a.j.wilson@bham.ac.uk

Skow on the Passage of Time

Alastair Wilson (University of Birmingham & Monash University)

18th June 2017

1. Introduction

In his book *Objective Becoming* (Skow 2015), Bradford Skow has offered a rich and systematic treatment of the passage of time. We learn much about what objective passage could and could not amount to from engaging with his careful work.

Skow's overall conclusion is that the 'block universe' deflationary theory of passage is stronger than any currently-available version of the recently-popular *moving spotlight* theory of temporal passage. To help establish this conclusion, Skow provides a taxonomy of theories of temporal passage, including some new and unfamiliar theories that he classifies as versions of the moving spotlight view. These new theories are worthy of further study; however, in this commentary I will argue that they suffer from some problems that render them uncongenial to committed believers in temporal passage (§2-§5). I'll also make a few brief remarks about some other arguments in the book, concerning branching time (§6), relativistic presentness (§7), and temporal experience (§8).

2. Assessing MST-Time

In chapter 4 of *Objective Becoming*, Skow proposes a new way of thinking about the moving spotlight theory of temporal passage. *MST-Time* is a perspectivalist theory of time that resembles Kit Fine's fragmentalism (Fine 2005). Skow also puts forward *MST-Spacetime*, a relativistivic version of the theory – but for the most part we can simplify the discussion by restricting attention to MST-Time, since the main arguments apply equally to both theories.

Skow introduces MST-Time as follows.

> *"(4) Each time is present relative to itself, and only to itself." (p.58)*

> *"[MST-Time] says that there are no perspective-independent facts. While it is true that from the perspective of T, T is present, this does not follow from any perspective-independent fact about time together with some facts about how T is related to other times." (p.64.)*

I'll argue that MST-Time suffers from two significant objections, which prevent it from capturing the theoretical motivations driving the moving spotlight theory in the first place. It also introduces some problematic brute necessities that block universe theorists avoid.

Taken together, these problems suggest that MST-Time doesn't give us any objective passage worth wanting.

The first problem (§3) is that MST-Time does not contain any elements that makes it a moving spotlight view, as opposed to a stationary spotlight view. Call this the *objection from motion simpliciter*. I argue that if there is no privileged perspective from which it is true that the spotlight moves, then nothing in the resulting picture conflicts with a logically and conceptually possible scenario: the stationary spotlight scenario. In the stationary spotlight scenario, there is a preferred perspective that does not change. But this scenario differs from our envisaged scenario only by addition of further metaphysical structure; MST-Time is fully consistent with it. A legitimate moving spotlight theory ought not to be consistent with a stationary spotlight scenario. So however plausible it might or might not be, MST-Time is not a moving spotlight theory.

The second problem is that MST-Time doesn't give us any clear sense in which the spotlight moves steadily forwards rather than moving backwards or moving in some other way (§4). Call this the *objection from mode of motion*. I'll suggest that, by being compatible with any account of the direction and topology of time that might come out of physics, Skow's moving spotlight theories give up the spirit of objective passage: a *directed* and *irreversible* notion of becoming that was supposed to be at the heart of the nature of time. Time flows in exactly the same sense, according to MST-time, in temporally symmetric worlds and in temporally asymmetric worlds, in worlds with circular time and in worlds with non-circular time, in worlds consisting of only one instant and in worlds consisting of many instants, and in worlds where space and time are emergent and in worlds where space and time are fundamental. The notion of passage that emerges from MST-Time is even compatible with a world containing only a single instant; all the ingredients are in place in such a world for the type of objective passage that Skow describes.

MST-Time also requires that we accept some problematic brute necessities, which the block universe theorist avoids (§5). This provides further reason for believers in robust temporal becoming to look elsewhere for an account of passage that can hold its own against the block universe.

3. A stationary spotlight?

Skow commends MST-Time to moving spotlight theorists on the grounds that it avoids some problems that he identifies with more familiar versions of the moving spotlight view. Recall that according to MST-Time, each time comes equipped with a perspective, such that from different perspectives different temporal facts obtain. There is no perspective-neutral sense in which one perspective is the uniquely correct one; every perspective is correct from its own perspective and is incorrect from every other perspective.

Why does Skow think that MST-Time should count as a theory of objective becoming? His reason is as follows: "Since different times are present from different perspectives, time itself changes" (p.61). However, I don't see how the claim that time itself changes can be vindicated by MST-Time, regardless of its perspectival element. For Skow's assertion that time itself changes is an assertion made at a particular time – presumably, at some time during the writing of the book, or perhaps when it is published or when it is read – and from the perspective of that time, the assertion that time itself changes is simply false. While it is true at every perspective that different times are present from different perspectives, it is (always) false at every perspective that different times are present *simpliciter*. I am calling this the objection from motion simpliciter.

The objection can be sharpened by contrasting a moving spotlight picture of time with a hypothetical *stationary spotlight* picture of time. In the stationary spotlight scenario, everything is just as MST-Time takes it to be. However, in addition to the individual perspectives attached to times, in the stationary spotlight scenario there is also an additional timeless perspective, from which the spotlight does not move. I take this scenario to be logically and conceptually possible, even if metaphysically impossible. Now, any *bona fide* moving spotlight view ought to conflict with the stationary spotlight scenario. The problem is that MST-Time is fully compatible with it. As a result, we can get from a putative moving spotlight view to a stationary spotlight view just by adding additional metaphysical structure, rather than by taking any metaphysical structure away. That doesn't seem right.

The appealing features of MST-Time stem precisely from the lack of any privileged perspective from which to assess how the spotlight moves. Skow points out that this feature frees us from the dubious metaphysical commitments of primitive tense or additional dimensions of supertime. But by giving up a privileged perspective, we also give up any inconsistency with the stationary spotlight picture. And moving spotlight theorists, I expect, will want to insist on such an inconsistency.

The objection can be put in the terms of metaphysical completeness that Skow favours (Sider 2011). So formulated, the objection from motion simpliciter is the problem that "T is present" is not metaphysically complete. Skow says that this problem amounts to a failure of the theory to involve 'robust change', but not to a failure to contain 'robust passage':

> "We should not automatically reject a theory of objective becoming because it fails to contain robust change. MST-Time is a fantastic departure from the block universe. The passage of time in it is more substantial than the anemic passage that goes on in the block." (p.67).

As far as I can see, this last claim is unwarranted. There is indeed more metaphysics in MST-Time than there is in the block universe view. But it is just not clear why this extra metaphysics should count as giving us robust passage. The extra metaphysics is itself neutral on the question of whether the spotlight moves or remains stationary.

In an earlier discussion of a different view, MST-Supertime, Skow says:

> "I think that believers in objective becoming should be allowed to disagree about whether objective becoming requires robust change or not. The (anemic) "movement" of presentness in MST-Supertime is still a kind of passage that is more robust than anything that goes on in the block universe." (p.50)

What I'm contesting is the claim that MST-Time gives us any kind of passage whatsoever. It is more robust metaphysics in the sense it involves more theoretical commitments, but Skow has not given us any reason to think that it secures anything that counts as passage. (The scare quotes Skow uses around "movement" suggest that he is not immune to this concern.)

Skow's own initial presentation of the moving spotlight view says that "...the moving spotlight theory does not just say that exactly one time is present. The theory also says that which time is present keeps changing." (p.45). This feature has got lost in MST-Time: there's no time from the perspective of which more than one time is ever present. The closest thing to this that MST-Time delivers us is that there's no perspective-independent fact about where the spotlight is; from the perspective of one time, it's at one time, and from the perspective of another time, it's at another. But that doesn't give us motion of the spotlight, it just gives us lack of absoluteness of its position.

I make no claim that the objection from motion simpliciter is either particularly new or particularly surprising. And as far as I can tell, Skow doesn't think it is either:

> "Dozens of philosophers have said something like this [that a theory lacking robust change also lacks robust becoming] about a theory like MST-Time. Among them are Horwich, *Asymmetries in Time* (p.22); Callender, "Shedding Light on Time" (p. S591); Zimmerman, "The Privileged Present" (p. 212); and a former version of myself, in "Relativity and the Moving Spotlight" (p.67).

My central thesis in this section has been only that Skow's new theory doesn't get around this old problem. In the next section, I'll aim to raise a less familiar problem about the mode of motion of the spotlight.

4. How does the spotlight move?

The objection from motion simpliciter is that, given MST-Time, there's no clear sense in which the spotlight *moves rather than remaining stationary*. The objection from mode of motion is that MST-Time gives us no clear sense in which the spotlight *moves steadily forwards rather than moving in any other way*.

An important motivation behind the moving spotlight theory is that presentness moves in a *directed* manner. Merely appending a perspective to each instant of time doesn't secure such a mode of passage. The formulation of MST-Time is time-symmetric; it doesn't build in

any temporal asymmetry that could give the motion of the spotlight a direction. Whatever instants were, or however they were arranged, they could be associated with perspectives. For example, we might associate perspectives with points of space, giving us metaphysically complete facts about what is *here* for each point in space. That wouldn't give us passage of space. So, if MST-Time is to give us passage of time, there has to be something in the difference between instants of times and points of space that makes the difference between passage (of time) and non-passage (of space). It's not obvious what this difference could be.

It seems as though it is an important part of the motivation behind the moving spotlight view that presentness should move in a certain way; roughly, the motion of the spotlight should be directed, it should be continuous, and it should be inexorable. But simply appending a perspective to each instant of time doesn't secure this mode of passage, since we can imagine theories of time according to which the instants are arranged in all sorts of peculiar ways. I'll argue that the variety of different cosmological models of time undermines any claim that times automatically give rise to objective passage when they are associated with perspectives. Here are four types of cosmology that give rise to deviant forms of objective passage when considered in the context of MST-Time:

i) Cosmologies with time-symmetric laws of nature and symmetrical distributions of events across time, as envisaged by Thomas Gold (1962), threaten the intuitive idea of the directionality of the passage of time. How does the spotlight know which direction in which to move in a world in which physical reality is completely time-symmetric?

ii) Cosmologies with circular time, backwards causation, and time travel around closed timelike curves, threaten the intuitive idea of inexorability of the passage of time. Does the spotlight keep moving around and around the circle, and does it jump around following the backwards causal influences and/or the time travellers?

iii) 'Timeless' cosmologies in quantum gravity, including the approach of Julian Barbour (1999), contain only a single instant of time. In worlds of just one instant, MST-Time is perfectly well-defined but it does not deliver us any notion of passage. The spotlight simply has nowhere to go.

iv) Cosmologies in which ordinary space and time are non-fundamental emergent structures, for example models of loop quantum gravity. In these theories there is nothing in the fundamental ontology for perspectives to attach to.

I take the upshot of these varied proposed models for time to be that whether a perspectival theory like MST-Time can even be applied, and whether it secures us a notion of objective becoming of the kind intended by moving spotlight theorists, turns out to depend sensitively on the details of how physics happens to turn out. Typically, though, friends of objective becoming don't want to make their view hostage to any empirical fortune: our experience of

the passage of time is meant to be sufficient evidence for the kind of objective becoming they have in mind, such that physics could not in principle provide defeaters for it.

Perspectival theories of passage such as MST-Time are caught in an uneasy double-bind; they do not by themselves give rise to the intuitive mode of motion of the spotlight, since the kind of becoming they deliver depends on the actual physical configuration of instants. But many conceivable physical configurations of instants are inimical to the intended notion of objective becoming. Perspectivalism passes the hard work of characterizing the structural features of temporal passage over to the physical theories that characterize our actual pattern of instants of time, but the empirical study of this pattern cannot be relied on to give the results that moving spotlight theorists want and expect.

The burden of §2 was to argue that MST-Time is not a view according to which the spotlight genuinely moves. The burden of this section has been to argue that even if MST-Time does secure the claim that the spotlight moves, it doesn't secure the sorts of claims about *how* it moves that defenders of the moving spotlight theory want to make. So, MST-Time still cannot do justice to their motivations.

5. The source of perspectival necessities

My final worry about MST-Time concerns Skow's claim that it is consistent, but impossible, for one time to fail to be present from its own perspective. Where we have consistent claims that are nonetheless impossible, we typically expect there to be some principle of metaphysics that prevents these claims from holding. But defenders of MST-Time apparently have to say that it's just a brute necessity that times are present from their own perspective and from no other. The block universe view doesn't need any such brute necessity. So MST-Time saddles the moving spotlight theorist with some uncomfortable commitments, and if the arguments above are on the right track then the view doesn't provide sufficient explanatory benefits with which to offset this theoretical cost.

Analogues of this problem don't arise for all moving spotlight theories. Defenders of MST-Supertime or of MST-Supertense can point to the essence of supertime, or to the essence of supertense, to explain the necessity of time's passing. But I don't see any similarly plausible move for defenders of MST-Time. Perhaps they can say that it is part of the essence of an instant that it is present from its own perspective. But this response isn't very satisfying; it puts the source of necessity into the instant itself, and we make use of these very same instants in other theories without any inkling that they have essences linking them to perspectives. So MST-Time saddles the moving spotlight theorist with some rather uncomfortable commitments at the level of brute necessities, and if the previous two sections are on the right track then these views don't provide sufficient benefits with which to offset this theoretical cost.

6. Skow's critique of branching-time theory

Skow is highly critical of branching time theories. He argues that they have no advantages over MST-Time, because the notion of future-directed indeterminacy that they generate (which is supposed to be their main advantage) is illegitimate. The problem is meant to be that "overabundance of determinateness does not make for indeterminacy" (p.77). According to Skow, rather than giving us an indeterminate future, branching time semantics just gives us a complex multi-branched determinate future. This objection is a familiar one; it comes up also in the context of Everettian approaches to quantum mechanics (see e.g. Loewer 1996). And a closely-related objection to Lewisian modal realism (Lewis 1986) has been influential; as modal realists allegedly offer us 'just more actuality', so branching time theorists offer us 'just more determinacy'.

Call this style of objection the *just more analysans* objection. In general it seems to me to amount to a refusal to take the analysis seriously, rather than to a cogent argument against it, and this applies equally to Skow's deployment of the objection against branching time theory. The hypothesis under consideration is that indeterminacy is *constituted* by an overabundance of determinacy; to deny that an overabundance of determinacy could possibly constitute indeterminacy is just to reject the analysis. (Ted Sider comes to a very similar verdict about Kripke's notorious 'Humphrey objection' (Sider MS).)

To press the point on perhaps more familiar ground: would Skow make the same criticism of supervaluationist treatments of semantic indeterminacy? Supervaluationists use precise interpretations (precisifications) to make sense of semantic indeterminacy. Accordingly, their analysis of indeterminacy appeals to theoretical resources which themselves are fully precise. Semantic indeterminacy is just indecision between fully precise contents; there is no imprecise content in the vicinity to which we are directly cognitively related. So, ought we to say that supervaluationism fails to get off the ground since it invokes 'just more precision' in its analysis of imprecision? This objection is indeed sometimes raised against supervaluationism, but it is usually regarded as unpersuasive; I think Skow's argument against the branching time theory is equally unpersuasive.

In fact, the just more analysans objection seems to generalize to any analysis whatsoever. We want to analyse some target phenomenon (the analysandum) in terms which do not invoke the target phenomenon (the analysans). But, any analysis which we produce in terms only of the analysans will be just more analysans; it is always open to us to deny that, no matter what we say about the analysans, we have still said nothing about the analysandum. So an analysis of gender in terms of social behaviour would give us 'just more attitudes' and nothing distinctively gendered; an analysis of baldness in terms of number of hairs would give us 'just more hairiness' and nothing distinctively balding; an analysis of vixens as female foxes might give us 'just more foxes' and nothing distinctively vixenish.

This innocence-by-association argument also applies to theoretical identifications in the sciences. The identification of water with H_20 gives us 'just more molecules' but nothing genuinely wet; the identification of heat with molecular motion gives us 'just more jiggling' but nothing genuinely hot; the identification of thought with patterns of neuronal activity gives us 'just more brain processes' but nothing genuinely mental. As far as I can see, Skow has not given us any special reason to reject the analysis of indeterminacy in terms of branching time that does not generalize to all analyses and to all theoretical identifications.

One final related thought: it seems to me that the branching time analysis gives Skow's favoured versions of the moving spotlight theory some resources with which to resist my objection from mode of motion in §4. Consider a version of MST-Time that incorporates branching time as well as perspectivalism. According to these new views, each of the instants on each of the branches comes equipped with a perspective. Then we can characterize the mode of motion of the spotlight in terms of the branching-time structure, which branching-time theorists suppose obtains necessarily. The asymmetry of the mode of motion of the spotlight need not be traced to the relation between each instant and its perspective, a relation which lacks the needed asymmetric character; rather, it can be traced to the (necessary) pattern of instants arrayed across modal-temporal space. There are more instants immediately futurewards of any given instant than there are instants immediately pastwards of it. Assuming that MST-Time can somehow avoid the objection from motion simpliciter, the combination of MST-Time with a branching-time framework might then also be able to avoid the worst of the problems generated by the objection from mode of motion.

7. The past light-cone perspective theory

Although it doesn't get much attention in *Objective Becoming*, I quite like the view that in relativistic contexts presentness should be associated with the back light cone of a given spacetime point. This sort of view can be developed in the same perspectivalist way as Skow develops his relativistic moving spotlight theory MST-Spacetime, and the resulting theories will have a lot in common.

Skow thinks that a theory of the sort that I have in mind cannot work. He argues that it would allow for the entire trajectory of a photon to be present at a single time:

> "In a theory [that says that the regions that are present are back light cones] it is possible that a photon's entire worldline be present at a single point in supertime. True, a photon cannot have experiences, so the theory does not need to say that a continuous series of someone's experiences are present at a single point in supertime. But I still think this is a decisive objection." (p.156)

I'm not sure why Skow thinks this objection is decisive. Here are some potential reasons.

First, Skow might say that even though (in the actual world, with actual psychophysical laws) photons cannot have experiences, still it is metaphysically possible for them to have experiences, and so our theory of passage should allow for this without making it such that a continuous series of experiences would then be present at a single instant. But I don't find this reply convincing. Photons are not the kinds of things that could possibly have experiences, no matter what the psychophysical laws might be, assuming only that these laws link the having of experiences to certain causal relations obtaining between the parts of an experiencing entity or between the experiencing entity and some external events. But photons do not have parts that can causally interact with each other, nor can they causally interact with external events without being absorbed and thereby destroyed. So even a fairly weak form of physicalism is apparently going to rule out photonic experiences.

Second, Skow might argue that photons are temporally extended objects since they travel finite distances in finite lengths of time. But, I think the defender of the instants-as-past-light-cones perspectival view can contest this reasoning. While photons do traverse finite distances in finite lengths of time relative to our inertial frames, making them look like temporally extended objects to us, what presumably matters here is whether they traverse finite distances in finite lengths of time relative to their own 'frames'. And they do not. Photons traverse zero spacetime intervals, so the only sensible value that can be assigned to the proper time along a photon's worldline is zero. (Actually the notion of a rest frame of a photon is degenerate; but proper time elapsed along a worldline tends to zero as velocity approaches c.) The apparent finite velocity of a photon's journey is thus only apparent; from the 'photonic perspective', absorption and emission occur at the very same moment. So there is no problem with the entire trajectory of a photon being located at a single instant.

The situation can be compared to a map of the Earth's surface in a flat projection (though the analogy is of course not exact). The North and South poles each correspond to an entire edge of such a map, by convention the top and bottom edges respectively. Any route along the top or bottom edge of a map like this has zero length, even though it looks extended on the map. The map is misleading concerning lengths across the Earth's surface in the limiting case of the North and South poles, just as a Minkowski diagram is misleading concerning proper times elapsed in the limiting case of photon trajectories.

For these reasons I don't think that Skow's objection to the instants-as-past-light-cones perspectival view (MST-Lightcones?) is decisive, so the view remains a live option. And MST-Lightcones has the (apparently very significant) advantage over MST-Spacetime that relative to ordinary inertial frames MST-Lightcones recovers instants with non-zero spatial extension. Accordingly, more than one spatially disjoint event can occur at a given instant. This seems like a very important part of the folk notion of an instant of time.

8. The argument from presented experience

I am no more impressed than Skow is by arguments for the moving spotlight picture based on temporal experience, and I think that in chapter 11 of *Objective Beoming* he gives exactly the right treatment of what he calls the arguments from content and phenomenology. However, I'm unsure why Skow thinks what he calls the argument from presented experience does better at capturing the moving spotlight theorist's motivations. At the root of my worry is this: of all the things we might think pick out the present, why is availability of experience different from (say) availability of cookies?

Here is how Skow formulates the argument from presented experience:

"(P1) Only the red experiences are available to me...
(P2) If the block universe theory is true then either both the red and white experiences are available to me, or neither the red nor the white experiences are available to me...
(C) The block universe theory is false." (p.211)

Now it seems to me that this argument does not in fact turn on the notion of experience at all. Suppose that in my enlightened philosophy department, coconut cookies are served on Mondays and chocolate cookies are served on Tuesdays. Then both premises of the following argument seem fine when assessed in the department lounge on Monday:

(P1c) Only the coconut cookies are available to me.
(P2c) If the block universe theory is true then either both coconut and chocolate cookies are available to me, or neither coconut cookies nor chocolate cookies are available to me.
(Cc) The block universe theory is false.

My point is just that the argument from presented experience, as Skow reconstructs it, does not depend essentially on any features of experience. Given that the arguments from experience in favour of the block universe view certainly were intended to depend on features of experience, this suggests that there may be an argument in the vicinity that is motivating moving spotlight theorists but which Skow has not addressed. Unfortunately, I have no idea what that argument might be.

9. Conclusion

I'll conclude by reiterating my main concern about Skow's proposed moving spotlight theories. The additional perspectival metaphysics that these theories involve does not secure us a clear sense in which the spotlight moves, does not settle the way in which it moves, and introduces undesirable new brute necessities. Accordingly, it seems unlikely that moving spotlight theorists will be quick to take up Skow's perspectivalist approach. As I understand them, moving spotlighters really do want to make the more radical claims that Skow's book so cogently warns them against.

References

Barbour, J. (1999) *The End of Time: The Next Revolution in Physics*. Oxford: Oxford University Press.

Fine, K. (2005) "Tense and Reality", in *Modality and Tense: Philosophical Papers*. Oxford: Oxford University Press.

Gold, T. (1962), "The Arrow of Time", *American Journal of Physics* 30(6): 403–410.

Lewis, D.K. (1986) *On the Plurality of Worlds*. Oxford: Blackwell.

Loewer, B. (1996) "Comment on Lockwood", *The British Journal for the Philosophy of Science* 47(3): 229-239.

Sider, T. (2011) *Writing the Book of the World*. Oxford: Oxford University Press.

Sider, T. (MS) "Beyond the Humphrey Objection". Online at http://tedsider.org/papers/counterpart_theory.pdf .

Skow, B. (2015) *Objective Becoming*. Oxford: Oxford University Press.