper with the that kind of headline--is lacking. It would have been less misleading had Taylor omitted the notion of equipment from his comments about his sense of ability.

By contrast, in our sense of 'accessible', it is not accessible as of t that George lift a weight at t. George cannot lift a weight at t for the simple reason that no weights are there for him to lift. Nor is it accessible that Taylor read a headline describing a naval battle that occurred yesterday. There simply is no such headline for him to read.

What is Taylor's reply? He first grants that in his sense of ability or power, there are unactual states of affairs within someone's power. George isn't lifting a weight at t, yet it is within his power, in Taylor's sense, to do so. "But to make that point," he continues,

> is really to miss the point. If there is lacking
> some condition C, necessary for my doing a certain
> act A, or which is such that A cannot occur without
> it, then not only do I not do A, I _cannot_ do it, no
> matter what my natural or acquired abilities might
> be. This is perfectly obvious when one considers
> necessary conditions which are lacking in the past.
> It should be no less obvious when one considers
> necessary conditions which are lacking in the
> future.(64-65)

At first glance it looks as though Taylor is merely

reiterating his fifth datum. But I suspect he is saying

more. I think he is saying that his notion of ability is

not relevant to his fifth datum--our (b)--because his

fifth datum uses a notion of ability or power that is akin

to our notion of accessibility. He says of act A that "I

cannot do it, no matter what my natural or acquired

abilities might be." This explanation of Taylor's remarks

would explain why the observation that there are some

unactual states of affairs within someone's power, in his

sense of power, "misses the point."

My suspicion is confirmed in Taylor's next paragraph.

> For example, we noted that if conditions are such
> that a naval battle yesterday is a necessary
> condition for there being a certain kind of headline
> today, then, given that no such battle occurred, we
> can conclude not only that I _do not_ read such a
> headline, but that I _cannot_, that it is not within
> my power [i.e., accessible], for there is just no
> such headline for me to read. This is perfectly
> consistent with my _knowing how_ to read it, having
> the requisite skill and vision, and so on, and thus
> being able in _that_ sense [i.e., Taylor's sense].(65)

Taylor can therefore agree that in his sense, there are

some unactual states of affairs within his power. It does

not follow that in our sense, there are some unactual states of affairs that are accessible. He claims further that the criticism in question rests upon his notion of ability or power. But it seems that something like our notion of accessibility is relevant to his fifth datum.

It is true that remarks about Taylor's notion of ability or power do not bear directly upon his fifth datum, because that datum appeals not to Taylor's notion of power, but to something like our notion of accessibility. But this observation does not meet the objection I raised against (b). That objection was stated not in terms of Taylor's notion of power, but rather in terms of a notion of power akin to accessibility. The objection, briefly, is that it was within my power, in our sense, to dine at Bub's, even though I went to Joe's instead. That implies that there was an accessible proposition that was not true, namely that I will dine at Bub's. Hence (b) is false. Taylor's reply does not bear upon this reasoning.

4. Conclusion

Fatalism provides us with a solution to our puzzle about divine foreknowledge. But the price we must pay is too high. Fatalism is itself an unpalatable position; moreover it leads to unalterabilism, which in turn forces us to give up the intuition that there is something

someone can but will not do. In the absence of a successful argument for fatalism, it is best to look for other solutions to our puzzle.

CHAPTER III

ETERNALISM

1. Introduction

According to the second solution to our puzzle, there never was a time at which God was omniscient. This is the solution endorsed by medieval philosophers such as Augustine, Boethius, Anselm, and Aquinas. To be sure, they held that God is omniscient; but they insisted that God is also eternal. On their view, God's knowledge is not properly called _fore_knowledge. God does not know things before they happen, because God is not a temporal being. Rather, God exists outside of time. God's knowledge is not subject to time in the way that ours is.

In this chapter, I reconstruct a medieval version of the puzzle, and a medieval response--both to be found in Aquinas. Aquinas's response is based upon the doctrine that God is eternal. Some philosophers think that this doctrine is incoherent.[1] I think some sense can be made of

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1. For example, Anthony Kenny, _Aquinas, a Collection of Critical Essays_ (London, 1969), p. 264: "The whole concept of a timeless eternity, the whole of which is simultaneous with every part of time, seems to be radically incoherent."

the medieval concept of eternity. I try to explain eternity by contrasting the medieval topology of time with the standard topology of time. I argue in the end, however, that the medieval view of eternity, sophisticated though it may be, does not provide an adequate solution to the puzzle.

2. A Medieval Statement of the Problem

In De Veritate, Aquinas asks whether God knows singular future contingents. He then considers the following argument for the negative answer.

> 7. In every true conditional, if the antecedent is absolutely necessary, then the consequent is absolutely necessary. But this conditional is true: if something was known by God, that will be. Therefore, since this antecedent, namely, this was known by God, is absolutely necessary, the consequent will be absolutely necessary. Therefore, it is necessary that everything known by God exists absolutely. That this is absolutely necessary, namely, this was known by God, is proved thus: this is something said about the past, so if it is true, it is necessary; because what was cannot not have been. Therefore, it is absolutely necessary.[2]

In this passage Aquinas poses a problem concerning God's knowledge of future contingents. This problem may appear superficially to be different from the problem of fore-

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2. Thomas Aquinas, De Veritate, qu. 2, art. 12. I thank Robert Sleigh for this translation, which is from Opera Omnia, ed. Stanislai Eduardi Fretté, vol. 14 (Paris: Ludovicum Vivès, 1889), p. 376

knowledge and freedom. But they boil down to the same issues. If we have freedom, then there are contingent statements about the future that describe alternative courses of action that are still open to us. If God knows in advance what actions we will perform, then God must know the relevant future contingents which describe those actions.

The argument in the above passage turns upon the as-sumption that if something true is said about the past, then it is necessary. Aquinas speaks here of absolute necessity, and it is natural to interpret this as either logical or metaphysical necessity. But we saw in chapter one that the past is neither logically nor metaphysically necessary. To make the argument plausible we must inter-pret "absolute necessity" in some other way. As one might expect, I suggest that we use the concept of unalterabil-ity.

In the argument, Aquinas speaks of "true conditionals." Conditionals come in many kinds, of course: there are material, subjunctive, and many varieties of strict conditionals. I think it is fair to interpret Aquinas's conditionals as strict conditionals, because his notion of absolute necessity plays such a prominent role in the argument. I interpret absolute necessity as unalterability. Thus a conditional, on my

interpretation of Aquinas, is a statement of the form, it
is unalterable that if A then B.

3. The Argument Reconstructed

Aquinas's argument can now be formulated. The three
principal assumptions are:

1. If the antecedent of a true conditional is unal-
   terable, then the consequent is unalterable.

2. It is unalterable that if God knew that A then
   A.

3. If it was true that A, then it is now unalter-
   able that it was true that A.

From these premises it follows that whatever God knew is
now unalterable. To see this, suppose that God knew, say
yesterday, that A. By (3), it is now unalterable that God
knew yesterday that A. From (2), it is unalterable that
if God knew yesterday that A, then A. Thus by (1), it is
now unalterable that A. Hence

4. If God knew that A then it is unalterable that
   A.

The argument is not yet complete. Its conclusion is that
whatever God knows (in the present) is unalterable. We
can reach that conclusion by adding the assumption that

5. If God knows that A, then God knew that A.

From (4) and (5) it follows that

6. If God knows that A then it is unalterable that
   A.

There are two minor problems with this argument. Premises (2) and (5) are false. (2) says in effect that whatever God knew in the past is still true in the present. But there are many propositions that were true in the past, and presumably were known by God, that are not true in the present. Consider the proposition: I am seventeen years old. This was true, and presumably was known by God. But it is true no longer.

Premise (5) is false for similar reasons. It says that everything God knows now was known by God in the past. But like us, God can know only things that are true. And there are many things that are true now that have never been true in the past. For example, I am 9740 days old. (I write this on June 2, 1983.) This was never true before, and hence was never known by God.

Both of these problems can be solved by assuming for the sake of argument that some statements are tenseless. Examples that are often suggested are the truths of mathematics. Consider the statement, '2 < 3'. It is suggested that the less-than sign is in neither the present tense, nor the past tense, nor the future tense.[3] On the suggestion in question, the less-than sign simply

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3. See W. V. O. Quine, Word and Object (Cambridge, Mass.: The M.I.T. Press, 1960), chap. 5, sec. 36, esp. pp. 170-71.

has no tense. It merely expresses a mathematical relation that holds timelessly between two and three. Other examples are drawn from philosophy. Philosophers often use expressions such as "p is true at t" or "s believes p at t," in circumstances under which t is allowed to range over past, present, and future times. This seems to suggest that the 'is' or 'believes' in such phrases has no tense at all. Let us indicate the tenseless form of a verb by placing a bar above it.[4] Thus '$\overline{\text{loves}}$', and '$\overline{\text{kisses}}$' are examples of tenseless verb forms.

Among the statements we can make with tenseless verbs are a special class that will help us solve the problem with premises (2) and (5). These are what I call time-indexed tenseless statements. The canonical form for such a statement is "A at t," where t rigidly designates a time and A is a tenseless statement. For example,

Reagan $\overline{\text{is}}$ $\overline{\text{elected}}$ at 8 P.M. on November 4, 1980.

Breshnev $\overline{\text{dies}}$ at 2 A.M. on November 10, 1982.

Such statements often sound like headlines that appear in newspapers. Every time-indexed tenseless statement has an important feature: when used normally, it expresses a

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4. I borrow this notational device from Nicholas Wolterstorff, "God Everlasting," in God and the Good, ed. Clifton Orlebeke and Lewis Smedes (Grand Rapids, Mich.: Eerdmans Publishing Co., 1975), pp. 181-203.

proposition which is true at all times if true at any time. Let us call the propositions expressed by time-indexed tenseless statements, time-indexed tenseless propositions.

Premise (2) is true if the schematic letter 'A' is restricted to time-indexed tenseless statements. Let A be time-indexed and tenseless. Suppose that God knew at some earlier time t that A. Then it was true at t that A. Since A is time-indexed and tenseless, it is true now that A. This reasoning will hold for any possible world; hence it is necessary that if God knew that A then A. And surely, whatever is necessary is unalterable; hence premise (2). Premise (5) is also true when A is restricted to time-indexed tenseless statements, provided that God has always been omniscient. Let A be time-indexed and tenseless, and suppose that God knows that A. Then it is true that A, and hence was true, say yesterday, that A. If God was omniscient yesterday, then God knew yesterday that A. Let us assume hereafter that the schematic letters in our argument are restricted to time-indexed tenseless statements.

The argument is now impressive. It is valid, and the premises seem undeniable. Given our interpretation of 'true conditional', (1) says that if the antecedent of an unalterable material conditional is unalterable, then the

consequent is unalterable. It is reasonable to demand that a condition such as this hold for any acceptable sense of necessity. We have just seen that (2) is true when restricted to time-indexed tenseless statements. (3) seems difficult to deny. (5) is also true when restricted to time-indexed tenseless statements, provided that God has always been omniscient. Finally, the conclusion is equivalent to

7. If it is not unalterable that A then God does not know that A.

(7) entails that if it is open that A then God does not know that A. Put briefly, "God knows no contingents."

From this result it follows that divine omniscience is incompatible with human freedom. For if we are free, then there are many open statements describing our future acts. Consider

I plant peppers at noon on May 1, 1984.

I refrain from planting peppers at noon on May 1, 1984.

If I can freely plant peppers, then both of these statements are accessible as of now; hence both are open. Thus if God knows no open propositions, then God knows neither of these statements. Yet, one of them is true: assuming that I live long enough, one of them describes an act that I will execute in the Spring. It follows that God is not omniscient.

4. Aquinas's Response

When responding to this argument, Aquinas defends it against many objections. He defends the first three premises and indeed, grants that in some sense the conclusion is true. In some sense of 'knows', whatever God knows is unalterable, or alternatively, God knows no contingents. Lest someone should infer that omniscience conflicts with freedom, Aquinas hastens to add that the claim in question is ambiguous. It could mean that God does not know any contingents as future, or it could mean that God does not know any contingents as present. Aquinas admits that God does not know contingents as future, but insists, of course, that God does know them as present.

This move might sound to some like the ad hoc reply of a desperate philosopher who refuses to give up either God's omniscience or our freedom at any cost. But I think it isn't. No doubt, giving up either God's omniscience or our freedom was never a serious option for Aquinas. But that does not make his reply ad hoc. His reply is based upon fundamental features of the medieval view of God. According to the medievals, God is eternal. God exists outside of time. Thus God's knowledge is not temporal, like ours. To express the distinction between temporal knowledge and eternal knowledge, medieval philosophers speak of knowing as future versus knowing as present. To

understand Aquinas's response, we must first understand the distinction between knowing as future and knowing as present. To do that, we must first understand the medieval doctrine that God is eternal. It will be useful to start with an explanation of what it is for a being to be temporal.

5. Temporality and Eternity

Time can be characterized in first-order logic by interpreting the domain of quantification as the set of all instants or moments of time, and by selecting a binary predicate to represent the earlier-than relation. The following axioms characterize what has come to be called the standard topology of time.

T1. ∀t-(t < t)

T2. ∀s∀t(s < t --→ -(t < s))

T3. ∀r∀s∀t(r < s < t --→ r < t)

T4. ∀s∀t(s ≠ t --→ (s < t v t < s))

T5. ∀r∀s∃t(r < s --→ r < t < s)

T6. ∀s∃t(s < t)

T7. ∀s∃t(t < s)

T1 (irreflexivity) asserts that no moment is earlier than itself. T2 (asymmetry) asserts that if s is earlier than t then t is not earlier than s. T2 entails T1. T3 (transitivity) asserts that if r is earlier than s and s

is earlier than t, then r is earlier than t. T4 (con-nectedness) asserts that if s and t are distinct moments, then either s is earlier than t or t is earlier than s. T1, T2, T3, and T4 together guarantee that time is linear. T5 (density) asserts that between any two distinct moments there is a third distinct moment. T6 (non-ending) asserts that there is a moment after any given moment, and T7 (non-beginning) asserts that there is a moment before any given moment.[5]

Talk about past, present, and future times can be formalized by selecting a constant, say, n (for 'now') to designate the present moment of time, and by selecting three unary predicates, say, P, Q, and F, to mean respectively, "is past," "is present," and "is future." The following axioms characterize pastness, presentness, and futureness.

T8. $\forall t(Pt \leftrightarrow t < n)$

T9. $\forall t(Qt \leftrightarrow t = n)$

T10. $\forall t(Ft \leftrightarrow n < t)$

These axioms say that a moment is past if and only if it is earlier than now, present if and only if it is now, and future if and only if now is earlier than it. T8, T9, and

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5. For an illuminating discussion of the topology of time, see W. H. Newton-Smith, The Structure of Time (London: Routledge and Kegan Paul, 1980), chs. 3-6.

T10 are not intended to comprise an informative philosophical theory of pastness, presentness, and futureness. Nor are they intended to provide a satisfactory account of the way in which 'now' functions in English. They are intended to show merely that the past, the present, and the future can be characterized in first order logic. A given interpretation of axioms T1 through T10 will depict a "slice of time;" that is, it will depict the temporal relations and properties that apply to the moments of time, as of a given time.

According to this characterization of time, the defining feature of temporality is the earlier-than relation. This suggests a simple way to characterize a temporal being:

D1: x is temporal =df x exists at some moment that is either earlier or later than some other moment.

With this notion of temporality in mind, we now turn to the medieval notion of eternity.

How do medieval philosophers describe eternity? Augustine writes in his <u>Confessions</u>:

Your years neither go nor come, but our years pass and others come after them, so that they all may come in their turn. Your years are completely present to you all at once, because they are at a permanent standstill.[6]

Boethius offers his classic definition of eternity in book five of <u>The Consolation of Philosophy</u>:

Eternity is the complete possession of an endless life enjoyed as one simultaneous whole.... [An eternal being] must necessarily always be its whole self, unchangingly present to itself, and the infinity of changing time must be as one present before him.[7]

Anselm says in his _Proslogium_:

Thou wast not, then, yesterday, nor wilt thou be tomorrow; but yesterday and today and tomorrow thou art; or, rather, neither yesterday nor today nor tomorrow thou art; but simply, thou art, outside all time. For yesterday and today and tomorrow have no existence, except in time; but thou, although nothing exists without thee, nevertheless dost not exist[8] in space or time, but all things exist in thee.

Finally, Aquinas writes in his _Summa Theologiae_ that

two things characterize eternity. First, anything existing in eternity is _unending_, that is to say, lacks both beginning and end (for both may be regarded as ends). Secondly, eternity itself exists as an _instantaneous whole_ lacking successiveness.[9]

These writers suggest three main ideas concerning eternity. First, to say that God is eternal is to say

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6. Augustine, _Confessions_, trans. R. S. Pine-Coffin (Harmondsworth, Middlesex, England: Penguin Books, 1961), bk. 11, chap. 13, p. 263.

7. Boethius, _The Consolation of Philosophy_, ed. and abr. James J. Buchanan (New York: Frederick Ungar Publishing Co., 1957), pp. 62-63.

8. Anselm, _Proslogium_, in _Saint Anselm: Basic Writings_, trans. S. N. Deane (La Salle, Illinois: Open Court, 1962), chap. 19, p. 25.

9. Thomas Aquinas, _Summa Theologiae_, ed. Thomas Gilby (Garden City, N.Y.: Image Books, 1969), vol. 1, pt. 1, qu. 10, art. 1, p. 144.

that God's life is unending. By this they mean that God's life has no beginning and no end. Second, to say that God is eternal is to imply that God is not subject to time in the way that we are. In Augustine's words, "[God's] years neither go nor come, but our years pass and others come after them."   As Aquinas puts it, eternity "lacks successiveness." Third, to say that God is eternal is to imply that God sees or experiences everything as if it happened all at once. In Augustine's words "[God's] years are present to [God] all at once, because they are at a permanent standstill." In the words of Boethius, "the infinity of changing time must be as one present before [God]." In the words of Aquinas, eternity exists as an "instantaneous whole." There are, of course, many ways to articulate these ideas. The last two, that eternity lacks successiveness and that eternity exists as an instantaneous whole, suggest that eternity is an instant or moment of time that is neither earlier nor later than any other moment of time. The medievals seem to be suggesting that there is only one such moment, and that an eternal being is a being whose entire life occurs at that moment. That is,

D2: x is eternal =df eternity is the only moment at
    which x exists.

If a being x is eternal in this sense, then there is a sense in which x's life has a beginning and an end.

Eternity is the first and last moment of x's life, since there are no earlier moments of x's life, and no later moments of x's life. But it is odd to speak this way. The life of an eternal being is outside of the ordinary temporal array (the set of moments that are connected by the earlier-than relation). The "first" moment of its life never passes, and neither does the "last." It is more useful, in this context, to observe that the life of an eternal being never began and will never end. To say that x's life began is to say that there is a moment earlier than now that is the first moment of x's life. To say that x's life will end is to say that there is a moment later than now that is the last moment of x's life. Since no moments in the life of an eternal being are earlier or later than now, an eternal life never began and will never end.

We can characterize the medieval view of eternity by modifying the above axioms.[10] Instead of assuming that all moments of time are connected by the earlier-than relation (T4), we assume that all moments except eternity are connected by the earlier-than relation. Instead of assuming

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10. By speaking of "the medieval view of eternity" I do not, of course, mean to imply that all medieval philosophers endorse the view in question. Ockham is a noteworthy exception.

that every moment is followed by some moment, and preceded by some moment, we assume that every moment except eternity is followed by some moment, and preceded by some moment. The resulting view, which we may call the medieval topology of time, is characterized by the following axioms.

E1. $\forall t - (t < t)$

E2. $\forall s \forall t (s < t \longrightarrow -(t < s))$

E3. $\forall r \forall s \forall t (r < s < t \longrightarrow r < t)$

E4. $\forall s \forall t (s \neq e \neq t \neq s \longrightarrow (s < t \lor t < s))$

E5. $\forall r \forall s \exists t (r < s \longrightarrow r < t < s)$

E6. $\forall s \exists t (s \neq e \longrightarrow s < t)$

E7. $\forall s \exists t (s \neq e \longrightarrow t < s)$

E8. $\forall t - (t < e \lor e < t)$

E9. $\forall t (\forall s - (s < t \lor t < s) \longrightarrow t = e)$

E1 (irreflexivity), E2 (asymmetry), and E3 (transitivity) are the same as before. E4 (a restricted version of con- nectedness) asserts that for any two distinct moments that are each distinct from e (eternity), one is earlier than the other. E5 (density) is unchanged. E6 (a revised version of non-ending) asserts that any moment other than e is followed by some moment. E7 (a revised version of non-beginning) asserts that any moment other than e is preceded by some moment. E8 (eternity) asserts that e is an eternal moment. E9 (uniqueness) asserts that e is the

only eternal moment. An equivalent set of axioms is obtained by deleting E8 and changing the conditional in E9 to a biconditional.

It might sound puzzling to suggest that there could be a moment of time that is neither earlier nor later than any moment of time. It is tempting to believe that if a particular item is neither earlier nor later than any moment of time, then it simply cannot be a moment of time. This temptation is based upon the intuition that all moments of time are essentially related to other moments of time by the earlier-than relation. In spite of this unimpeachable intuition, the medieval suggestion that there is a unique eternal moment is not formally incoherent. We have just seen that this suggestion can be characterized using nothing more than the earlier-than relation and first order logic.

Since eternity is a moment of time, the medievals can say sensibly that propositions are true at eternity. This suggests a simple characterization of eternal truths. A proposition p is an eternal truth if and only if p is true at eternity. By contrast, a temporal truth is a proposition that is true, but is not an eternal truth.

Before turning to the distinction between knowing as present and knowing as future, it will be helpful to make some observations about simultaneity. Simultaneity can be

thought of as either a binary relation between moments of time, or a binary relation between events. The following are two plausible characterizations of the simultaneity of moments.

8. s is simultaneous with t if and only if -(s < t
   v t < s)

9. s is simultaneous with t if and only if
   ∀r((r < s ←→ r < t) & (s < r ←→ t < r))

(8) asserts that s is simultaneous with t if and only if neither is earlier than the other. (9) asserts that s is simultaneous with t if and only if every moment earlier than one is earlier than the other, and every moment later than one is later than the other. On the standard topology of time, (8) and (9) are equivalent. Axioms T1 (irreflexivity) and T4 (connectedness) are enough to guarantee that equivalence. Furthermore, it is a theorem that s is simultaneous with t if and only if s = t. However, on the medieval topology of time, (8) and (9) are not equivalent. Given the medieval topology and (8), for example, each moment is simultaneous with itself, and each moment is simultaneous with eternity. On this view, s is simultaneous with t if and only if s = t or s = e or t = e. Given the medieval topology and (9), on the other hand, each moment is simultaneous with itself, but the only moment simultaneous with eternity is eternity itself. On this view, s is simultaneous with t if and only if

s = t.

Given the standard topology of time and either (8) or (9), simultaneity is transitive. That is, for any moments r, s, and t, if r is simultaneous with s and s is simultaneous with t, then r is simultaneous with t. This result also holds given the medieval topology of time and (9). On the other hand, given the medieval topology of time and (8), simultaneity is not transitive. For let r be some "ordinary" moment, let s be eternity, and let t be some "ordinary" moment distinct from r. Then r is simultaneous with s, and s is simultaneous with t, because s, being eternity, is simultaneous with every moment. Yet, r is not simultaneous with t. However, given the medieval topology of time and (8), simultaneity is transitive when restricted to "ordinary" moments of time--moments other than eternity. That is, for any moments r, s, and t, if $r \neq e$, $s \neq e$, and $t \neq e$, then if r is simultaneous with s and s is simultaneous with t, then r is simultaneous with t.

The simultaneity of events can now be characterized in terms of the simultaneity of moments. Let e and f be events. Then,

    10. e is simultaneous with f if and only if ∀t[(e is occurring at t --→ ∃s(s is simultaneous with t & f is occurring at s)) & (f is occurring at t --→ ∃s(s is simultaneous with t & e is occurring at s))]

This says that e is simultaneous with f if and only if each moment at which one is occurring is simultaneous with some moment at which the other is occurring. Given the standard topology of time and either characterization of the simultaneity of moments (either 8 or 9), (10) is equivalent to the following.

11. e is simultaneous with f if and only if ∀t(e is occurring at t ←→ f is occurring at t)

This says that e is simultaneous with f if and only if they are both occurring at exactly the same moments of time. Given the medieval topology of time and (9), it also turns out that (10) is equivalent to (11). However, given the medieval topology and (8), (10) is not equivalent to (11). Given the medieval topology, (8), and (10), any event that is occurring at eternity is simultaneous with every event. Whereas, given the medieval topology, (8), and (11), an event that is occurring only at eternity is not simultaneous with any event that is not occurring at eternity.

We have now seen two characterizations of simultaneity for moments, (8) and (9), and two for events, (10) and (11). (8) and (10) will be particularly useful in reconstructing the medieval view of God and time. Henceforth, the view expressed by E1--E9, (8), and (10) will be called the medieval view of time.

6. Knowing as Future vs. Knowing as Present

We turn now to the distinction between knowing as future and knowing as present. Aquinas characterizes this distinction in De Veritate.

> ... it would be impossible for God to have knowledge of future contingents if He knew them as future. Now, something is known as future when an order of past and future stands between the event and the knowledge. This order, however, cannot be found between the divine knowledge and any contingent thing whatsoever; but the relation of the divine knowledge to anything whatsoever is like that of present to present.[11]

A simple way to characterize this distinction is by appealing to the ordinary notion of knowledge at a time, and the notion of a proposition being "about the future" of a given time. The first is clear enough: obviously, what a person knows at one time may differ from what that person knows at another time. The second is not as clear. But we will have no need to place much weight upon the notion of "about the future." So, I think it is clear enough for our purposes. With these two notions, we can define knowledge as future as follows.

D3: x knows as future at t that A =df x knows at t that A and A is about the future as of t.

For example, to say that I know as future now that I will

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11. Thomas Aquinas, Truth, trans. Robert W. Mulligan (Chicago: Henry Regnery Co., 1952), vol. 1, qu. 2, art. 12, p. 119.

plant peppers is to say that (a) I know now that I will plant peppers and (b) the claim that I will plant peppers is a claim about the future as of now. It is plausible to suppose that the proposition in question is about the future as of now, for if it is true now, then there is a time in the future of now at which I plant peppers. As Aquinas would put it, an order of past and future stands between the event--my planting peppers--and the knowledge--my knowing now that I will plant them. So, knowledge as future is ordinary temporal knowledge of some proposition about the future.

By contrast, something is known as present, presumably, if no order of past and future stands between the event and the knowledge. For example, you know now that you are reading this paragraph; and it is true now that you are reading this paragraph. Since the event is neither earlier nor later than the knowledge, Aquinas would say, presumably, that you know as present that you are reading this paragraph. So, one way to know something as present is to have ordinary temporal knowledge of some proposition that is "about the present."

Given the medieval view of time, there is another way to know something as present. No order of past and present stands between eternity and any ordinary moment of time. Thus, whenever someone knows at eternity of some

temporal event, the event in question is neither earlier nor later than the knowledge of it. These remarks suggest the following definition of knowledge as present.

> D4: A being x knows as present at t that A =df either x knows at t that A and A is about the present as of t, or x knows at t that A and t is eternity.

For example, if you know now that you are reading this sentence, and if the proposition that you are reading this sentence is about the present as of now, then you know as present now that you are reading this sentence. If God knows at eternity that I plant peppers at noon on May 1, 1984, then God knows as present at eternity that I plant peppers at noon May 1, 1984.

7. What Does God Know?

According to medieval philosophers, then, God is eternal and omniscient. These two attributes may appear to conflict. Presumably a person cannot know something at a time t unless he or she exists at t. And the only things a person can know at t are things that are true at t. On the medieval view, then, the only time at which God can know anything is eternity, and the only things God can know then are things that are true at eternity--the eternal truths. It follows that God does not know any temporal truths. God does not know that you were born,

nor that you are alive, nor that you will die. God does not know that Reagan was elected president, nor that Breshnev died. Although these things are true in the temporal present (now), they are not true at eternity. It is not true at eternity that Reagan <u>was</u> elected president, because there is no time earlier than eternity; hence there is no time earlier than eternity at which Reagan could have won an election. It is not true at eternity that you <u>are</u> alive, because you are not an eternal being. It is not true at eternity that you <u>will</u> die, because there is no time later than eternity at which you could die. So, there are many truths that cannot be known by an eternal God.

In addition to the above examples, there are many time-indexed truths. For example, let t_1 be the time at which you were born, let t_2 be now, and let t_3 be the time at which you will die. The following are examples of time-indexed truths.

    You were born at t_1.
    You are alive at t_2.
    You will die at t_3.
    Reagan was elected president on November 4, 1980.
    Breshnev died November 10, 1982.

These truths also cannot be known by an eternal being. It is true at a time t that you <u>were</u> born at t_1 only if t_1 is earlier than t. It is true at t that you <u>are</u> alive at t_2 (where "are" is in the present tense) only if t = t_2. It

is true at t that you <u>will</u> die at t_3 only if t is earlier than t_3. Since eternity is neither earlier than, nor identical with, nor later than t_1, t_2, or t_3, these three claims are not true at eternity. Thus on the medieval view of time, God cannot know them.

Consider next the chronologically definite truths. Some examples are:

    You are, were, or will be born at t_1.
    You are, were, or will be alive at t_2.
    You die, died, or will die at t_3.

Each of these propositions is, always has been, and always will be, true. Yet they are not eternal truths. The second of the three, for example, amounts to the following disjunction:

    Either (a) you are alive at t_2, or (b) you were alive at t_2, or (c) you will be alive at t_2.

Neither (a), nor (b), nor (c) is true at eternity for reasons we have already seen. Eternity is neither earlier than, nor identical with, nor later than t_2. Thus it cannot be true at eternity that you <u>are</u> alive at t_2, nor that you <u>were</u> alive at t_2, nor that you <u>will be</u> alive at t_2. An eternal God cannot not know even chronologically definite truths.

So, there is a rich body of facts that escape God's knowledge. Any fact that we express in the past, present, or future tense cannot be known by an eternal God. History is full of such facts about emperors and kings,

victories and defeats, inventions and discoveries. Astronomy is full of such information about the origin of the stars, the behavior of the planets, and the nature of our galaxy. Geology, anthropology, and sociology are filled with temporal truths. If the medieval view of God and time is correct, then God must be ignorant of all of this information.

These observations may appear to imply that eternalness is incompatible with omniscience. However, that is only an appearance. When the medievals say that God is omniscient, they mean of course that God is omniscient at eternity. To say that a being x is omniscient at a time t is to say that x knows at t everything that is true at t. Thus God is required to know only eternal truths. God's ignorance of temporal truths is, technically, no stain on God's omniscience.

It would be dissappointing nonetheless, if God were completely ignorant of temporal matters. I should think it would disturb any reflective theist to think that such an immense body of information is completely unkown to God. What exactly does God know?

On the medieval view, God knows all and only eternal truths. What sorts of propositions are true at eternity? We have seen that no propositions that we express in the past, present, or future tense can be true at eternity.

If there are any expressible propositions that are true at eternity, they must be expressible with tenseless sentences. If we grant that verbs have a tenseless form, we thereby open the door to eternal truth. It is plausible to think that the theorems of mathematics and logic are eternal truths. But that is only the beginning. Consider some time-indexed tenseless statements.

You are born at t_1.
Reagan is elected on November 2, 1980.
Breshnev dies on December 17, 1982.

It is plausible to think that each of these statements is true if and only if its chronologically definite correlate is. It is also plausible to hold that if any one of these statements is true at any time, then it is true at all times, including eternity. If so, then there are lots of eternal truths. Corresponding to each temporal truth is a time-indexed tenseless statement which expresses an eternal truth. For example, corresponding to the fact that you were born, is the proposition that you are born at t_1, where t_1 is the time of your birth. Every truth of history and astronomy, geology and anthropology, will be represented among the eternal truths by a time-indexed tenseless counterpart. In this way God can have knowledge of temporal matters. If God knows all of the eternal truths, then God's knowledge is vast indeed.[12]

In addition to claiming that God is eternal and omni-scient, and that God knows the future not as future but as present, medieval philosophers assert that God sees everything as if it were present to God all at once. That assertion can be interpreted in light of our remarks about simultaneity. Given (8), (10), and the medieval topology of time, every event is simultaneous with God's knowledge of that event. For any event f, and time t, if f is occurring at t then f is simultaneous with the event of God's knowing that f is occurring at t. For f is occurring at t, and God's knowledge of f is occurring at eternity. According to (8), t is simultaneous with eternity. Hence by (10), f is simultaneous to God's knowing that f is occurring at t.

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12. There may, however, be some troublesome cases. For example, it is a temporal truth that it is now June 2, 1983. What this means, I think, is that the second day of June 1983 has the property of being present. If so, then the corresponding time-indexed tenseless proposition is something like this: the second day of June 1983 has the property of being present on the second day of June 1983. Since the latter proposition is trivial, but the former is not, it would appear that they are significantly different pieces of information. Thus there may be temporal truths that have no "genuine" correlates--correlates that convey the "same" information--among the tenseless truths known by God. Nevertheless, there is a rich body of temporal truths that do have genuine correlates among the tenseless truths known by God. If God knows all tenseless truths, then God's knowledge is quite extensive.

I now summarize my reconstruction of the medieval view of God and time. Time is connected, save for one moment, eternity. God exists at eternity and God knows as present all and only the eternal truths. We can express eternal truths by using tenseless statements. This allows for a rich body of eternal truths, which include correlates of most temporal truths. There is a sense in which God sees temporal events as if they were happening all at once. God's knowledge of all events is eternal, and eternity is simultaneous with every moment of time. Hence God's knowlede of all events is simultaneous with all of those events.

8. A Reply to Aquinas

Let us return at last to the problem facing Aquinas. The following argument alleges that everything God knows is unalterable.

1. If the antecedent of a true conditional is unalterable, then the consequent is unalterable.

2. It is unalterable that if God knew that A then A.

3. If it was true that A, then it is now unalterable that it was true that A.

4. If God knew that A then it is unalterable that A. (1,2,3)

5. If God knows that A, then God knew that A.

6. If God knows that A then it is unalterable that A. (4,5)

It is assumed that A ranges over propositions that are time-indexed and tenseless. The argument is valid and Aquinas accepts the first three premises. But the argument, says Aquinas, is ambiguous. Premise (2), premise (5), and the conclusion all speak of knowledge, which can be interpreted as either knowledge as future, or knowledge as present. First let us ask, how does the argument fare when knowledge is taken to be knowledge as future? So interpreted, premise (2) says, in effect, that it is unalterable that every time-indexed tenseless proposition that God knew as future is true. On Aquinas's view, it is impossible for God ever to know anything as future. Hence (2) is vacuously true. The same holds for premise (5): it is vacuously true that whatever is known as future by God, was known as future by God. The same also holds for the conclusion. For Aquinas, it is a vacuous truth that everything God knows as future is unalterable, or alternatively, God knows no contingents as future. This conclusion is harmless. It won't show that divine omniscience conflicts with freedom, because divine omniscience, on Aquinas's view, does not require knowledge as future.

Next let us ask, how does the argument fare when knowledge is taken to be knowledge as present? So inter-

preted, the conclusion says that every time-indexed tenseless proposition that God knows as present is unalterable. This conclusion, if true, would cause serious trouble for Aquinas. On his view, God knows as present every eternal truth. Among the eternal truths are some time-indexed tenseless propositions that describe our future actions. If those propositions are unalterable, then we are not free.

Apparently, Aquinas sought to avoid this result by denying premise (5). He seems to have reasoned as follows. Suppose that God knows at eternity that A. Since A is time-indexed and tenseless, it is always true if ever true. Thus it follows that it was true at some time in the past that A. But it does not follow that God knew at some time in the past that A. On Aquinas's view, eternity is the only time at which God knows anything.

I say that this _appears_ to have been Aquinas's reasoning. Whether it was or not, it is not a satisfactory response to the argument. This can be seen by taking a closer look at (5). It says that if God knows that A then God knew that A. This conditional is ambiguous because both the antecedent and the consequent speak of knowledge. If we interpret knowledge as knowledge as present, then (5) amounts to the following claim:

5a. If God knows as present that A then God knew as
     present that A.

This means, in effect, that if God knows at eternity that
A, then there was a time in the past at which it was true
that God knows at eternity that A. But this is a direct
result of Aquinas's view of eternity. By their very
nature, eternal truths are, always have been, and always
will be eternal truths. Thus, if it is true now that it
is true at eternity that A, then it has always been true
that it is true at eternity that A. Likewise, if it is
true now that God knows at eternity that A, then it has
always been true that God knows at eternity that A. I see
no way for Aquinas to deny this.

Perhaps Aquinas interpreted (5) as follows:

5b. If God knows at eternity that A, then God knew
    at some time in the past that A.

This is, in effect, to interpret the 'knows' in the ante-
cedent as knowledge as present, and the 'knew' in the con-
sequent as knowledge as future (or perhaps, as "knowledge
as past"). It is easy to see why Aquinas would want to
deny (5b). Given his views of God and time, it is clearly
false. However, the argument in question does not need
(5b); (5a) will work for its purposes.

It is not easy to see that Aquinas has an objection
to the argument, when knowledge is interpreted as
knowledge as present. The first premise is:

1. If the antecedent of a true conditional is unalterable, then the consequent is unalterable.

This is beyond question. When interpreted with knowledge as present, the second premise is:

2a. It is unalterable that if God knew as present that A then A.

To say that God knew as present that A is to say that it was the case that God knows as present that A. Given that A is restricted to propositions that are time-indexed and tenseless, surely this is true. The third premise is:

3. If it was true that A, then it is now unalterable that it was true that A.

This premise says that the past is unalterable. Aquinas could challenge (3), but he never shows any interest in doing so. From these three premises it follows that

4a. If God knew as present that A then it is unalterable that A.

The final assumption of the argument is

5a. If God knows as present that A, then God knew as present that A.

We have seen that this is a direct consequence of Aquinas's view of eternity. And from (4a) and (5a) it follows that

6a. If God knows as present that A, then it is unalterable that A.

This argument does not trade on the ambiguity of 'knows' and 'knew'. It speaks explicitly about knowledge as present. It seems to me that the only weakness of this

argument is the third premise. If Aquinas accepts it, as it appears that he does, then I see no way for him to avoid the conclusion that whatever God knows as present is unalterable.[13]

Aquinas was aware of the problem that arises from foreknowledge, freedom, and the necessity of the past. He sought to solve the problem by appealing to the doctrine that God is eternal, and to the distinction between knowing as present and knowing as future. But Aquinas's views about God and time, sophisticated though they may be, do not give him a satisfactory solution to the problem. If Aquinas grants that the past is unalterable, then he is forced to admit that God knows no contingents as present. That, in turn, commits him to the view that divine omniscience is incompatible with human freedom.

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13. There are, of course, other ways to interpret the medieval view of eternity. See for example, Eleonore Stump and Norman Kretzmann, "Eternity," Journal of Philosophy 78 (1981): 429-58; and Nicholas Wolterstoff, "God Everlasting." Perhaps one of these accounts of eternity will provide Aquinas with an objection to the argument. They will not be discussed in this dissertation.

CHAPTER IV

SEMANTIC INDETERMINISM

1. Introduction

According to the third solution to our puzzle, not all propositions about the future are either true or false. Alternatively, some propositions about the future are neither true nor false. This view is a species of the weaker view that some propositions are neither true nor false. I call the latter weaker view semantic indeterminism. Many who hold this view also believe that some propositions are open. Also, they often hold the view that all open propositions are neither true nor false. The view that some propositions are open and all open propositions are neither true nor false, is a view that I call open semantic indeterminism. A consequence of open semantic indeterminism is that all open propositions about the future are neither true nor false. This view is often stated as the view that "future contingents are neither true nor false." This view is interesting only if accompanied by the view that there are some "future contingents"--some open propositions about the future. As it turns out, propositions about the future are most often

cited by open semantic indeterminists (also known as "gappers") as examples of open propositions.

Another consequence of open semantic indeterminism is the negation of the law of excluded middle. This "law" says that every proposition is either true or false. According to open semantic indeterminism, there are some open propositions, and all of them are counterexamples to this law.

A third consequence of open semantic indeterminism is unalterabilism--the view that whatever is true is unalterable. To see this, assume that

    1.   If it is open that A then it is neither true that A nor false that A.

This is the second conjunct of open semantic indeterminism. We need to show that

    4.   If it is true that A then it is unalterable that A.

It is open that A if and only if it is neither unalterable that A nor unalterable that -A. Thus from (1) it follows that

    2.   If it is neither unalterable that A nor unalterable that -A then it is neither true that A nor false that A.

The contrapositive of (2) is

    3.   If it is either true that A or false that A then it is either unalterable that A or unalterable that -A.

Now, if it is true that A, then it is not unalterable that

-A. Likewise, if it is false that A, then it is not unalterable that A. From these facts and (3), we get the following claims:

4. If it is true that A then it is unalterable that A.

5. If it is false that A then it is unalterable that -A.

These are two forms of unalterabilism.

The above argument works backwards as well; thus it shows also that the second conjunct of open semantic indeterminism is a consequence of unalterabilism.

Richmond Thomason elegantly articulates the view that future contingents are neither true nor false, in his terse article, "Indeterminist Time and Truth Value Gaps."[1] In the next section of this chapter, I summarize Thomason's semantic theory of tenses; in section three I use his theory to state open semantic indeterminism. In section four I present two objections to this view. Finally, I conclude my discussion in section five.

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1. Richmond Thomason, "Indeterminist Time and Truth Value Gaps," Theoria 36 (1970): 264-81. Further references to that article will be made in the text of this chapter by enclosing page numbers in parentheses.

2. Thomason's Theory

Thomason presents a semantic theory of tenses which is an application of van Fraassen's supervaluations to tense logic. It thus assigns truth-values to formulas in a way that allows truth-value gaps. To interpret the future and past tense operators F and P, and the unalterability operator L,[2] Thomason uses (1) a set K of times ordered by a relation $<$, and (2) a supervaluation V which is a function that assigns truth-values $V_\alpha(A)$ to various (though perhaps not all) formulas A at various times α in K.[3] Such a set K together with an ordering relation $<$ is called a model structure, and represents the underlying structure of time.(265)

Thomason's primary concern is with nonlinear model structures. He supposes that $<$ is a treelike ordering, in that it allows branching into the future but not the past; that is, for all $\alpha, \beta, \gamma \in$ K, if $\beta < \alpha$ and $\gamma < \alpha$, then

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2. Thomason speaks of inevitability where I speak of unalterability. As near as I can tell, this is merely a terminological difference. For convenience, I will continue with the terminology used in earlier chapters.

3. 'A', 'B', etc. will be used as metavariables ranging over formulas. '*P*', '*Q*', etc. will be used as sentence letters. Thus italic '*P*' is a sentence letter, whereas roman 'P' is the past tense operator. As Thomason remarks about his similar usage, this should cause no confusion.

either $\beta = \gamma$ or $\beta < \gamma$ or $\gamma < \beta$. He also assumes that $<$ is transitive: if $\alpha < \beta$ and $\beta < \gamma$ then $\alpha < \gamma$.(266) A <u>history</u> on a model structure is a linear pathway through the structure; that is, a history is a subset h of K such that (1) for all $\alpha, \beta \in$ h, either $\alpha = \beta$ or $\alpha < \beta$ or $\beta < \alpha$ ($<$ is connected on h), and (2) if g is any subset of K such that for all $\alpha, \beta \in$ g, either $\alpha = \beta$ or $\alpha < \beta$ or $\beta < \alpha$, then if $h \subseteq g$ then g = h (h is a <u>maximal chain</u> on the model structure). The set of histories containing α is denoted by $\mathcal{H}\alpha$.(267)

The truth-values assigned by V are determined by a two-stage process. First, V assigns a truth-value $V_\alpha^h(A)$ to each formula A with respect to each history h and time α in h.(277) These asignments characterize the notion of truth-in-a-history-at-a-time. They are bivalent (they contain no gaps) and are classical (they preserve the truth of all classical tautologies). Second, V assigns a truth-value $V\alpha(A)$ to some, but not necessarily all, formulas A with respect to each time α in K. These assignments characterize the notion of truth-at-a-time, and are not relative to histories. They allow gaps, but preserve classical tautologies. To illustrate the first stage, consider any formula of the form FA, PA, or LA.

$$V_\alpha^h(FA) = T \text{ if } V_\beta^h(A) = T \text{ for some } \beta \in h \text{ such that } \alpha < \beta$$
$$= F \text{ otherwise}$$

$$V_\alpha^h(PA) = T \text{ if } V_\beta^h(A) = T \text{ for some } \beta \in h \text{ such that}$$
$$\beta < \alpha$$
$$= F \text{ otherwise}$$

$$V_\alpha^h(LA) = T \text{ if } V_\alpha^g(A) = T \text{ for all } g \in \mathcal{H}\alpha$$
$$= F \text{ otherwise}$$

Such an assignment V^h is called a <u>bivalent valuation</u>.

The second stage of assigning truth-values is as follows.(274)

$$V_\alpha(A) = T \text{ if } V_\alpha^h(A) = T \text{ for all } h \in \mathcal{H}\alpha$$
$$= F \text{ if } V_\alpha^h(A) = F \text{ for all } h \in \mathcal{H}\alpha$$
$$\text{is undefined otherwise}$$

Such an assignment V is called a <u>supervaluation</u>. According to such a supervaluation, and the preceding bivalent valuations, the special cases in which A is of the form FB or LB have the following truth conditions.

$$V_\alpha(FB) = T \text{ iff for all } h \in \mathcal{H}\alpha, \text{ there is a } \beta \in h$$
$$\text{such that } \alpha < \beta \text{ and } V_\beta^h(B) = T$$

$$= F \text{ iff for all } h \in \mathcal{H}\alpha, \text{ there is no } \beta \in h$$
$$\text{such that } \alpha < \beta \text{ and } V_\beta^h(B) = T$$

$$\text{is undefined otherwise}$$

$$V_\alpha(LB) = T \text{ iff for all } h \in \mathcal{H}\alpha \text{ and for all } g \in \mathcal{H}\alpha,$$
$$V_\alpha^g(B) = T \text{ (iff for all } g \in \mathcal{H}\alpha,$$
$$V_\alpha^g(B) = T)$$

$$= F \text{ iff for all } h \in \mathcal{H}\alpha \text{ there is a } g \in \mathcal{H}\alpha$$
$$\text{such that } V_\alpha^g(B) = F \text{ (iff there is a}$$
$$g \in \mathcal{H}\alpha \text{ such that } V_\alpha^g(B) = F)$$
$$\text{is undefined otherwise}$$

Thus, FB is true at α if in all histories through α, B is true at some time later than α. FB is false at α if in all histories through α, B is true at no times later than α. If B is true at a later time in some histories but not

others, then FB is neither true nor false at α. This happens in the following model structure and supervaluation.

Figure One
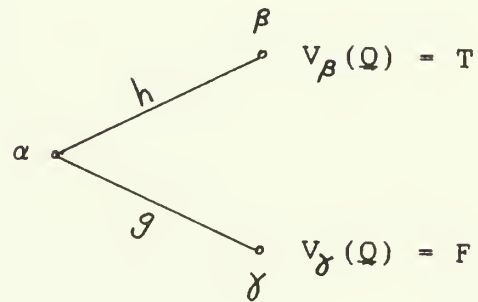
FQ is true at α in history h, but false at α in history g. Thus FQ is neither true nor false at α. LB is true at α if, in all histories through α, B is true at α. LB is false at α if in some history through α, B is false at α.

A formula A is a <u>semantic consequence</u> of a set Γ of formulas, written $\Gamma \Vdash A$, if and only if for all model structures $\mathcal{M}$, for all points of reference α of $\mathcal{M}$, and for all supervaluations V on $\mathcal{M}$, if $V\alpha(B) = T$ for all B in Γ then $V\alpha(A) = T$. A formula A is valid if and only if $\Vdash A$. (274)

3. Formulating the View

The principal contribution of Thomason's paper, by his own account, is a rigorous formulation of the view that future contingents can be neither true nor false.(265) However, he does not explicitly state that view in terms of his theory. Instead he gives us enough machinery to do so. With Thomason's machinery we can state the view that future contingents are neither true nor false, and also the stronger thesis that I have called open semantic indeterminism. For our purposes, a more useful statement of the former view is the following.

    6. For any formula of the form FA, if it is open
        that FA, then it is neither true that FA nor
        false that FA.

An analogous version of the latter ·view can be put as follows.

    7. For some formula A, it is open that A; and for
        any formula A, if it is open that A then it is
        neither true that A nor false that A.

Our principal task in this section is to use Thomason's theory to formulate (6) and (7).

Four of the concepts used in (6) and (7) are open to interpretation: "it is open that," "it is true that," "it is false that," and "if ... then." Given Thomason's theory, "it is open that FA" can be expressed in the object language by the formula: (-LFA & -L-FA). It can also be expressed in the metalanguage by saying that for a

given model structure $\mathcal{m}$, for a given point of reference α of $\mathcal{m}$, and for a given supervaluation V on $\mathcal{m}$, $V\alpha(-LFA \ \& \ -L-FA) = T$. To express "it is true that FA" in the object language, we can introduce a new sentential operator $\bar{T}$.[4] As Thomason points out, the truth condition for this operator is evidently the following.

$V_\alpha^h(\bar{T}A) = T$ iff $V_\alpha^h(A) = T$

$= F$ otherwise

"It is true that FA" can then be expressed in the object language by the formula: $\bar{T}FA$. It can also be expressed in the metalanguage by saying that for a given model structure $\mathcal{m}$, for a given point of reference α of $\mathcal{m}$, and for a given supervaluation V on $\mathcal{m}$, $V\alpha(FA) = T$. To express "it is false that FA" in the object language, we introduce a new sentential operator, $\bar{F}$, with the following truth condition:

$V_\alpha^h(\bar{F}A) = T$ iff $V_\alpha^h(A) = F$

$= F$ otherwise

"It is false that FA" can then be expressed in the object language by the formula: $\bar{F}FA$. It can also be expressed in the metalanguage by saying that for a given model

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4. Thomason uses T instead of $\bar{T}$. (278) I use $\bar{T}$ because it is analogous to $\bar{F}$. I use $\bar{F}$ for "it is false that," because F is already used to mean "it will be the case that."

structure $\mathcal{M}$, for a given point of reference α of $\mathcal{M}$, and for a given supervaluation V on $\mathcal{M}$, $V_\alpha(FA) = F$. Finally, "if A then B" can be expressed in the object language by the formula: $A \supset B$. It can also be expressed in the metalanguage by writing $A \Vdash B$.

The above options produce one interesting interpretation of the claim that some propositions are open:

8. For some formula A, for some model structure $\mathcal{M}$, for some point of reference α of $\mathcal{M}$, and for some supervaluation V of $\mathcal{M}$,
   $V_\alpha(-LFA \ \& \ -L-FA) = T$.

This is an interpretation of the first conjunct of (7). (8) is a result of Thomason's theory. This can be seen by considering again the model structure and supervaluation depicted in figure one. There, $V_\beta(Q) = T$ and $V_\gamma(Q) = F$. Thus $V_\alpha^h(FQ) = T$, and $V_\alpha^g(FQ) = F$; this means that $V_\alpha^h(-FQ) = F$ and $V_\alpha^g(-FQ) = T$. Therefore $V_\alpha^h(LFQ) = V_\alpha^g(LFQ) = V_\alpha^h(L-FQ) = V_\alpha^g(L-FQ) = F$. Hence $V_\alpha^h(-LFQ) = V_\alpha^g(-LFQ) = V_\alpha^h(-L-FQ) = V_\alpha^g(-L-FQ) = T$. Thus $V_\alpha^h(-LFQ \ \& \ -L-FQ) = V_\alpha^g(-LFQ \ \& \ -L-FQ) = T$. Thus $V_\alpha(-LFQ \ \& \ -L-FQ) = T$. Letting A be the formula FQ, we see that (8) holds.

These options produce three noteworthy interpretations of the second conjunct of (7).

9. For any formula A, $\Vdash (-LA \ \& \ -L-A) \supset -(\overline{T}A \ v \ \overline{F}A)$.

10. For any formula A, $(-LA \ \& \ -L-A) \Vdash -(\overline{T}A \ v \ \overline{F}A)$.

11. For any formula A, for any model structure $\mathcal{M}$, for any point of reference α of $\mathcal{M}$, and for any supervaluation V on $\mathcal{M}$,

> if $V\alpha(-LA \;\&\; -L-A) = T$ then $V\alpha(A) \neq T$ and $V\alpha(A) \neq F$.[5]

Only the third of these three statements is a result of Thomason's theory.

Before explaining why (11) holds, it will be worthwhile pausing to explain why (9) and (10) do not. For any formula A, the truth condition for $\overline{T}A$ is identical to the truth condition for A. Thus $\overline{T}$ can be deleted from (9) and (10) without harm. Similarly, the truth condition for $\overline{F}A$ is identical to the truth condition for -A. Thus $\overline{F}$ can be replaced by - in (9) and (10) without harm. The results are:

9a. For any formula A, $\Vdash (-LA \;\&\; -L-A) \supset -(A \;v\; -A)$.

10a. For any formula A, $(-LA \;\&\; -L-A) \Vdash -(A \;v\; -A)$.

Both of these statements fail in Thomason's theory, and for essentially the same reason. (9a) says that for any model structure $\mathcal{M}$, for any point of reference α of $\mathcal{M}$, and for any supervaluation V on $\mathcal{M}$, $V\alpha[(-LA \;\&\; -L-A) \supset -(A \;v\; -A)] = T$. But consider again the

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5. Strictly speaking, each of these interpretations does not say merely that open propositions <u>are</u> neither true nor false; each asserts the stronger claim that open propositions <u>can be</u> neither true nor false.

model structure and supervaluation depicted in figure one. Call (-LFQ & -L-FQ) <u>Sam</u>, and call -(FQ v -FQ) <u>Sally</u>. Sam says that it is open that Q, while Sally says that it is undetermined that Q. In this case, $V_\alpha^h(FQ) = T$ but $V_\alpha^g(FQ) = F$. Hence $V_\alpha^h(LFQ) = V_\alpha^g(LFQ) = F$, and $V_\alpha^h(-LFQ) = V_\alpha^g(-LFQ) = T$. Also, $V_\alpha^h(-FQ) = F$ and $V_\alpha^g(-FQ) = T$. Hence $V_\alpha^h(L-FQ) = V_\alpha^g(L-FQ) = F$, and $V_\alpha^h(-L-FQ) = V_\alpha^g(-L-FQ) = T$. Therefore $V_\alpha^h(-LFQ \& -L-FQ) = V_\alpha^g(-LFQ \& -L-FQ) = T$. However, $V_\alpha^h(-FQ) = F$ and $V_\alpha^g(-FQ) = T$. Thus $V_\alpha^h(FQ \text{ v } -FQ) = V_\alpha^g(FQ \text{ v } -FQ) = T$. Therefore $V_\alpha^h[-(FQ \text{ v } -FQ)] = V_\alpha^g[-(FQ \text{ v } -FQ)] = F$. From all of this it follows that $V_\alpha^h(Sam \supset Sally) = V_\alpha^g(Sam \supset Sally) = F$. Thus $V\alpha(Sam \supset Sally) = F$. That suffices to show that $\not\models$ (Sam ⊃ Sally). Hence (9a) does not hold; nor does (9).[6]

The same model structure and supervaluation will show that (10a) does not hold. (10a) says that for any model structure $\mathcal{m}$, for any point of reference α of $\mathcal{m}$, and for any supervaluation V on $\mathcal{m}$, if $V\alpha(Sam) = T$ then $V\alpha(Sally) = T$. But on the model structure and supervaluation depicted in figure one, $V_\alpha^h(Sam) = V_\alpha^g(Sam) = T$; hence $V\alpha(Sam) = T$. Yet, $V_\alpha^h(Sally) =$

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6. If we let V' be a supervaluation just like V except that $V'_\beta(Q) = F$, then we get $V'\alpha(Sam \supset Sally) = T$, and $V'\alpha[-(Sam \supset Sally)] = F$. Thus $\not\models$ -(Sam ⊃ Sally). This means that neither (Sam ⊃ Sally) nor -(Sam ⊃ Sally) is valid.

V_α^g(Sally) = F; hence V_α(Sally) = F. Accordingly, Sam $\nVdash$ Sally. Thus (10a) does not hold; nor does (10).

Although (9) and (10) do not hold in Thomason's semantic theory, (11) does. To see this, let $\mathcal{M}$ be any model structure, let α be any point of reference of $\mathcal{M}$, and let V be any supervaluation on $\mathcal{M}$. Assume that V_α(-LA & -L-A) = T; we need to show that V_α(A) $\neq$ T and V_α(A) $\neq$ F. If V_α(-LA & -L-A) = T, then V_α^h(-LA & -L-A) = T for all h ϵ $\mathcal{H}\alpha$. Thus V_α^h(-LA) = V_α^h(-L-A) = T for all h ϵ $\mathcal{H}\alpha$. Thus V_α^h(LA) = V_α^h(L-A) = F for all h ϵ $\mathcal{H}\alpha$. Hence for some h ϵ $\mathcal{H}\alpha$, V_α^h(A) = F; and for some g ϵ $\mathcal{H}\alpha$, V_α^g(-A) = F. Therefore V_α^g(A) = T. But then V_α(A) $\neq$ T and V_α(A) $\neq$ F. Q.E.D.

We have seen that (11) is a result of Thomason's theory, but (9) and (10) are not results of his theory. For this reason, I take it to be clear that Thomason intended that (11) be used to express the view that contingent statements are neither true nor false.[7]

Open semantic indeterminism can now be stated in Thomason's theory. It amounts to the conjunction of (8)

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7. Another possible interpretation of the claim that contingent statements are neither true nor false is the following: for any formula A, if $\Vdash$ (-LA & -L-A) then neither $\Vdash$ A nor $\Vdash$ -A. However, this is an empty truth; there are no formulas A that are such that $\Vdash$ (-LA & -L-A). What this means is that no formula is forced to be open.

and (11). The view that future contingents are neither true nor false can be expressed by altering (11): simply replace all but the first occurrence of A by an occurrence of FA.

We noted in section one of this chapter that endorsing open semantic indeterminism would force one to give up the law of excluded middle. There are two ways to express this law in Thomason's theory. First, it can be expressed by saying that for any formula A, $\Vdash$ A v -A. (This is equivalent to saying that for any formula A, $\Vdash \overline{T}$A v $\overline{F}$A.) This statement is a result of Thomason's theory, because every bivalent valuation is classical. Thus Thomason does not have to give up _this_ version of the law of excluded middle. However, the law can be expressed in a second way by saying that for any formula A, for any model structure $\mathcal{M}$, for any point of reference α of $\mathcal{M}$, and for any supervaluation V on $\mathcal{M}$, either $V\alpha(A) = T$ or $V\alpha(A) = F$. This claim is false in Thomason's theory; the model structure and supervaluation depicted in figure one show that it is false when A is FQ.

We also noted in section one that unalterabilism is a consequence of open semantic indeterminism. There are two ways to express unalterabilism in Thomason's theory. It can be expressed either as the claim that for any formula A, $\Vdash$ A ⊃ LA, or as the claim that for any formula A,

$A \Vdash LA$. As Thomason notes, only the latter is a result of his theory.(275)[8]

We have seen that open semantic indeterminism can be stated in Thomason's theory as the conjunction of (8) and (11). I now want to raise the question: is Thomason's formulation of open semantic indeterminism true? By this I do not mean to ask whether (8) and (11) are _true in Thomason's theory_. We have already seen that the answer to that question is yes. Rather, I want to raise the question: is Thomason's formulation of open semantic inde-terminism _really true_? Or perhaps: is there any reason to _accept_ Thomason's theory? Does his theory accurately represent reality so far as future contingents are concerned?

Thomason does not attempt in his article to argue for open semantic indeterminism. In the next section I present two objections to this view, and I show how they apply to Thomason's formulation of it. Both are simple objections, and I doubt that they will surprise an open semantic inde-terminist; but I find them convincing.

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8. To see that for some formula A, $\nVdash A \supset LA$, see Thomason, p. 275. To see that for all formulas A, $A \Vdash LA$, let m be any model structure, let α be any point of reference of m, and let V be any supervaluation on m. Suppose that $V\alpha(A) = T$; we need to show that $V\alpha(LA) = T$. If $V\alpha(A) = T$ then $V_\alpha^h(A) = T$ for all $h \in \mathcal{H}\alpha$. Hence $V\alpha(LA) = T$.

4. Two Objections

A. The First One. One objection to open semantic indeter-
minism can be put as follows. If open semantic indeter-
minism is true, then the law of excluded middle is not
true; the law of excluded middle is true; therefore, open
semantic indeterminism is not true. This argument is
valid, and the first premise is clearly true. (An argu-
ment for the first premise was given in section one of
this chapter.) Hence the objection turns upon the second
premise. What can be said in favor of the law of excluded
middle?

I have no deductive argument to offer in favor of
this law. However, the natural light of my reason shines
brightly upon it. Consider a putative counterexample: I
will be drinking water tonight at 8 P.M. The open seman-
tic indeterminist and I may both agree that this proposi-
tion is open. I say it is also either true or false; but
the open semantic indeterminist disagrees. Why do I think
it is either true or false? Because it seems to me that I
now have only three alternatives: either I wait until
8 P.M. and then drink, or I wait until 8 P.M. and then
abstain from drinking, or I cease to exist by 8 P.M.
There is simply nothing else that can happen to me. Since
these are the only alternatives I have now, either I am

now taking the first one, or I am now taking the second one, or I am now taking the third one. There is simply no other course of action I can be taking now. If I am now taking the first alternative, then it is true that I will be drinking water tonight at 8 P.M. If I am now taking the second alternative, then it is false that I will be drinking water tonight at 8 P.M. If I am now taking the third alternative, then again it is false that I will be drinking water tonight at 8 P.M. This is the best I can do to explain why I believe that the law of excluded middle holds in this case.

This objection can be applied directly to Thomason's theory. If his theory is true then the law of excluded middle is not true; the law of excluded middle is true; therefore his theory is not true. To see the details of such an application, let Q be the proposition that I am drinking water tonight at 8 P.M. (June 2, 1983). Then FQ says that I will be drinking water at that time. Let $\mathcal{M}$, V, and α be such that $\mathcal{M}$ is a model structure, V is a supervaluation on $\mathcal{M}$, α is a point of reference of $\mathcal{M}$ that is intended to represent now (noon on June 2, 1983), and $V\alpha(-LFQ \ \& \ -L-FQ) = T$. Our intuitions tell us, or at least my intuitions tell me, that either I will be drinking water tonight at 8 P.M. or I won't. Thus it should be that either $V\alpha(FQ) = T$ or $V\alpha(FQ) = F$. But that cannot

happen in Thomason's theory. If $V\alpha(-LFQ \ \& \ -L-FQ) = T$ then $V\alpha(FQ) \neq T$ and $V\alpha(FQ) \neq F$.

There is a reply that Thomason can make to this objection. He could distinguish between the time of evaluation and the time of verification of a given statement.[9] Thomason could say that if I assert now (at noon June 2, 1983) that I will be drinking water tonight at 8 P.M., then noon is the time of evaluation of my statement, and 8 P.M. is the time of its verification. Then if I insist that either I wait until 8 P.M. and then drink, or I wait until 8 P.M. and then abstain from drinking, or I cease to exist by 8 P.M., Thomason has a reply. He can say that if my statement is to be true, then it must mean the following: either I exist and am drinking will be true at the time of verification; or I exist and am not drinking will be true at the time of verification; or I do not exist will be true at the time of verification. With that statement Thomason can agree; afterall, the assignments made by V to atomic formulas must be bivalent.(277) If we let P stand for I exist tonight at 8 P.M., and if we let Q stand for I am drinking water

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9. Thomason does not use this terminology; however, that he had the idea for this distinction is suggested by his remarks on p. 279 about truth being relative to events up to the present vs. inevitability being relative to some time in the past.

tonight at 8 P.M., then Thomason could (indeed, must) agree with the following. No matter which history we follow from now on, if β is the point of reference on that history corresponding to 8 P.M. tonight (the time of verification), then either $V_\beta(P) = T$ or $V_\beta(P) = F$; and either $V_\beta(Q) = T$ or $V_\beta(Q) = F$. If so, then $V_\beta(P \& Q) = T$ or $V_\beta(P \& -Q) = T$ or $V_\beta(-P) = T$. (It is a result of Thomason's theory that for any model structure $\mathcal{M}$, for any point of reference α of $\mathcal{M}$, and for any supervaluation V on $\mathcal{M}$, $V\alpha(A \& B) = T$ if and only if $V\alpha(A) = V\alpha(B) = T$; also, $V\alpha(-A) = T$ if and only if $V\alpha(A) = F$.) However, Thomason will no doubt insist that if α is the point of reference on that history corresponding to now (the time of evaluation), then $V\alpha(FQ) \neq T$ and $V\alpha(FQ) \neq F$.

I am not convinced by this reply. I accept the following principle:

Al: If A, B, and C will be the only alternatives at t, then it will be the case at t that either A is true or B is true or C is true.

Thus I agree that if P & Q, P & -Q, and -P will be the only alternatives tonight at 8 P.M. (the time of verification), then no matter which history we follow, either $V_\beta(P \& Q) = T$ or $V_\beta(P \& -Q) = T$ or $V_\beta(-P) = T$ where β represents 8 P.M. on that history. However, I also assert the following principle:

A2: If <u>A</u>, <u>B</u>, and <u>C</u> <u>are</u> the only alternatives at t,
then it <u>is</u> the case at t that either <u>A</u> is true
or <u>B</u> is true or <u>C</u> is true.

The only alternatives I have now, at the time of
evaluation, are $F(\underline{P} \& \underline{Q})$, $F(\underline{P} \& -\underline{Q})$, and $F(-\underline{P})$. Thus, if
α represents now (the time of evaluation), then it should
be that either $V\alpha[F(\underline{P} \& \underline{Q})] = T$ or $V\alpha[F(\underline{P} \& -\underline{Q})] = T$ or
$V\alpha(F-\underline{P}) = T$. First, if $V\alpha[F(\underline{P} \& \underline{Q})] = T$ then $V\alpha(F\underline{P}) =$
$V\alpha(F\underline{Q}) = T$. Second, if $V\alpha[F(\underline{P} \& -\underline{Q})] = T$ then $V\alpha(F\underline{P}) =$
$V\alpha(F-\underline{Q}) = T$. To say that $V\alpha(F-\underline{Q}) = T$ is to say that it is
true now that <u>it will be the case that it is not the</u>
<u>case that</u> I am drinking water tonight at 8 P.M. If that
is true, then it is true now that <u>it is not the case that</u>
<u>it will be the case that</u> I am drinking water tonight at
8 P.M. Thus $V\alpha(-F\underline{Q}) = T$, and $V\alpha(F\underline{Q}) = F$. Third, if
$V\alpha(F-\underline{P}) = T$, then it is true now that it will be the case
that it is not the case that I exist tonight at 8 P.M. If
so, then surely it is true now that it is not the case
that it will be the case that I am drinking water tonight
at 8 P.M. Thus $V\alpha(-F\underline{Q}) = T$ and $V\alpha(F\underline{Q}) = F$. Therefore no
matter which of the three alternatives I am taking now at
α, either $V\alpha(F\underline{Q}) = T$ or $V\alpha(F\underline{Q}) = F$. That is why it seems
to me that it should be that as of now--the time of
evaluation--either $F\underline{Q}$ is true or $F\underline{Q}$ is false.

I have no arguments for A1 and A2. Both seem to me
to be conceptual truths about the relevant concept of an

alternative. I suspect that an indeterminist would agree that these principles hold when A, B, and C are not contingent statements about the future. I suspect further that the indeterminist would say that with respect to contingent statements about the future, these principles do not hold.

A1 and A2 can be expressed in Thomason's theory as follows:

A3: If $V\alpha(A \lor B \lor C) = T$ then $V\alpha(A) = T$ or $V\alpha(B) = T$ or $V\alpha(C) = T$.

To use A3 to express A1, we let α represent some time in the future; to use A3 to express A2, we let α represent now. According to Thomason's theory A3 is true when the formulas A, B, and C contain no occurrences of the future-tense operator. However, A3 does not hold in general when the formulas in question contain occurrences of the future-tense operator. What reason is there for thinking that A1 and A2 do not hold in the case of future contingents? Or, what reason is there for thinking that a semantic theory in which A3 fails for formulas containing the future-tense operator represents reality accurately, so far as future contingents are concerned?

An indeterminist could say that contingent statements about the future are exceptions to A1 and A2 because as of now, there is no "fact of the matter" regarding future contingents--their truth-values are "not yet determined."

This reply does not amount to much--it simply raises more questions. First, by saying that the truth-values of future contingents are "not yet determined," an indeterminist might mean that for a given future contingent, A, it is not unalterable that it is true that A and not unalterable that it is false that A. With that I agree; but that claim gives us no reason to question A1 and A2.

Second, by saying that the truth-values of future contingents are "not yet determined," an indeterminist might be merely reasserting the thesis that future contingents are neither true nor false. Now I agree that if future contingents are neither true nor false, then A1 and A2 do not hold. But what is at issue is the assertion that future contingents are neither true nor false. If that assertion is to give us a reason for rejecting A1 and A2, it must be accompanied by some reasons for thinking that it is true. Why believe that contingent statements about the future are neither true nor false? That is a question for the indeterminist.

Third, the claim that the truth-values of future contingents are "not yet determined" could mean something else. What else could it mean? Again, that is a question for the indeterminist.

I know of no answers to these questions. Indeed, I know of no reasons to think that A1 and A2 do not hold with respect to future contingents. Accordingly, I see no reason to think that a semantic theory in which A3 fails for formulas representing future contingents represents reality accurately, so far as future contingents are concerned.

B. <u>The Second One</u>. Another objection to open semantic indeterminism can be stated as follows. If open semantic indeterminism is true, then unalterabilism is true; unalterabilism is not true; therefore, open semantic indeterminism is not true. This argument is valid, and the first premise is clearly true. (An argument for the first premise was given in section one of this chapter.) Hence the objection turns upon the second premise. What can be said against unalterabilism?

If there is anything anyone can do but will not do, or will do but can avoid doing, then unalterabilism is not true. I think examples of such things are plentiful. For instance, it is true that I will drink some water tonight at dinner (on June 2, 1983); but it is not unalterable that I will do so. Examples like this convince me that some true propositions are not unalterable.

Why do I believe it is true that I will drink some water tonight at dinner? Because I want to drink some water tonight at dinner; I know how to drink some water; I am physically and psychologically able to drink some water; I believe that I will not lose those abilities by dinner time; I plan to dine at some place where I can obtain some water; I believe that my plan will not be thwarted (afterall, water is easy to come by); I doubt that I will forget to drink some water tonight at dinner (afterall, this example has been on my mind all afternoon); I want to be able to say truthfully that the prediction I made in the preceding paragraph was true.

These claims are not intended to be the premises of a deductive argument for the conclusion that I will drink some water tonight at dinner. I have no deductive evidence to offer in support of that conclusion. Making the above remarks is the best I can do to explain why I believe it is true that I will drink some water tonight at dinner.

Why do I believe it is not unalterable that I will drink some water tonight at dinner? Because I could change my mind--perhaps someone will convince me that my example about drinking water is a bad example, or perhaps someone will suggest a better example; perhaps I will find out that the water here (in Amherst, Massachusetts) is

temporarily undrinkable--such things happened in Amherst during my years as a graduate student; perhaps I will forget, for some unforeseeable reason, to drink some water tonight at dinner; perhaps the people with whom I dine tonight will maliciously prevent me from drinking water in order to refute the prediction that I made three paragraphs above--stranger things have happened.

Of course I am not suggesting that any of these eventualities will become actual; all I am saying is that they _could_. What sense of 'could' do I have in mind? The 'could' of accessibility. I claim that it is accessible that such things happen. There is some thing some group of persons can do such that were they to do it, some such thing would happen.

This objection also can be applied directly to Thomason's theory. If his theory is true then unalterabilism is true; but unalterabilism is not true; therefore, his theory is not true. To see the details of such an application, again let Q be the proposition that I am drinking water tonight at 8 P.M. (on June 2, 1983). Then FQ says that I will be drinking water at that time. Let $\mathcal{M}$, V, and α be such that $\mathcal{M}$ is a model structure, V is a supervaluation on $\mathcal{M}$, α is a point of reference of $\mathcal{M}$ that is intended to represent now (noon on June 2, 1983), and $V\alpha(FQ) = T$. My intuitions tell me that it is true but not

unalterable that I will drink some water tonight at dinner. Thus it should be that $V\alpha(FQ) = T$ but $V\alpha(LFQ) \neq T$ But that cannot happen in Thomason's theory. If $V\alpha(FQ) = T$ then $V_\alpha^h(FQ) = T$ for all histories h through α. Thus $V_\alpha^h(LFQ) = T$ for all histories h through α, and $V\alpha(LFQ) = T$. In short, being true is different from being unalterable; yet, Thomason's theory does not allow such a difference.[10]

5. Conclusion

I am sure Thomason realizes that his theory precludes the law of excluded middle: for any formula A, for any model structure $\mathcal{m}$, for any point of reference α of $\mathcal{m}$, and for any supervaluation V on $\mathcal{m}$, either $V\alpha(A) = T$ or $V\alpha(A) = F$. He acknowledges that his theory requires unalterabilism: for any formula A, $A \Vdash LA$. For these reasons I doubt that either of the above objections will surprise Thomason. But they might convince him; and then again, they might not.

In any event, I am persuaded by both of these objections. Of course an open semantic indeterminist

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10. Thomason's theory does, however, allow us to say that having been true is different from having been unalterable.(279) See section eight of his article for a discussion of this point.

could deny the second premise in each case. Regarding the first objection, an indeterminist could reject principle A2 as well as my intuition that either it is true, or else it is false, that I will drink some water tonight at dinner. Regarding the second objection, an indeterminist could reject my intuition about unalterabilism; in spite of my remarks, an indeterminist could simply insist that if it is true that I will drink some water tonight at dinner, then it is unalterable that I will do so.

What reason could be given for denying the second premises of these objections? An indeterminist could claim that open semantic indeterminism is the only escape from fatalism. If so, then we face a dilemma: either we accept fatalism, or we give up the law of excluded middle and accept unalterabilism. An indeterminist could agree that the law of excluded middle is intuitively attractive. He or she could agree further that unalterabilism is intuitively unattractive. But as I myself have argued in chapter two, fatalism is intuitively unattractive. The indeterminist could suggest, with plausibility, that our intuition that fatalism is bad is more dear than our intuition about the law of excluded middle, and more dear than our intuition about unalterabilism. For this reason, the indeterminist could say, we should swallow hard: open semantic indeterminism is the best we can do, and

endorsing it requires that we reject the law of excluded middle and accept unalterabilism.

In the next chapter I will refute the claim that open semantic indeterminism is the only alternative to fatalism. I will argue that Ockhamism accommodates our intuition that fatalism is bad, our intuition that unalterabilism is bad, and our intuition that the law of excluded middle is good. At the end of that chapter I will argue that Ockhamism does not charge a price for these intuitions.

OCKHAMISM

The fourth solution to our puzzle consists in denying that every proposition about the past is unalterable. This solution was suggested by William of Ockham in the fourteenth century.[1] Ockham distinguished propositions about the past from those about the present, and from those about the future. He held that some true propositions about the past are necessary, and others are not. In our terminology, the former truths would be unalterable, and the latter would be open. Philosophers who share this position have called the former hard facts, and the latter soft facts. Recent discussions of Ockham's response have quite properly centered upon attempts to articulate the distinction between hard and soft facts. Marilyn McCord Adams has attempted to characterize this distinction, and John Martin Fischer has criticized her attempt.[2] Fischer has also presented a general challenge

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1. See chap. 1 sec. 5 above.

2. Marilyn McCord Adams, "Is the Existence of God a 'Hard' Fact?" Philosophical Review 76 (1967): 492-503; John Martin Fischer, "Freedom and Foreknowledge," Philosophical Review 92 (1983): 67-79.

to any sort of Ockhamist attempt to explain this distinction. In this chapter, I explain why most of Fischer's objections to Adams miss the mark. I argue, however, that her account of this distinction is indeed defective. I then attempt to meet Fischer's challenge by offering an alternative characterization of the distinction between hard and soft facts. I do this by presenting a semantic theory that accommodates Ockhamism--the view that some propositions about the past are open. Finally, I show that endorsing my version of Ockhamism does not commit one to the view that we can literally change the past.

1. The Puzzle Reformulated

The discussions of Adams and Fischer focus on a version of our puzzle offered by Nelson Pike.[3] In order to examine Adams's account on her own turf, and to evaluate fairly Fischer's criticisms, it is best to consider a reformulation of the puzzle which is modeled after Pike's argument.

Central to Pike's version of the puzzle is the concept of essential omniscience. To say that a being x

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3. Nelson Pike, "Divine Omniscience and Voluntary Action," Philosophical Review 74 (1965): 27-46.

is essentially omniscient is to say that at every time in every possible world, if x exists then x knows all true propositions, and believes only true propositions. Also of importance to this version of the puzzle are the following three assumptions: God is essentially everlasting, propositions about the future necessarily have truth values, and the past is fixed. To say that God is essentially everlasting is to say that in every possible world, if God exists at any time then God exists at every past, present, and future time. To say that propositions about the future necessarily have truth values is to say that in every possible world, for any proposition p and time t, if p is about the future relative to t, then either p is true at t or p is false at t. The assumption that the past is fixed can be put as follows.

P1: In every possible world, if a time t is earlier than a time t' and if a proposition p is true at t, then it is a hard fact as of t' that p is true at t.

The puzzle can be stated as an argument for the incompatibility of divine omniscience and human freedom. Its conclusion will be that as a matter of necessity, if God exists and is essentially omniscient then no humans act freely. Call this conclusion _incompatibilism_.

Let w be a world in which God exists and is essentially omniscient. Let t_1 and t_2 be times, and let t_1 be earlier than t_2. Let A be an action that some human,

say, Sam, performs at t_2 in w. It follows from our assumptions that in w, it was true at t_1 that Sam would do A at t_2, and that God believed at t_1 that Sam would do A at t_2. Now if it is open as of t_2 in w that Sam refrains from doing A at t_2, then either (1) it is open as of t_2 in w that God holds a false belief at t_1, or (2) it is open as of t_2 in w that God did not hold a belief at t_1 that God in fact (in w) held at t_1. (To see that (1) and (2) are the only possibilities, consider for a moment a world w' in which Sam refrains from A at t_2. In such a world, either God believed at t_1 that Sam will do A at t_2 or God did not so believe. If God believed at t_1 in w' that Sam would do A at t_2, then God held a false belief. For by hypothesis, Sam refrains from A at t_2 in w'. On the other hand, if God did not believe at t_1 in w' that Sam would do A at t_2, then God did not hold a belief at t_1 in w' that God in fact (that is, in w) held at t_1.)[4] But (1) is ruled out by God's essential omniscience in w. And (2) is ruled out by our assumption P1 that the past is fixed. (To see this, let t be t_1, t' be t_2, and let p be the proposition that God believes that Sam will do A at t_2.) Hence it was

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4. This reasoning does not presuppose that God exists in w'. If God does not exist in w', then God holds no beliefs in w'. Hence there is a belief God held at t_1 in w which is such that it is not the case that God held it at t_1 in w'.

not within Sam's power at t_2 in w to refrain from doing A. If it wasn't within his power to refrain, then he didn't do it freely. From all of this it follows that by necessity, if God exists and is essentially omniscient then no humans act freely.[5]

This argument turns upon P1--the assumption that the past is fixed. To assess this principle, we need to inquire into the nature of hard facts.

2. Adams's Account of Hard Facts

Marilyn Adams, herself an Ockhamist, has proposed a definition of hard facts. Her basic idea is that hard facts do not entail anything about the future. She begins by introducing the notion of a statement being at least in part about a time.

> (B) "Statement p is at least in part about a
> time t" =df "The happening or not happening,
> actuality or nonactuality of something at t
> is a necessary condition of the truth of p."

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5. I do not claim that this reformulation of the puzzle is a faithful rendering of Pike's argument. One difference, for example, is that I say that a state of affairs p is open, where Pike would say that it is within some person's power to bring about p and within that person's power to bring about -p. Another difference is that Pike considers not two, but three alternatives that could result if it is open that Sam refrains from doing A at t_2. I believe that his third alternative is merely a special case of his second.

Thus the statement "Caesar died 2009 years before Saunders wrote his paper" is at least in part about 44 B.C., since Caesar's death at that time is a necessary condition of the truth of that statement. It is also at least in part about 1965 A.D. since Saunders' writing his paper in 1965 A.D. is also a necessary condition of the truth of that statement. Given (B) the notion of a "hard" fact may be explained as follows.

(C) "Statement p expresses a 'hard' fact about a time t" =df "p is not at least in part about any time future relative to t."

Hence the statement "Caesar died in 44 B.C." expresses a "hard" fact about 44 B.C. But the statement "Caesar died 2009 years before Saunders wrote his paper" does not, since it is at least in part about 1965 A.D.[6]

Essential to this account is the notion of one thing being a necessary condition for another. According to tradition, to say that a proposition q is a necessary condition for a proposition p is to say that p entails q. It is clear from her discussion that Adams follows this tradition.[7] Also important to this account is the notion of "the happening or not happening, the actuality or nonactuality of something." Adams does not say what kind of thing she has in mind. "The happening or not happening" suggests events, while "the actuality or nonactuality" suggests states of affairs. I will consider

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6. Adams, "Is God's Existence a 'Hard' Fact?" pp. 493-94.

7. Ibid., see the top of 496 and the bottom of 497.

both options, because there may be important differences between events and states of affairs--differences that in part determine the success or failure of Adams's account. First I interpret her account as being based upon states of affairs; then I turn to events.

Understood in terms of states of affairs, Adams's account says that p is a hard fact about t if p does not entail the future actuality, or the future nonactuality of any state of affairs. As we know, states of affairs are intimately related to propositions; for convenience I will speak as if they *are* propositions. Thus, talk about the actuality of a state of affairs, say, Caesar's having died, is interchangeable with talk about the truth of a proposition, in this case, that Caesar died. Accordingly, we can paraphrase Adams's account by saying that a hard fact does not entail the future truth of any proposition. More precisely,

> (D) A proposition p is a hard fact about t =df there
>   is no time t' later than t and proposition q
>   such that p entails that q is true at t'.[8]

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8. I speak of "propositions" where Adams speaks of "statements." It is not entirely clear what Adams takes statements to be. Nearly all agree that sentences are syntactic items, and that propositions are abstract items that can be expressed by using sentences. "Statements" can be regarded either as sentences or as propositions. Adams speaks of sentences expressing statements, *and* of statements expressing facts (p. 494). Thus it is not clear what ontological status she assigns to statements.

(Since every proposition has a negation, nothing is lost by failing to say, "or p entails that q is false at t'.) Presumably, p is a soft fact about t if and only if p is a fact about t but not a hard fact about t. Adams uses her account of the distinction between hard and soft facts to defend an extreme Ockhamist's position. On her view, the claim that God exists and is essentially omniscient and essentially everlasting, is not a hard fact.

There are two features of Adams's account that are odd. First, her account does not require that hard facts are true. Thus hard facts need not be facts at all. Second, on her account, if p is a hard fact about t, then it has always been and always will be a hard fact about t. The reason for this is that entailments do not change over time. If p ever entails q, it always entails q. Thus, if the proposition that Caesar died in 44 B.C. is a hard fact about 44 B.C., then it always has been a hard fact about 44 B.C. In particular, it was a hard fact about 44 B.C. long before Caesar was born. This result is counterintuitive. First, it was not true before Caesar's birth that Caesar _died_ in 44 B.C. What was true before his birth was the future tensed claim that Caesar _will die_ in 44 B.C. Second, even though this future tensed claim was true before Caesar's birth, from an Ockhamist's point of view it surely was not a fixed, or hard fact at that

time.

Perhaps these oddities could be avoided by making minor modifications of Adams's account. I will simply set them aside, and turn to deeper difficulties.

3. Objections to Adams's Account

Fischer raises a variety of objections to Adams's account of the distinction between hard and soft facts. In my view, only one of his objections succeeds. But some of the failures are instructive, and are worth a brief discussion.

Adams claims that on her account, it is not a hard fact about 44 B.C. that (3) Caesar died 2009 years before Saunders wrote his paper. To show this, she must show that there is at least one proposition q and time t such that t is later than 44 B.C. and the truth of q at t is entailed by (3). She says that one such q is the proposition that Saunders wrote his paper, and one such t is 1965. She is saying, in effect, that the fact that Caesar died 2009 years before Saunders wrote his paper entails that Saunders wrote his paper in 1965.[9] Fischer's first criticism is that this entailment does not hold. (3) "entails that Caesar's death and Saunders's writing his paper be separated by 2009 years, but it does not entail any two particular dates for the two events."[10] Surely

Fischer's point is correct: the entailment in question does not hold. But evidently, Fischer concludes from this that Adams's account fails to show that (3) is not a hard fact about 44 B.C. Here he is incorrect. All Adams needs for her case is one proposition q and time t later than 44 B.C. such that the truth of q at t is entailed by (3). Now, Adams suggests a q and a t that do not work. That is Fischers's point. But there are other examples that work for Adams. For the sake of clarity, let us take the past tenses in (3) seriously. So understood, (3) entails that Caesar <u>died</u>, and also that Saunders <u>wrote</u> his paper. Thus (3) cannot be true at any time before Saunders wrote his paper. Now let q be the proposition that

(4) It is, was, or will be the case that (3).

By necessity, if (3) is true, then (4) is true at all times. Thus (3) entails that (4) is true in 1965. As Adams might say, the actuality in 1965 of the state of affairs expressed by (4) is a necessary condition of the

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9. Fischer claims that there is an error in Saunders's arithmetic. He is, or course, correct that there is no year zero. However, whether or not it is accurate to say that 2009 years separate the two events in question could depend upon the exact times during the years in question at which the events happened, and upon whether one wants to round to the nearest year, as opposed to truncating. For convenience I will pretend that Saunders is correct about the 2009 years.

10. Fischer, p. 73.

truth of (3). This means that according to (D), it is not a hard fact about 44 B.C. that Caesar died 2009 years before Saunders wrote his paper. This is just the result that Adams wants.

Fischer raises a second objection to Adams's account:

> Consider also the statement, "John F. Kennedy was assassinated." Given [Adams's account], this statement expresses a hard fact about 1961, since it does not _entail_ the occurrence of anything subsequent to 1961. Of course, there are logically possible worlds in which Kennedy was assassinated in 1961. But we want to say that in 1962 (and in 1963, until November 22nd), it was within Oswald's power so to have acted that Kennedy wouldn't have been assassinated.[11]

Fischer claims that the statement in question does not entail the occurrence of anything subsequent to 1961. But consider

(5) JFK is, was, or will be assassinated.

The truth in 1983 of this proposition is entailed by the proposition that JFK was assassinated; and 1983 is subsequent to 1961. Thus, on Adams's account, the proposition that JFK was assassinated is not a hard fact about 1961. Again, this is the result that Adams wants.

A third objection raised by Fischer concerns complex statements. Consider,

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11. Fischer, p. 74.

(6) Either Smith knew at T_1 that Jones would do X at T_2, or Jones believed at T_1 that Jones would do X at T_2.

According to Fischer, if the second disjunct of (6) is in fact false (if Jones did not so believe), then (6)

should _not_ express a hard fact about T_1; the Ockhamist would say that Jones might have been able so to act at T_2 that this disjunctive statement would be false. Yet on Adams' account, the statement expresses a _hard_ fact about T_1, since its truth does not entail that anything happens after T_1; the truth of the disjunction does not entail that anything happens (or fails to happen, etc.) after T_1.[12]

It is true that (6) does not entail that Jones will do X at T_2. Nor does it entail that Jones will refrain from X at T_2. However, because both disjuncts are time-indexed, (6) entails that (6) itself is true at T_2. By hypothesis T_2 is in the future of T_1. Hence, on Adams's account, (6) is not a hard fact about T_1.

Each of Fischer's first three criticisms alleges that Adams's account of hard facts is too broad; each alleges that some proposition that from an Ockhamist's point of view _should_ be a soft fact, turns out on her account to be a hard fact. Fischer's fourth criticism alleges that Adams's account is too narrow. He gives an example of a proposition that from an Ockhamist's point of view should

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12. Fischer, "Freedom and Foreknowledge," p. 74.

be a hard fact, but on Adam's account is not. Suppose, says Fischer, that "Smith existed at T_1" is true, and that T_1 is earlier than T_2.

> It is a necessary condition of the truth of this statement ... that it is not the case that Smith existed for the first time at T_2. It is obvious that Smith's existing at T_1 entails that he doesn't exist for the first time at T_2.... Thus, by (B), the statement "Smith existed at T_1" is at least in part about T_2; by (C) the statement <u>fails</u> to express a hard fact about T_1. But since Smith need not be eternal (or essentially omniscient) this is a disastrous result for Adams's account.[13]

With this objection I agree. From an Ockhamist's point of view, it should be a hard fact about T_1 that Smith existed at T_1. But this fact entails that at T_2, it is not the case that Smith existed for the first time at T_2. It follows from the present interpretation of Adams's account that the proposition that Smith existed at T_1 is not a hard fact about T_1. Thus, Fischer has uncovered one problem with the "propositional interpretation" of Adams's account. He has found a proposition that should be a hard fact, but is not on her account.

There is, however, a deeper problem for Adams's proposal--a problem that is suggested by the failure of Fischer's first three criticisms. Those criticisms allege that some proposition that should be a soft fact, turns

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13. Fischer, "Freedom and Foreknowledge," p. 75.

out on her account to be a hard fact. In each case we found that according to Adams's account, the proposition in question was indeed a soft fact. The reason for this result is that it is quite easy to find a q whose future truth is entailed by the proposition p in question. In fact it seems too easy to find a suitable q in these cases. In one case (the third objection) p itself serves as a suitable q. In the other cases, minor modifications of p produce a suitable q. It is noteworthy that in all three cases, the q in question is a temporally stable proposition; that is, either q is always true or q is always false. This suggests a strategy by which we can always find a q whose future truth is entailed by a given proposition p. Let p be any proposition, let t_1 be any time, and let t_2 be any time later than t_1. Then let q be the temporally stable proposition that p is, was, or will be true. It follows that p entails that q is true at t_2. Alternatively, the actuality of q at t_2 is a necessary condition for the truth of p. Thus on Adams's account, p is not a hard fact about t_1. This strategy will work for any proposition and any time. Hence it shows that the propositional interpretation of Adams's account is much too narrow: on this interpretation, there are no hard facts.

4. Adams's Account Reinterpreted

Adams might try to overcome these difficulties by framing her definition in terms of events rather than states of affairs or propositions. Instead of saying that a hard fact does not entail the future truth, or future falsehood, of any proposition, she could say that it does not entail the future occurrence, or future nonoccurrence, of any event. More precisely, she might suggest:

(E) A proposition p is a hard fact as of t_1 =df p is true at t_1 and there is no event e and time t_2 later than t_1 such that either by necessity, if p is true at t_1 then e occurs at t_2, or by necessity, if p is true at t_1 then e does not occur at t_2.

On this proposal, to say that it is a hard fact as of 1983 that Caesar died in 44 B.C. is to say first, that it is true in 1983 that Caesar died in 44 B.C., and second, that the proposition that Caesar died in 44 B.C. does not entail the occurrence or nonoccurrence of any event subsequent to 1983. This formulation avoids some of the oddities of its predecessor. On this account, hard facts must be facts. Also, this account in principle allows a fact to be hard at some times but not at others. The structure of (E) allows a proposition such as that Caesar died in 44 B.C., to be soft at times before 44 B.C., and hard thereafter. We may presume that a proposition true at t is a soft fact as of t if and only if it is not a

hard fact as of t.

This "events-interpretation" of Adams's account might allow her to escape objections such as those raised above. My objection to the propositional interpretation rests upon the assumption that for any proposition p, there is a temporally stable proposition expressed by saying that p is, was, or will be true. It is not as obvious that a similar assumption holds for events. Adams could claim, with some plausibility, that while Caesar's death is an event that corresponds to the proposition that Caesar dies, there is no event that is always happening, and that corresponds, in the same way, to the disjunctive proposition that Caesar died, dies or will die. In reply to Fischer's objection, Adams could claim, perhaps plausibly, that while Smith's existing for the first time might be an event, there is no time-indexed event such as Smith's existing for the first time at T_2. If such claims were true, then the events-interpretation might escape the difficulties faced by the propositional interpretation of Adams's account.

It is not easy to evaluate (E) without the aid of a theory of events. If (E) is to be useful to an Ockhamist, then the following things must be true of events. There must be no time-indexed events, and there must be no temporally stable events analogous to disjunctive proposi-

tions such as that Caesar died, dies, or will die. Otherwise, (E) will meet the same fate as (D). There must be no logically necessary events, such as the sky's being blue or not blue, or the earth's existing or not existing--events that by necessity are always happening. Otherwise, there will be no hard facts, because every proposition entails the future occurrence of such events. There must be no logically impossible events, such as your writing a book that you do not write--events that by necessity never happen. Otherwise, there will again be no hard facts, because every proposition entails the future nonoccurrence of such events.

Perhaps there is a defensible theory of events that meets these requirements. Still, I believe there are further difficulties with (E) that arise from natural assumptions about events. It is natural to believe that any change is an event. I am inclined further to believe that the acquisition of a property is a change. That is, if a thing acquires a property, no matter the sort of thing or property, this acquisition constitutes a change in the thing, and hence an event. The notion of property-acquisition involved here may be defined as follows.

> D1: x acquires property p at time t =df there is an interval of time such that t is the last moment in the interval, and t is the only moment in the interval at which x has p.

(For our purposes, I assume that all intervals contain more than one moment of time. If there are momentary intervals, then .D1 should be revised to speak only of nonmomentary intervals.) I am also inclined to believe that there are moments of time, and that being present is a property that every moment has at that moment, and only at that moment. For example, noon on January 1, 2001 will have _presentness_ at noon on January 1, 2001, and at no other time. But then by D1, every moment acquires presentness at itself. Thus on my view, any moment's acquisition of presentness is an event. It is common to speak of such an acquisition as the _arrival_ of the moment in question, and it seems quite natural to speak of such arrivals as events. For example, a prisoner might wait with anticipation for his first moment of freedom to arrive. The arrival of that moment is no doubt an important event in his life. An adolescent might look forward to the moment at which she becomes sixteen. The arrival of that moment might be an important event for her; it might open a new chapter in her social life.

If the arrival of a moment of time is an event, then the arrival of an interval of time is also an event. Not all intervals arrive, of course; some stretch infinitely far into the past. An interval arrives if and only if it has an earlier bound. (A moment of time, t, is an earlier

bound of an interval, i, if and only if no moment earlier than t is in i, in formal symbols, $-\exists s(s < t \; \& \; s \in i).)$ If we assume that moments of time are structured like the real numbers, then if an interval of time has an earlier bound, it has a latest earlier bound. The latest earlier bound of an interval is the moment at which the interval begins, or arrives. For example, a day is an interval whose latest earlier bound is midnight. When midnight becomes present, a new day arrives.[14]

If the arrival of an interval is an event, then a serious problem arises for Adams's account of hard facts. An anniversary is an interval of time, usually an entire day, that transpires n years after some notable event. For example, the twentieth anniversary of Caesar's death is a day that transpires twenty years after Caesar's death. Now, the proposition that Caesar died in 44 B.C.

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14. Some intervals that have a latest earlier bound, contain their latest earlier bound; such an interval is closed to the left. Other intervals that have a latest earlier bound, do not contain their latest earlier bound; such an interval is open to the left. If an interval is closed to the left, then it contains a first moment, namely its latest earlier bound. Obviously, such an interval arrives at its first moment. If an interval is open to the left, it has no first moment. Still, such an interval arrives eventually; it is natural to say that it arrives at its latest earlier bound. Thus, for our purposes it does not matter whether midnight is the first moment of a new day, or the last moment of an old day. In either case, a new day arrives every day at midnight.

entails that the twentieth anniversary of Caesar's death arrives in 24 B.C. Thus according to (E), the proposition in question is not a hard fact as of, say, 34 B.C. Similar examples will show that the proposition in question is not a hard fact as of any time subsequent to 44 B.C. In general, no proposition that corresponds to some event, e, (in the way that Caesar died in 44 B.C. corresponds to Caesar's death) will be a hard fact on Adams's account. For it will entail the future occurrence of e's anniversaries.

It is also natural to assume that the coming into existence of a person or a thing is an event. This implies that one of Fischer's examples will also cause trouble for Adams's account. Call the event consisting of Smith's coming into existence for the first time, Smith's inception. (I leave it open whether one's inception coincides with one's conception, one's birth, 'or perhaps some other event in one's development.) Let $t_1 < t_2 < t_3$, and assume that Smith exists at t_1. Then it is true at t_2 that Smith exists at t_1. Further, it is necessary that if it is true at t_2 that Smith exists at t_1, then Smith's inception does not occur at t_3. Hence according to (E), it is not a hard fact as of t_2 that Smith exists at t_1. In general, any proposition that attributes a property to a thing at t_1 will not be a hard fact as of t_2. For it is

necessary that if x has p at t_1 then x's inception does not occur at t_3.

Finally, it is natural to assume that any act of believing is an event. In the presence of this assumption, however, principle (E) has a consequence that many Ockhamists will find unwelcome. In effect, principle (E) does not allow an Ockhamist to hold that by necessity, God is omniscient and everlasting. To see this, we must keep in mind that any sensible Ockhamist needs an account of hard facts according to which some facts are hard and others are not. But according to (E), if God is omniscient and everlasting in every possible world, then there are no hard facts. For let p be any proposition and let $t_1 < t_2$. By necessity, if p is true at t_1 then God believes at t_2 that p is true at t_1. The occurrence at t_2 of the event, God's believing that p is true at t_1, is entailed by the proposition that p is true at t_1. Hence, p is not a hard fact as of t_1. As a result, any Ockhamist who adopts principle (E) is thereby forced to give up the claim that by necessity, God is omniscient and everlasting. Perhaps that claim is not essential to the Ockhamist's position. Still, an Ockhamist should not be forced to abandon it.

Adams's account of hard facts faces serious problems. If it is interpreted in terms of propositions, then her

account is much too narrow; it implies that there are no hard facts. On the other hand, if her account is interpreted in terms of events, then again it is too narrow. In that case, her account implies that no propositions that correspond directly to events are hard facts. It also implies that no proposition that attributes a property to a thing at a time is a hard fact. Finally, it does not allow an Ockhamist to hold that as a matter of necessity, God is omniscient and everlasting. I see no easy way for Adams to solve these problems.

5. A New Approach to Ockhamism

The idea behind Adams's account is that hard facts are propositions that do not entail anything about the future. It seems wise to abandon this idea because almost any proposition entails something about the future. I suggest a new approach to the Ockhamist's task of distinguishing hard and soft facts. As we said, hard facts are true propositions that are unalterable; soft facts are true propositions that are not unalterable. To clarify this distinction, we need to explain unalterability; to do that, I will present a semantic theory that construes unalterability as truth in all accessible worlds.

We will use a formal language L that contains the sentence letters P, Q, R, etc. A, B, C, etc., will be used as metavariables ranging over formulas. The connectives are − and −−→, the future-tense operator F, the past-tense operator P, and the unalterability operator L. The sentences are formed in the usual ways: every sentence letter is a sentence, if A and B are sentences, then so are −A, (A−−→B), FA, PA, and LA; nothing else is a sentence.

To interpret F and P we need a set of moments M, and a binary relation < on M which is intended to represent the earlier-than relation. To interpret L we use a set of possible worlds W, and a reflexive relation A on WxM (the set of "world-times"). It is required that if A([w,t],[w',t']) then t = t'. A([w,t],[w',t]) is intended to mean that w' is accessible from w as of t. The latter locution will be discussed in section seven.

In developing a semantic theory that can accommodate Ockhamism, it is not necessary to invoke branching time. For this reason, we require that < is connected: for any moments s and t in M, either s = t or s < t or t < s. It is also reasonable to require that < is asymmetric and transitive: for any s and t in M, if s < t then −(t < s); and for any r, s, and t in M, if r < s and s < t then r < t. These requirements guarantee that time is linear.

It will be useful to select a privileged member <u>a</u> of W to represent the actual world, and a privileged member n of M to represent now. We can now say that a <u>model structure</u> is a sextuple (W,M,<u>a</u>,n,A,<) where W is a set of worlds, M is a set of moments, <u>a</u> is a member of W, n is a member of M, A is a reflexive relation on WxM such that if A([w,t],[w',t']) then t = t', and < is a binary relation on M that is asymmetric, transitive, and connected.

We say that a <u>theory</u> is a nonempty set of formulas; its <u>vocabulary</u> is the set of sentence letters occurring among its members. To assign truth values to the formulas of a theory T with vocabulary V, we use an <u>interpretation</u> of T on a model structure (W,M,<u>a</u>,n,A,<), which is a function φ from VxWxM into {T,F}. The truth conditions for formulas of the form FA, PA, and LA, are straight-forward. Let w be a member of W and let t be a member of M. Then,

 FA is true at t in w under φ if and only if for
  some s in M, t < s and A is true at s in w under
  φ; otherwise FA is false at t in w under φ.

 PA is true at t in w under φ if and only if for
  some s in M, s < t and A is true at s in w under
  φ; otherwise FA is false at t in w under φ.

 LA is true at t in w under φ if and only if for all
  w' in W such that A([w,t],[w',t]), A is true at
  t in w' under φ; otherwise LA is false at t in
  w under φ.

Thus unalterability is truth in all accessible worlds.[15] A formula A is <u>true under</u> φ if and only if A is true at n

in a under φ (true now in the actual world); otherwise, A is _false under_ φ. A formula A is a _semantic consequence_ of a set Γ of formulas, written $\Gamma \Vdash A$, if and only if for all model structures $\mathfrak{m}$, and for all interpretations of $\Gamma \cup \{A\}$ on $\mathfrak{m}$, if B is true under φ for all B in Γ then A is true under φ. A formula A is _valid_ if and only if $\Vdash A$.

One important result of this theory is that $\nVdash FP \dashrightarrow LFP$. To see this, consider a model structure and interpretation of the following sort.

Figure One

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        s     n     t
 w:   o-----o-----o    φ(P,w,n) = φ(P,w,t) = F
 a:   o-----o-----o    φ(P,a,n) = φ(P,a,t) = T
 A([a,n],[w,n])
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In such a case, FP is true at n in a, but false at n in w. Hence LFP is false at n in a. Another result is that $\nVdash PFP \dashrightarrow LPFP$, which can be seen by considering the same example. In the above situation, PFP is true at n in a,

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15. I borrow the idea that unalterability is truth in all accessible worlds from Fred Feldman, _Doing the Best We Can_ (Dordrecht, Holland: D. Reidel, forthcoming), chap. 1.

but false at n in w. Hence LPF$\underline{P}$ is false at n in $\underline{a}$.

A third result is that $\not\models$ P$\underline{P}$--$\rightarrow$LP$\underline{P}$. This can be seen by considering a model structure and interpretation of the following sort.

<u>Figure Two</u>

```
        t      n
w:    o-----o     𝜑(P,w,t) = F
a:    o-----o     𝜑(P,a,t) = T
A([a,n],[w,n])
```

In this case, P$\underline{P}$ is true at n in $\underline{a}$ but false at n in w. Hence LP$\underline{P}$ is false at n in $\underline{a}$. If we think of atomic formulas as the translations of ordinary present-tensed sentences such as "Sally is sailing," then this result may seem counterintuitive. The only model structures and interpretations on which P$\underline{P}$--$\rightarrow$LP$\underline{P}$ is false are those on which some accessible worlds have distinct pasts. To rule out such cases we could require that for any worlds w and w', for any time t, and for any atomic formula Δ, if A([w,t],[w',t]) then for all s $\langle$ t, $\varphi(\Delta,w,s)$ = $\varphi(\Delta,w',s)$. If a model structure and interpretation satisfy this condition, then no accessible worlds differ with respect to the assignments given to atomic formulas in the past; that is, if w' is accessible from w as of t,

then the assignments of truth-values to atomic formulas in w up until t are the same as the assignments of truth-values to atomic formulas in w' up until t.

These three results show that $\nvDash$ A--$\rightarrow$LA. That is, if A is FP, or PFP, or PP, then we get a counterexample to the claim that $\Vdash$ A--$\rightarrow$LA. Figure one shows that P itself is another counterexample.

The second and third results show that $\nvDash$ PA--$\rightarrow$LPA. If A is FP or P, then we get a counterexample to the claim that $\Vdash$ PA--$\rightarrow$LPA.

Another important result of the present theory is that if $\Gamma \cup \{A\} \Vdash$ B then $\Gamma \Vdash$ A--$\rightarrow$B.[16] In particular, if A $\Vdash$ B then $\Vdash$ A--$\rightarrow$B. When combined with our earlier results, we get the following facts:

FP $\nvDash$ LFP

PFP $\nvDash$ LPFP

PP $\nvDash$ LPP

PA $\nvDash$ LPA

A $\nvDash$ LA

Finally, two versions of the law of excluded middle are results the present theory. First, for any formula A, $\Vdash$ A v -A. (A v B is an abbreviation of -A--$\rightarrow$B.) Second,

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16. This is the semantic counterpart to the deduction theorem of proof theory: if $\Gamma \cup \{A\} \vdash$ B then $\Gamma \vdash$ A--$\rightarrow$B.

for any formula A, for any model structure $\mathcal{m}$ containing a world w and a time t, and for any interpretation φ of {A} on $\mathcal{m}$, either A is true at t in w under φ, or A is false at t in w under φ.

6. Ockhamistic Semantics

The full details of the semantic theory described above are given in this section. Those not interested in these details are encouraged to skip the rest of this section.

The __primitive symbols__ of L are the following.

1. Sentence letters: P, Q, R, etc., with or without subscripts drawn from the natural numbers.

2. Connectives: -, -->, F, P, L

3. Parentheses: (,)

The __sentences__ of L are defined as follows.

4. Every sentence letter is a sentence.

5. If A and B are sentences then so are -A, (A-->B), FA, PA, and LA.

6. Nothing else is a sentence.

A __model structure__ is a sextuple $(W,M,a,n,A,<)$ where W is a set of worlds, M is a set of moments, a is a member of W, n is a member of M, A is a reflexive relation on WxM such that if $A([w,t],[w',t'])$ then $t = t'$, and $<$ is a binary relation on M that is asymmetric, transitive, and

connected.   If   A   is   reflexive   and   transitive   then
$(W,M,a,n,A,\langle)$ is called an S4 model structure. If A is
reflexive   and   symmetric   then $(W,M,a,n,A,\langle)$ is called a
Brouwersche model structure. If A is an equivalence
relation   then $(W,M,a,n,A,\langle)$ is   called   an   S5   model
structure. If A is such that for all w and w' in W, and
for all t and t' in M, if $A([w,t'],[w',t'])$ and $t \langle t'$
then $A([w,t],[w',t])$,   then $(W,M,a,n,A,\langle)$ is   called   a
nonexpanding model structure. On such a model structure,
"the set of accessible worlds never expands."   That is,
the set of worlds accessible as of t from w is always a
subset of the set of worlds accessible as of any time
earlier than t from w.

A theory is a nonempty set of formulas;   its
vocabulary is the set of sentence letters occurring among
its   members.   An   interpretation   of   a   theory   T   with
vocabulary V on a model structure $(W,M,a,n,A,\langle)$ is a
function φ from VxWxM into {T,F}.

Let $(W,M,a,n,A,\langle)$ be a model structure, let w be any
member of W, and let t be any member of M. Then a
sentence letter A is true at t in w under an interpreta-
tion φ (on $(W,M,a,n,A,\langle)$) if and only if $\varphi(A,w,t) = T$;
otherwise A is false at t in w under φ. Where A and B are
any formulas,

-A is <u>true at</u> t <u>in</u> w <u>under</u> φ if and only if A is false at t in w under φ; otherwise -A is <u>false at</u> t <u>in</u> w <u>under</u> φ.

(A--→B) is <u>true at</u> t <u>in</u> w <u>under</u> φ if and only if either A is false at t in w under φ or B is true at t in w under φ; otherwise (A--→B) is <u>false at</u> t <u>in</u> w <u>under</u> φ.

FA is <u>true at</u> t <u>in</u> w <u>under</u> φ if and only if for some s in M, t < s and A is true at s in w under φ; otherwise FA is <u>false at</u> t <u>in</u> w <u>under</u> φ.

PA is <u>true at</u> t <u>in</u> w <u>under</u> φ if and only if for some s in M, s < t and A is true at s in w under φ; otherwise PA is <u>false at</u> t <u>in</u> w <u>under</u> φ.

LA is <u>true at</u> t <u>in</u> w <u>under</u> φ if and only if for all w' in W such that A([w,t],[w',t]), A is true at t in w' under φ; otherwise LA is <u>false at</u> t <u>in</u> w <u>under</u> φ.

'True under φ', 'false under φ', 'semantic consequence', and 'valid' are defined in the preceding section.

Some results of the present theory are the following.

1. $\nvDash$ FP--→LFP

2. $\nvDash$ PFP--→LPFP

3. $\nvDash$ PP--→LPP

4. $\nvDash$ PA--→LPA

5. $\nvDash$ A--→LA

6. If $\Gamma \cup \{A\} \Vdash B$ then $\Gamma \Vdash A$--→B

7. FP $\nVdash$ LFP

8. PFP $\nVdash$ LPFP

9. PP $\nVdash$ LPP

10. PA $\nVdash$ LPA

11. A $\nVdash$ LA

This theory can be extended so that the object language can be used to refer directly to particular moments of time. This is done by adding to the language some constants r, s, t, etc. (with or without subscripts drawn from the natural numbers), and three functors, F, N, and P, for the future, the present, and the past respectively. To the definition of a sentence we add that if A is a sentence and if m is a constant then FmA, NmA, and PmA are sentences. The vocabulary of a theory becomes the set of all sentence letters and constants that occur among its members. An interpretation becomes a function φ from VxWxM into {T,F}xM such that for all sentence letters A in V, for all constants m in V, for all w and w' in W, and for all t and t' in M, (1) $\varphi(A,w,t) \in \{T,F\}$, (2) $\varphi(m,w,t) \in M$, and (3) $\varphi(m,w,t) = \varphi(m,w',t')$. To the truth conditions for formulas we add the following:

FmA is true at t in w under φ if and only if
t < $\varphi(m,t,w)$ and A is true at $\varphi(m,t,w)$ in w
under φ.

NmA is true at t in w under φ if and only if
t = $\varphi(m,t,w)$ and A is true at $\varphi(m,t,w)$ in w
under φ.

PmA is true at t in w under φ if and only if
$\varphi(m,t,w)$ < t and A is true at $\varphi(m,t,w)$ in w
under φ.

7. <u>Accessibility</u>

The semantic theory presented above is based upon the concept of accessibility. In this section I attempt to clarify this concept.[17] In its fundamental form, accessibility is expressed by saying that a state of affairs p, is accessible to a group g of people, as of a time t, from a world w; this can be abbreviated by writing Ag,t,w,p.

I take accessibility to be an undefined notion; the only way I can explain it is by giving examples. The most intuitive examples arise in the special cases where the group in question has only one member, and the world in question is the actual world. In these cases, we say that p is accessible to a person s at t, abbreviated As,t,p. Your reading the rest of this chapter is accessible to you as of now. Your swimming the Atlantic during the next hour is not accessible to you as of now. Suppose that were Sally to suggest to Sam that they sail tomorrow, Sam would agree and they would sail tomorrow. Then Sam's sailing tomorrow is accessible to Sally as of now. There is something she could do, namely make the appropriate suggestion, such that were she to do it, Sam would sail. Suppose also that on this particular occasion, if Sally

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17. My attempt is inspired by Feldman's discussion of accessibility in chapter one of <u>Doing the Best We Can</u>.

does not suggest sailing to Sam, Sam would not sail tomorrow; he is willing but not eager, we may suppose, and will go only if Sally suggests it. Then Sam's not sailing tomorrow is also accessible to Sally as of now. There is something she could do, namely refrain from making the appropriate suggestion, such that were she to do it, Sam would not sail. Let us suppose further that Sally absolutely refuses to go hiking tomorrow. She could, but she does not want to. Nothing Sam can do would convince her to hike, and Sam is neither willing nor able to force her to do so. In this case, Sally's hiking tomorrow is accessible to Sally as of now, but that state of affairs is not accessible to Sam. Nothing he can do is such that, were he to do it, Sally would hike tomorrow.

To continue our story, suppose that Sam and Sally will in fact sail tomorrow, and will not hike tomorrow. Suppose also that tomorrow is Saturday. Then as of today (Friday), Sally's hiking on Saturday is accessible to Sally. On Sunday, however, the state of affairs in question will no longer be accessible to Sally. By then it will be too late for her to take that course of action.

To take another example, suppose there is a farmer in North Dakota who has never seen or heard of Sally. Suppose further that this farmer will plant wheat this Spring no matter what Sally does. In this case the

farmer's planting wheat in the Spring is accessible to Sally. The state of affairs in question does not involve her in any way, since it is the farmer who will do the planting. Nor is there any causal connection between the farmer's planting and any of Sally's actions. Whether the farmer plants wheat is not up to Sally. Nevertheless, the farmer's planting wheat in the Spring is accessible to her, in the sense in question. If she bides her time until Spring, the farmer will plant wheat. Thus, there is something she can do such that if she does it, the farmer will plant wheat. Indeed, by hypothesis, everything she can do has that feature. So, the state of affairs in question is accessible to Sally now, though in a somewhat trivial fashion.

It is important to emphasize that on my view, accessibility is undefined. I do not regard the phrase, 's has the power as of t so to act that p obtains,' or the phrase, 'there is something s could do as of t such that, were s to do it, p would obtain,' as a definition or an analysis of the phrase, 'p is accessible to s at t.' Such a counterfactual analysis would not accurately express the concept of accessibility I have in mind. The phrases in question are offered merely as informal characterizations of accessibility. They are heuristic devices which are intended to guide the intuition.

It is also important to avoid confusing accessibility with the related but much narrower notion of power. In many cases, what is accessible to one coincides with what is within one's power. As of now, your reading the rest of this chapter is accessible to you and within your power. Sally's hiking tomorrow is accessible to Sally and within her power. Sally's hiking tomorrow is neither accessible to Sam nor within his power. On the other hand, there are many cases in which what is accessible to one does not coincide with what is within one's power. The farmer's planting wheat in the Spring is accessible to Sally; but it is not within her power. Nothing she can do will have any causal connection to the farmer's actions. What the farmer plants is not up to Sally, or under her control. To take another example, tomorrow's sunset is not within your power; you cannot bring it about that the sun sets tomorrow. Nothing you can do would have any causal effect upon the motion of the sun or the earth; the matter is simply out of your hands. Nonetheless, tomorrow's sunset is accessible to you in the sense in question. If you merely go about your own business tomorrow, the sun will set. In a like manner, all of the necessary states of affairs are accessible to all of us at all times. If p is necessary, then everything we can do is such that if we do it, p obtains.

Suppose now that we have an intuitive understanding of what it is for a state of affairs to be accessible to a person at a time. It is then easy to explain the notion of an accessible world. A possible world, on the view I endorse, is merely a state of affairs of a special sort, to wit, one that is maximal and possible.[18] Thus we can speak sensibly of a possible world being accessible to a person at a time, in abbreviated form, As,t,w. A world w is accessible to you now if, loosely speaking, there is something you can do as of now such that were you to do it, w would be actual. There are worlds accessible to Sally now in which Sam sails tomorrow, and worlds accessible to her in which he does not. There are no worlds accessible to Sam in which Sally hikes tomorrow.

In the examples discussed above I assumed, for instance, that Sam's sailing was accessible to Sally as of now from the actual world. But similar examples could be generated for other possible worlds. If we understand As,t,p then it should be easy to understand As,t,w,p, which says that p is accessible to s as of t from w. The

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18. A state of affairs, p, is maximal if and only if for any state of affairs q, either p includes q or p precludes q. p includes q if and only if it is impossible that both p obtains and q does not obtain. p precludes q if and only if it is impossible that both p obtains and q obtains. See Alvin Plantinga, The Nature of Necessity (Oxford: Oxford University Press, 1974), ch. 4.

former is the special case of the latter in which w is the actual world. Furthermore, examples could be generated in which p is accessible to a group of more than one person as of t from w. For instance, Sam and Sally's sailing tomorrow is accessible to the pair of them as of now in the actual world. Thus, if we understand As,t,w,p then it should be easy to understand Ag,t,w,p. The former is the special case of the latter in which s is the only member of g. For the special case in which g is the group of all human beings, and p is a possible world w', we write A,t,w,w'. In the semantic theory presented above this was written A([w,t],[w',t]).

Thus far we have treated accessibility as a relation. Ag,t,w,p has been treated as if it were a formula of first order logic in which A is a four-place predicate letter, and g, t, w, and p are variables. Accessibility can also be treated as a modality. This can be done by introducing a sentential operator A, into our formal language. AA is defined as -L-A. Thus AA is true at t in w under φ if and only if for some w' in W such that A([w,t],[w',t]), A is true at t in w' under φ. Unalterability is truth in all accessible worlds, whereas accessibility is truth in some accessible worlds.

On my view, when accessibility is taken to be a binary relation on world-time pairs, it is an equivalence

relation (it is reflexive, transitive, and symmetric). Moreover, on my understanding, "the set of accessible worlds never expands." That is, the set of worlds accessible to g as of t from w is always a subset of the set of worlds accessible to g as of any time earlier than t from w. For these reasons, I believe that nonexpanding S5 model structures are the only model structures that can be used to represent reality accurately. I am inclined further to agree with Feldman that "the set of accessible worlds always shrinks."[19] That is to say, the set of worlds accessible to g as of t from w is always a <u>proper</u> subset of the set of worlds accessible to g as of any time earlier than t from w.

8. <u>Some Comments about Ockhamistic Semantics</u>

Some comments are in order regarding the philosophical significance of the semantic theory presented in section six, where accessibility is understood as explained in section seven.

First, the semantic theory presented above--call it <u>Ockhamistic semantics</u>--provides an escape from fatalism. Fatalism is the view that no propositions are open; it can

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19. Feldman, <u>Doing the Best We Can</u>, chap. 1.

be expressed by the schema (LA v L-A) and also by the equivalent schema -(-LA & -L-A). On model structures and interpretations of the sort depicted in figure one, it is open that P. That is, (LP v L-P) is false at n in a (false now in the actual world) under φ; also, (-LP & -L-P) is true at n in a under φ. Thus fatalism is invalid in Ockhamistic semantics: that is, $\not\models$ (LA v L-A) and $\not\models$ -(-LA & -L-A). Although we are allowed to escape from fatalism, it is important to note that Ockhamistic semantics does not force us to do so. There are model structures on which (LA v L-A) is true for all formulas A at all times in all worlds under all interpretations. Any model structure in which the only world accessible from w as of t is w itself, is an example; such structures are called <u>fatalistic model structures</u>. Indeed, fatalism can be formulated as the claim that for any world w and time t, w is the only world accessible as of t from w. A fatalist can therefore accept Ockhamistic semantics; any fatalist who does so will no doubt insist that if we want to represent reality accurately, then we should restrict our attention to fatalistic model structures. So, Ockhamistic semantics allows us to deny fatalism, but does not make it a law of logic that fatalism is false. This is as it should be. My intuitions tell me that it is not a law of logic that there are free agents. If so, then it

should not be a law of logic that there are open proposi-
tions.

Second, Ockhamistic semantics allows us to avoid
unalterabilism--the view that whatever is true is unalter-
able. This view can be expressed by the formula A-->LA;
it can also be expressed as the claim that A⊩LA. In model
structures of the sort depicted in figure one, FP is true
at n in a under φ, but LFP is false at n in a under φ.
Thus FP-->LFP is false at n in a under φ. This shows that
A-->LA is invalid, and that A⊮LA. Again, it is important
to note that Ockhamistic semantics allows but does not
require that we give up unalterabilism. On any fatalistic
model structure, A-->LA is true for all formulas A at all
times in all worlds under all interpretations. Again this
is as it should be. It should not be a law of logic that
unalterabilism is false; if there were no free agents then
every truth would be unalterable.

Third, Ockhamistic semantics not only allows but
requires two versions of the law of excluded middle.
First, for any formula A, ⊩ A v -A. Second, for any
formula A, for any model structure $\mathfrak{m}$ containing a world w
and a time t, and for any interpretation φ of {A} on $\mathfrak{m}$,
either A is true at t in w under φ or A is false at t in
w under φ. This too is as it should be, or so it seems to
me.

Fourth, Ockhamistic semantics accommodates Ockhamism (and hence deserves its name). Ockhamism is the view that not all propositions about the past are fixed; some propositions about the past are open. An Ockhamist denies not only unalterabilism but also unalterabilism with respect to the past--the view that whatever is true about the past is unalterable. Model structures and interpretations of the sort depicted in figure one show that Ockhamism can be accommodated. In such cases, PFP is about the past (it is of the form PA), and PFP is true at n in a under φ but false at n in w under φ. Thus it is open that PFP at n in a under φ: that is, (-LPFP & -L-PFP) is true at n in a under φ. It is important to note that Ockhamistic semantics does not require that there be open propositions about the past. As we have seen, it does not require that there be any open propositions. Again this is as it should be. Ockhamists should be allowed to believe that all free agents could cease to exist, and that if that happened then there would be no open propositions about the past, present, or future.

9. An Ockhamistic Solution

We return now to hard facts and the puzzle presented in section one. Saying that it is a hard fact as of t in w that A is another way of saying that it is unalterable as of t in w that A. On this account, it is a hard fact as of 1983 that Caesar died in 44 B.C. There is nothing any group can do as of now such that, were that group to do it, it would not be true that Caesar died in 44 B.C. This proposition is true in all worlds accessible to any group as of now. However, the corresponding future-tensed proposition, that Caesar will die in 44 B.C., may not have been a hard fact as of, say, 45 B.C. There may have been someone at that time who could have hastened Caesar's death, or someone who could have delayed Caesar's death. If so, then there would have been worlds accessible to such a person as of 45 B.C. in which Caesar did not die in 44 B.C.

If Sam and Sally sail tomorrow, then it is a soft fact as of now that they sail tomorrow. For there are worlds still accessible to Sally as of now, in which she does not suggest to Sam that they sail. In such worlds, they do not sail tomorrow. Let us suppose that Fischer wrote his paper in 1982. Then on our account, it is a soft fact as of, say, 1981, that Caesar died exactly 2025 years before Fischer wrote his paper. In all worlds

accessible to Fischer as of 1981, Caesar died in 44 B.C. But in some worlds accessible to Fischer as of 1981, Fischer does not write his paper in 1982. In those worlds, it is not true that Caesar died exactly 2025 years before Fischer wrote his paper.

The puzzle with which we started turns upon the assumption that the past is fixed.

> P1: In every possible world, if a time t is earlier than a time t' and if a proposition p is true at t, then it is a hard fact as t' that p is true at t.

In terms of Ockhamistic semantics, this could be expressed by saying that for any formula A, for any model structure $\mathcal{M}$, and for any interpretation φ of {A} on $\mathcal{M}$, if $\mathcal{M}$ and φ represent reality accurately then $PA \dashrightarrow LPA$ is true at all times in all worlds under φ.

The Ockhamist has a powerful objection to this principle. If there are any soft facts at all, then P1 is false. Suppose it is a soft fact that Sam will sail at noon tomorrow, on June 3, 1983; in laymen's terms, Sam will sail tomorrow at noon, but he could refrain. For convenience, let t_3 be noon on June 3, 1983, let t_2 be noon today, on June 2, 1983, and let t_1 be noon yesterday, on June 1, 1983. Then in the actual world, Sam sails at t_3 (tomorrow); but there is some world w accessible to Sam as of t_2 (today) in which he does not. Moreover, it is true at t_1 in the actual world that Sam will sail at t_3,

but false at t_1 in w that Sam will sail at t_3. Thus contrary to P1, it is a soft fact as of t_2 that "Sam will sail at t_3" is true at t_1.

Are there any soft facts? It is no surprise that my answer is yes. I suggested in chapter two that as of Friday afternoon, "I will eat at Joe's on Friday night" was a soft fact. I argued in chapter four that it is a soft fact as of now that I will drink some water tonight at dinner. Other examples abound.

An incompatibilist could respond to this objection by revising his argument. For there is a principle weaker than P1 that will serve his purposes. What is really at issue, an incompatibilist might insist, is the claim that past beliefs are fixed. More precisely,

> P2: In every possible world w, if t is earlier than t' and if s believes p at t in w, then it is a hard fact as of t' in w that s believes p at t.[20]

P2 will work in the incompatibilist's argument just as well as P1. If P2 is true then contrary to (2), it is not open as of t_2 in w that God did not hold a belief at t_1 that God in fact (in w) held at t_1.

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20. Compare Pike, "Divine Omniscience," p. 34: "4. It is not within one's power at a given time to do something that would bring it about that someone who held a certain belief at a time prior to the time in question did not hold that belief at the time prior to the time in question."

The Ockhamist has an objection to this principle as well. If there are any soft facts, and if God is essentially omniscient and everlasting (as is assumed in this context by the incompatibilist himself for the sake of argument) then P2 is false. Suppose again that it is a soft fact as of t_2 (now) that Sam will sail at t_3 (tomorrow). Then it was true at t_1 (yesterday) in the actual world that Sam will sail at t_3. If God is omniscient and everlasting then God knew, and hence believed, at t_1 that Sam will sail at t_3. Moreover, if it is a soft fact as of t_2 that Sam will sail at t_3, then there is a world w accessible to Sam as of t_2 in which he does not sail at t_3. In w it was false at t_1 that Sam will sail at t_3. Presumably there is nothing Sam can do as of t_2 such that, were he to do it, God would not exist. If so, then God exists in every world accessible to Sam as of t_2. If God is essentially omniscient and everlasting, then God is omniscient and everlasting in every world accessible to Sam as of t_2. Thus in w God knew, and hence believed, at t_1 that Sam will not sail at t_3. Accordingly, P2 is false.

10. Fischer's Constraint

In section III of his article, Fischer presents a constraint which he thinks an incompatibilist might use to defeat any account of the distinction between hard and soft facts. He holds that on any account of this distinction that meets his constraint, God's prior beliefs are hard facts. According to Fischer's constraint,

> the only way in which God's belief at T_1 about Jones at T_2 could be a soft fact about the past relative to T_2 would be if one and the same state of the mind of the person who was God at T_1 would count as one belief if Jones did X at T_2, but a different belief (or not a belief at all) if Jones did not do X at T_2. (p. 76)

Fischer's idea seems to be this: on any acceptable account of hard facts, past states of mind are hard facts. (This is the incompatibilist's constraint.) If past states of mind are hard facts, but past beliefs are soft facts, then in some situations, one and the same state of mind at t would count as different beliefs given different events subsequent to t. But this is implausible; hence it is implausible that past beliefs are soft facts.

Consider an example in which it is alleged by the Ockhamist that past beliefs are soft facts. Suppose again that Jones does X at T_2, but that he could refrain. God, being omniscient, believed at T_1 that Jones will do X at T_2. Let's say that God's mind was in state s at T_1; as Fischer might say, this constituted God's believing that

Jones would do X at T_2. The Ockhamist holds that if Jones had not done X at T_2, then God would have believed at T_1 that Jones would not do X at T_2. Fischer seems to be suggesting that if Jones had not done X at T_2, it still would have been the case that God's mind was in state s at T_1. Thus, if the Ockhamist is right that in such cases past beliefs are soft facts, then one and the same state of mind at T_1, namely s, would count as one belief if Jones does X at T_2, and a different belief if Jones does not do X at T_2. But Fischer denies that s would count as one belief in the former situation, and a different belief in the latter situation. He concludes that contrary to the Ockhamist, past beliefs are hard facts.

Fischer claims that God's state of mind, s, would not count as one belief if Jones does X at T_2, and another belief if Jones does not do X at T_2. This plausible claim is based upon the intuition that beliefs are intimately related (if not identical) to states of mind, and that they would be so related no matter what Jones or anyone else does. I share that intuition, and am willing to accept Fischer's claim. I disagree, however, with Fischer's assumption that past states of mind are hard facts. Let w be some world accessible to Jones as of T_2 in which Jones does not do X at T_2. I presume that there is nothing Jones can do as of T_2 such that, were Jones to

do it, God would not exist. If so, and if God is essentially omniscient and everlasting, then God is omniscient and everlasting in w. Hence in w, God believed at T_1 that Jones would not do X at T_2; in the actual world, God believed at T_1 that Jones would do X at T_2. Since God's belief at T_1 in w is not the same as God's belief at T_1 in the actual world, surely the state of God's mind at T_1 in w is not the same as God's state of mind at T_1 in the actual world. This, too, is based upon the intuition that beliefs are intimately related to states of mind, and are so related not only in the actual world, but in every world accessible to anyone. So, given this intuition about the relation between beliefs and states of mind--an intuition to which Fischer himself seems to appeal--Fischer's constraint is inappropriate. In some cases, past states of mind are soft facts, as are past beliefs.

Fischer has presented a twofold challenge to the Ockhamist: "first, to formulate the hard fact/soft fact distinction in a way which yields Ockhamism, and second, to explain why the incompatibilist's constraint is inappropriate."[21] I have offered an account of hard and soft facts which, when coupled with the view that there are some soft facts, yields Ockhamism. That is to say, on

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21. Fischer, "Freedom and Foreknowledge," p. 79.

my account if there are any soft facts then there are some soft facts about the past. Moreover, my account shows why the incompatibilist's constraint is inappropriate. It seems to me that Fischer's challenge has been met.

11. Can We Change the Past?

According to Ockhamism, not all propositions about the past are unalterable. Some propositions about the past are soft facts. Does this view imply that we can literally alter or change the past?

What would it be to change the past? Plantinga puts it simply:

> To bring it about, obviously, that a proposition which is true and about the past before I act, is false thereafter. If I were to [change] the past, then there would be an action I perform at a time t and a proposition about the past--the past with respect to t-- such that prior to t the proposition in question is true at t but at some time after t (after I perform the action) it is false at t.[22]

Consider an example. Let t_1 be noon on June 6, 1974, and let p be the proposition that I graduated from high school at t_1. As of today p is true, let us suppose. Indeed, p

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22. "Ockham's Way Out," p. 11. Plantinga does not use the term 'unalterable' in the way that I do. For him, to say that the past is unalterable is to say, in my terms, that the past cannot be changed. When I say that the past is not unalterable, I mean, in Plantinga's terms, that the past is not accidentally necessary. Although our terminology differs here, we agree on the matters of substance.

has been true ever since my high school graduation. If I change the past with respect to p by noon tomorrow, then there is some action I perform before then such that at noon tomorrow (after I perform it) p is false. If I do such a thing, then as of tomorrow afternoon, I will not have graduated at t_1. That is what it would be like literally to change the past.

To say that someone can change the past, is to say that there is a possible world accessible to someone in which he or she changes the past. Are there such worlds? Is there a world accessible to me, for example, in which I change the past with respect to my high school graduation? In a word, no. Suppose for reductio that there is such a world, say, w. Then today in w, it is true that I graduated from high school at t_1. Hence in w, I graduate from high school at t_1. But if I change the past with respect to my graduation tomorrow at t_2 in w, then it is false at t_2 in w that I graduated at t_1. Thus, in w it is false that I graduate from high school at t_1. This is contradictory.

My version of Ockhamism implies that there are worlds accessible to each of us now in which the past is different from the past of the actual world. But it does not imply that there is a world accessible to someone in which the past is different from the past of that world.

Although some things about the past are open, no one, not even God, can change the past. For it is metaphysically impossible to do so.

12. Final Comments

It is worth pointing out that my version of Ockhamism does not imply that there are worlds accessible to someone in which God believed something at t_1 that God did not believe at t_1. Suppose again that Sam will sail at t_3 (tomorrow), but that as of t_2 (today), it is accessible to Sam not to sail. Thus God believed at t_1 (yesterday) that Sam will sail at t_3. Let w be some world accessible to Sam as of t_2 in which he sails at t_3. In w, God believed at t_1 that Sam would not sail. Thus God believed something at t_1 in w that God did not believe at t_1 in the actual world, but God did not believe something at t_1 in w that God did not believe at t_1 in w.

Further, my version of Ockhamism does not imply that we cause God to have had the beliefs God actually had. Consider a question such as, 'What caused God to believe at t_1 that Sam will sail at t_3?' Some might speculate that Sam's sailing at t_3 caused God to have that belief at t_1. Others might speculate that God's having complete knowledge of the state of the universe at t_1, including the state of Sam's mind, caused God to have that belief at

t_1. No doubt there are other speculations as well. I have no desire to take up such speculations here, much less, to endorse one. Such a question raises deep cosmological and theological issues. But as far as I can tell, my version of Ockhamism does not turn upon such issues.

My view has no implications, so far as I can tell, about the _evidence_ that God has had for God's beliefs. Consider a question such as, 'What evidence did God have at t_1 for believing that Sam will sail at t_3?' Such a question raises deep epistemological and theological issues. But again, my version of Ockhamism does not turn upon such issues.[23]

Some thinkers might allege that Ockhamism is implausible. It is counterintuitive, some might say, to think that any propositions about the past are open. Although Ockhamism does not imply that we can literally change the past, it seems to imply that we do have some sort of "control" over the past. The primary examples of propositions about the past that are open are propositions that involve human freedom. For instance, I assert that

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23. I do not mean to suggest that the issues about the causes of God's beliefs are unconnected to issues about the evidence God has for God's beliefs. Indeed, one would suspect that they are intimately related. But again, questions such as, 'In what manner are they related?" will not be discussed here.

it was true yesterday that I will drink some water tonight at dinner; I believe nonetheless that it is accessible to me as of now that it was false yesterday that I will drink some water tonight at dinner. This seems to suggest that my actions tonight at dinner will "influence" the past in some way. An objector might insist that influencing the past is no less counterintuitive than changing the past.

I agree that it sounds implausible to say that some propositions about the past are open. Indeed, I believe that there is a sense of "about the past" in which all propositions about the past are fixed. I regret that I cannot explain clearly the sense I have in mind. But in that sense, the proposition that "it was true that I will drink some water tonight at dinner" is not about the past; in some (albeit obscure) sense, that proposition is really about the future. It is a proposition "about" the events that will take place tonight at dinner. Given the relevant sense of 'about the future,' I think it is helpful to think of such "future-infected" propositions as propositions about the future that are masquerading as propositions about the past.

According to the objection under discussion, it is implausible to assert that some propositions about the past are open. I agree that in a difficult-to-explain sense, no propositions about the past are open. But this

objection does not cast any doubt upon the version of Ockhamism that I have articulated in this chapter. For I have been using a very broad sense of 'about the past'. In the sense that I have in mind, almost any sentence whose principal verb is past tensed expresses a proposition about the past when used in a normal way. In the broad sense of 'about the past', the proposition that "it was true that I will drink some water tonight at dinner" is about the past. Such future-infected propositions about the past have a very superficial pastness; their pastness is only "skin-deep" so to speak. I see nothing counterintuitive about the claim that in this broad sense, some propositions about the past are open. The only reason such propositions are open is that they turn essentially upon some events in the future that are not yet settled.

Some thinkers might allege that the Ockhamistic solution to our puzzle about foreknowledge and freedom is implausible. That solution requires not only that there be propositions about the past that are open; it requires that some propositions about beliefs that God held in the past are open. For example, I assert that it is open that God believed yesterday that I will drink some water tonight at dinner. An objector might agree that it is not implausible to assert that some future-infected proposi-

tions about the past are open. An objector might agree further that propositions expressed by sentences of the form "it was true that it will be true that ..." are paradigms of future-infected propositions about the past. An objector might insist, however, that propositions about past beliefs are not future-infected.[24] A proposition such as, "God believed yesterday that I will drink some water tonight at dinner," an objector might claim, is about the past in a simple and straightforward manner: it simply reports that a certain binary relation held yesterday between God and the proposition in question.

To answer this objection completely, we need to elucidate the concept of future-infection. Unfortunately, I am unable at present to clarify that concept. I can only make some loose comments regarding my intuitions about future-infection. It seems to me that whether a given proposition about the past is future-infected or not depends upon whether it "turns essentially" upon events that will take place in the future. Consider for example, the proposition that "it was the case that it will be the case that I drink some water tonight at dinner." That proposition "turns essentially" upon the events that will

24. See Pike, "Divine Foreknowledge, Human Freedom, and Possible Worlds," Philosophical Review 86 (1977): 209-16.

transpire tonight at dinner. Call the proposition in question p, and call the event consisting of my drinking some water tonight at dinner e. P is true if and only if e occurs tonight. Moreover, in some sense that I cannot explain, e's occurring tonight would "make it the case that" p is true. P's being true consists of little more than e's occurring. Likewise, e's not occurring tonight would "make it the case that" p is false. P's being false consists of little more than e's failing to occur. That inclines me to say that p "turns essentially" upon e.

Consider now the proposition that "God believed yesterday that I will drink some water tonight at dinner." This too seems to me to "turn essentially" upon events that will transpire tonight at dinner. If God is essentially omniscient, then God is omniscient in every world accessible to me as of now. For every such world w, whether or not God believed yesterday in w that I will drink some water tonight "depends" upon whether or not I will drink some water tonight in w: if I will drink in w, then in w God believed that I will drink; if I will not drink in w, then in w God did not believe that I will drink. It follows of course that whether or not God believed yesterday in the actual world that I will drink "depends" upon whether or not I in fact will drink. For these reasons it seems to me that such propositions about

the beliefs God held in the past are future-infected. And if such propositions are future-infected, then I see nothing implausible about the claim that they are open.

Ockhamism is an attractive position. It allows us simultaneously to accept the law of excluded middle, and to reject fatalism and unalterabilism. But it does not demand that we espouse the doctrine that we can change the past. It accommodates our intuitions, without charging a price. Is there an argument that can be offered in favor of this attractive view?

There is something someone can but will not do, or will do but can avoid doing. If so, then there are some soft facts. If there are some soft facts then there are some soft facts about the past. And if there are some soft facts about the past, then Ockhamism is true.

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GLOSSARY

Accessibility: It is <u>accessible</u> that A if and only if it is not unalterable that -A.

Eternalism: God is eternal (outside of time).

Fatalism: No propositions are open.

Fixability: It is <u>fixed</u> that A if and only if it is not open that A.

Incompatibilism: As a matter of necessity, if God exists and is essentially omniscient then no humans act freely.

Law of Excluded Middle: Every proposition is either true or false; alternatively, no proposition is neither true nor false.

Ockhamism: Some propositions about the past are open; alternatively, not all propositions about the past are fixed.

Openism: Some propositions are open.

Openness: It is <u>open</u> that A if and only if it is accessible that A and accessible that -A (if and only if it is not unalterable that A and not unalterable that -A).

Open Semantic Indeterminism: Some propositions are open, and all open propositions are neither true nor false.

Semantic Indeterminism: Some propositions are neither true nor false.

Unalterabilism: Whatever is true is unalterable; alternatively, whatever is accessible is true.

Unalterability: It is <u>unalterable</u> that A if and only if it is not accessible that -A.

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Philosophy 100
Introduction to Philosophy
Spring, 1984

Cartesian Cosmological Arguments

Pseudo-Cartesian Argument

1. An idea of God exists.

2. If an idea of x exists, then it was caused by x.

3. If something was caused by God, then God exists.

4. Therefore, God exists. (1,2,3)

Semi-Cartesian Argument

1. An infinitely perfect idea of God exists.

2. Everything that exists has a cause at least as perfect as it

3. Therefore, there is an infinitely perfect being. (1,2)

4. x is God =df. x is an infinitely perfect being.

5. Therefore, God exists. (3,4)

The formal reality of x: a number indicating the position of x in the scale of ontological perfection.

The objective reality of x: a number indicating the formal reality that the object represented by x would have, if it existe

Cartesian Cosmological Argument

1. There is an idea with infinite objective reality.

2. If there is an idea, i, with n degrees of objective reality, then there is some cause of i with at least n degrees of formal reality.

3. x is God =df. x is a being with infinite formal reality.

4. Therefore, God exists. (1,2,3)