Comments on Eli Hirsch's "Talmudic Destiny"

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The crucial premise in Hirsch's reconstruction of Rashi's argument is that, if it was once not determinate that Reuven's wife was going to choose house A, then it is now not determinate that Reuven's wife was going choose house A. This premise is an instance of the schema

(1) $P\neg\Delta F\phi \rightarrow \neg\Delta PF\phi$

where P means "it was once the case that …", F means "it will be the case that …", and Δ means "it is determinate that …". The argument also appeals to the premise that, although it is now determinate that Reuven's wife chose house A, it was once not determinate that she was going to choose house A. In symbols:

(2) $\Delta p \wedge P\neg\Delta Fp$

Hirsch tentatively endorses both (1) and (2). As he rightly notes, this combination of commitments has some very surprising consequences. For example, together with the relatively uncontroversial principle that determinacy is closed under modus ponens

(K) $\Delta(\phi \rightarrow \psi) \rightarrow (\Delta\phi \rightarrow \Delta\psi)$,

it entails that

(3) $\neg\Delta(p \rightarrow PFp)$.

In other words, it is not determinate that, if Reuven's wife chose house A, then it was going to be the case that she chose house A. This is a startling conclusion. It is not for nothing that $p \rightarrow PFp$ is an axiom of standard tense logic. It seems incredible that this seeming logical truth not be determinately true. So we have strong reason to resist Rashi's argument.

This reaction is also suggested by the fact that the negation of (3) is valid on a simple and natural semantics for a propositional language with determinacy and tense operators. This is because the semantics validates all axioms of standard tense logic (in particular, $p \rightarrow \mathrm{PF}p$) and its validities are closed under the rule of Δ-necessitation (if ϕ is valid, then so is $\Delta\phi$). Moreover, (1) is not valid on the semantics, since the semantics validates (K) but does not invalidate (2). Let me now sketch the semantics I have in mind, and explain how according the corresponding metaphysical picture the openness of the future reveals itself in the temporally asymmetric interaction of determinacy and tense.

The idea behind the semantics is that, as time passes, history may become increasingly determinate: any course of history ruled out at a time is ruled out at all later times. Let a model be a septuple $\langle H,T,<,a,n,D,[[]]\rangle$ such that: H is a set of possible histories; T is a set of times; < is a linear order on T; $a \in H$ ('the actual history'); $n \in T$ ('the present time'); D is a set of history-time pairs $\langle h,t\rangle$ such that i) $\langle a,t\rangle \in D$ for all t, and ii) if $\langle h,t\rangle \in D$ and $t'<t$, then $\langle h,t'\rangle \in D$; [[]] is a function from formulas to sets of world-time pairs such that

$$[[\neg\phi]] = H\times T \backslash [[\phi]]$$
$$[[\phi \rightarrow \psi]] = [[\neg\phi]] \cup [[\psi]]$$
$$[[P\phi]] = \{\langle h,t\rangle: \langle h,t'\rangle \in [[\phi]] \text{ for some } t'<t\}$$
$$[[F\phi]] = \{\langle h,t\rangle: \langle h,t'\rangle \in [[\phi]] \text{ for some } t<t'\}$$
$$[[\Delta\phi]] = \{\langle h,t\rangle: \langle h',t\rangle \in [[\phi]] \text{ for all } \langle h',t\rangle \in D\}$$

A formula ϕ is true in a model $\langle H,T,<,a,n,D,[[]]\rangle$ just in case $\langle a,n\rangle \in [[\phi]]$; a formula is valid just in case it is true in all models.

Although the Δ-free fragment of the resulting logic is just the standard tense logic of linear time, and so is symmetric with respect to past and future, the full logic is temporally asymmetric, since it validates $F\neg\Delta\neg\phi \rightarrow \neg\Delta\neg F\phi$ but not $P\neg\Delta\neg\phi \rightarrow \neg\Delta\neg P\phi$ and $\neg\Delta\neg P\phi \rightarrow P\neg\Delta\neg\phi$ but not $\neg\Delta\neg F\phi \rightarrow F\neg\Delta\neg\phi$. The two validities should be uncontroversial: If it will be open that *p*, then it is open that it will be the case that *p*, and if it is open that it was once the case that *p*, then it was once open that *p*. And the two invalidities arguably have counterexamples. Suppose a coin just landed tails. Although it was once open that this coin was going to land heads, it is not now open that it was once going to land heads, so we have a counterexample to $P\neg\Delta\neg\phi \rightarrow \neg\Delta\neg P\phi$. Suppose another coin is about to land tails. Although it is now open that this coin will land heads, it is not the case that it will be open that it lands heads, so we have a counterexample to $\neg\Delta\neg F\phi \rightarrow F\neg\Delta\neg\phi$.

It seems to me that, if we want to explain the idea of the openness of the future in terms of some notion of determinacy, then the above picture is preferable Hirsch's Rashian one. But unlike Hirsch, I am not convinced that we need a primitive notion of determinacy to make sense of the openness of the future. Isn't it enough to observe that, although past and present contingencies all have objective chance 0 or 1, future contingencies can have intermediate objective chances? That a certain coin just landed heads either has chance 1 (if it did) or chance 0 (if it didn't), but that the coin will land heads the next time it is flipped has chance ½. It is not clear to me that there is anything more to the openness of the future than such temporal asymmetries in objective chances—that is, anything else in addition to the familiar temporal asymmetries of knowledge, counterfactual dependence, causal influence, entropy increase, etc. (Note: I am not suggesting that we identify determinacy with having objective chance 1, since falsehoods can have objective chance 1 when they concern chancy processes with infinitely many possible outcomes. I think there are a number of interesting notions of determinacy in the vicinity, including a) being a consequence of the physical laws together with all physical facts about the past and present, and b) being a consequence of the physical laws together with the macroscopic facts about the past and present.)