

APPENDIX B

THE DETERMINACY
OF PHYSICAL EVENTS
AND HEISENBERG'S
UNCERTAINTY PRINCIPLE

The popular appeal to Heisenberg's uncertainty principle as a defense of indeterminacy is unsound and unconvincing. It merely betrays the prejudices of the modern trend toward irrationalism. Heisenberg's uncertainty principle does not prove *indeterminacy* in natural events. It only proves uncertainty with respect to either location or momentum of a sub-atomic particle. To extrapolate from that and conclude that physical events are undetermined is not at all justified. To say that I, an observer in space and time, cannot know both the location and the momentum of a sub-atomic particle is not at all the same as saying that there exists nothing that determines both the velocity and location of that sub-atomic particle. The confusion comes from the popular fallacy of equating determinacy and predictability. The person who infers indeterminacy from unpredictability is assuming the validity of the following proposition: if an event is not, in principle, predictable from physical data that are, in principle, available to a human observer, then it follows that that event is not determined by any physical realities. Now the inverse of this proposition is true. Namely, if an event is predictable from physical data by a human observer, then it follows that that event is determined by physical realities. But the initial proposition is not true. To be unable to predict an event does not logically require the indeterminacy of that event. To more readily see that this is fallacious, consider an equivalent proposition, the contrapositive of the proposition under consideration: if an event is determined by physical realities that are, in principle, knowable, then it follows that that event is, in principle, predictable from physical data that are, in principle, available to a human observer. Clearly this is not necessarily true. Consider weather prediction, for example. One can quite readily see that an event could be physically determined without being predictable, even in principle. Accordingly, the absence of predictability does not entail the lack of determinism. And if we consider the hypothesis that an event is determined by a non-physical, transcendent cause, then it is even more certain

that the inability to predict an event from physical data does not entail its wholesale indeterminacy. What misleads the philosophically naive scientist to conclude that Heisenberg's uncertainty principle is evidence of indeterminacy is his acceptance of this latter, fallacious proposition—namely, that the inability to predict an event from physical data implies that the event is indeterminate.