What is a Block Universe?

(A Foundational Question?)

Steven F. Savitt
Department of Philosophy
University of British Columbia

There are two (distinct) ideas that seem to me intertwined in the standard idea of a "block universe".

(1) A spacetime in which there is no distinguished foliation into universe-wide simultaneity slices (or global *Now*s).

(2) A Spacetime in which time is static, inert or in some important way non-dynamic.

E.g. from Julian Barbour:

"There is no natural way in which time can flow in Minkowski space-time. At least within classical physics, space-time is a block—it simply is. This is known as the block universe view of time. Everything—past, present, and future—is there at once." (*The End of Time*, p. 143)

(2)—the static nature of a "block universe"--is often expressed by saying that in a block universe time does not "flow" or "move". While I agree that time does not "flow" or "move", I argue nevertheless that (2) does not follow from (1).

(a) What time does is *pass* or *lapse*. This passing or lapsing is the successive occurrence of events. It is *not* "movement" or "flow".

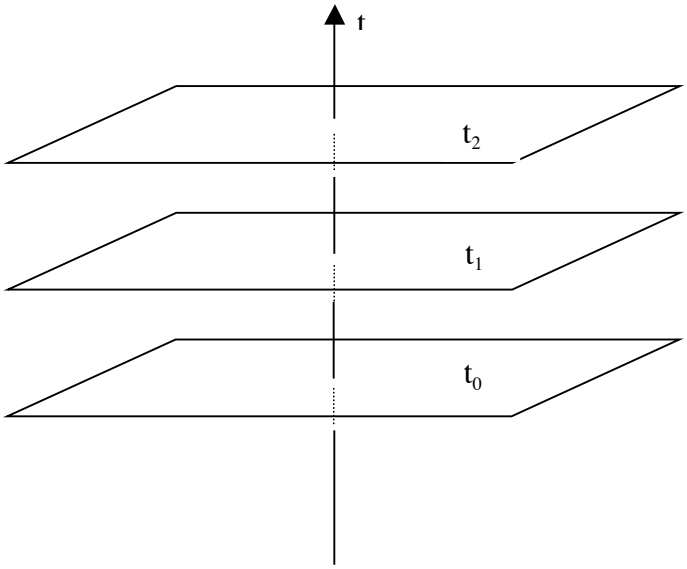
(b) And the lapsing of time is, as Einstein taught us, *local*.

> "We shall now inquire into the insights of definite nature which physics owes to the special theory of relativity.
>
> (i) There is no such thing as simultaneity of distant events…"

(2) does not follow from (1), I claim, since global *Now*s are not essential to passage, though local *nows,* successive events along (or near) a timelike world line, are.

Classical Physics

It is always true to say that the events that occur at t_0 occur at t_0, always true to say that the events that occur at t_1 occur at t_1, and always true to say that the events that occur at t_0 occur earlier than the events that occur at t_1, and so on. These unchanging facts are often illustrated by a picture like the one below, with two-dimensional planes replacing three-dimensional spaces for ease of illustration. Where in this picture, it may be asked, is passage?



Successive sets of simultaneous events

My response to this critical question is that change or passage is not *in* this picture but in what it is a picture *of*. One who asks the question is confusing a static representation with a representation of stasis. If we learn from philosophers of mind that "we must distinguish features of representings from the features of representeds", if we keep in mind that one dimension of this spacetime structure is supposed to represent time, that events occur at times, and that (some) different events occur at (some) different times, I think we should have no trouble in understanding that this static structure can represent a dynamic or unfolding world. *We do not need an animated picture to have a picture of animation.* In my view, the call for animation in the model (rather than in what it is a model of) is an unnecessary duplication that is at the root of most of the paradoxes and regresses that are supposed to attend upon the idea of passage or temporal becoming.[1]

[1] For an extended discussion of the notion of passage in classical (Newtonian) spacetimes, see my paper "On Absolute Becoming and the Myth of Passage" in *Time, Reality and Experience*, edited by Craig Callender (Cambridge University Press, 2002).