Counterfactuals, compatibilism and rational choice
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<u>The puzzle</u>: It seems that the assumption that we live in a deterministic world implies that a complete description of the intrinsic state of the world at any given time, together with the laws of nature that are true, entails all the truths about the state of the world at any other time, and this seems to imply that if the course of events had been different from the way it actually is in any way, however trivial, then either some law of nature would have been false, or the intrinsic state of the world at *every* time would have been different, at least in small ways.

1. Laws and determinism

A *dynamic theory* is a theory that has the resources to define a notion of a state of the system that is the subject matter of the theory at a time, and a set of laws that constrain the relations between the states of the system at any one time and the states at other times.

A dynamic theory is *deterministic* if and only if the propositions describing the complete state of the system at any one time t, together with the set of laws, entails the state of the system at all other time (or perhaps at all times later than t).

The *metaphysical thesis of determinism* is true if and only if a deterministic theory is true, and is also *comprehensive*, meaning that all facts about the world are supervenient on the facts about the total states of the system at all the different times.

A fact about particular time is *intrinsic* to that time if it is supervenient on the state of the system at that time.

2. Two examples

It's the last day of the tournament, and we're on the 18th green. Annika sets up for an 18 foot putt for a birdie, which would give her a first place finish. After careful consideration, taking account of the wind conditions, the slope of the green, etc., she sends the ball on its way, and it looks like it has an excellent chance of reaching the cup, but when it is just a few feet away, the droppings of a sea gull who happened to be flying above land right on the ball, slowing and diverting it so that it stops a bit before its intended destination. Would the putt have been sunk if it hadn't been for the bird? We can't know for sure, since even putts that look like winners when they are just a couple of feet away sometimes stop just short on the edge of the cup, or slide by, but it seems likely that it would have, and it certainly seems safe to assume, on the assumption of determinism, that there is a fact of the matter (in the actual world) about whether it would have.

Sly Pete and Mr. Stone are playing draw poker on a Mississippi riverboat. Pete has two pair (threes and tens), with an outside ace. Mr. Stone has the five, six, seven, and eight

of clubs, along with a useless queen of diamonds. Pete deliberates about whether to trade in his ace in the hopes of turning his two pair into a full house, but decides to stand pat. Mr. Stone trades in his queen with the hope of turning his hand into either a straight (if he draws any four or nine), or a flush (if he draws any club). But since the top card on the deck is the ten of spades, his hand remains worthless after the draw, so he folds when Pete bets. But what would have happened if Pete had traded in his ace? There is no question in this story: he would have drawn the ten that in fact went to Mr. Stone, and therefore a full house. Stone would have gotten the next card from the top of the deck, which happened (in fact) to be the nine of clubs, so Mr. Stone would have gotten not just a straight or a flush, but both. Both players would have bet big, leading to a much more exciting finish, with Mr. Stone's straight flush beating Pete's full house.

3. Context dependence

A *speech context* for a conversation can be represented by an information state, the presumed common knowledge of the participants in the conversation. We can model such a state by the set of possible worlds that are compatible with the presumed common knowledge together with a partition of this space into the alternatives that are relevant to what is at issue in the conversation.

The semantics gives the truth-conditions for conditionals in terms of a parameter, to be determined by context. The parameter is a selection function with two arguments: the first is one of the relevant alternatives, and the second is the proposition expressed by the antecedent of the conditional. The value of the function is a possible situation in which the antecedent proposition is true. Intuitively, it is the possible situation in which the antecedent proposition is true, and that is minimally different in relevant respects from the possible situation that is the argument of the function

4. Counterfactuals and deliberation

A decision situation facing an agent can be represented (according to David Lewis's version of causal decision theory) by space of possibilities, and two cross-cutting partitions of the space: The first is a space of actions available to the agent, and the second is a set of *dependency hypotheses*, which is defined in terms of the action partition as follows (for a particular agent and time): a dependency hypothesis is a maximally specific proposition about how things the agent cares about do and do not depend causally on his present actions. The relevant alternatives for the agent's deliberation are the intersections of the two partitions.

If the conditionals of interest are those that have (complete) action propositions as their antecedents, then the relevant parameter for their interpretation in this kind of context is clear from the setup: the selected possible situation, relative to situation x, is the one in which the action proposition expressed by the antecedent is and the dependency hypothesis that is true in x are both true. (There are some qualifications needed for the case where objective chance is involved, but they are not relevant to the deterministic case.)

5. Betting on the past

> In my pocket (says Bob) I have a slip of paper on which is written a proposition P. You must choose between two bets: Bet 1 is a bet on P at 10:1 for a stake of one dollar. Bet 2 is a bet on P at 1:10 for a stake of ten dollars. . . . Before you choose whether to take Bet 1 or Bet 2 I should tell you what P is. It is the proposition that the past state of the world was such as to cause you now to take Bet 2.

Here is the matrix that Arif Ahmed gave to model this decision problem:

	P	~P
Bet 1	10	-1
Bet 2	1	-10

Ahmed argues that, since Bet 1 strictly dominates Bet 2, and since the causal decision theorist accepts the thesis that strictly dominated actions should always be rejected, the causal decision theorist is committed to choosing Bet 1, which is obviously the wrong choice.

The mistake in Ahmed's argument is the assumption that because the truth or falsity of P was settled by facts about the distant past, it is therefore entailed by the true dependency hypothesis.

Some references

A. Ahmed 2014. *Evidence, Decision and Causality*. Cambridge University Press.

C. Dorr 2016. 'Against counterfactual miracles', *Philosophical Review* **125**:241-286.

D. Lewis 1981. 'Causal Decision Theory', *Australasian Journal of Philosophy* **59**:5-30.

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