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Abstract

It is a classical argument against the objectivity of the flow of time that it would not be possible to make sense of its direction without stepping into a vicious circularity. This paper is dedicated to discuss some of the objections Tim Maudlin has recently put forward against this argument, while outlining an alternative and more effective way out of it.

Keywords

Time, flow, direction, future, positive time axis.

Introduction

Time flows — or, at least, it seems to: the present moment is but a feeble sparkle, suddenly lighting up while emerging from the future, and leaving only pale traces in our memories while fading away into the past. But is it all real? Does time really flow or pass independently of human experience, or is transiency a mere projection of our minds?

In his latest book, Maudlin 2007 discusses some stock philosophical arguments Price 1996 endorses to contest the objectivity of the flow of time. In particular, one of these arguments targets the claim that time flows *from* past *to* future, by contending that there is no non-circular way to determine the direction of its flow:

If time flowed, then – as with any flow – it would only make sense to assign that flow a direction with respect to a choice as to what is to count as a positive *direction* of time. In saying that the sun moves from east to west or that the hands of a clock move clockwise, we take for granted that the positive time axis lies toward what we call the future. But in the absence of some objective grounding for this convention, there isn't an objective fact as to which way the sun or the hands of the clock are 'really' moving. Of course, proponents of the view that there is an ob-

jective flow of time might see it as an advantage of their view that it does provide such an objective basis for the usual choice of temporal coordinate. The problem is that until we have such an objective basis we don't have an objective sense in which time is flowing one way rather than another. In other words, [...] it [...] doesn't make sense to speak of an objective direction of flow of time (Price 1996: 13).

The intent of this paper is to point out the shortcomings of Maudlin's reply to this argument, while outlining an alternative and more effective objection to the latter. For this purpose it will be useful, in the first place, to outline the logical structure underlying the argument in question. On the one hand, this will make it possible to see that the argument comes necessarily equipped with the implicit corollary that the direction of flows is, in general, no objective matter of fact. On the other hand, it will make it possible to see that Maudlin's objections fail precisely because he basically accepts the logical structure of the argument, leaving its auxiliary premises substantially untouched. Finally, I will carry the logical consequences of the argument one step further, showing that it comes to the unacceptable conclusion of denying the objectivity of flows themselves – the sole way of avoiding such an extremely implausible contention being either relaxing one tacit premise of the argument or falling into an illegitimate double standard.

The No-Direction Argument

Following Price, but unlike Maudlin, I shall hereafter consider terms like 'flow', 'passage' or 'motion' as equivalent, since they bear no substantial difference for the purposes of my discussion. Given this proviso, the coarse-grained logical structure of Price's argument – hereafter labeled the *no-direction* argument – can be laid down as follows.

- (1) Time flows objectively.
- (2) If time flows objectively, then it flows objectively in a certain direction.
- (3) The direction of flows can only be established by referring to the positive direction of the time axis.
- (4) By convention, the positive direction of the time axis points toward the future.

- (5) The future is objectively distinguished from the past exactly because it is the objective direction of the flow of time.

By premises (1) and (2), time objectively flows in a certain direction which, according to (3) and (4), can only be established by referring to the future. However, given (5), the future direction of time is only objectively distinguished from its past direction as the direction toward which time objectively moves; and therefore, the direction of the flow of time can be only established by circularly referring to the objective direction of the flow of time. To escape this circularity, and given the plausibility of premises (2)-(4), premise (1) should then be relinquished, leading to the conclusion that time does not objectively flow.

Those who deny the objectivity of the flow of time would certainly be content with this result. However, the argument bears a further, though rarely acknowledged, consequence. If there is no objective flow of time then, *a fortiori*, there is no objective direction of that flow. Hence, by premise (5), there is no objective distinction between the past and the future and, therefore, there is no objective direction toward which the time axis can be oriented according to the convention laid down in (4). So, given premise (3), not only the no-direction argument denies the objectivity of the flow of time – it also comes to deny the objectivity of the direction of *any* flow.

Incidentally, this would be a claim Price would be likely to subscribe. In fact, one of his leading theses is that the direction of causation, to which the temporal orientation of physical processes is often reduced, is but a secondary quality originating from our perspective attitude of agents: as deliberating and operating beings, we are naturally inclined to project the purely subjective directionality of the means-end relation into the physical world. The origin of the causal asymmetry thus lies in our experience ‘of doing one thing to achieve another’, in the fact that ‘we cannot reverse the order of things, bringing about the second state of affairs in order to achieve the first’ (Price 1992: 515). In this view, there is no mind-independent matter of fact about the temporal asymmetry of causes and effects, and hence no mind-independent matter of fact about whether causal processes, including flows, take place in one direction rather than the opposite: flows are only objective as long as they involve the displacement of the flowing objects; the direction of that displacement, instead, is a

purely subjective addition made by human observers. Maudlin's objections, on the other hand, concentrate precisely against this view.

Maudlin's Reply

Contrary to Price, Maudlin believes that time passes objectively: the passage of time is 'an intrinsic asymmetry in the temporal structure of the world' – the asymmetry 'that grounds the distinction between sequences which run from past to future and sequences which run from future to past' (Maudlin 2007: 198). In this view, there is more about flows and motions than mere displacement: flows and motions have an objective direction, and this is precisely the one which is determined by the objective passage of time.

Schematically, Maudlin's reply to Price can be split in two main parts: on the one hand, he argues in favor of the objectivity of the flow of time by invoking the empirical evidence of the directionality of flows; on the other hand, he argues that the problem of determining the positive direction of the time axis, which is essential to Price's argument, is ill-posed *ab initio*. Let us examine these two objections separately.

The point about directionality of flow is [...] exactly correct: flows only have a direction because the asymmetry inherent in the passage of time provides temporal direction: from past to future. The natural thing is now to turn Price's modus tollens into a modus ponens: since there obviously is a fact about how the Mississippi flows (north to south) or how the hands of standard clocks turn (clockwise) there is equally a real distinction between the future direction in time and the past direction (Maudlin 2007: 114).

Price's argument is structured as a *reductio ad absurdum*; so what modus tollens does Maudlin refer to? In order to reconstruct it, we shall proceed backward, recovering its premises from those of the modus ponens that Maudlin wishes to obtain by reversing its logical structure.

The conclusion Maudlin is searching for is admittedly the refutation of Price's major conclusion, namely the statement that time objectively flows. What motivates this conclusion, acting as the minor premise of his modus ponens, is the claim that the direction of flows – exemplified by the direction of rivers and clocks – is an objective

matter of fact. The major premise connecting this claim to the above conclusion is, accordingly, the statement that the direction of flows is objective only if time objectively flows. By contrast, the modus tollens which Maudlin attributes to Price is the one whose major premise is the same as the major premise of Maudlin's modus ponens, whose minor premise is the negation of its conclusion, and whose conclusion is the negation of its minor premise: since the direction of flows is objective only if time flows objectively, but this is not the case, then flows have no objective direction.

However, this is still not Price's argument. So, what relation does the above modus tollens bear to Price's argumentation and, in particular, where does its major premise come from? Let us go back to Price's own assumptions and let us notice that, due to statement (3), the direction of flows is objectively determined only if the positive direction of the temporal axis, to which the former is necessarily referred, is objective in its turn. In accordance to (4), this obtains just in case the future direction of time, which is conventionally identified with its positive direction, is objectively distinguished from the past; but, according to (5), this can only be done by the objective flow of time. Taken together, statements (3)-(5) accordingly amount to the statement that the direction of flows is objective only if the flow of time is, which is precisely the major premise of Maudlin's modus ponens.

The modus tollens Maudlin refers to is, therefore, the one having as its major premise the conjunction of statements (3)-(5) and as its minor premise the negation of statement (1): in other words, it is the argument leading from the conclusion of the no-direction argument to the corollary that no flow is objectively oriented in time. Maudlin's strategy is thus the following: taking the empirical force of the directionality of flows as a proof of their objectivity, and then turning the sign of the above argument upside down, invoking the objective directionality of flows to reaffirm the objectivity of the flow of time. Unfortunately, this strategy fails in two different respects.

In the first place, a supporter of Price's view could easily reply that, being the flow of time merely mind-dependent, there is simply no objective matter of fact about whether flows take place in one direction rather than the other – or, at the very least, that the sole appearance of the temporal orientation of flows is no sufficient reason to guarantee its mind-independence. The onus of proving the contrary, on the other hand, would lie entirely on Maudlin's side.

In the second place, the very strategy of turning the above mentioned modus tollens into a modus ponens would lead Maudlin back into the logical trap of the no-direction argument. In fact, changing the sign of the modus tollens would evidently demand retaining its major premise, i.e. the conjunction of hypotheses (3)-(5); and, on the other hand, in speaking of ‘the asymmetry inherent in the passage of time’, Maudlin is evidently subscribing to premise (2). So, in turning the modus tollens upside down, Maudlin is merely reaffirming (1) while still endorsing all of the auxiliary assumptions of the no-direction argument, with the inevitable consequence of falling into a vicious circularity.

The second of Maudlin’s objections is no less unfortunate: The remark about choosing a convention for the ‘positive direction of time’ is a red herring:

It is, of course, merely a convention that our clocks typically count up (i.e. indicate larger numbers as time passes) rather than count down. Nothing in the nature of the passage of time provides an ‘objective basis’ for that choice. A society that happens to build clocks that count down rather than up is not making any sort of mistake: attaching numbers to moments of time clearly requires purely arbitrary conventions. One who believes in the objective passage of time does not think there is an objective fact about which sort of clock is counting ‘right’ and which ‘wrong’, merely that there is an objective fact about which is counting up and which down. Up-counting clocks show higher numbers in the future direction, down-counting clocks lower numbers. To deny that there is an objective distinction between such clocks is to deny that there is any objective distinction between the future direction and the past, and that is precisely to beg the question (Maudlin 2007: 114-115).

Of course choosing up-counting clocks, rather than down-counting clocks, is a matter of pure convention. The problem, however, is that such a convention, by itself, falls short of determining what clocks are up-counting and what are not: for, unless the increasing or positive direction of time is established, there is simply no way to determine whether a clock is moving forward rather than backward in time, and hence no way to determine whether that clock is assigning higher numbers to increasing times, rather than the converse.

Maudlin is only entitled to claim that there is an ‘objective distinction’ between up-counting clocks and down-counting clocks because he takes it for granted that it is ‘an objective matter of fact’ about

what clocks are counting up and what clocks are counting down. But, in doing so, he is assuming the objectivity of the direction of flows or motions, just as he did in his former objection. In consequence, all of the shortcomings we encountered in the previous case equally apply to the present one.

In sum, Maudlin's attempts to reject Price's argument fail because he never puts its premises into serious question. However, the weakness of the no-direction argument lies precisely in the ultimate consequences of its basic assumptions, as we are now going to see.

Escaping the No-Direction Argument

Looking to the premises of Price's argument at a finer level, we observe that hypothesis (2) is a special case of a more general statement, namely

- (2a) Everything which flows objectively, objectively flows in a certain direction.

What consequences does this statement bear for Price's argumentation? Replacing hypothesis (2) with (2a) would leave the logical structure of Price's argument substantially unaltered; but at the same time, it would also lead to extremely implausible consequences. For, as we saw, it is a corollary of Price's argument that no flow is objectively oriented in time; and, given (2a), this would straightforwardly entail the untenable claim that no flow is, in the end, objective.

Flows, as well as any other form of motion, consist in something being located at contiguous places at contiguous times. The direction of flows, instead, is determined by the location of the flowing objects at subsequent or increasing times. In order to deny the objectivity of the direction of flows, one is therefore only required to deny that times are objectively ordered according to the relation of subsequence, which is as much as denying the objectivity of the positive or increasing direction of the time axis. Denying the objectivity of flows, instead, demands rejecting this simple and basic fact: that time is objectively composed of different instants or moments, that space is objectively composed of different places, and that the spatial location of physical objects may vary from time to time in a continuous fashion, independently of human cognition. Except for the radical ideal-

ist, no one would presumably dare to endorse this extreme position – even if, like Price, she denied the objectivity of the direction of flows.

Of course, assuming (2) does not *ipso facto* commits one to assuming (2a). So, why should a supporter of Price’s argument endorse the latter? We saw that a supporter of Price’s view would be willing to admit that objective flows may nonetheless have no objective direction, so why could not she retain premise (2), while rejecting (2a)? The point is that, in doing so, she would fall victim of a double standard. For, once (2a) were relaxed, what would compel us to accept (2)? If we conceded that some objective flows existed which had no objective direction, what would prevent us from conceding that the same could be true of time?¹

If (2a) were false, assuming the truth of (2) would introduce a substantial disparity between the flow of time and those flows which, albeit objective, had no objective direction. However, it is a basic prerequisite for the efficacy of Price’s argument that the directional properties of the flow of time were in all similar to those of all other flows: for otherwise, one would be simply allowed to invoke the exceptional nature of the flow of time to reject one or more of the given premises. For example, one may simply maintain that, contrary to all other flows, the direction of the flow of time could be established without making prior reference to the positive direction of the time axis, in which case no vicious circularity would obtain. Price himself implicitly admits this, while claiming that ‘[i]f time flowed, then – *as with any flow* – it would only make sense to assign that flow a direction with respect to a choice as to what is to count as a positive direction of time’.

So it seems that those who subscribe to Price’s argument are faced with an insoluble dilemma: either accepting (2a), this way admitting that flows are no objective matter of fact, or rejecting it, this way

¹ Let me emphasize that this is not intended to mean that a supporter of Price’s position should necessarily be committed with (2): in a recent work on the flow of time, Price 2011 explicitly relaxes that assumption, separating the issue of the objectivity of the flow of time from the one of its direction, and arguing independently against each of them. This certainly shows that there exist further reasons to doubt that the flow of time is objective, which are independent of premise (2); however, the fact remains that assuming (2), at least as a working hypothesis, is vital for the sake of the argument which is presently under discussion.

conceding that the flow of time has some exceptional features and so undermining the logical strength of their own argument.

Conclusion

To conclude, let me now briefly summarize the results of my discussion. In the first place I have shown that, given the mind-dependence of the flow of time, the set of assumptions underlying Price's argument leads to the corollary claim that the direction of flows is in no case objective. Then, I have argued that Maudlin's objections fail because they only focus on this corollary, leaving the logical premises of Price's argument untouched. Finally I have pointed out that, given such premises, one is either doomed to deny the objectivity of flows themselves, or to regard the flow of time as *sui generis*, this way renouncing one of the fundamental presupposition of the argument under discussion. In no way, of course, these results may possibly aim to settle the question about the objectivity of the flow of time. However, they certainly leave those who argue against it with one weapon less.*

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