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The philosopher versus the physicist: Susan Stebbing on Eddington and the passage of time

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ABSTRACT



In this paper, I provide the first in-depth discussion of Susan Stebbing's views concerning our experience of the passage of time – a key issue for many metaphysicians writing in the first half of the twentieth century. I focus on Stebbing's claims about the passage of time in *Philosophy and the Physicists* and her disagreement with Arthur Eddington over how best to account for that experience. I show that Stebbing's concern is that any attempt to provide a scientific account of the passage of time will face problems, since the events described by physics are necessarily measured against the passage of time. I then identify views elsewhere in her philosophical corpus that can help shed light on this claim. Ultimately, I argue, Stebbing's views on time should be construed as part of her wider commitment to 'realism'. To be a realist, for Stebbing, is to accept a set of propositions which are a pre-requisite for even beginning to analyse the world around us. For Stebbing, I argue, part of what it means to be a realist is to accept our experience of the passage of time as something fundamental that cannot itself be subject to analysis.

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1. Introduction

Like other early analytic philosophers, such as Russell and Moore, Susan Stebbing's writing addresses issues in philosophy of language, logic, and philosophy of science. Like Moore (and later Austin) Stebbing also examines the relationship between philosophical analysis, common sense, and ordinary language discourse.¹ Stebbing is also engaged in the debate between realists and idealists and many of her academic papers are attempts to explore how various developments in science and philosophy might help combat

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¹Frederique Janssen Lauret argues that the stereotype of Stebbing as "very much a disciple of Moore" ("Susan Stebbing's Metaphysics", citing Ayer, *Part of my Life*, 77) or as a "committed Moorean" (Beaney and Chapman, "Susan Stebbing", §§3–4) is inaccurate. Janssen Lauret argues that, unlike Moore, Stebbing accepts that metaphysical analyses can sound (to an ordinary language user) paradoxical and nonetheless be correct. See also Coliva, "Stebbing, Moore (and Wittgenstein)", 1–2.

idealism.² In what follows, I demonstrate that like several idealists, such as J. M. E. McTaggart and May Sinclair,³ Stebbing also paid considerable attention to the question of how to account for our experience of the passage of time. I will argue, however, that the account she develops is decidedly realist.

Stebbing engaged in two discussions about our experience of time, both published in the mid-1930s. The first is a paper entitled “Some Ambiguities in Discussions Concerning Time” published in 1936. The second is in *Philosophy and the Physicists*, a text aimed at a popular audience, published in 1937.⁴ In what follows, I focus primarily on the discussion in *Philosophy and the Physicists* (henceforth: PP), which appears in a chapter entitled “Entropy and Becoming”, where Stebbing critiques the popular physicist Arthur Eddington’s views concerning our experience of the passage of time. There, she responds to the account Eddington presents in *The Nature of the Physical World* (1929) (henceforth: NPW) where he appeals to the second law of thermodynamics and the increase of entropy to give a scientific account of our temporal experience – a position which Stebbing describes as “absurd” (PP, 195). I return to “Some Ambiguities in Discussions Concerning Time” later in my discussion.

After its release, critical reviews of *Philosophy and the Physicists* cited the fact that, as Siobhan Chapman puts it, it “was almost entirely negative in tone” (*Susan Stebbing*, 116). Even positive reviewers, such as the Cambridge metaphysician C. D. Broad (well-known to philosophers of time as the originator of the ‘growing block’ theory), claimed that Stebbing’s main achievement was “clearing up the messes made by amateur philosophers” – namely, Eddington and James Jeans (another popular physicist) – and Broad has little to say about Stebbing’s own views (Broad, “Review”, 226). This might suggest that there is little to be gained, in terms of understanding Stebbing’s own views, by examining this text. However, I will argue that Stebbing’s views concerning our experience of time are in fact connected to her wider commitment to ‘realism’. This means we can learn more about what Stebbing thinks it means to be realist by analysing her views in *Philosophy and the Physicists*.

There is currently no secondary literature that focuses on either Stebbing’s engagement with debates about time.⁵ In fact, as Janssen Lauret notes, “there

²See, e.g., Stebbing, “Abstraction and Science”; “Materialism”; “Realism and Modern Physics”.

³For a discussion of Sinclair’s views on time, see Thomas, “The Idealism and Pantheism of May Sinclair”.

⁴*Philosophy and the Physicists* was originally published with Methuen and later with the Penguin imprint “Pelican”. Douglas and Nassim (“Logical Interventionism”) argue that Stebbing’s public writings are works of ‘logical interventionism’. This label is appropriate insofar as both are attempts to make a fruitful intervention in public discourse, aided by the tools Stebbing acquired via her training in formal logic; for instance, the ability to identify and rebut an invalid argument. For discussion of Stebbing’s public philosophy, see also Chapman, *Susan Stebbing*, ch. 6; West, “Pause. Reflect. Think”.

⁵Siobhan Chapman’s monograph on Stebbing’s life and philosophy (which is the most in-depth discussion of Stebbing’s views available in recent literature) does not feature any discussion of Stebbing’s views on time. Even in chapter six, where Chapman gives a detailed synopsis of each chapter of *Philosophy and the Physicists*, there is (peculiarly) no reference to “Entropy and Becoming” or Stebbing’s response to Eddington’s account of the passage of time.

has been relatively little investigation into Stebbing's philosophy of physics" more generally ("Susan Stebbing's Metaphysics", 4). In what follows, I thus address that lacuna in recent scholarship.

The structure of this paper is as follows. In section one, I outline Eddington's account of our experience of the passage of time in NPW. In section two, I consider Stebbing's criticisms of Eddington, focusing on the inconsistency she thinks is at the heart of his account. Stebbing's concern with Eddington's attempt to provide a scientific account of the passage of time lies in the fact that any event described by physics must be *measured against* the passage of time. In sections three and four, I connect Stebbing's views concerning our experience of the passage of time to her realism. In section three, I examine the views she endorses in "Some Ambiguities in Discussions Concerning Time" where she critiques McTaggart's argument for the 'unreality' of time. Stebbing's responses to both Eddington and McTaggart, I argue, should be construed as part of her account of what it means to be a 'realist'. Thus, in section four, I outline Stebbing's account of 'realism' and show how her views on time can be incorporated into that account. To be a realist, for Stebbing, is to accept a set of common-sense propositions which are a pre-requisite for even beginning to theorize about the world around us. For Stebbing, I argue, an acknowledgement of the fundamentality of our experience of the passage of time is part of what it means to be a realist.

2. Eddington on time

2.1. *Two types of time*

Our experience of the passage of time – specifically, our experience of time as something that flows in one direction – was a central issue in metaphysical debates in the first half of the twentieth century.⁶ Some thinkers, most famously the British idealist J. M. E. McTaggart, argued that our experience of the passage of time is illusory. On this view, our experience of the passage of time does not correspond with any genuine state of affairs in reality. Others, including the idealist May Sinclair, took our experience of the passage of time as a piece of fundamental data in need of explaining. Any view that cannot account for our experience of the passage of time, according to Sinclair, must be rejected. Ultimately, Sinclair thinks idealism is the only account of reality that can provide such an account (see Thomas, "The Idealism and Pantheism of May Sinclair"). Perhaps most notably, Henri Bergson, an influential figure during the first half of the twentieth century, argued that the experience we have of ourselves as *enduring*

⁶This is largely down to Einstein's work on relativity, which uprooted longstanding assumptions about the similarities and differences between time and space, and the nature of time more generally.

through time is the most fundamental and direct access we have into the nature of reality. For Bergson, what he calls '*la durée*' is the only part of reality we know immediately and intuitively.

In NPW, Eddington argues that there are two types of time, one of which is familiar to us through everyday experience and another which is part of the world described by physics.⁷ Eddington calls the former 'the time of consciousness' and the latter 'physical time'. Physical time, Eddington explains "permeates every corner of physics" and "has been woven into the structure of the classical physical scheme" (NPW, 36). Physical time thus provides a backdrop to all the events described by physics and is the framework by means of which we are able to put those events into a sequential order. For that reason, physical time is comparable with space which also provides a backdrop to events (and objects) and allows us to organize them in terms of their location. As he puts it, "[p]hysical time is, like space, a kind of frame in which we locate the events of the external world" (NPW, 40).

The second kind of time is what Eddington calls 'the time of consciousness'. The time of consciousness, Eddington claims, is that which "Prof. Bergson" is an "authority" on (NPW, 36). Although Eddington's familiarity with Bergson is unclear (this is the only reference to Bergson in NPW), this reference suggests that Eddington is referring to Bergson's notion of *la durée*.⁸ *La durée* (the immediate experience we have of ourselves as enduring) plays a crucial role in Bergson's metaphysics and philosophy of mind as espoused, for example, in *Creative Evolution* (1907) and *An Introduction to Metaphysics* (1912).

The suggestion that Eddington has Bergson's notion of *la durée* in mind is supported by a passage where Eddington outlines the difference between the indirect experience we have of space relations and the *direct* experience we have of the time of consciousness. There, Eddington claims that while there is a parallel to be drawn between our experience of space and our experience of *physical* time, there is no equivalent comparison between space and the time of consciousness. He writes:

Our knowledge of space-relations is indirect, like nearly all our knowledge of the external world – a matter of inference and interpretation of the impressions

⁷In the Introduction to NPW, Eddington draws a now famous distinction between two tables: "an ordinary table" familiar to common sense and a "scientific table" (NPW, ix). It is tempting to think of Eddington's two kinds of time as inhabiting the same worlds as these two tables; the world of common sense and the world as described by science, respectively. However, Eddington suggests common sense does *not* provide us with a coherent account of time (for those who follow common sense, he claims, time is "Heaven knows what!" (NPW, ix)). It is thus unclear which 'world' the time of consciousness inhabits. For Eddington, this makes the problem of linking these two kinds of time (discussed in 1.2) all the more pressing.

⁸For discussion of the other sources of Eddington's philosophical thought, see Dingle, *Sources of Eddington's Philosophy*.

which reach us through our sense organs. We have similar indirect knowledge of the time-relations existing between the events in the world outside us.
(NPW, 51)

To which he adds:

[I]n addition we have direct experience of the time-relations that we ourselves are traversing – a knowledge of time not coming through external sense-organs, but taking a short cut into our consciousness.

For Eddington, while there is one set of time-relations between events that we experience *indirectly* via the sense organs (and which are comparable with space relations), there is also another set of time-relations between events that we ourselves are involved in and thus experience directly *without* the aid of the sense organs.

Eddington further emphasises the difference between our experience of space and our experience of *conscious* time when he writes:

When I close my eyes and retreat into my inner mind, I feel myself *enduring*, [but] I do not feel myself *extensive*. It is this feeling of time as affecting ourselves and not merely as existing in the relations of external events which is so peculiarly characteristic of it; space on the other hand is always appreciated as something external.

(NPW, 51)

For Eddington, space, like physical time, is only ever experienced as something external to us. I am able to feel *myself* enduring but do not necessarily feel myself taking up space. Thus, Eddington claims, there is something unique about the immediate access I have to the intrinsic nature of the time of consciousness, via introspection, which is part of my own experience of myself. The same cannot be said for either space or physical time which are ways of measuring the succession of *external* events.

In this way, Eddington distinguishes between two kinds of time: 'physical time', which plays a crucial role in understanding the world described by physics, and 'the time of consciousness', which we are immediately conscious of *as an aspect of ourselves* via introspection. In the next subsection, I explain why Eddington thinks this gives rise to a problem of 'linkage'; a problem that threatens to render our experience of the time of consciousness an illusion. I then explain how he thinks this problem can be solved by appealing to the second law of thermodynamics and entropy.

2.2. Solving the problem of 'linkage'

The problem of 'linkage', Eddington explains, is the problem of connecting our immediate experience of the time of consciousness with the succession of events described by physics in a way that preserves the reality of that experience. Eddington's concern is that without a 'link' between what we

are conscious of and the world described by physics, our experience of the passage of time will go the same way as our experience of colours. That is, it will be rendered an 'illusion': a mere appearance with no place in the world as really described by physics (NPW, 88, 52). Eddington is not a reductionist about our experience of the passage of time but he is clearly working on the assumption that any phenomenon that cannot be grounded in physical theory is illusory. The problem of 'linkage' thus comes out of the fact that while Eddington feels the pull of those who seek to restrict reality to the sum total of things that can be described by physics, he is nonetheless reluctant to let go of that which we have immediate experience of, namely, the time of consciousness.⁹ For these reasons, Eddington sets out to solve the problem of linkage and to identify a means by which our experience of the passage of time might be accounted for by appealing to the world as described by physics.

Eddington argues that the problem of 'linkage' is insurmountable for any physical theory that only describes 'primary laws'. Primary laws are those which pertain only to particular events or subsets of events within nature. For instance, we might accept that according to the law of gravitation, objects will be drawn towards the nearest body with the greatest gravitational pull. The concern, Eddington explains, lies in the fact that primary laws do not entail that the events described by physics are *asymmetrical*. This is because primary laws have nothing to say about the direction or order a succession of events must play out in. As he puts it, primary laws "admit of the undoing as easily of the doing" (NPW, 65). In which case, Eddington argues, it follows that "they must be indifferent as to a direction of time from past to future" (NPW, 66). Thus, if we focus on primary laws alone, he argues, there is "no more distinction between past and future than between left and right".

The problem of 'linkage' arises, Eddington claims, when we come to realize that our experience of the time of consciousness *is* directional and asymmetrical. As he puts it, "it is obvious to ordinary experience that there is a distinction between past and future of a different kind from the distinction of left and right" (NPW, 67). When we are conscious of ourselves as enduring, we are conscious of ourselves as enduring *in a particular direction*. Unless the

⁹There is an analogy to be drawn between Eddington's claim that a scientific theory which fails to account for our experience of the passage of time ought to be rejected and the *panpsychist's* claim that a scientific theory which fails to account for consciousness ought to be rejected. In both cases, a datum is identified which (the argument goes) we have immediate conscious experience of – our conscious experience of the passage of time and the existence of consciousness itself, respectively – and which must be accounted for. According to a panpsychist like Phillip Goff, for example, 'Galileo's error' was to suggest that explaining the existence of consciousness lies beyond the realm of physical science (Goff, *Galileo's Error*, 4). To extend the analogy, one might think of an 'illusionist' about consciousness (such as Frankish, "Illusionism") as making a similar point to McTaggart who is an 'illusionist' about our experience of time.

time of consciousness is to go the same way as our experience of colours, and be rendered a mere appearance or illusion, Eddington thinks, we need a physical system that can account for it. Thus, Eddington argues that to account of our experience of the time of consciousness, we must move beyond primary laws and appeal to *secondary* laws: those which pertain to “the study of organisation” (NPW, 67–68). More specifically, Eddington claims we must appeal to the second law of thermodynamics. This law, which describes *entropy* or the increase in the disorganization of the universe as a whole can, in Eddington’s words, help us “put some sense into the world” (NPW, 68). It can help us to preserve the reality of the time of consciousness since it implies that the succession of events described by physics *is* asymmetrical.

However, the problem of ‘linkage’ has not yet been solved. So far, Eddington has managed to identify a phenomenon described by physics (entropy) that might explain our experience of time as directional. But it is not yet clear how the increase of entropy (as described by physics) and the directionality of time (which Eddington thinks we are immediately conscious of) relate to one another. In other words, while we now know what needs to be ‘linked’, it’s not yet clear *how* that ‘linkage’ works.

When it comes to our experience of colours, the relation between what physics describes (micro-physical properties of objects such as surface texture) and what we are conscious of (colour sensations) is *causal*. Our sense organs interact with the former, giving rise to an experience of the latter. But, for Eddington, a causal explanation will not suffice in the case of our experience of the time of consciousness. First, because our sense organs are not involved in our experience of duration. Second, because that would render the time of consciousness, like our experience of colours, a mere illusion, appearance, or epiphenomenon – something Eddington has already ruled out.¹⁰ As such, he thinks, we need an alternative explanation of how entropy and the time of consciousness are ‘linked’.

Eddington’s answer is that, unlike colour experiences, “we must regard the feeling of ‘becoming’ as (in some respects at least) a true mental insight into the physical condition which determines it” (NPW, 89). While colour experiences involve accessing a mere appearance of what the world (as described by physics) is like via our sense organs, our experience of the time of consciousness, or ‘becoming’, involves directly ‘reading off’ what the world is really like (albeit, on an organizational level). The relation between our experience of the time of consciousness and entropy is, then, for Eddington, one of direct insight. While our experience of colours is mediated by the sense organs, in consciousness we are granted direct

¹⁰Eddington’s aim is thus to avoid rendering the passage of time a ‘secondary quality’; i.e., one which has no place in the ‘real’ world but is uniquely a quality of our experiences (Price, “The Flow of Time”, 305).

access through what Eddington calls a ‘private door’ into the underlying nature of the world:

consciousness, looking out through a private door, can learn by direct insight an underlying character of the world which physical measurements do not betray.
(NPW, 91)

Eddington’s view is, as Huw Price puts it, that “[human] minds have the ability to detect a fundamental aspect of reality, detectable in no other way” (Price, “The Flow of Time”, 300). In this way, our conscious experience of ourselves as *enduring* bypasses the sense organs and provides us with direct knowledge of the underlying character of the world. Specifically, it tells us that, contrary to what the primary laws of physics inform us, time does indeed have an ‘arrow’. It is in *this* sense that Eddington thinks consciousness provides us with a kind of “shortcut” into reality (NPW, 51).

Eddington anticipates that this claim is likely to raise the question of *how* or *why* consciousness is able to access this ‘private door’ into the underlying, structural nature of reality. His answer is that consciousness is able to both detect time’s arrow and roughly measure the passage of time thanks to “some kind of clock in the material of the brain” (NPW, 101). He explains that this “entropy-clock” measures the differences between events (such as changes from cold to hot) and is thus able to tell us “which of the two events is the later” (NPW, 102).¹¹

Thus, Eddington raises and takes himself to have solved the problem of ‘linkage’ which is generated by his distinction between physical time and the time of consciousness. In experiencing the time of consciousness, Eddington thinks, we are receiving a direct insight into the underlying structure of the physical world. In the next section, I outline Stebbing’s criticism of this account, focusing on the claim that Eddington’s account involves an inconsistency and rests upon an “incredible confusion” (PP, 193).

3. Stebbing’s critique of Eddington

Stebbing argues that Eddington’s “incredible confusion” (PP, 193) involves a failure to acknowledge that the events described by physics are *measured against* the passage of time. This leads Stebbing to conclude that the very project of trying to provide a scientific account of our experience of the passage of time is futile. Thus, it is not so much Eddington’s *solution* to the problem of ‘linkage’ that she takes issue with, but rather the *problem itself*. As she puts it, “The question [of linkage] is not *important*; it is *absurd*” (PP, 194–95). In light of his own manufactured distinction (between two kinds

¹¹More could be said of Eddington’s hypothetical ‘entropy-clocks’, but I leave aside discussion since this is not where Stebbing’s concerns lie.

of time) Eddington has been “*forced* to look for some ‘linkage’ with the familiar world” (PP, 194, my emphasis).

Stebbing identifies a ‘confusion’ concerning Eddington’s view that our experience of the passage of time must be accounted for by science. But Stebbing also argues that there is an *inconsistency* in the account that Eddington develops on the back of this ‘confusion’. This inconsistency arises, Stebbing claims, because Eddington mistakenly acts as though the second law of thermodynamics were an a priori principle. In turn, she claims, this reveals Eddington has forgotten the actual context in which this law (like any physical law) was discovered: the field of observation and experiment. She emphasises that the second law of thermodynamics is “a well-established *experimental law*” which, as even Eddington himself acknowledges, is “very deeply rooted in physics” (PP, 195, emphasis in original). Stebbing thus accuses Eddington of taking for granted that the second law of thermodynamics is something we can arrive at independently of experimental research. But that is simply not the case, she argues, for:

in order to discover the law [the second law of thermodynamics] scientists had to perform experiments. These experiments required that apparatus should be used by the experimenters, i.e. human beings; that observations should be made and recorded; that after these records had been interpreted the scientists had to formulate the law.

(PP, 195)

In other words, Stebbing maintains, Eddington mistakes a law of physics, which scientists were only able to arrive at by means of experiment and observation, for a metaphysical law which can be arrived at a priori, independently of observation and experience. For this reason, Stebbing finds an inconsistency in Eddington’s reasoning:

if increase of entropy is the criterion of the distinction of earlier from later, how was it discovered that entropy increases *as time goes on*? The experimental physicist had to remember the order in which he took the readings of the thermometers: that is, he had to know which was the earlier, which the later, before he could have detected that entropy increases in an irreversible direction.

(PP, 195, emphasis in original)

Stebbing’s point is this: according to Eddington, by tracking entropy (using entropy-clocks and ‘private doors’) we are made aware of the passage of time. But, Stebbing points out, we already need to be aware of the passage of time – that is, we already need to know time has passed – in order to discover the second law of thermodynamics; the law that describes the increase of entropy in the first place. If Eddington is right then the explanandum (our experience of the passage of time) turns out to be the very same thing as the conditions that allow us to identify the explanans (the second law of thermodynamics). On Eddington’s account, she argues, our experience of the

passage of time is both that which needs to be explained *and* that which allows us to identify an explanation for it. Entropy cannot make us aware of the passage of time, since we must already be aware of the passage of time before we come to discover the physical law that describes entropy.

It is Stebbing's claim that we must already be aware of the passage of time to discover entropy that this argument turns on and which is supposed to reveal the inconsistency at the heart of Eddington's view. This claim is therefore deserving of special attention. It is worth laying out her argument more formally:

P1. For a law to account for something, we must have either a priori or observational/ experimental knowledge that that law holds.

P2. If Eddington is right, our experience of the passage of time can be accounted for by the second law of thermodynamics.

C1. Therefore, if Eddington is right, we must have either a priori or observational/ experimental knowledge that the second law of thermodynamics holds.

P3. We do not have a priori knowledge that the second law of thermodynamics holds.

C2. Therefore, if Eddington is right, we must have observational/ experimental knowledge that the second law of thermodynamics holds.

P4. All observational/ experimental knowledge is dependent on our experience of the passage of time.

C3. Therefore, if Eddington is right the knowledge from which we derive the second law of thermodynamics is dependent on our experience of the passage of time.

C4. [from P2] If Eddington is right, our experience of the passage of time can be accounted for by a law, knowledge of which is itself dependent on our experience of the passage of time.

Stebbing argues that it is *this* conclusion that is "absurd" (PP, 195): we cannot depend on that which *needs explaining* to arrive at an explanation.¹²

Before moving on, it is worth examining the premises that get us this 'absurd' conclusion. Stebbing seems to take P1 for granted. P2 follows from Stebbing's reading of Eddington's account of the passage of time (and his solution to the problem of 'linkage' discussed in 1.2). Stebbing insinuates that Eddington himself is committed to P3 when he claims that the second law of thermodynamics is "very deeply rooted in physics" (PP, 195). Either way,

¹²One might push back against the apparent absurdity of this conclusion. Perhaps Stebbing is confusing the conditions of explanation and the fact observed here. For instance, my having eyes is a condition of the observation of other eyes, but the way my observation is caused by my eyes (retina, brain, light etc.) still requires explanation (thanks to Matyáš Moravec for this comment). My aims in this paper are interpretative rather than evaluative, so (while I think they are important) I will postpone such considerations until another time.

it certainly does not seem plausible that the second law of thermodynamics is an a priori law.

Ultimately, it is P4 that is doing a lot of work for Stebbing. She provides some initial motivation for this claim when she writes:

[t]he experimental physicist had to remember the order in which he took the readings of the thermometers: that is, he had to know which was the earlier, which the later, before he could have detected that entropy increases in an irreversible direction.

(PP, 196)

Stebbing thinks this reveals an “obvious” problem with Eddington’s account (PP, 196): to carry out the experiments that are supposed to explain our temporal experience, we must in fact pre-suppose that that experience tracks something in reality; namely, the passage of time.¹³

Stebbing presents this as an ‘obvious’ objection to Eddington’s theory (accessible to the popular audience PP was intended for). Nonetheless, I also think Stebbing’s case against Eddington is connected to her commitment to ‘realism’; the idea that certain common-sense propositions must be accepted before we can begin to analyse the world around us. In sections three and four, I will argue that, for Stebbing, part of what it means to be a realist is to accept the fundamentality of our experience of the passage of time. I begin with her case against McTaggart in “Some Ambiguities in Discussions Concerning Time” before tying her views on time to her realism as articulated in “Realism and Modern Physics”. Therefore, rather than treating Stebbing’s objection to Eddington as a standalone issue, I show that it should be read into her account of what it means to be a ‘realist’.

4. Time as a pre-requisite to analysis

In the previous section, I established that Stebbing’s disagreement with Eddington is rooted in her claim that scientific observations are necessarily *measured against* the passage of time. In what follows, I will argue that Stebbing’s response to Eddington, and her views on time more generally, can shed light on her account of what it means to be a ‘realist’. In this section, I show that elsewhere in Stebbing’s writing it is possible to identify a commitment to the view that our experience of the passage of time is what we might call a *pre-requisite to analysis*. For Stebbing, that is, our experience of time is not something that can be analysed since it is necessarily *part of* any attempt to analyse the world around us.¹⁴ This provides a reason to think that Stebbing’s critique of Eddington is connected to her wider commitment to realism.

¹³Thanks to an anonymous reviewer for articulating Stebbing’s objection in this way.

¹⁴Some readers may note a similarity with Kant’s view that time (like space) is something which necessarily *underlies* any experience of the world around us (for discussion, see Janiak, “Kant’s Views on Space and Time”).

Aside from *Philosophy and the Physicists*, Stebbing's only in-depth engagement with the philosophy of time is in "Some Ambiguities in Discussions Concerning Time". The paper is largely a critical assessment of McTaggart's argument for the unreality of time. Stebbing argues that McTaggart is only able to arrive at the conclusion that time is unreal by using certain terms – such as 'changeless', 'permanent', 'timeless', and 'always' – ambiguously.¹⁵

Stebbing begins the paper with St. Augustine's answer to the question *what is time?* Augustine notes that, *until* he is asked this question, he knows what time is but, once asked, the question is impossible to answer. Stebbing then claims that contemporary discussions about time constitute attempts to answer this question ("Some Ambiguities", 107). While Stebbing states that it would be rash to assume that this kind of question cannot possibly be answered, she does raise the possibility that it may in fact not be a "proper question to be asked".

Again, the discussion in this paper is largely critical; in that regard, it is similar to Stebbing's discussion of time in *Philosophy and the Physicists*. However, it is nonetheless possible to extract some 'positive' claims on Stebbing's behalf. First, Stebbing emphasises that when discussing time, we must be careful not to commit the 'fallacy of the substantive'. To commit this fallacy, she explains, is to take certain words and phrases to refer to substantial entities, when in fact they do not refer at all. For instance, because we talk of 'the past' and 'the future' – and even attribute properties to them – it is easy to fall into the trap of taking the past and the future to be substantial entities. But this is a mistake:

The difficulty of avoiding the fallacy of the substantive is likely to be greater if we allow ourselves to use 'in the past' instead of 'was', and 'in the future' instead of 'will be'. Such phrases lend themselves to the supposition of a quasi-substantive *the past*, or *the future*, and these quasi-substantives come to be regarded as having a shadowy kind of existence in which events are located. The mistake is analogous to regarding space as a kind of tenuous box or receptacle.

("Some Ambiguities", 117)

'The past' and 'the future' for Stebbing are *not* referring terms. Rather, to say of an event that it is 'in the future' is simply to say that *it will be*. As such, the

¹⁵For example, she thinks that there are at least two uses of 'temporal' on offer in McTaggart's writing. In a strict sense, 'temporal' means something like 'involving change'. In this sense, McTaggart argues that the apparent temporality of the A series cannot be real, since change requires that events and objects possess inconsistent properties. The death of Queen Anne, for example, both 'is present' in 1714 and 'is past' today. But McTaggart also denies that the B series is 'temporal'. In this instance, Stebbing argues, 'temporal' is being used as a mere descriptive "epiphet"; in the same way that 'material' is used when we talk of material facts or 'mental' is used when we talk of 'mental facts' ("Some Ambiguities", 114–115). This is symptomatic of a wider use of certain terms ambiguously which, once appreciated, Stebbing thinks, undermines the efficacy of McTaggart's argument.

past and the future, she argues, do *not* have a “shadowy kind of existence”, any more than space does.¹⁶

Stebbing also takes the A series to be more fundamental than the B series. That is, she maintains that if (pace McTaggart) time exists then it ought to be understood in terms of the passing of events from the future into the present and then into the past, rather than in terms of ‘earlier than’ and ‘later than’ relations (“Some Ambiguities”, 120–121). What is important, for our purposes, is that the A series, unlike the B series, is consistent with our experience of time as having a genuine *passage*.¹⁷

These views can help us to situate Stebbing amongst the debates about time going on around her (and, indeed, some contemporary metaphysical debates). However, it is also possible to identify a more implicit view which is motivating Stebbing’s response to such discussions about time. This is the claim that time is a *pre-requisite to analysis*. For Stebbing, the passage of time – understood in terms of the A series, where events pass through the future, the present, and then the past – is absolutely fundamental to any experience. For instance, she explains that if McTaggart is right then

Whenever we perceive anything in time – which is the only way in which, in our present experience, we do perceive things – we are perceiving it more or less as it really is not.

(“Some Ambiguities”, 108)

To have a perceptual experience, Stebbing claims, is to perceive something as happening *in time*. To deny that such experiences are veridical (as McTaggart does), Stebbing argues, is “paradoxical to common sense” (“Some Ambiguities”, 108).¹⁸

For Stebbing, the fundamentality of our experience of time reflects the fundamentality of what she calls ‘time-determinations’ themselves. She writes:

we are forced to recognise three fundamental time-determinations: future, present, past. These are mutually irreducible. Thus, *will be*, *is now*, and *was*

¹⁶In light of her denial that space and time have any kind of substantial existence, we might plausibly characterise Stebbing as an ‘relationalist’; i.e., as one who rejects the ‘absolutist’ view that space and time have an absolute existence independent of any events or objects that exist ‘within’ them. Absolutism largely fell out of favour in light of the rejection of Newtonian in favour Einsteinian physics (see Newton-Smith, *The Structure of Time*).

¹⁷Stebbing also endorses the view – central to contemporary ‘presentism’ – that the present has a privileged status in relation to the past and the future. She claims that the present has a “privileged position in relation to us” insofar as it does “seem to differ from the both the future and the past.” In fact, Stebbing suggests that the past and the future are “constructions” (“Some Ambiguities”, 119). She does not elaborate on this claim but does note that “*being a construction* does not entail *being unreal*”. There is a connection here to her wider interest in analysis and construction, explored in (e.g.) Stebbing, “Directional analysis” & “Constructions”.

¹⁸It is worth noting that, in this regard, Stebbing and Eddington are in agreement. Both argue that our experience of the passage of time is *not illusory*. However, while Eddington sees this as a reason to find a scientific account of that experience, Stebbing takes it to be a pre-requisite to analysis.

are each unique; they cannot be analysed in terms of each other, nor in terms of anything else.

("Some Ambiguities", 116)¹⁹

And later she explains that

it is the temporal passing of the events which *makes it possible* for us to have these relations and thus to have this knowledge.

("Some Ambiguities", 119, my emphasis)

Stebbing's view thus seems to be that an awareness of the passage of time is fundamental to our experience *because* it is a fundamental aspect of reality. The fundamentality of the relations of the past, present, and future 'makes it possible' and, indeed, 'forces' us to recognize them in experience. There is a clear parallel here with her claim, in response to Eddington, that to discover the second law of thermodynamics, "experimenter[s]" had to make observations at different points in time (PP, 195).

However, unlike Eddington (and, indeed, McTaggart), Stebbing does not think that makes the passage of time the kind of thing that ought to be subjected to analysis. That is, our experience of time is not something we need to provide an account of.²⁰ Hence, she claims, the fundamentality of the passage of time is that "which makes it difficult to give an account of the temporal series that would make it fit neatly with our rational scientific schemes" ("Some Ambiguities", 120–121). Why? Because rather than being something that needs to be analysed – as both Eddington and McTaggart take it to be – our experience of the passage of time is fundamental to analysis itself. In other words, one cannot analyse something unless one is analysing that thing as existing *in time*.

This insight plays an important role in Stebbing's critique of McTaggart. McTaggart's aim is to establish that time is unreal. Yet, his own writing is littered with temporal language; turns of phrase that (Stebbing thinks) only make sense if we pre-suppose that time *is* real. For instance, McTaggart talks of events in the B series as existing *permanently*. But what does it mean for something to exist permanently? Stebbing claims: "Permanence, as commonly used, involves *persisting* through time" ("Some Ambiguities", 111). Thus, if McTaggart thinks that events in the B series are permanent, then he must really think they persist through time.²¹ This reveals an

¹⁹Since past, present, and future are "mutually irreducible" Stebbing claims they cannot be analysed in terms of anything else. But, as an anonymous reviewer pointed out, it is unclear why she claims they cannot be analysed in terms of one another. For instance, why can't 'the Battle of Waterloo is in the past' be defined as 'the Battle of Waterloo is neither happening now nor in the future'? Stebbing's concern seems to be that doing this will lead to what she calls the "vicious infinite" ("Some Ambiguities", 116, fn.1). Her worry seems to be that defining 'past' in terms of 'not present' and 'not future' in turn requires a definition of 'present' and 'future', and so on ad infinitum.

²⁰Note that this puts Stebbing at odds with most contemporary metaphysicians of time.

²¹For a response to the kind of concern about McTaggart's argument raised by Stebbing (albeit, not Stebbing's *own* concern), see Dummett, "A Defense of McTaggart", 502–503.

inconsistency in McTaggart's argument: his language suggests that events in the B series both do and do not exist in time. In turn, Stebbing maintains, such inconsistencies reveal the absurdity of the position McTaggart is trying to establish – just as Stebbing thinks the inconsistency in Eddington's account reveals its own absurdity.

By Stebbing's lights, both McTaggart and Eddington make the same mistake; both take it that our experience of time is something that can be subjected to analysis. However, Stebbing's own position is more like that of Augustine who found himself simply *unable* "to formulate a theory about that experience" ("Some Ambiguities", 107). This is not because our experience of the passage of time is illusory, but rather because that experience is a pre-requisite to analysis itself. As she puts it in *Philosophy and the Physicists*, "[w]e can form no conception of what an experience would be like in which *has happened, is happening now, will happen* had not each their unique significance" (PP, 194). In the next section, I further elucidate this claim by situating it in the context of Stebbing's wider commitment to 'realism'.

5. Stebbing's realism

5.1. *The passage of time and realism*

In this final section, I outline Stebbing's account of what it means to be a 'realist' and explain why we ought to read Stebbing's views concerning the passage of time as part of that account. I then respond to a possible objection to the interpretation I have developed so far.

One of the over-arching aims of Stebbing's philosophy is to combat idealism. Much of her philosophy of science, particularly, involves combatting the view, which had become increasingly widespread (and which was endorsed by Eddington himself), that modern physics leads to idealism.²² Stebbing is not alone in rejecting idealism in favour a more seemingly 'commonsensical' way of understanding the world around us. Famously, for instance, Moore rejected idealism on the basis of common sense. However, Stebbing herself adopts a position which she calls 'realism'. In and of itself, this does not entail a rejection of idealism; for Stebbing, 'realism' is not the *antithesis* of idealism. While idealism *is* incompatible with other metaphysical positions like materialism or neutral monism, Stebbing does not see realism as a rival metaphysical position. Rather, for Stebbing, realism is a set of propositions one must accept as true *before* one can engage in metaphysical or physical analysis. It is thus neither a rival position to

²²See Carr, "Relativity and Idealism".

metaphysical views like idealism or materialism nor a rival to scientific views such as Einsteinian physics.²³

In a paper given at a symposium on the topic “Realism and Modern Physics” published in 1929 (several years before *Philosophy and the Physicists*), Stebbing sets out her account of what ‘realism’ involves. She lists six propositions, “with regard to each of which” she states, “I am now asserting that I know this proposition to be true”. They are:

- (1) I am now seeing a red patch.
- (2) I am now perceiving a piece of blotting paper.
- (3) That is a piece of blotting paper.
- (4) That piece of blotting paper is on the table.
- (5) That piece of blotting paper was on the table before I saw it.
- (6) Other people besides myself have seen that piece of blotting paper.

As Frederique Janssen-Lauret notes, by committing herself to the truth of these propositions, Stebbing is also asserting the truth of other ‘common sense’ beliefs such as the existence of external objects, the reliability of sense-perception, and the existence of other minds. As Janssen-Lauret puts it, for Stebbing:

There is a well-delineated collection of truths about perception, mind, other minds, and external objects which form the basis of philosophical and scientific investigation; together these truths constitute ‘realism’.

(“Susan Stebbing’s Metaphysics”, 25)

To accept these propositions is to commit oneself to a specific position which Stebbing calls ‘realism’: “I should say that anyone who believes that such propositions as these are true and can be known to be true is to be called a *realist*” (“Realism and Modern Physics”, 147). This distinction between what constitutes common sense and what constitutes realism is important for Stebbing, since she thinks that realist propositions are the kinds of propositions that *must* be accepted as true before one can engage in either science or philosophy (Janssen-Lauret, “Susan Stebbing’s Metaphysics”, 23). Common-sense truths, on the other hand, may turn out, after analysis, to be the kind of claims we ought to reject.²⁴

Stebbing is critical of those who suggest that realist propositions, such as those listed above, are the kinds of truths which have been “rendered doubtful by modern physics” (“Realism and Modern Physics”, 147). In fact, Stebbing argues, we cannot even begin to ask the kinds of questions that physics

²³In the introduction to *Philosophy and the Physicists*, Stebbing argues against Eddington’s claim that the world of physics and the world of everyday experience are rival positions, only one of which can plausibly be accepted (PP 44–51). This can be seen as part of Stebbing’s commitment to the view that one must accept realism *before* one can engage in scientific or philosophical analysis.

²⁴Janssen-Lauret argues that this is crucial difference between Stebbing and Moore’s treatment of common sense (“Susan Stebbing’s Metaphysics”, 25–26).

attempts to answer *until* we have accepted that such propositions are true, since such questions concern “*how* we come to know such facts as these and *what* is their correct analysis” (“Realism and Modern Physics”, 148). Stebbing thinks it follows from this that

the denial of realism is inconsistent with the validity of physical theories, since *all* such theories are based upon the acceptance of propositions such as the six I have enumerated.

(“Realism and Modern Physics”, 149)

She follows this claim with the remark that, “unless perceptual science is true theoretical physics cannot be true”. In short, then, Stebbing not only rejects the suggestion that modern physics entails idealism and a rejection of realism but maintains that the very project of understanding the world through physical (and metaphysical) theories assumes the truth of a set of claims which, together, constitute realism.

How does this relate to Stebbing’s account of the passage of time? Recall that in the previous section, I established that Stebbing sees our experience of time as something that cannot itself be subjected to analysis. Rather, it is a *pre-requisite* for analysis insofar as we cannot even begin to analyse a phenomenon unless we conceive of it as existing in time. With that view in mind, my suggestion is that, for Stebbing, part of what it means to be a realist is to accept that our experience of the passage of time is fundamental.

How exactly should we cash out that claim? One option would be to suggest that we add a seventh proposition to the list of propositions “that are believed by the plain man to be true”. After all, Stebbing states that propositions “such as” these constitute realism, seemingly leaving the door open to further propositions (“Realism and Modern Physics”, 149). Consider Stebbing’s claim, from *Philosophy and the Physicists*, that “[w]e can form no conception of what an experience would be like in which *has happened, is happening now, will happen* had not each their unique significance” (PP, 194). With that claim in mind, we might add to Stebbing’s list of realist truths the following proposition:

- (7) *There are events that took place before I perceived the piece of blotting paper and there are events that will take place after I perceive the piece of blotting paper.*²⁵

This captures Stebbing’s commitment to the view that we cannot begin to analyse a phenomenon unless we take it to exist *in time*. On this reading, we

²⁵Similarly, we might re-phrase Janssen-Lauret’s characterisation of Stebbing’s realism like so: “[for Stebbing] there is a well-delineated collection of truths about perception, mind, other minds, external objects, *and the passage of time* which form the basis of philosophical and scientific investigation; together these truths constitute ‘realism’.”

should read this claim about the passage of time as on a par with other 'realist truths' like the existence of external objects or other minds.

The draw-back of this reading, of course, is that, Stebbing does not make any explicit reference to time in her list of realist propositions. Although it is possible that Stebbing *would have* included a further proposition intended to capture the fundamentality of our experience of time had she revisited her account of realism. This suggestion finds support in the fact that Stebbing's interest in time seems to have grown during the 1930s (with her two discussions of time appearing in 1936 and 1937 respectively).

Even so, there is another way of incorporating Stebbing's account of the passage of time into her realism that *is* supported by the textual evidence. Note that four of the six initial realist propositions Stebbing lists are articulated in *tensed* language:

- (1) I *am now seeing* a red patch.
- (2) I *am now perceiving* a piece of blotting paper.
- ...
- (3) That piece of blotting paper *was* on the table before I saw it.
- (4) Other people besides myself *have seen* that piece of blotting paper.

In the case of her criticism of McTaggart, we saw that Stebbing takes tensed *language* to be indicative of the fact that, try as we might, we cannot help but conceive of things as existing *in time*. The failure of McTaggart's argument for the unreality of time, as Stebbing sees it, is due to the fact that temporality is built into the very process of analysis. It is not insignificant, then, that Stebbing's own realist propositions are tensed. In determining what kinds of propositions must be accepted before we can even begin to analyse the world around us, Stebbing could not help but articulate those claims in tensed language. This indicates that when we analyse a phenomenon we cannot help but take it to exist *in time*.

Throughout her corpus, Stebbing places considerable emphasis on choosing the language we use carefully. Stebbing chose to articulate the propositions any realist must accept in tensed language; language that presupposes the persistence of objects through the present to the past. The best explanation for her having done so, I suggest, is that, for Stebbing, part and parcel of what it means to be a realist is to accept the fundamentality of our experience of the passage of time.

5.2. A possible objection

At this point, it is worth anticipating a possible objection to my interpretation. I have argued that we can better understand Stebbing's criticism of Eddington by connecting it to her account of 'realism'. What's more, I have argued,

examining Stebbing's response to Eddington's (and McTaggart's) attempts to provide an analysis of temporal experience sheds new light on Stebbing's views about what it means to be a realist. Doing so reveals that to accept Stebbing's realism is, in part, to accept the existence of the passage of time as fundamental. The concern that might arise at this juncture is that we do not *need* to understand (or even be familiar with) Stebbing's realism in order to understand her criticism of Eddington. In which case, one might ask, is it really plausible to tie Stebbing's response to Eddington and her realism together in this way?²⁶ This concern is perhaps underscored by the fact that Stebbing herself writes:

This objection to Eddington's argument is so obvious that I might have supposed myself to have misunderstood him were it not for the fact that his difficulty is due to his conception of the symbolic nature of physics.

(PP, 196)

There is a sense, then, in which Stebbing thinks the problem with Eddington's account is trivial. Having 'temporarily forgotten' about the context in which physical discoveries are made – a world inhabited by people who experience events as earlier or later than one another – Eddington attempts to explain how we could *come to have* knowledge of the passage of time. But he has forgotten that knowledge of the passage of time was there all along. As Stebbing puts it, "There is no escape from the conclusion that the experimenter must be directly aware of the order of his observations" (PP, 195).

It seems to me that the objection at hand (that we do not *need* Stebbing's realism to understand her response to Eddington) rests on the assumption that if a particular view is connected to Stebbing's realism, then it must be impossible to explain why Stebbing accepts that view *without* appealing to her realism. However, that is not the case I have tried to make so far. I do not, for example, think that a commitment to realism (as articulated in "Realism and Modern Physics") is a *premise* in Stebbing's argument against Eddington's account of the passage of time. Were that the case, it would be hard for her to convince a general readership.²⁷ Rather, I think the core

²⁶Thanks to an anonymous reviewer for raising this concern.

²⁷Noting Stebbing's respective audiences, in *Philosophy and the Physicists* and "Realism and Modern Science" is also important. Stebbing's 1936 paper is a contribution to a volume of essays intended for members of the academic, philosophical community. The discussion therein assumes familiarity with various views concerning time including those of McTaggart and Augustine. Since she is writing for an audience who are, to some extent, already informed about philosophical discussions concerning time, it makes sense that Stebbing would feel at liberty to more explicitly draw on her wider philosophical commitments. Meanwhile, Stebbing wrote *Philosophy and the Physicists* for "that section of the reading public who buy in large quantities and, no doubt, devour with great earnestness the popular books written by scientists for their enlightenment" (PP, 5). Given that Stebbing's audience in PP are not philosophers, it would be unwise for her to assume any prior knowledge on their behalf. Thus, Stebbing identifies a flaw in Eddington's account of time that she thinks is "obvious" (PP, 196) and does not require any further philosophical knowledge. But this does not rule out a connection between her response to Eddington and her wider philosophical views.

insight of that earlier paper – that some common sense claims must be accepted *before* we can begin to analyse the world around us – leads Stebbing to uncover the “confusion” at the heart of Eddington’s position (PP, 193).

It is true that Stebbing develops a case against Eddington that works as a standalone objection (and is thus accessible to a wide readership) but this is also an example of the kind of inconsistency or absurdity that Stebbing thinks arises when one makes the mistake of trying to analyse aspects of our experience which are, in fact, *pre-requisites for analysis*. The manner of Stebbing’s objection to Eddington (in PP) fits the same mould as her objection to McTaggart (in “Some Ambiguities in Discussions Concerning Time”). In both cases, Stebbing points out an absurdity or inconsistency that arises as a consequence of trying to analyse our experience of the passage of time. Again, in both cases, Stebbing claims that the mistake lies in failing to treat temporal experience as fundamental. Undoubtedly, she is more explicit in linking this to her commitment to realism in her 1936 paper than she is in PP but that is because, in the latter, she is writing for a popular audience. Her aim in PP is to ensure that a general readership is not misled by popular scientific writing. With that aim in mind, simply showing that Eddington’s view is *obviously absurd* will suffice. But that does not mean her response to Eddington is not connected to her realism in an important way. The textual evidence, I have argued, indicates that it is: for even in “Realism and Modern Physics” Stebbing formulates her six realist propositions in tensed language. Given her criticism of McTaggart’s use of temporal language, there is good reason to think this is significant. Thus, I have argued, an examination of Stebbing’s criticism of Eddington’s (and McTaggart’s) views on time sheds light on her own account of what it means to be a realist.

6. Conclusion

I set out to show that Stebbing’s critique of Eddington on time is connected to her own commitment to ‘realism’. Stebbing identifies an inconsistency in Eddington’s account that arises in light of the fact that, as she sees it, any scientific description of the world must be *measured against* the passage of time. Eddington takes our experience of the passage of time to be an explanandum of which the second law of thermodynamics is the explanans. For Stebbing, this is where Eddington goes wrong. Our experience of the passage of time cannot possibly be an explanandum in science since it is a pre-requisite for any scientific experiment or observation in the first place.

I then demonstrated that Stebbing endorses a similar view in “Some Ambiguities in Discussions Concerning Time” where she critiques McTaggart’s argument for the unreality of time. Like Eddington, McTaggart works on the assumption that time is something that can be subjected to analysis. McTaggart does not treat our experience of the passage of time as a scientific

explanandum (but rather a metaphysical one), but he does try to show that, subjected to the correct analysis, it should be construed as an illusion. Again, like Eddington, Stebbing thinks, McTaggart's argument thus rests on an inconsistency – one which is revealed by his use of temporal language despite his attempt to argue for the unreality of time itself. Both attempts to subject our experience of time to analysis fail, according to Stebbing, because that experience is absolutely fundamental to the process of analysis itself. With her criticisms of Eddington and McTaggart in mind, I argued that Stebbing's views concerning our experience of time should be construed as part of her account of what it means to be a 'realist'. Realism, for Stebbing, is a position that one must adopt in order to engage in analysis of the world around us. Part of what it means to be a realist, I argued, is to treat our experience of the passage of time as fundamental. Try as you might, she thinks, you simply cannot analyse it.

Like Augustine, Stebbing thinks the question 'what is time?' is impossible to answer. Not because time is not real but because the question itself is a bad question. For Stebbing, whether you are a physicist, like Eddington, or a philosopher, like McTaggart, trying to provide a comprehensive answer will inevitably lead to absurdity or inconsistency.

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