ABSTRACT

Title of dissertation: THE EXISTENCE OF TIME AND ITS RELATIONSHIP TO TEMPORAL PASSAGE

Kyley Ewing, Doctor of Philosophy, 2020

Dissertation directed by: Professor Allen Stairs
Department of Philosophy

The starting point of my project is the deeply rooted tension between our everyday pre-theoretic experience of time and our leading metaphysical and physical theories of time. Prime examples of this tension can be found both in discussions surrounding the ontology of the past, present, and future and debates over the fundamental nature of the passage and direction of time. When it comes to the existence of the past, present, and future, our pre-theoretic experience informs us that the present is more special than the past and the future. The present is *now*, our lives play out in the present, and everything that we directly experience comes from the present. The past and the future, in contrast, appear somehow less "real" than the present and seem to us mere shadows in comparison to the vividness of the present. Our best physical theories, however, arguably provide little support for our feeling that the present has a different ontological status than the past and the future. Further, while it feels like time really passes, a physical description of temporal passage is both absent from and widely taken to be incompatible with the science of our world. Lastly, although it seems that time has a direction insofar as we, for example, remember the past but not the future, there has been much debate over whether the direction of time is in fact a genuine feature of our world. Resolving these and other issues is a central and ongoing endeavor in both physics and philosophy.

THE EXISTENCE OF TIME AND ITS RELATIONSHIP TO THE REALITY OF TEMPORAL PASSAGE

BY

KYLEY EWING

Dissertation submitted to the Faculty of the Graduate School of the
University of Maryland, College Park, in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
2020

Advisory Committee:

Professor Allen Stairs, Chair
Professor Jerrold Levinson
Professor Harjit Bhogal
Professor Paolo Santorio
Professor Andrew Elby

PREFACE

While united by the search for the correct understanding of the relationship between, on the one hand, our experience and, on the other hand, the metaphysics and science of time, my project is divided into four separate papers. In what follows, I provide a brief summary of each paper.

Temporal Passage in a Fragmented World looks at the relationship between fragmentalism and the passage of time. As it was introduced by Fine in "Tense and Reality" (2005)[1], fragmentalism is an A-theoretic view that divides the world into incompatible fragments of tensed facts. I begin by explaining how the Fineian fragmentalist can respond to claims that their theory is only able to offer an irredeemably incoherent account of time. I then argue that, even if sense can be made of the general picture of time it presents, Fineian fragmentalism is unable to supply a passable account of the mind-independent passage of time in line with our experience. The conclusion from this will be that Fineian fragmentalism is a subpar tensed A-theoretic account. Lipman (2018)[2] provides a recent modification of Fineian fragmentalism based in a tenseless fragmentalist framework. My suggestion, however, is that Lipman's attempt to supply a tenseless account of genuine fragmentalist temporal passage is ultimately unmotivated. One underexplored possible option open to the fragmentalist is to argue that time does not really pass in a fragmented universe.

[1] Fine, K. (2005). *Modality and Tense: Philosophical Papers*. Oxford: Oxford University Press.
[2]Lipman, M.A. (2018). A Passage Theory of Time. In K. Bennett & D.W. Zimmerman (Eds.). *Oxford Studies in Metaphysics: Volume 11* (95-122). Oxford: Oxford University Press.

Norton's Objective Temporal Passage considers one unique solution to the puzzle of temporal passage in the block universe. Norton (2010)[3] argues that, although a precise description of its workings is currently beyond our understanding, time really passes. After introducing Norton's account, I argue that it both implies a counterintuitive relationship between the "now" and passage and that it leads to an unlikely relationship between our experience and reality. I then propose that, even if one is willing to accept these consequences, there is reason to question whether Norton builds a convincing case for the claim that, since we are not able to find any of the identifying characteristics of an illusion in the case of temporal passage, the passage of time is not an illusion.

A Defense of the B-Theoretic, Block Universe offers a defense of the B-theoretic, block universe theory of time. I begin by motivating the connection between, on the one hand, the B-theory and the block universe and, on the other hand, the A-theory and dynamic views such as presentism. With this connection in place, I argue that the overall weight of experiential, metaphysical, and scientific considerations support the B-theoretic, block universe. My conclusion is that, although there is reason to favor the B-theoretic, block universe over A-theoretic, dynamic views, there are still important and unanswered questions surrounding the B-theoretic, block universe.

Non-Dynamic Temporal Passage presents an account of the mind-independent and non-dynamic passage of time that is consistent with the block universe theory and central features of our experience of time. In explaining the passage of time, I appeal to the temporal boundaries of the

[3] Norton, J. (2010). Time Really Passes. *Humana. Mente: Journal of Philosophical Studies*, 13, 23-34.

block universe and argue that the passage of time explains both the earlier than relation and the direction of time. Although a minimalist account of temporal passage, it provides substantial answers to the following core questions about temporal passage: What is the basis of the passage of time? What does the passage of time itself amount to? What does the passage of time explain?

DEDICATION

For Heather Ewing,

with endless love

ACKNOWLEDGEMENTS

Look back on Time, with kindly eyes –

He doubtless did his best –

How softly sinks that trembling sun

In Human Nature's West

— Emily Dickinson

I owe a deep debt of gratitude to my advisor, Allen Stairs, for the many years of encouragement and advice. Working with Allen has given me the opportunity to not only pursue my project in the philosophy of time but to learn from a patient and open-minded teacher. There has never been a time where I felt that I could not show up at Allen's office with questions or ask about clarifications on arguments that I did not fully understand. I could not have asked for a better or kinder advisor.

Jerrold Levinson was one of the first professors I met when I came to Maryland. From the beginning he has always made me feel welcome. I will fondly remember the lively discussions we had in his graduate seminars and the many potlucks he went out of his way to host for the department throughout the years. I feel very lucky to have had the chance to work with him on this project. Harjit Bhogal has spent many hours painstakingly going over my dissertation with me and commenting on drafts of my papers. The reading group Harjit helped organize on time provided much needed motivation for some of the ideas that would become a focal point of my

research. Sharing an office corridor with Harjit and Brain Kogelmann brought laughter to many of my days around the department. Although Paolo Santorio joined my committee towards the end of my time at Maryland, he greatly contributed to the project and devoted much time trying to help me work out my ideas and encouraging me to clearly think through my main arguments. Andrew Elby has provided indispensable assistance in my project. I am grateful to him for his insightful questions and comments.

There are many other professors at Maryland not on my committee that I would like to thank for their guidance and support. Rachel Singpurwalla, Dan Moller, Sam Kerstein, Patricia Greenspan, Brain Kogelmann, Lindley Darden, and John Brown have all contributed greatly to my experience at Maryland. I am indebted to them for their kindness, advice, and conversation over the years.

One of the things that I have loved most about Maryland is the community of graduate students. I have been very fortunate to share my time here with so many dedicated and compassionate people. Some of them were just at Maryland for a semester, some finished or left before I did, and others are continuing in their studies, but all have meant a great deal to me. Aida Roige was the best officemate I could ever ask for, and I will always look back fondly on the times we had in 1110A Skinner. I am thankful to Javiera Perez-Gomez, Jimmy Licon, Aiden Woodcock, Quinn Harr, Mike McCourt, Julia Janczur, Mike Dascal, Leisa Schwab, Casey Enos, Illaria Canavotto, Margarida Neves, Kelsey Gipe, Julius Schoenherr, Shen Pen, Andrew Fyfe, Kalewold Kalewold, Alex Knoxs, Aylon Manor, and Jeremiah Tillman for their friendship, wit, and inspiration.

A special thank you to Louise Gilman. Louise is the heart of the philosophy department. During my years at Maryland she has shared many laughs (and a few tears) with me, and I will dearly miss being able to stop by her office just to say ‘hi’.

Words will never adequately express how much I owe to my mom, Heather Ewing, for her love, devotion, and encouragement throughout the process of writing my dissertation. There were days when I thought I would not be able to complete this project. She has never once let me doubt my ability to continue and finish. She has been there with me through every high and every low of graduate school. I have dedicated this project to her with endless love. I am incredibly grateful to have been surrounded by so many thoughtful, strong, and caring friends and family. Arthur Birstein has always told me to follow my own path in the world and to find what I love most and pursue it. I owe him a lifetime of love and support. Lindsay Crawford, Mandie Lennard-White, Erik Ewing, Monique Pinkerton, Peggy Thomas, Nicole Offen, Bruni Ewing, James Sullivan, and Chris Sullivan have provided laughter, companionship, and indispensable friendship. Although he passed away two months before I entered the program, I have carried the memory of my dad, Robert Ewing, with me throughout every day at Maryland. He only ever wanted to see the people around him happy. Losing him was the most heartbreaking experience of my life, but I know that he would have told me to always follow my dreams.

TABLE OF CONTENTS

TEMPORAL PASSAGE IN A FRAGMENTED WORLD

1. Introduction.

Fragmentalism is a relatively recent and striking addition to the debate between tensed and tenseless theories of time. As originally introduced by Fine (2005 and 2006), fragmentalism takes its place in the corner of tensed theories. The metaphysics of Fineian fragmentalism divides a world that is on the whole incurably incoherent into internally coherent fragments of tensed facts. One of the professed strengths of tensed A-theoretic accounts, such as presentism[4], is that they are able to account for the intuitive, everyday feeling that time really passes. B-theoretic tenseless accounts, on the other hand, are usually thought to accord better with the science of our world[5] and are typically paired with the much less intuitive view that the passage of time is an illusion[6].

My aim is to consider if and in what sense fragmentalism can capture the mind-independent reality of temporal passage. After a short introduction to fragmentalism, I provide a general argument that Fineian fragmentalism is neither able to accommodate the genuine global

[4] Presentism holds that only the present exists and time passes insofar as the present changes or renews itself. It is often thought to get at the feeling we have that, on the one hand, the past and future are somehow less real than the present and, on the other hand, the passage of time is inextricably bound to the moving of events and things from the future into the present and then continuously on into the further and further depths of the past. For more on presentism, see Prior (1970) or Zimmerman (2005 & 2008).

[5] See, for example, Callendar (2017), Dainton (2010), or Silberstein et al. (2018).

[6] For exceptions to this trend see Maudlin (2007) or Mozersky (2015). Defending the block universe, which incorporates the eternalist ontology of time, Maudlin believes that the passage of time is a real and irreducible part of the block. Along similar lines, Mozersky is a B-theorist who argues that the passage of time is a mind-independent phenomenon that is to be understood in terms of the earlier than relation and its relationship to change.

nor local passage of time[7]. I then respond to a proposal for a tenseless fragmentalist version of mind-independent temporal passage presented by Lipman (2018) and argue that it is unmotivated. My conclusion will be both that Fineian fragmentalism lacks the advantages of orthodox A-theoretic tensed accounts and that there is no convincing reason to endorse a tenseless theory of genuine temporal passage over standard A-theoretic and B-theoretic accounts of the passage of time.

2. A World in Fragments.

First introduced by Fine in "Tense and Reality" (2005), fragmentalism is a rare instance of both a theoretically intriguing and novel theory of time. Fine's suggestion is that, *if* one endorses a tensed A-theoretic account, then one ought to be a fragmentalist. One way to initially approach Fineian fragmentalism is to provide a simplified and intuitive reading of the seemingly unfamiliar and unintuitive picture of time that it presents. Toward this end, we can consider figure 1.

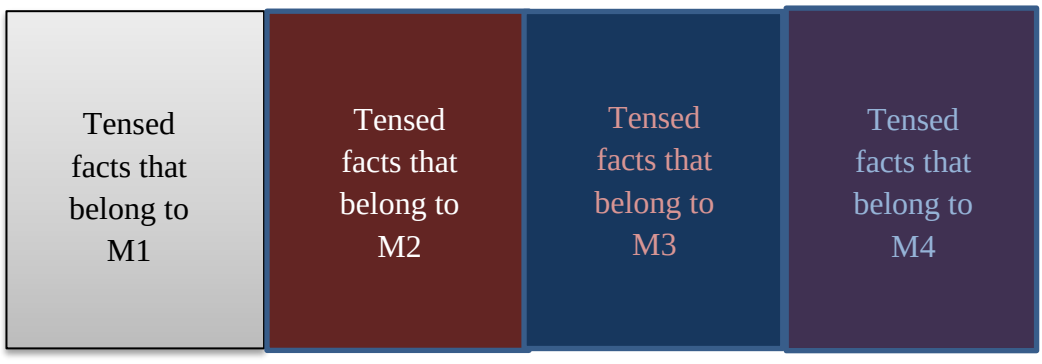

Figure 1. General Idea Behind Fineian Fragmentalism.

[7] Throughout this paper, I will be using 'mind-independent temporal passage' as synonymous with 'genuine temporal passage'. Both characterizations are meant to capture our everyday notion of the passage of time as an active, dynamic phenomenon as it is defended by the standard A-theorist.

As depicted in figure 1, a plausible way to think of the general idea behind Fineian fragmentalism is to begin by imagining, as best as one can, the world *sub species aeternitatis*. From this vantage point, the world is to be sectioned into momentary temporal slices, which are represented by M1-M4 in figure 1. Next, imagine that each of these temporal slices includes tensed facts about every entity and event in the world. This means that there will be a vast number of tensed facts, such as *it is the case that the Berlin Wall is standing* and *it is the case that the Berlin Wall will no longer be standing*, composing each individual momentary temporal slice. Finally, each of the temporal slices should be considered a reality in itself.

In order to add some precision to the rough picture of fragmentalism just presented, we can turn to the details of Fine's description of fragmentalism. The world according to the Fineian fragmentalist is one wherein:

> There are to be many alternative realities. But these are not alternative *possibilities* for reality, for no one of them is distinguished as actual. Nor are they alternative *perspectives* on reality, for there is no more fundamental reality upon which they are a perspective. And nor are they incomplete *parts* of a more comprehensive reality, since each of them, on its own, settles all of the facts…there is no underlying reality, of the usual sort, of which these different realities are a manifestation. (Fine, 2006, p. 403)

The fragments that compose the Fineian fragmentalist's world do not form the unified picture of reality with which we are familiar. To remain as consistent as possible, when speaking of Fineian fragmentalism, I will refer to 'the world' as the totality of all of the fragments and 'reality' as something that belongs to each of the individual fragments. With this in mind, and

specifying the account further still, the following are the four core tenets of Fineian fragmentalism:

(1) *Tense Realism*: The world is, at least in part, constituted by tensed facts.

(2) *Neutrality*: The tensed facts in (1) are not oriented towards one time.

(3) *Incompatibility*: The neutral tensed facts in (2) are divided into incompatible fragments.

(4) *Coherence*: The incompatible fragments in (3) are maximally coherent sets of neutral tensed facts.

(1) holds that there really are past, present, and future facts that are not reducible to the earlier than, simultaneous with, or later than relations. These tensed facts are what ground or make tensed statements true. For instance, if an observer O in Maryland happens to notice that it is currently raining and declares "it is raining in Maryland", O's utterance would be made true by a tensed fact about the world, namely *it is the case that it is now raining in Maryland*.

As captured by (2), fragmentalism endorses a form of neutrality about time wherein no time is given a special status (see Savitt 2016). The commitment to neutrality means that:

> No time is privileged. The tensed facts that constitute reality are not oriented towards one time as opposed to another. (Fine, 2005, p. 271)

Given (2), the tensed facts that partly constitute the fragmentalist's world cannot be said to be aligned with one time rather than another. This means that fragmentalism should not be viewed either as a variant of presentism wherein one fragment is deemed as a special moment that is *the*

present or a version of presentism wherein all of the tensed facts in each fragment align with *the present* of each fragment. Rather, all of the fragments are of equal specialness and the tensed facts constituting the individual fragments may be of past, present, or future alignment.

Connecting (1)-(4), it follows that the fragmentalist's world is an amalgamation of neutrally orientated tensed facts, such as *It is the case that Alex was reading* "*Life and Fate*", and atemporal facts, such as "humans call this object a chair", that are sectioned into groupings that are internally consistent but irrevocably at odds with one another.

In order to fully appreciate the philosophical import of Fineian fragmentalism it is important to note that it is meant to successfully respond to an objection to tensed A-theoretic accounts that can be traced back to McTaggart. In his 1908 article "The Unreality of Time", McTaggart famously argued that the tense realist – what he coined the endorser of the "A-series" – has a potential contradiction on their hands. The issue for the tense realist stems from an incompatibility that is brought out by the absolute determinations of past, present, and future. To say that the determinations of past, present, and future are absolute is to say that they hold throughout the universe and are therefore not relativized to any given frame of reference. According to tense realism, then, all observers will agree about which facts belong to the present, the past, and the future.

To see how the fragmentalist attempts to avoid the McTaggartian contradiction, we can begin by considering some tensed facts about Orwell's *1984*[8]:

[8] The following analysis of Orwell's *1984* is similar in kind to LePoidevin's (2003) discussion of the contradictory nature of the A-series positions.

Present Facts:

- In the recent past it is the case that Orwell was writing *1984* in the present
- In the present it is the case that Orwell wrote *1984* in the recent past
- In the near future it is the case that Orwell wrote *1984* in the not-so-recent past

There is no contradiction contained within the above list of present facts. However, if both the past and the present exist, then the tense realist must also account for:

Past Facts:

- In the recent past it is the case that Orwell is going to write *1984* in the near future
- In the present it is the case that Orwell is writing *1984* in the present
- In the near future it is the case that Orwell wrote *1984* in the recent past

As with the list of present facts, the list of past facts is internally consistent. The problem arises when we try to countenance a reality wherein both the list of present facts and the list of past facts must obtain. This is because in such a world the following would all have to be true:

(A)

- In the recent past it is the case that Orwell was writing *1984* in the present
- In the recent past it is the case that Orwell is going to write *1984* in the near future

(B)

- In the present it is the case that Orwell wrote *1984* in the recent past

- In the present it is the case that Orwell is writing *1984* in the present

(C)

- In the near future it is the case that Orwell wrote *1984* in the not-so-recent past
- In the near future it is the case that Orwell wrote *1984* in the recent past

Granting that the law of non-contradiction holds, the statement-fact-pairs contained in (A), (B), and (C) cannot both be true. For instance, assuming as the tense realist usually does that there is only one present that holds universe-wide, it cannot be a fact that in the present Orwell is both currently writing *1984* and that he wrote *1984* in the recent past. This would amount to saying that it is a fact that Orwell has presently both completed and not completed *1984*. The situation for the tense realist only gets worse if the reality of the future, along with the accompanying future facts, is introduced.

What is the tense realist to do at this point? Fine's answer is that the tense realist ought to embrace fragmentalism. Unlike an A-theoretic view such as presentism, which seeks to avoid the existence of incompatible facts by positing that only the absolute present exists, Fineian fragmentalism embraces a world wherein inconsistency reigns. As captured by (2), it is a basic postulate of fragmentalism that the world is divided into incompatible fragments. Narrowing our focus down to three fragments for the moment, we might imagine – rather implausibly – that the tensed facts that compose a possible fragmented world are limited to the nine present tense facts in figure 2.

Fragment 1	*Fragment 2*	*Fragment 3*
It is presently the case that Orwell is thinking of writing *1984*	It is presently the case that Orwell is writing *1984*	It is presently the case that Orwell has completed *1984*
It is presently the case that Morgan is sitting	It is presently the case that Morgan is standing	It is presently the case that Morgan is jumping
It is presently the case that the year is 1944	It is presently the case that the year is 1947	It is presently the case that the year is 1955

Figure 2. Three Fragments.

The facts that respectively form the distinct fragments 1, 2, and 3 are all of equal metaphysical specialness, absolute, and irreconcilable. It therefore follows from the overall account of the world presented in figure 2 that Morgan is presently sitting, standing, and jumping, for instance.

At this point, one may understandably be confused by the fragmentalist resolution of the McTaggartian contradiction. Is the fragmentalist, it might be wondered, truly resolving the worry with tense realism? How might a plethora of incompatible fragments help the fragmentalist avoid the charge that the tense realist is committed to a contradictory set of absolute tensed facts? Is not, in other words, offering an incoherent metaphysical account of the world a poor way to respond to the objection that your theory is incoherent? The Fineian fragmentalist, however, has a solution to restore intelligibility to their ontologically disjointed world.

According to the Fineian fragmentalist, if we consider the relationship between the ontology and semantics of time, we will see that consistency in fact reigns in the world of fragmentalism. We can illustrate the fragmentalist's reasoning with the help of Figure 2. As a reminder, the fragmented world in Figure 2 considered *sub species aeternitatis* tells us that the tensed facts in fragments 1, 2, and 3 all exist equally and are contradictory. Hence, according to the overall account of the world offered in figure 2, it is true – in an absolute sense – that the present year is 1944, 1947, and 1955. This is the point at which the fragmentalist will appeal to semantics by noting that language use is situated within the individual fragments. An utterance will only be true if it occurs within a fragment that includes the relevant facts and it will only be false if it occurs within a fragment that does not include the relevant facts. From fragment 2, for example, the utterance 'it is presently the case that the year is 1947' is true, while the utterance 'it is presently the case that the year is 1955' is false. Given the situated use of language to within each fragment, and seeing as no fragment contains contradictory facts, there will never be a true utterance of a contradiction in the fragmented world depicted in figure 2. From this, the Fineian fragmentalist can conclude that the ontological framework presented in figure 2 neither leads to nor supports the truth of contradictory utterances.

Since any fragmented world will follow the general model presented by figure 2, the Fineian fragmentalist can respond to allegations that they endorse an incoherent theory by stressing that any given utterance is focused on a single, maximally coherent fragment and not the world *en masse*. As long as this line of reasoning is convincing, there is a consistent way to speak about and understand the fragmentalist's general picture of the existence of time.

Perhaps the most obvious downfall with thinking that appealing to the relationship between the ontology and the semantics of time truly solves worries brought out by the

McTaggartian contradiction is that the fragmentalist is left with an incoherent overall ontological basis to their semantics. To put the objection another way, even if there is a way to make sense of and give meaning to it, the fundamental account of the ontology of time belonging to the world that is offered by the Fineian fragmentalist remains contradictory.

In reply, the Fineian fragmentalist can acknowledge that there will always be a perspective from which their theory harbors contradictions. Nonetheless, they can maintain that for all practical purposes, and as understood from the worldview of embedded observers, Fineian fragmentalism comes out as a consistent theory of time. The important thing to stress is that it is the fragments that are explanatorily basic rather than the set of facts that obtain in the world as a totality (see Hofweber and Lange 2017). Further, a reminder could be given that, while all of the absolute facts in a fragmented world obtain, no contradictory tensed facts co-obtain since the fragments themselves are to be considered distinct realities. Along these lines, it may be more fruitful to think of Fineian fragmentalism as akin to a multiverse or many-worlds view wherein each fragment has its own consistent and comprehensible timeline. Just as a multiverse, for instance, contains many functionally independent and non-interacting universes that may lead to inconsistent results when combined, Fineian fragmentalism houses a plethora of fragments that each tell an internally lucid story and yet when viewed in total lead to some highly questionable outcomes. Another way to get at the same idea might be to think of fragmentalism in terms of Lewisian possible worlds. Each individual fragment would be a possible fragment that is just as real as the fragment that we happen to inhabit. When we say, from within our fragment, that only what is happening "now" is actual, what we would be doing is picking out our momentary fragment from the other possible – and equally real – momentary fragments. There are, then, at

least a few things that may be said in response to the objection that the ontological basis of Fineian fragmentalism dooms the theory to the dustbin of unsatisfactory theories.

My aim thus far has been to show how one might argue that sense can be made of Fineian fragmentalism by appealing to both its ontological and semantic basis. Even if we are not licensed to reject it outright as an unintelligible theory, there are still many aspects of Fineian fragmentalism that are likely to elicit some perplexed head scratching. We might, for example, wonder about the details of the coherence relation that relates tensed facts and thereby defines the connection between the fragments.

In his original discussion of fragmentalism, Fine (2005) suggests that we may want to take the coherence relation to be fundamental. The reason for this is that, while the coherence between tensed facts explains why it is that some tensed facts are conjoined into coherent fragments and others are not, there does not seem to be anything that serves to explain the coherence relation itself. Some might find the inexplicable character of the coherence relation to be too mysterious to endorse. Yet, allowing that all metaphysical theories will include some amount of basic facts, the fundamentality of the coherence relation should not in itself be objectionable. If one is willing to accept fundamental facts but is specifically adverse to the coherence relation being such a fact, then there may be some prospect in reducing the coherence between tensed facts down to the moment of time to which they belong. This would in essence amount to explaining the conjunction of tensed facts that separates reality into fragments in terms of their coherence with one another and then explaining the coherence of tensed facts in terms of their identification with a given moment of time.

In light of what has been said, it might be thought that the prospects for Fineian fragmentalism are much better than one would think at first glance. My goal in the next section

is to argue that, even if one thinks that the fragmentalist can provide a plausible account of time itself, the possibilities for a fragmentalist version of mind-independent temporal passage are uninspiring.

3. Fragmented Temporal Passage.

I start this section by suggesting that the Fineian fragmentalism is unable to accommodate the genuine passage of time. If this line of argument is correct, there would be reason to think that fragmentalism, at least as it was first devised by Fine, it is not a successful A-theoretic, tensed theory. Having set aside Fineian fragmentalist temporal passage, I turn to Lipman's tenseless fragmentalist proposal for genuine temporal passage and argue that there is no reason to favor it over other well-known accounts of the passage of time.

3.1. Fineian Fragmentalist Temporal Passage.

There are two different general frameworks for the genuine passage of time in a fragmented world:

> *Global Passage*: This is the type of temporal passage that governs the world in its totality.
>
> *Local Passage*: This is the type of temporal passage that belongs to each fragment.

Global passage is a singular universe-wide phenomenon that describes the passage of time as a process which encompasses and influences everything that exists in time. Local passage is a

singular phenomenon from within any given temporal perspective and multitudinous when viewed from the world as a totality. If it is the case that local passage is just global passage from a particular perspective, then local passage would be the same thing as global passage.

When it comes to the relationship between, on the one hand, genuine local and global passage and, on the other hand, our experience of time, it seems to me that:

- Our experience provides indirect corroboration for genuine global passage.
- Our experience provides direct corroboration for genuine local passage.

Genuine global passage is indirectly supported by our experience insofar as we infer from our experience that the passage of time is a phenomenon that extends beyond us to the world at large. One reason to think that genuine local passage finds direct backing in our experience is that, no matter how hard we might try, it seems impossible to shake the feeling that the moments of our own lives are continuously slipping past us. The seemingly inevitable passing of the moments of our lives does not appear to be a phenomenon that we are imposing on a world wherein time really does not pass. Providing further support for genuine local passage, our experience tells us that as long as we live not only our own lives but those of others and the proximate world itself are also inescapably caught up in the workings of the passage of time. As a result, both our internal experience and our perception of our immediate surroundings give direct vindication to the claim that the local passage of time is mind-independent.

With an eye to the genuine global passage of time in a fragmented world, Fine argues that (2005):

> …on the current view, there is no obvious impediment to accounting for the passage of time in terms of a successive now. We have assembled all of the relevant NOWs, so to speak, even if there remains some question as to why the relationship between them should be taken to constitute a genuine form of succession. (p. 288)

Although Fine is not providing a comprehensive explanation of the relationship between fragmentalism and the genuine passage of time, he sees no reason why such an account could not be worked out. His focus is on global passage because he conceives of the fragmentalist's task to be a matter of elucidating the connection between the individual fragments. Contra Fine, I will suggest that this is an insurmountable task.

In order to see why it is that Fineian fragmentalism is ultimately unable to provide an acceptable account of genuine global passage, more needs to be said about the main features of our experience that recommend a global account. A global account is recommended to us insofar as we deduce the following features of temporal passage from our direct experience of time:

(a) The passage of time is a phenomenon that continuously ushers moments from the future to the past. In this way, it provides a way to distinguish the present from the past and the future.
(b) The passage of time is a phenomenon that cannot be put to a halt and its workings are irrevocable and influence all that exists in time.
(c) The passage of time acts as a signpost to count the years, days, and minutes of existence.

(a) captures both the feeling that the passage of time is the umpire of the past, the present, and the future and the feeling that without the passage of time it would make little sense to say that there is a difference between that which is present, that which is past, and that which is future. (b) supports the feeling that the passage of time is a phenomenon that cannot be stopped[9] and that the influence it has cannot be changed or reversed. That the passage of time cannot be stopped according to our common experience of it seems pretty clear. While it may feel like some moments drag on forever and others speed by much too quickly, no one – I think – would seriously propose that a defining feature of the workings of temporal passage is that it can be stopped and started on command, at will, or even randomly. It also seems central to our experiential understanding of the passage of time that it cannot be flipped or altered. We neither believe that we are able to wake up one morning to the experience of moments that have passed awaiting our future experience nor think that temporal passage can be shuffled or mixed up insofar as a random moment that has passed, for example, can suddenly make an appearance in the present in any form other than recollection. (c) affixes to the feeling that temporal passage is the time-keeping device of the world, and it underlies our conventional use of the passage of time in accounting for the time that is given to us.

In connecting (a)-(c) to the genuine global passage of time, we can begin by noting that a common theme underlying (a)-(c) is the assumption that the passage of time is a unified phenomenon that applies to the world at large. Both the ushering of moments and the distinction between the past, the present, and the future in (a) presuppose an absolute past, present and future that hold throughout the world. That there is an absolute past, present, and future is supported indirectly by our experience given that we use our direct experience of a single – albeit

[9] Here we might want to add the caveat that this holds for matter travelling at subluminal speeds.

changing – present that marks an absolute divide between the past and the future as a basis for a universal, absolute division between the past, present, and future. The impact of the passage of time and the inability to stop the progress of temporal passage in (b) apply to everything that exists in the world. That the passage of time does have such an encompassing reach is to be concluded indirectly from our experience since our direct experience informs us that all we come into contact with is subject to the ceaseless workings of the passage of time, and from this we infer that everything outside our direct experience must also be subject to the same workings. The time-keeping of existence in (c) refers to a universal system that connects and provides a way to measure all of the moments of existence. Evidence that such a system exists follows indirectly from our experience given an extrapolation from our direct experience of the passage of time in accounting for the moments of the world around us to the totality of the moments of the world.

The main tools fragmentalism offers to make sense of the concept of genuine global temporal passage are the core tenets (1)-(4). (1) – tense realism – fits nicely with both (a)-(c) and global passage since it provides the distinction in tense that is required to mark a difference between the past, the present, and the future. (2) – neutrality – could be said to be compatible with global passage as long as one fragment can be picked out as the present. This fragment, then, would be the special fragment that moves, progresses, or somehow renews itself. (4) – coherence – does not by itself stand in conflict with global passage. It would, for instance, seemingly be in line with an account of genuine global passage wherein the world was divided into maximally coherent parts that connected with one another. In such a world, we would be able to explain the global passage of time as the type of temporal passage that applies to and relates the parts of the world as a whole. Perhaps such a view would even be comparable to the

moving spotlight theory. The maximally coherent aspects of reality might be thought of as those parts that may be illuminated by the spotlight and the coherence between the parts as a matter of the association that exists between moments given that some moments are in the past of and some moments are in the future of the spotlight. There are undoubtedly many more things to be said about such a view. The important point is that it is (3) – incompatibility – that seems to be the main place where issues arises for genuine global passage in a Fineian fragmented world.

The irreconcilability of the coherent fragments entailed by (3) – incompatibility – means that any account of genuine global passage in line with Fineian fragmentalism must encompass fundamentally unrelated moments. The reason for this is that, since the fragments are to be thought of as their own realities that are contradictory with one another, a global account of temporal passage would have to subsume incompatible realities under its rule. Appealing again to the idea of a multiverse or many-worlds view, global temporal passage in a fragmented world would be akin to global passage in a multiverse wherein all of the different, independent, and incompatible universes or worlds would have to be thought of as being governed by a single, unified phenomenon of temporal passage. This would seem to be a very odd picture of global temporal passage. To put the point yet another way, in a fragmented world there is no unified 'global' basis of reality to which a global account of temporal passage can apply. All that fragmentalism offers are disconnected, independent fragments that are each to be thought of as their own reality. The passage of time between these incompatible and disconnected fragments can only be captured by an account of temporal passage that is itself in some way disunited and disconnected. Such an account of temporal passage is an unfitting candidate for a global theory of mind-independent passage that governs the world as a totality and is consistent with our experience. If (3) holds, it therefore does not make sense to speak of *the* passage of time, and

this seems to eliminate any acceptable prospects for a Fineian account of genuine global temporal passage.

One way to further illustrate the worry for a fragmented account of genuine global passage is to compare it to genuine global passage according to other A-theoretic views, such as presentism or the moving spotlight theory. Global temporal passage in a presentist world would serve to usher moments – along with their accompanying events and entities – from the non-existent future into the existent present and then on into the non-existent past. As a result, unlike fragmented global passage, global passage in a presentist world would govern moments of time that are notably connected. Although the past and the future have a different ontological status than the present according to presentism, all three aspects of time belong to the same timeline. This means that there is no impediment to understanding the global passage of time as a unified phenomenon connecting the past, present, and future of the presentist timeline. The applicability of a unified account of genuine global passage to the moving spotlight theory is perhaps even more straightforward. The moving spotlight theory endorses both the eternalist continuum wherein the past, present, and future all exist – albeit unequally – on a single timeline and the A-theoretic absolute distinction between the past, present, and future. It is, then, easy to see how a unified account of global temporal passage would, in contrast to a fragmented world, work according to the moving spotlight theory. This is because global temporal passage in a moving spotlight world would simply govern the entire timeline insofar as the absolute present moves along the eternalist continuum.

It may be responded that a world composed of incompatible, disconnected fragments is not inevitably incompatible with genuine global temporal passage. What, it could be asked, about the fact that, unlike a multiverse or many-worlds view, all of the fragments belong to *one*

world? The motivation behind this question comes from the seemingly natural supposition that there is a single spatio-temporal structure underlying and acting as a container for all that exists in the spacetime of fragmentalism. It is in line with the substantivalist claim that spacetime exists independently of material bodies and their spatiotemporal relations (see Dasgupta 2015 or Pooley 2012). Applied to Fineian fragmentalism, the specific suggestion might be that the global passage of time applies to spacetime itself regardless of the nature of the fragments contained within spacetime. There are two reasons why this response seems to be a category mistake. First, there is no substratal reality behind the fragmentalist's fragments. At least as they are conceived by Fine, the fragments are themselves fundamental insofar as there is no more fundamental reality of which they form a part. Second, before asserting that it is even feasible to hold that time passes independently of that which exists in spacetime we would need to settle the matter of the passage of time in a temporal vacuum. The general consensus has historically been that in a temporal vacuum time does not in fact pass (see LePoidevin 2003).

Given that (3) precludes genuine global temporal passage, and seeing as (a)-(c) are the features of our experience of time that recommend a global account, (3) should also rule out (a)-(c). In proposing that the passage of time is a phenomenon that transfers moments between the absolute future, present, and past, (a) requires that there is a single, universal, distinguishable, and unified past, present, and future through which moments pass. If there is no global passage, there is no way for this requirement to be satisfied. It seems important to note that global passage is not needed for there simply to be an absolute distinction between the past, present, and future. A frozen version of presentism or even a non-moving spotlight theory would, irrespective of the plausibility of the theories themselves, include such a distinction. Yet, if there is to be any ushering or movement of moments along with their corresponding entities and

events from the absolute future through the absolute past, there must be a mechanism that is able to explain and sustain the ushering or movement. This mechanism is the global passage of time. Without global passage, the demands of (b) would also not be met. (b) stands in need of a phenomenon that, via its perpetually active and irreversible influence, governs the temporal movement of all that exists in time. Global passage is the right candidate for this phenomenon. Lastly, (c) is only satisfied if there exists something that acts as the mechanism behind the continuous progression of moments by regulating and offering a basis for our conventional ways of keeping track of time. As with (a) and (b), global passage is the appropriate phenomenon for this role.

I have argued that (3) is the main reason why genuine global passage is untenable in a Fineian fragmented world and hence also why the Fineian fragmentalist is not able to substantiate the specific features of our experience of time (a)-(c) that recommend a global account. The next question that needs to be addressed is: What options might the Fineian fragmentalist have for a *local* account of genuine temporal passage? In response, we can begin by setting aside the option that the Fineian fragmentalist's local passage is just global passage as experienced from within a given fragment. If we are looking to produce a tenable account of local passage, it would be of little benefit to equate it with a view of temporal passage that turns out to be unsustainable in the end. The Fineian fragmentalist's local account of temporal passage must for this reason stay staunchly local. The ramifications of this are that any and all temporal passage will be limited to and divided by the individual fragments.

It might be proposed that the requirement that the passage of time be limited to a local phenomenon is not a mark against Fineian fragmentalism. It is, it could be suggested, more important to explain that which figures directly in our experience than that which figures

indirectly. Not only do we have more evidence for that which factors prominently in our experience, we are more likely to be mistaken about that which we infer from direct experience than about our direct experience itself. The claim, then, would be that providing a compelling account of genuine local passage should be, contrary to Fine's remarks, the fragmentalist's main goal. The idea being that, although it might be best if Fineian fragmentalism were able to offer an underpinning for both global and local genuine passage, if both cannot be done, it is better to provide the metaphysical grounds for local rather than global genuine passage. While this does seem like a potentially promising line of argument, it is only as successful as Fineian fragmentalism's account of genuine local temporal passage.

One reason to think that Fineian fragmentalism does not deliver a very successful account of local temporal passage is connected to the momentary temporal extension of the fragments. If the composition of each individual fragment is solely made up of momentary and simultaneous tensed facts, then from each fragment the only real tensed facts would presumably be those that belong to a single moment. A single moment of time is presumably not in itself qualified to meet the requirements for a dynamic and active account of temporal passage. When it comes to the passage of time the issue for the Fineian fragmentalist can thus be brought out by focusing on the unchanging character of the momentary, neutrally aligned tensed facts making up each fragment.

To expand on the above reasoning, if all of the neutrally aligned tensed facts composing each fragment are unchanging, momentary groupings of simultaneous facts, then, insofar as change is necessarily connected to the passage of time, it seems that the prospects for a Fineian fragmentalist account of genuine local passage are not overly bright. This is because an unchanging array of facts does not lend itself to the renewal, progress, or, say, movement that is

so central to A-theoretic temporal passage. Although the neutrality of the fragments rules out explaining Fineian fragmentalism as a frozen version of presentism wherein each fragment is – at least in part – composed of a set of momentary and unchanging present tensed facts, it might help to think about the fragments in this light in order to get a clearer understanding of the problem. It is arguably uncontroversial that unchanging incompatible present's are not a good candidate for a dynamic, moving, progressing picture of local passage. Momentary, simultaneous present tense facts themselves offer only a static "snapshot" of facts about the world at a given moment. There is no metaphysical ground from which to find anything resembling dynamic, A-theoretic passage in such facts. Along similar lines, the neutral, simultaneous, and momentary tensed facts constituting the individual fragments do not provide sound metaphysical grounds for a dynamic account of temporal passage. Bringing everything together, the reason that Fineian fragmentalism is not able to proffer a convincing basis for genuine local temporal passage in line with our experience is that the unchanging list of present tense facts that describe the world in its totality at a moment and the non-tensed facts, such as "2+2=4", that combine to constitute each individual fragment exhibit none of the defining characteristics of A-theoretic, dynamic temporal passage.

At this juncture, it may be pointed out that not all theorists of time will agree that there is a necessary connection between change and the passage of time. B-theorists and block universe tenseless theorists will argue that change can be separated from the passage of time since there can be mind-independent change without the mind-independent passage of time[10]. The argument for mind-independent change without the mind-independent passage of time begins by defining change as the same entity having one set of properties at one time and a different set of

[10] See, for instance, Mellor (1981 and 1998) or Williams (1951).

properties at an earlier or a later time. For instance, at time T1 a light is red and at a later time T2 the same light is green. It then looks for an objective correlate of the earlier than relation that allows us to distinguish processes such as weight gain from weight loss (see Maudlin 2007). This asymmetry might be found in the direction of increasing entropy, for example.

There are two things to say in response to the claim that mind-independent change and mind-independent temporal passage can come apart. On the one hand, the Fineian fragmentalist should think, in opposition to the standard tenseless B-theorist, that there is a very close relationship between the passage of time and change insofar as they defend a tensed, A-theoretic view. The reason that the standard B-theorist and block universe theorist deny that there is a necessary connection between passage and change is that they want to allow for mind-independent and non-dynamic change in a world wherein time itself does not really pass. Sharing no such motivation, the Fineian fragmentalist should be on board with following the arguably common-sense supposition that where there is change, time can be said to pass and where time passes, there will be change[11]. On the other hand, even if one were to argue that fragmentalism is a non-standard tensed, A-theoretic theory, the fragments themselves would not support the first step in the tenseless B-theoretic argument for mind-independent change without mind-independent temporal passage. As a reminder, the first step defines mind-independent change in a non-dynamic way as the having of properties at one time that are not had at another time. When combined with the ontological disconnection between the fragments, it seems that the momentary nature of each individual fragments is not able to provide the structure for non-dynamic change since there are no other moments in relation to which an entity or event can be

[11] This would also be in agreement with the claim that time does not pass in a temporal vacuum.

said to have different properties. Fragmentalism would therefore not be compatible with a local account of genuine temporal passage in line with the standard version of the tenseless B-theory.

I have argued that there is reason to think that Fineian fragmentalism is incompatible with both the genuine global and local passage of time. Given that these two options exhaust the possibilities for mind-independent temporal passage, it should follow that Fineian fragmentalism is not a suitable candidate for an account of time capable of supporting our experience. Not everyone, though, agrees that fragmentalism is an unfit contender for a world wherein time really passes. Lipman (2018), for instance, maintains that time really passes in a fragmented world. In an effort to fully assess fragmentalism's prospects for mind-independent temporal passage, I next address Lipman's proposal.

3.2. Lipman's Tenseless Fragmentalist Temporal Passage.

Lipman (Ibid) argues both that time really passes in a fragmented world and that this passage should be understood as the most basic temporal notion. Before analyzing Lipman's fragmentalist genuine basic temporal passage, it is important to point out that Lipman's version of fragmentalism differs in certain respects from the Fineian fragmentalism that has been the basis for the discussion up to this point. Lipman's version of fragmentalism endorses the view that:

> …the world shouldn't be read as featuring tensed descriptions of facts. Contra Fineian fragmentalism, the fragmentalist framework that will be the basis for the passage theory of time doesn't feature tense at all, not even the present tense. The descriptions should all be understood as tenseless descriptions. The reason for this is simple. If the claim that

> ‘Aristotle is alive’ were understood as saying that *Aristotle is now alive*, then, in treating all times on a par, the fragmentalist would be claiming that it is *now* the case that Aristotle is alive. But it’s a straightforward historical fact that Aristotle isn’t now alive. In entertaining the fragmentalist view, I’m simply not concerned with the way things are now. The fragmentalist’s predications must be tenseless predications if we are to adopt a truly neutral standpoint and treat the contents of all times on a par. We can think of ‘Aristotle is alive’ as expressing that Aristotle instantiates a certain property, not as expressing that he instantiates the property *now*, nor that he *always* or *eternally* instantiates the property, just that he has the property. (Ibid, p. 107)

While a Fineian account would hold that a statement such as “Aristotle is alive’ should be understood as *Aristotle is now alive*, Lipman maintains that ‘Aristotle is alive’ should be understood to express that there is a certain property that Aristotle instantiates. It is, further, neither the case that Aristotle instantiates the property of being alive *now* nor that he instantiates the property *eternally*. Nothing about where in time a given object has a given property is implied by the predication of properties according to Lipman’s account.

The contrast between Fine and Lipman is by no means a minor discrepancy. As noted, Fine (2005) introduced fragmentalism as the best metaphysical theory of realism about time. His suggestion being that, if one is going to be a tensed theorist, then one ought to be a fragmentalist. Turning fragmentalism into a tenseless theory therefore flips its original purpose on its head. If the relationship between Lipman’s fragmentalism and the passage of time is to be made clear, more needs to be said about his analysis of the passage of time.

While there are many moving parts to Lipman's theory of time based in passage, there are a few key features that stand out. Since the passage of time is the most basic notion, it is the precondition for phenomena such as 'change' and 'movement'. In itself, passage consists in a fact's ceasing to obtain, coming to obtain, or recurrent obtaining. Seeing as Lipman's analysis is concerned with the relation between facts that exist at different moments, it follows that his analysis of the passage of time is global in scope. Every true passage sentence will either have a sentence on one side and its negation on the other or the same sentence on both sides. For instance, the fact that *Morgan is jumping* might pass into the fact that *Morgan is not jumping* and the fact that *Morgan is standing* might pass into the fact that *Morgan is standing*, but the fact that *Morgan is jumping* will not pass into the fact that *it is raining in Maryland*. This stipulation on temporal passage is meant to capture the idea that passage involves either one state being produced from or coming out of another. Letting $\hookrightarrow$ stand for 'passes into', Lipman's theory holds that the following may all be cases of temporal passage (Ibid, p. 110/111):

- **Coming to be**: *A* comes to be iff $\neg A \hookrightarrow A$
- **Ceasing to be**: *A* ceases to be iff $A \hookrightarrow \neg A$
- **Coming to be a particular way***: A* comes to be a particular way *B* iff $\neg AB \hookrightarrow AB$
- **Ceasing to be a particular***: A* ceases to be a particular way *B* iff $AB \hookrightarrow \neg AB$
- **Staying the same**: A stays the same iff $A \hookrightarrow A$

Because the passage of time is the most basic phenomenon, there would be no explanatory basis for the above cases of temporal passage. Why, though, might fragmentalism be the apt framework for such passage?

As it is conceived by Lipman, there are two principal aspects of fragmentalism that make it the right theory from which to make sense of the passage of time. First, it endorses the view that all times are ontologically on a par. Second, it holds that contrary facts equally obtain. These two features of fragmentalism are crucial given that when it comes to the passage of time:

> There are the facts that are constitutive of each moment of time and there is the passing of the one collection of facts into the other. (…) Only the passage of a fact into a contrary fact can make for a genuine change of the objects involved in those facts. So if the facts of distinct times equally obtain, and those facts make for genuine change across time, then it seems that contrary facts equally obtain. (Ibid, p. 95)

Lipman's reasoning here is that the passage of time leads us to fragmentalism and fragmentalism supports the passage of time insofar as the passage of time involves a relation of contrary existent facts across time and fragmentalism maintains that all times exist and contrary facts equally obtain.

An example might help to explicitly connect Lipman's version of fragmentalism to his account of temporal passage. Let's take Morgan's standing passing into Morgan's not standing as our example. It would follow from Lipman's fragmentalist genuine basic passage that both the fact that *Morgan is standing* and the fact that *Morgan is not standing* should be understood as tenseless facts that convey no information about where in time Morgan is standing and where in time Morgan is not standing. The fact that Morgan's standing passes into Morgan's not standing is a basic fact that requires that both the fact that *Morgan is standing* and the fact that *Morgan is not standing* equally exist. Letting *A* stand for 'Morgan' and *B* stand for 'is standing', Lipman's

account would understand the passing of Morgan's standing to Morgan's not standing as: $AB \hookrightarrow \neg AB$.

One final thing to point out about Lipman's view is that it is distinct from both the typical A-theoretic and B-theoretic notions of temporal passage. It is in opposition to the A-theoretic conception of passage because it denies that tensed descriptions of the world are more fundamental than tenseless description. Lipman believes this divergence from the A-theory to be a point in favor of his view because he thinks that the A-theory is unable to provide a feasible account of genuine temporal passage. In short, his main issue with the standard A-theoretic notion of temporal passage is that, seeing as A-theoretic tensed sentences are only ever descriptions of the current state of the world, the closest they come to capturing the passage of time is in a perpetual re-writing of their description of the world. This re-writing, so the claim is, does not capture the passage of time. This is because the *passing* of time is in the waiting between the switching from one tensed description of the world to another and is thus not found in any of the descriptions that are offered by an A-theoretic theory (Ibid, p. 96). In contrast to standard B-theoretic notions of temporal passage, Lipman argues that the passage of time is mind-independent. The reason that he proposes for why the traditional tenseless descriptions of the world offered by the B-theorist are inadequate for genuine passage is that they are only relations that hold between compatible facts (Ibid, p. 97). If the passage of time is to allow for change, then it must be able to make room for cross-temporal incompatible relations between facts. Lipman defends this reasoning by claiming that change itself involves the passing of facts into contrary facts[12].

[12] Lipman's stipulations on change here go against the sparse account of change, as previously introduced, that is traditionally defended by the B-theorist.

The first thing to observe in reply to Lipman is that his fragmentalist basic temporal passage does not allay the argument that Fineian fragmentalism is a deficient tensed theory since it is unable to follow its A-theoretic rivals in supplying a genuine account of the dynamic passage of time in line with our experience. Hence, even if Lipman is correct about the nature of genuine temporal passage and its metaphysical framework, his theory would not help the traditional tensed fragmentalist avoid the main charge forwarded in this paper. There is, however, reason to doubt that Lipman does indeed present a winning examination of the workings of and setting for the passage of time.

The main stumbling block for Lipman's account is that it is unclear why the non-fragmentalist A-theorist and the B-theorist are not, despite what Lipman suggests, able to produce either essentially the same or better accounts of temporal passage. The non-fragmentalist A-theorist may argue that an A-theoretic view can invoke a basic notion of temporal passage relevantly akin to Lipman's. This move on behalf of the A-theorist might go as follows:

(i) Lipman holds that the standard A-theory does not capture an animated picture of temporal passage since all that it can offer is a continual re-writing of descriptions of still snapshots of the world.

(ii) Given (i), Lipman proposes that the standard A-theoretic notion of temporal passage is insufficient and would be better replaced by a basic notion of temporal passage set in a tenseless fragmentalist framework, which captures facts ceasing to obtain, coming to obtain, or recurrent obtaining via states being produced from or coming out

of each other. For instance, tenseless fact *A* comes to be iff $\neg A \hookrightarrow A$, wherein $\hookrightarrow$ captures the passing of $\neg A$ into *A*.

(iii) In response to (ii), the A-theorist can argue that they can also employ a basic notion of temporal passage that "animates" their tensed A-theoretic framework by capturing facts ceasing to obtain, coming to obtain, or recurrent obtaining via states being produced or coming out of each other. For instance, tensed fact *C* comes to be iff $\neg C \hookrightarrow C$, wherein $\hookrightarrow$ captures the passing of $\neg C$ into *C*.

At the surface level, there seems to be very little difference in the work that the passage of time is doing between (ii) and (iii).

In reply, it could be pointed out that the facts in (ii) are tenseless whereas the facts in (iii) are tensed. Yet, given that $\neg A$ is incompatible with *A* and that $\neg C$ is incompatible with *C*, both the fragmentalist in (ii) and the A-theorist in (iii) would meet Lipman's stipulation that, for time to pass, contrary facts must obtain. It may be further objected that the tenseless facts in (ii) and the tensed facts in (iii) do not *equally* exist. The tenseless facts in Lipman's fragmentalist framework all have the same ontological status while the tensed facts in the non-fragmentalist A-theoretic framework are not ontologically on par. Why, though, must the incompatible facts exist equally in order for time to pass in the basic sense that Lipman proposes? If, as Lipman argues, the passage of facts into contrary facts makes for genuine change and if the passage of time is the precondition for genuine change, then it should follow that the passing of any contrary facts signifies genuine change and is underwritten by the passage of time.

Following a different course, the B-theorist might agree with Lipman's assessment of the A-theory, but push back on his dismissal of the B-theoretic possibilities for temporal passage.

The least conciliatory response would be for the B-theorist to double down on the assertion that the passage of time is mind-dependent and that genuine change does not require genuine temporal passage. Toward this end, the B-theorist may praise the tenselesness of Lipman's fragmentalism and yet question his commitment to the active nature of temporal passage, which is usually associated with the A-theory. The specific argument might be that it is not easy to see how Lipman's basic notion of passage captures the dynamic processes of coming to be and ceasing to be between incompatible tenseless facts that is, according to Lipman himself, central to genuine temporal passage and change. Where in the actual space-time world is basic passage to be found and would it not be better if we could say more about the basis for temporal passage? Simply positing that the genuine passage of time is a brute fact about the world to be found in the passing of facts into either the same or incompatible facts is not, so the argument might continue, overly illuminating. Taking this line of response would be to object to the inscrutable character of Lipman's basic temporal passage. The traditional B-theorist is likely to go on to add that a more promising recourse for solving the puzzling phenomenon of passage is to be found in the project of deciphering the psychological basis of our erroneous experience that time really passes.

One thing to keep in mind is that there exist a very small minority of B-theorists who will concur with Lipman that the passage of time should be considered a mind-independent and basic fact about our world. For instance, Maudlin (2007), who is a proponent of the block universe ontology often associated with the B-theory and mind-dependent temporal passage, goes against popular B-theoretic thinking and proposes that the passage of time is:

> ….an intrinsic asymmetry in the temporal structure of the world, an asymmetry that has no spatial counterpart. It is the asymmetry that grounds the distinction between sequences which run from past to future and sequences that run from future to past. (p. 108)

The genuine passage of time is also:

> …an asymmetry that plays a role in explaining both the nature of the final state of the universe and the constant increase in entropy that connects the initial to the final state. (p. 135)

While both Lipman and Maudlin conceive of the genuine passage of time as a basic fact about the world that has no underlying explanation, Maudlin applies his account to the standard tenseless block universe associated with the B-theory, whereas Lipman works from a non-standard tenseless fragmentalist he associates with neither the A-theory nor the B-theory. As mentioned, the main reason why Lipman thinks fragmentalism provides the best home for a basic notion of temporal passage is that fragmentalism allows for the equal existence of incompatible facts. An adherent of basic temporal passage in the block universe, though, can point out that incompatible facts, while necessary for genuine change according to Lipman, are not necessary for the genuine passage of time. Seeing as time genuinely passes even if facts stay the same for Lipman, the B-theoretic defender of basic temporal passage in the block universe could argue that time may still be said to genuinely pass in a world where there are only compatible facts. With this allowance in hand, the next task would be to extend basic genuine

temporal passage to compatible yet different facts. This would permit such passage to be expanded to include all of the facts in a B-theoretic block universe. While a full defense of this move would require an adequate investigation that is beyond the scope of the present discussion, the takeaway is that there may be important points of agreement between some B-theorists and Lipman that renders the two camps not as disanalogous as they may appear at first sight.

4. Conclusion.

Fine's (2005 and 2006) addition of fragmentalism to the discourse between tensed and tenseless theories of time remains a welcome and refreshing development. I have suggested that it should ultimately be concluded that Fineian fragmentalism is a subpar tensed, A-theoretic account owing to its inability to deliver an acceptable setting for genuine temporal passage. Lipman (2018) has offered an account of global passage in a fragmented world that is based in a tenseless and basic notion of temporal passage. My response to Lipman was twofold. First, I argued that Lipman's tenseless fragmentalism does not help the traditional fragmentalist, who embraces a tensed account, furnish a convincing footing for either the genuine global or local passage of time. Second, I proposed that both the non-fragmentalist A-theorist and the B-theorist could plausibly make a case that the standard A-theoretic and B-theoretic notions of temporal passage are able to match or surpass Lipman's tenseless basic fragmentalist genuine passage.

NORTON'S OBJECTIVE TEMPORAL PASSAGE

1. Introduction.

The claim that the passage of time is in some sense dependent on the mind finds strong support from many within both the philosophic and scientific communities (see Price 2011 or Williams 1951). Stressing the consonance between their views and theories such as relativity (see Silberstein et al. 2018), B-theorists and block universe theorists have traditionally argued that the idea that time really passes is at best metaphysically mysterious and at worst metaphysically incoherent (see Mellor 1981)[13]. In contrast to B-theorists and block universe theorists, A-theorists and dynamic theorists usually hold that time genuinely passes and we have the metaphysical machinery to both coherently and convincingly elucidate such passage (see Prior 1970). The debate over the fundamental nature of the passage of time has thus far proved to be intractable, admitting of neither universal agreement nor straightforward solutions.

My aim is to consider one unique solution to the puzzle of passage. Norton (2010) argues that, although a precise description of its workings is currently beyond our understanding, time really passes. Norton's view is particularly interesting insofar as it strikes a middle ground between, on the one hand, B-theorists and block universe theorists who propose that the passage of time is an illusion and little sense can be made of the objective, mind-independent passage of time and, on the other hand, A-theorists and dynamic theorists who defend the position that time really passes and we can offer a meaningful account of time's passage.

[13]For exceptions to this see Maudlin (2007) or Mozersky (2015), for instance.

Both the middle ground it stands upon and its seeming adherence with our everyday experience of passage are arguably advantages of Norton's account. Despite these potential pros, I think that more work needs to be done in order to successfully refute those who argue that time does not really pass. Toward this end, I begin by introducing Norton's account and suggesting that it both implies a counterintuitive relationship between the "now" and passage and that it leads to an unlikely relationship between our experience and reality. I then argue that, even if one is willing to accept these consequences, there is reason to question whether Norton builds a convincing case for the claim that, since we are not able to find any of the identifying characteristics of an illusion in the case of temporal passage, the passage of time is not an illusion.

2. The Relationship between the "Now" and Passage.

It really feels as if time passes. We seemingly find ourselves part of a world wherein, independent of our inclinations and at times against our wishes, day follows day and no moment sticks around for more than a moment. The most compelling motivation to think that time really passes comes from our experience of the ceaseless progression of both our own lives and the world around us.

Going against our experience, our best physical theories support the idea that the passage of time is an illusion. Merging space and time into a four-dimensional manifold of spacetime, relativity theory, for instance, reduces motion to the spacetime geometry of Minkowski spacetime. Ruled out by special relativity's relativity of simultaneity, in this spacetime geometry there is no basis for an ontologically special "now" that holds universe wide and somehow "changes" with the passing of successive moments of time. According to special relativity, then,

the "now" is not absolute but rather relative to an observer's frame of reference. There is therefore arguably no foundation for anything like dynamic, objective, and mind-independent temporal passage in relativity. If it is the case that time really does not pass, our main task would be to uncover the cognitive basis and mechanism responsible for our experience of temporal passage.

Noting that the passage of time is not to be found in our physics, Norton nevertheless dismisses the idea that temporal passage is illusory. His primary motive for rejecting the picture of passage provided by our physical theories stems from what he proposes to be our best evidence. This evidence is experiential in nature and consists of the way that the world presents itself to our consciousness via a succession of interconnected moments. As explained by Norton (2010):

> Time really passes. It is not something we imagine. It really happens; or,(…), our best evidence is that it does. Our sense of passage is our largely passive experience of a fact about the way time truly is, objectively. The fact of passage obtains independently of us. Time would continue to pass for the smoldering ruins were we and all sentient beings in the universe suddenly to be snuffed out. (p. 24)

Unlike the passage of time, which is a prominent feature of our experience, Norton believes that our experience does not provide evidence for a spatially extended "now". Instead, what is given to us in experience is a local "now":

> The passage of time is one of our most powerful experiences. What is not in that experience is the idea of a present moment, the "now," that has any significant extension in space. The "now" we experience is purely local in space. It is limited to that tiny part of the world that is immediately sensed by us. (Ibid)

When it comes to the “now” and its relation to the passage of time, I want to suggest that there is an issue for Norton’s view insofar as it is committed to both the following about the passage of time:

(i) One of our most powerful experiences is of the passage of time.

(ii) Our experience of the passage of time is of an objective fact about time, which tells us about the way time truly is.

(iii) Given (i) and (ii), time really passes and the positive evidence we have for this comes from our experience.

and the following about the “now”:

(a) Our experience supports a “now” that is purely local in space.

(b) Our physics of space and time point towards a “now” that is purely local in space.

(c) Given (a) and (b), any claims of a spatially extended “now” are based in groundless speculation.

Why might one be hesitant to commit to both (i)-(iii) and (a)-(c)? In order to answer this question, we can begin by observing that the "now" is inextricably bound with the passage of time. This is because it is essential to the passage of time that there be more than one moment of time and that what is "now" be different from one moment to the next. This difference may be cashed out in various ways depending on which metaphysical theory of passage one endorses. For example, if one is a moving spotlight theorist the passage of time will be captured by the movement of the present (i.e. "now") – which is highlighted by the spotlight – along the eternalist continuum, while the presentist will describe the passage of time via the changing or renewal of the present. Unless one is willing to endorse the view that time passes in a temporal vacuum, time will not pass lest what is "now" alters in some way over or with time. It follows from this that, if we grant both (i)-(iii) and (a)-(b), the passage of time would be local insofar as all our evidence supports a purely local "now". This is a supposition that Norton accepts.

On initially being told that the passage of time is a local phenomenon we may wonder about the limits of this localness. To determine how local the local passage of time is, we would need to figure out the boundaries of "now". As mentioned, Norton believes that the boundaries of "now" extend only so far as the very limited part of the world that is immediately sensed by us. Importantly, this would mean that what is "now" may be different for people not sharing the same immediate environment. It would also mean that the objective passage of time is limited to the part of the world that is immediately sensed by us. Although there may be some debate over what is "immediately sensed by us", it seems clear that what is immediately sensed by us will be of quite limited extension. There are two reasons why it seems odd to limit the objective, mind-independent passage of time to that which is immediately sensed by us:

(1) It posits an unusual connection between our ability to sense something and its reality.

(2) It entails that it is nonsensical to talk of *the* passage of time.

Starting with (1), Norton's view offers us two ways to think about the relationship between reality and our senses. The first way of understanding this relationship is one that Norton himself would arguably dismiss quickly. The second way seems to suffer from a lack of internal motivation.

First, it might be argued that limiting the scope of the objective, mind-independent passage of time to our local experience is an unusual way to think of the relation between reality and our senses because it makes reality dependent on our experience. If reality were dependent on our experience, we would be able to change the reality of temporal passage by altering our experience. Moreover, it would leave the door open for the possibility that objective passage is itself fractured insofar as it is dependent on individual minds. This line of thinking gives the mind a power over reality that most of us would be hesitant to grant. It also directly contradicts Norton's main thesis that time would continue to pass without humans and goes against the idea of objective passage. It would therefore be an unhappy consequence of Norton's view that he is likely to reject.

Second, it might be suggested that we should flip the reasoning around and suppose that, rather than us having the ability to influence the objective passage of time, the reality of temporal passage is what informs our sense of passage. Doing so, however, it would be unclear why, as Norton maintains, we should accept that the objective passage of time is localized to the part of the world that is immediately sensed by us. Why, we might challenge, should an objective, mind-independent phenomenon be delimited by that which figures prominently in our

experience? What would happen if all conscious agents were to disappear? How would we then understand the limits of the 'now' and thus the passage of time? While Norton might respond that what he means by 'immediately sensed by us' is actually 'relative to a frame of reference', he does not explicitly say this, and it also seems that what is immediately sensed by us is much narrower than that which is relative to a given frame of reference.

Moving on to (2), the idea is that if we limit the objective passage of time to a local phenomenon that is evinced by our experience, we rule out the possibility of temporal passage being a unitary feature of our world. If the passage of time is objective, mind-independent and non-unitary, then it would be the case that either the world has one temporal dimension with varying localized regions of potentially disparate passage or that the world itself has more than one temporal dimension. Neither option accords very well with our experience and pre-theoretical thoughts about temporal passage. Both the idea that there are numerous incompatible regions of temporal passage throughout the universe and the idea that the world itself has multiple temporal dimensions go against the following features of the passage of time, which seem to me to be recommended by our experiential, pre-theoretic understanding of time:

(I) The passage of time is a phenomenon that continuously ushers moments from the future to the past. In this way, it provides a way to distinguish the present from the past and the future.

(II) The passage of time is a phenomenon that cannot be put to a halt and its workings are irrevocable and influence all that exists in time.

(III) The passage of time acts as a signpost to count the years, days, and minutes of existence.

The first feature captures both the feeling that the passage of time is the umpire of the past, the present, and the future and the feeling that without the passage of time it would make little sense to say that there is a difference between that which is present, that which is past, and that which is future. The second feature supports the feeling that the passage of time is a phenomenon that cannot be stopped[14] and that the influence it has cannot be changed or reversed. That the passage of time cannot be stopped according to our common experience of it seems clear. While it may feel like some moments drag on forever and others speed by much too quickly, I do not think that anyone would seriously propose that a defining feature of the workings of temporal passage is that it can be stopped and started on command, at will, or even randomly. It also seems central to our experiential understanding of the passage of time that it cannot be flipped or altered. We neither believe that we are able to wake up one morning to the experience of moments that have passed awaiting our future experience nor think that temporal passage can be shuffled or mixed up insofar as a random moment, for example, that has passed can suddenly make an appearance in the present in any form other than recollection. The third feature affixes to the feeling that temporal passage is the time-keeping device of the world, and it underlies our conventional use of the passage of time in accounting for the time that is given to us.

All three features go against the world having one temporal dimension with varying localized regions of potentially disparate passage or the world itself having more than one temporal dimension. This is because a common theme that underlies (I)-(III) is the assumption that the passage of time is a unified phenomenon that applies to the world at large. Both the ushering of moments and the distinction between the past, the present, and the future in (I)

[14] Here we might want to add the caveat that this holds for matter travelling at subluminal speeds.

presuppose an absolute past, present and future that hold throughout the universe. The impact of the passage of time and the inability to stop the progress of temporal passage in (II) apply to everything that exists in the world. The timekeeping of existence in (III) refers to a universal system that connects and measures all the moments of existence. (I)-(III), then, seem to require a unified and global account rather than a local account of temporal passage.

There are two things to flag at this point. First, if the local passage of time simply amounts to the global passage of time as viewed from a certain perspective rather than a distinct multitudinous phenomenon, then the local passage of time would be in agreement with our everyday thinking. This move seems to be ruled out by Norton's account seeing as he thinks that there is no basis for a spatially extended "now" that is global in extent. Second, I have said that these features belong to our pre-theoretic, everyday experience of the passage of time, and one might wonder in exactly what sense this is so. Although there is much more that could be said on the topic, I want to suggest that (I)-(III), which support a global rather than local account of temporal passage, are an inferred part of our experience that informs our pre-theoretic understanding. For instance, we infer from our experience of not being able to stop the passage of time in our immediate environment that the passage of time cannot be stopped on the other side of the world, or on the moon, or in Andromeda and beyond. My claim is not that we are correct in our reasoning. Rather, it is that (I)-(III), which factor into our experience and pervade our pre-theoretic understanding of temporal passage, go against a local account of genuine temporal passage.

Seeing as Norton is basing his account on a tight connection between our everyday experiential understanding and the reality of temporal passage, the incompatibility between (I)-(III) and the local passage of time would be an unfavorable result. While we may be persuaded

to accept that the passage of time is objective, mind-independent and non-unitary based on compelling scientific or metaphysical considerations, on quick reflection our experience arguably supports the idea that there is only one temporal dimension wherein we and the world around us are subject to the ceaseless progression of a unified phenomenon. In sum, the second reason to doubt that the passage of time is localized to our immediate environment is that it goes against our sense that temporal passage is an unbounded and unitary phenomenon.

Along with the appeal to our experience, Norton defends the claim that time really passes by arguing that the passage of time lacks the defining characteristics by which we distinguish other illusions.

3. On Illusions.

We know that, on the one hand, our experience tells us that time really passes and, on the other hand, our best physical theories strongly suggest that the passage of time is an illusion. One way to argue for the former and against the latter would be to show that the passage of time is unlike any other illusion with which we are familiar. We might, for instance, take as our example the familiar illusion of a straight stick that appears bent when it is half emerged in water. Norton proposes that there are two means by which we persuade ourselves that a phenomenon is in fact an illusion (Ibid, p. 29):

(1) We are able to control or eliminate it.

(2) We are usually able to determine the mechanism behind it.

Working with the example of the stick in water, we see that (1) applies since we can both eliminate and control the illusion by removing the stick from the water. (2) is also satisfied insofar as we know that the mechanism behind the apparent bending of the stick is the refraction of light.

Norton maintains that neither (1) nor (2) pertain to the passage of time. (1) is not applicable since for all appearances we are not able to eradicate the passage of time from our experience. Although psychologists have been able to perform experiments to induce temporal dislocations, these dislocations have been on a very short timescale of milliseconds (see Rocchesso & Lemaitre 2013). Such miniscule dislocations, the reasoning goes, are far from what we would anticipate if the passage of time were itself an illusion. Seeing as we have not been able to identify the mechanism that might lie behind and hold responsibility for our experience of temporal passage, (2) is also not met. There are a few ways that we can respond to the claim that we are not able to eradicate, control, or find the mechanism behind the passage of time.

Starting with (1), we might first argue that our inability to eradicate the passage of time from our experience should not be surprising. Our experience of the passage of time is itself a necessary condition for our having any experience. This is because, in order to have an experience, there must not only be a change in our mental state but a first-person feeling that something that was once not part of the present moment is now part of the present moment. While such a feeling need not be an explicit part of our conscious experience, it does seem to be underwritten by the passage of time in that it requires a dynamic connection between what was once future, is now present, and will be past. When it comes to the relationship between change and the passage of time, most B-theorists and block universe theorists will balk at the idea that

objective change requires the objective passage of time. They will, however, likely agree that if we are to experience change, then we must experience time as passing. A-theorists and dynamic theorists, conversely, will presumably be on board from the outset with the idea that there is a necessary connection between both objective and experiential temporal passage and change.

All of this is to say that, unlike other familiar illusions, we are not able to eradicate our experience of the passage of time because in doing so we would be eradicating our capacity to have an experience itself. This should lead us to conclude that, if the passage of time is an illusion, it is more fundamental to our existence than any of the other illusions of which we are aware and we should therefore not expect it to factor into our experience in the same way as other less fundamental illusions. What about our ability to control the passage of time?

The minor temporal dislocations in our experience that have been produced in experimental settings are not enough to convince Norton that the passage of time is, similar to the bending of a stick in water, something that we can control. Specifically, he thinks that if the entirety of temporal passage were an illusion, we should be able to generate much larger dislocations, perhaps along the lines of a day or a year:

> …there is a healthy tradition in experimental psychology that seeks to generate temporal dislocations in our experience. Subjects hear sounds in each ear that are delivered slightly dislocated in time. Yet they misperceive them as simultaneous. Subjects are lead to misperceive the exact timing of an event they see by hearing cleverly timed audible clicks. These sorts of experiments are quite successful in leading to dislocations of the order of milliseconds. That sort of dislocation is remote from what one would expect if

> the entirety of passage is an illusion. With all the tricks at their disposal, why can't an inventive researcher induce dislocations of the order of a day or a year? (Ibid, p. 29)

In response, we can ask the following:

(a) Why must the dislocation be on such a large time scale?

(b) Why think that dislocations larger than milliseconds are not possible?

(a) asks why the capability to bring about any temporal dislocations in our experience should not count as evidence of our ability to control our experience of the passage of time. To put it another way, if we are simply looking for evidence that the passage of time is a phenomenon that can be controlled, then why would we not take our power to manipulate our experience of it to any degree as evidence that it can in fact be controlled? If this line of reasoning is convincing, (1) would apply to the passage of time.

The idea behind (b) is that, although experimental psychologists as of yet have not been able to bring about dislocations greater than a few milliseconds, we should not rule out the possibility that such dislocations are attainable. Norton takes our current inability to induce large dislocations as evidence that the passage of time is an objective, mind-independent fact about the world. We might, though, just as readily take it as evidence for either our limited understanding of the science of temporal dislocation or the *de facto* limits of our cognitive system. The latter would be the case if, for example, evolution has imposed a safeguard against our experiencing time either grossly out of order or drastically different than the norm for our species. This option would not rule out the possibility that the passage of time is itself nevertheless an illusion. Given

the above, it seems that we cannot dismiss the applicability of (1) to the passage of time. This leaves us with (2).

(2) concerns the mechanism responsible for an illusion. This mechanism must be found in the way that our cognitive system tricks us into thinking that a feature of the world is real when in fact it is not. As noted by Norton, we have not been able to pinpoint such a mechanism in the case of temporal passage. Our failure to locate the exact mechanism, however, does not mean that (2) cannot be fulfilled in the case of the passage of time. (2) does not state that we must be able to locate its mechanism in order for something to meet the criteria of an illusion. The passage of time might be one of those unusual circumstances where we have not, at least not yet, been able to specify a mechanism. Further, assuming for the moment that the passage of time is an illusion, it is not as if we would be left completely in the dark as to the nature of the mechanism behind our experience of temporal passage. At the most general level, we could start by classifying the passage of time with other familiar illusions involving a distortion in our perception of time. Instances of such familiar temporal illusions include the telescoping effect – the temporal displacement of an event whereby people perceive recent events as being more remote than they are and distant events as being more recent than they are (see Morwitz 1997) – and the oddball effect – a perceptual phenomenon whereby novel or unexpected stimuli result in longer perceived time durations (see Schindel et al. 2011). We could then, perhaps, narrow our analysis down to focus on how models of consciousness treat the process of the temporal ordering of subjective events in the brain[15]. From there, we could look for the areas of the brain that are responsible for our experience of duration and continuation. With an idea of how the brain both temporally organizes and connects together events, we would have a basis from which

[15]Dennett and Kinsbourne (2011) offer such an analysis.

to postulate how it is that the mind imposes a dynamic quality on the temporal dimension of a world wherein time does not truly pass.

Bringing everything together, there are circumstances under which both (1) and (2) are passably met in the case of the passage of time. This means that, as with other familiar illusions, the passage of time can be said to possess the key characteristics by which we define an illusion.

4. Conclusion.

Norton maintains that time really passes. My goal has been to argue that the ontological status of the passage of time remains an open puzzle. This argument has been supported in two ways. First, I have tried to show that Norton's account has implausible consequences. Second, I have suggested that Norton does not successfully dispose of the possibility that the passage of time shares in identifying features with other familiar illusions. Moving forward, a potentially promising line of response from the proponent of objective, mind-independent passage might be to further defend the idea that temporal passage cannot be identified by the same means by which we recognize other illusions.

A DEFENSE OF THE B-THEORETIC, BLOCK UNIVERSE

1. Introduction.

My aim in this paper is to provide a defense of the B-theoretic, block universe theory of time over A-theoretic, dynamic accounts of time. Towards this end, I begin by arguing that, although arguments from experience may at first glance appear to be on the side of A-theoretic, dynamic accounts, there is reason to think that experience does not provide decisive evidence in support of such views. I then suggest that arguments from science and arguments from metaphysics provide strong incentive to be a B-theoretic, block universe theorist. As a result, while a B-theoretic, block universe view has two out of the three arguments on its side, A-theoretic, dynamic accounts are not decidedly supported by any of the main categories of arguments that may be forwarded in support of a theory of time. I end by considering some of the unresolved questions posed to the B-theoretic, block universe theorist by arguments from experience.

2. The B-theoretic, Block Universe.

In this section, I introduce and explain three general categories of arguments that are commonly appealed to in support of a theory of time. These arguments invoke various experiential, scientific, and metaphysical factors, many of which touch on areas of research that are currently live and active topics of inquiry. Unless otherwise stated, all the considerations that follow come directly from the existing literature on time and are therefore not my own novel contributions. The outcome of the discussion will be that a survey of the existing arguments should lead us to

be B-theoretic, block universe theorists rather than A-theoretic, dynamic theorists. First, though, a brief note about terminology.

2.1. Brief Note about Terminology.

I have been associating the B-theory with the block universe and the A-theory with dynamic views. While this correlation holds throughout the literature, it is important to keep in mind that the B-theory is conceptually distinct from the block universe and the A-theory is conceptually distinct from any dynamic account of time.

One way to motivate the conceptual difference between, on the one hand, the A-theory and the B-theory and, on the other hand, the block universe and dynamic accounts is to focus on the scope of each view. Toward this end, I will understand the block universe and dynamic accounts as theories about the ontological status of time, wherein:

> *The Block Universe:* Four-dimensional space-time block containing all that exists in space and time. While certain times may be epistemically privileged in the block, all times are ontological on par. Given that there is no time that can be picked out as *the present* and since there is no active progression of the present itself, the passage of time in the block is widely taken not to be a mind-independent phenomenon.
>
> *Dynamic Theories:* May hold that only the present exists, that the past and the present exist, or that the past, the present, and the future all exist. *The present* is always both an epistemically and ontologically privileged time. Depending on which times are thought to unequally exist, the mind-independent passage of time will be captured by the

> continuous renewal of the present, the expansion of the present into the future, or the movement of the present from the past to the future.

The A-theory and the B-theory will be understood as theories about both the ontology and semantics of time that are distinguished in the following ways:

> *The A-Theory:* Holds that tensed language is fundamentally irreducible and usually incorporates a dynamic ontology.

> *The B-Theory:* Holds that tensed language is reducible to a tenseless meta-language and usually incorporates the block universe ontology.

The A-theory and the B-theory, then, have a broader scope than dynamic views and the block universe. While it is typically the case that a dynamic account is linked with the A-theory and the block universe is linked with the B-theory, not all theorists agree that the theories should be thus connected. For example, Silberstein et al. (2018), suggest that the block universe and the B-theory should remain separate theories. Despite their conceptual independence, however, I think that there is convincing motivation to pair the A-theory with dynamic accounts and the B-theory with the block universe. In order to bring out this motivation, a good place to start is by thinking about the nature of A-theoretic versus B-theoretic change.

Although the A-theory and the B-theory were initially introduced as a way to respond to McTaggart's (1908) argument for the unreality of time, both theories preserve key features of McTaggart's A-series and B-series respectively. Following the A-series, the A-theory is lauded

by its defenders as the theory capable of furnishing genuine change. Proponents of the B-theory will argue that the B-theory, inheriting its lineage from the B-series, is also able to supply an account of change. Change, according to the B-theorist, is a matter of an entity or event E having properties at one time that are different than the properties had by E at an earlier or later time. A-theorists will maintain that B-theory change is only a shadow of the genuine change captured by the A-theory. The A-theorist's reasoning here will be that genuine change inexorably involves the losing and gaining of properties and is therefore tied up with the notions of becoming, progression, and movement. Since these notions only find a home in a theory wherein time itself genuinely and actively passes and seeing as the B-theory in its standard formulation denies that time really passes, genuine change, so the argument will proceed, is only captured by an A-theoretic account of time.

Given that the A-theory seeks to provide a compelling analysis of genuine change and insofar as genuine change involves some sort of movement, progression, or becoming, the A-theorist is going to need a dynamic ontology of time. Even an A-theoretic view such as the moving spotlight theory that, similar to the block universe, incorporates the existence of all times will impart a special status and movement to the present as a way to explain the mind-independent passage of time. Further, seeing as dynamic theories rely on there being a special present moment whose renewal, movement, or growth signifies the genuine passage of time, the dynamic theorist is also going to want to be an A-theorist.

In contrast to the A-theory, the tenseless character of the B-theory means that the B-theorist explicitly rejects a fundamental distinction between the past, the present, and the future and dismisses any notion of a privileged present. As a result, the B-theory accords well with the ontological equality of times afforded by the block universe. The block universe theorist, in turn,

will be disposed to be a B-theorist so long as they feel the need to include the earlier than relation in the block universe. This is because, in order to sustain notions such as change and the direction of time in the block universe, the earlier than relation will be needed. The earlier than relation will be required if there is to be a direction of time as long as it is plausible to assume that the direction of time is an asymmetry of processes in time that runs from earlier to later processes. The earlier than relation is crucial to B-theoretic change since it would arguably make little sense to say that there was a change, for instance, from A to B if there was no way to determine whether in fact A comes before B or B comes before A.

Given the above considerations, I will continue to couple the A-theory with dynamic accounts and the B-theory with the block universe. The important questions, then, will be those surrounding which set of theories we ought to embrace and why this might be the case. These are the questions that I address next.

2.2. Experiential, Scientific, and Metaphysical Considerations.

The three types of arguments in support of a theory of time that will be discussed in this section are:

- Arguments from Experience: Advance considerations related to the phenomenology and psychology of time, such as the fact that we remember the past but not the future.
- Arguments from Science: Advance considerations related to both microphysical and macrophysical aspects of time, such as the time reversal invariance of almost all physical processes in time.

- Arguments from Metaphysics: Advance considerations related to the existence and fundamental nature of time, such as the temporal basis for persistence.

Although the three categories of arguments focus on different specific features of time, there will be overlap between many of the general features of time of interest to each type of argument. Arguments from science and arguments from metaphysics, for instance, will both seek to address the basic structure of the temporal dimension of our world and its relationship to the three spatial dimensions. All three categories of arguments will also presumably have something to say about the really big questions connected to time, such as the workings of the passage and direction of time. Taking each of the three categories of arguments in turn, my goal will be to explain why the overall weight of the arguments recommends a B-theoretic, block universe rather than an A-theoretic, dynamic account.

2.2.1. Arguments from Experience.

When arguments from experience are employed in the service of a semantic and ontological view of time it means that the view is thought to accord well with our experiential, pre-theoretic understanding of time – the way that it feels to be a being in time before we have subjected our experience to any rigorous thought or theoretical analysis. Three central components of our experiential, pre-theoretic understanding of time are:

(1) *The Present:* It feels as if the present – what is 'now' – is both more real and special than other moments of time. It also seems to us that the present marks a clear divide between the past and the future.

(2) *Passage:* It feels as if time really passes in the sense that, no matter how hard we try, we can neither stop our progression through time nor bring a halt to time itself. We are, as it were, irrevocably caught up in the flow, go, movement, and progression of time.

(3) *Direction:* It feels as if there is a directedness to time insofar as we remember the past but not the future, know more about the present and the past than the future, and are not able to turn around in time and start living our lives towards the past instead of towards the future.

Seeing as we are not able to directly see, hear, taste, touch, or smell time itself, our natural way of uncovering what time is must involve a more abstract and indirect application of our senses. It is through this means that we are led to conclude that (1)-(3) are key characteristics of time. (1) is a feature of time indirectly corroborated by our senses insofar as all of our conscious experience takes place in the present moment and we find the difference between our conscious lives and our memory and anticipation to be a stark one that clearly divides the present from the past and the future. (2) shows up indirectly to our senses as a vital facet of time since everything that we see, hear, taste, touch, and smell only presents itself to our senses for a limited period of time and then passes out of our detection. (3) is an attribute of time affirmed indirectly by our senses seeing as our apprehension of all processes, including our own lives, informs us that every process follows an invisible and irreversible course that is headed for the future.

A reason why one might think that (1)-(3) are crucial features of time that should be represented by any adequate theory of time is that it is not clear that we would be able to articulate any human experience that is not in some significant sense governed by (1)-(3). What would it be like if our lives played out in the past? Would the past, then, not simply become to

us what is considered the present? How would we even begin to make sense of an experience that was frozen in time? What about an experience wherein all processes in time, including the absorption of light by photoreceptor cells in the eye, was temporally reversed? If our experience counts for anything, a major point in support of a theory of time is that it can be made to align with (1)-(3). The argument by the A-theoretic, dynamic theorist, which is one that we all might be inclined to agree with upon initial reflection, is that A-theoretic, dynamic theories do a much better job of aligning with and accounting for (1)-(3) than the B-theoretic, block universe. The exact details of this argument will vary in accordance with the details of each A-theoretic, dynamic theory. Since there is not enough space to go over every possible A-theoretic, dynamic theory, my focus will be on presentism.

Presentism is an A-theoretical, dynamic view that may be briefly described as:

> *Presentism:* The view that only the present exists, while the past and the future are non-existent. Time passes insofar as the present continuously renews itself and in doing so ushers moments, along with their accompanying events and things, from the future to the past.

As a reminder, because presentism is an A-theoretic view, all talk of the notions of 'the past', 'the present', and 'the future' employed by the presentist should be taken to represent a real and fundamental distinction between the past, the present, and the future that holds universe-wide. At first sight, presentism arguably seems like a good semantic and ontological basis for (1)-(3). Accounting for (1), the commitment to the existence of the present and the non-existence of the past and the future means that presentism fits very well with the feeling we have that the present

is a divide between the past and the future that is more real and special than the past and the future. When it comes to (2), the presentist's claim that the present is ever renewing itself – and in this way changing – aligns well with the feeling that time really passes insofar as time is always on the move and all processes in time are caught up in this progression, themselves ever moving with time. Lastly, presentism provides plausible grounds for (3) in that the continuous renewal of the present via the non-existent future turning into the existent present and going once more out of existence as it passes into the non-existent past corresponds well with the feeling we have that there is a directedness to time that constrains all processes that unfold in time.

Unlike presentism, the B-theoretic, block universe may initially seem to be a poor match with (1)-(3). The denial that tensed language expresses the ontological truth about the world combined with the ontological equality of all times may be argued to mean that (1) finds no footing in a B-theoretic, block world. This is because a world wherein, on the one hand, our language use of the notions of 'the past', 'the present', and 'the future' do not connect to anything real in the world and where, on the other hand, every time exists and is equally real is not at first appearance a world that can ground our feeling that the present is an ontologically special time that marks a distinction between the past and the future. Further, the lack of any active progression or genuine movement in a B-theoretic, block world may be thought to rule out the sense that we are caught up in the flow of time that is central to (2). Finally, although the B-theoretic, block universe theorist's allegiance to the fundamentality of the earlier than relation furnishes an asymmetry between times that seems indispensable to our experience of living in a world where all processes follow a direction in time, some work would need to be done in order to show that the earlier than relation is enough to substantiate a global direction of time.

In response to the claim that arguments from experience are resolutely on the side of A-theoretic, dynamic accounts such as presentism, we can ask whether it really is the case that our experience of time would be different if we lived in a B-theoretic, block universe versus an A-theoretic, dynamic universe. If our experience was to be found identical whether we were in an A-theoretic, dynamic universe or a B-theoretic, block universe, then our experience could not be cited as a reason to favour one universe over the other. Interchangeability of our experience between an A-theoretic, dynamic universe and a B-theoretic, block universe would therefore make all arguments from experience for one theory over the other essentially powerless.

'The epistemological argument' is one argument that seeks to show that arguments from experience are unable to supply decisive motivation for either an A-theoretic, dynamic universe or a B-theoretic, block universe (see Prosser 2007, Silberstein et al. 2018, or Williams 1951). According to this argument:

> *The Epistemological Argument*: Regardless of whether we live in an A-theoretic, dynamic universe or a B-theoretic, block universe our experience would be the same. This is because events can be mapped one-to-one (including mental events) from dynamic universes to the block universe.

The basic idea behind the Epistemological Argument is that there would be no way for us to know whether we are in an A-theoretic, dynamic universe or a B-theoretic, block universe so long as our experience is equivalent between the two types of universes. If the argument is to have any force, then there must be a satisfactory way to justify the claim that our experience would in fact be the same regardless of the temporal character of the universe in which we live.

Demonstrating that we could experience (1), (2), and (3) as key features of time in both an A-theoretic, dynamic universe and a B-theoretic, block universe would be a way to achieve this feat. The strong connection between an A-theoretic, dynamic universe and (1), (2), and (3) has already been outlined. Ostensible reason has been given to think that a B-theoretic, block universe would not provide a congenial semantic or ontological setting for (1), (2), and (3). The B-theoretic block universe theorist might nonetheless maintain that if we think about it more we will find that there is a way to make sense of the experience of (1), (2), and (3) in a B-theoretic, block universe.

(1) – the feeling that the present is somehow a special time that divides the past and the future – could be said to fit with a B-theoretic, block universe given that our immediate consciousness is of limited temporal extension. The horizon of that which presents itself directly to our conscious experience, and in doing so forms our 'now', is sometimes called the 'specious present'. If all perceptions of the world that are "online" are contained within a brief temporally extended window that we deem the 'now', then it should not be surprising that this window feels special to us and acts as a divider between all that is directly available to our conscious experience and all that it not directly available to our conscious experience. This would explain why we feel that there is an important distinction between everything in time that belongs to the 'now', which we label 'the present' and everything in time that does not belong to the 'now', which we label 'the past' and 'the future'.

(2) – the feeling that time relentlessly flows – could be accounted for in a B-theoretic, block universe by there being a psychological link between a stretched-out series of four-dimensional presently-feeling experiences (see Callender, 2012). The general idea behind this suggestion is that we can ground our dynamic experience of time in a B-theoretic, block universe

in the psychological connection between the different "static" moments of our lives. While uncovering the specific details of this link is an ongoing area of psychological research, one can at least point towards the combination of "static" temporal slices and our psychology when explaining the feeling that time really passes in a B-theoretic, block universe.

(3) – the feeling that time has a direction – can be matched in a few ways with a B-theoretic, block universe. First, it could be argued that the ordering of moments of time by the earlier than relation is a basic fact about time that applies to the universe in its totality and therefore supplies an overall direction to the temporal dimension of our world. Second, it might be suggested that there is an objective grounding for both the earlier than relation and an overall direction of time in a B-theoretic, block universe in the form of the causal arrow or the thermodynamic arrow, for instance. Third, one could maintain that, although it is a mind-independent fact that moments, along with their accompanying entities and events, are locally ordered by the earlier than relation, there is no objective basis for the direction of time as a single phenomenon that governs the entire universe. Following this last option, any grounding for the sense that there is a singular, unified direction to the temporal dimension of our world would, similar to the standard account of the passage of time in a B-theoretic, block universe, have to be explained by an appeal to our psychology rather than a mind-independent fact about the world.

Given the Epistemological Argument, arguments from experience would be compatible with either A-theoretic, dynamic accounts or the B-theoretic, block universe. Nevertheless, we may have a lingering feeling that there *is* a significant difference between the way that A-theoretic, dynamic accounts relate to our experience and the way that the B-theoretic, block universe relates to our experience. In particular, is it not the case that A-theoretic, dynamic accounts do a better job of providing a direct semantic and ontological explanation of why it is

that we experience (1)-(3)? Said another way, even if arguments from experience are reconcilable with either view, should we not at least acknowledge and give credit to A-theoretic, dynamic accounts since they ground why it is that we experience the 'now' as special, feel that time genuinely passes, and pre-theoretically believe that there is a directedness to things in time provided by the direction of time, in the fundamental nature of the reality of time itself?

One thing to note in reply to the suggestion that A-theoretic, dynamic accounts are to be preferred simply in virtue of their being able to provide a direct semantic and ontological basis for key features of our pre-theoretic experience of time is that it arguably seems to flip the correct direction of explanatory dependence between our experience and the world. The reason for this is that it uses our experience of time to determine the correct semantic and ontological reality of time as opposed to starting from the most credible semantic and ontological basis of time and using this to explain our experience of time. If we feel the pull of heeding our best scientific and metaphysical considerations, then we ought to start from the science and metaphysics of our world rather than our experience. Of course, if our experience is in line with our science and metaphysics, then there are no worries. This, however, does not seem to be the situation when it comes to the passage of time.

If the A-theoretic, dynamic theorist responds that their theory is in fact motivated by the best scientific and metaphysical account of time, then the task would be to clearly demonstrate why this is the case. Directly dampening the prospects of this endeavour, the remainder of this section highlights arguments from both the domains of science and metaphysics that support the B-theoretic, block universe. Given both the Epistemological Argument and reason to make our scientific and metaphysical picture of time the explanans of our experience of time, these arguments should provide a persuasive defense of the B-theoretic, block universe.

2.2.2. Arguments from Science.

The primary scientific theory cited in the literature in support of a B-theoretic, block universe is Special Relativity (SR) (see Minkowski 1908, Smart 1964, or Crisp 2007). The argument is that SR's relativity of simultaneity strongly suggests the ontology of time incorporated by the B-theoretic, block universe. Accompanying this argument is the claim that the B-theoretic, block universe is recommended by Minkowski space-time, which is the picture of space-time offered by the geometrical picture of SR. In particular, the B-theoretic, block universe commitment to a tenseless account of time combined with the equal existence of all times accords well with the lack of a privileged present and the "static", unmoving picture of time presented by Minkowski space-time. Some theorists have proposed that the ontology of the B-theoretic, block universe is supported by the combination of General Relativity (GR) and SR even more than SR alone, while GR itself is less hospitable to A-theoretic, dynamic views such as presentism than SR alone (see Silberstein et al. 2018). The general idea motivating this thinking is that many solutions to GR do not provide a global foliation, and there is nothing in Einstein's equations that guarantees that there will be a global foliation or preferred frame. As a result, the existence of a global foliation or preferred frame that is so central for an A-theoretic, dynamic account ends up being contingent on the initial conditions, which are themselves contingent.

There is disagreement in the literature about whether the argument from relativity presents conclusive evidence in support of the general picture of time offered by the B-theoretic, block universe. However, although not every theorist is ready to cede pride of place in relativity to the B-theoretic, block universe tradition (see Hinchliff 2000 or Skow 2009), there is a general consensus that relativity does indeed necessitate, or at least strongly suggest, this tradition (see Bouton 2017). To keep the argument as uncontroversial as possible, my discussion will be

limited to the support from science that is given to the B-theoretic, block universe from SR. I will not devote much space to the discussion since this support is well-trodden territory within the literature.

The principal point that I want to highlight is that one of our most successful and experimentally verifiable scientific theories of time seems to be telling us that the fundamental nature of time is not A-theoretic and dynamic in character. Unless some third option were to be devised, and seeing as a B-theoretic, block universe appears to be well-suited to SR, our conclusion should be that arguments from science, at least those motivated by SR, recommend a B-theoretic, block universe. One caveat to mention is that there are obviously other theories of the physical world aside from SR. The appropriate response here seems to be that the role of time in other fundamental theories of physics, such as Quantum Mechanics and Quantum Field Theory, is less established than it is in Relativity Theory. It is, then, not altogether misguided to use Relativity Theory as our representative scientific theory.

The main reason that Relativity Theory is thought to be at odds with A-theoretic, dynamic accounts is that, according to the relativity of simultaneity, there is no basis in SR for an absolute, universe-wide divide between the past, the present, and the future. To see why the relativity of simultaneity is usually cited against A-theoretic, dynamic accounts and for the B-theoretic, block universe, we start can by considering figure 1[16].

[16] This diagram comes from http://www.informationphilosopher.com/freedom/special_relativity.html.

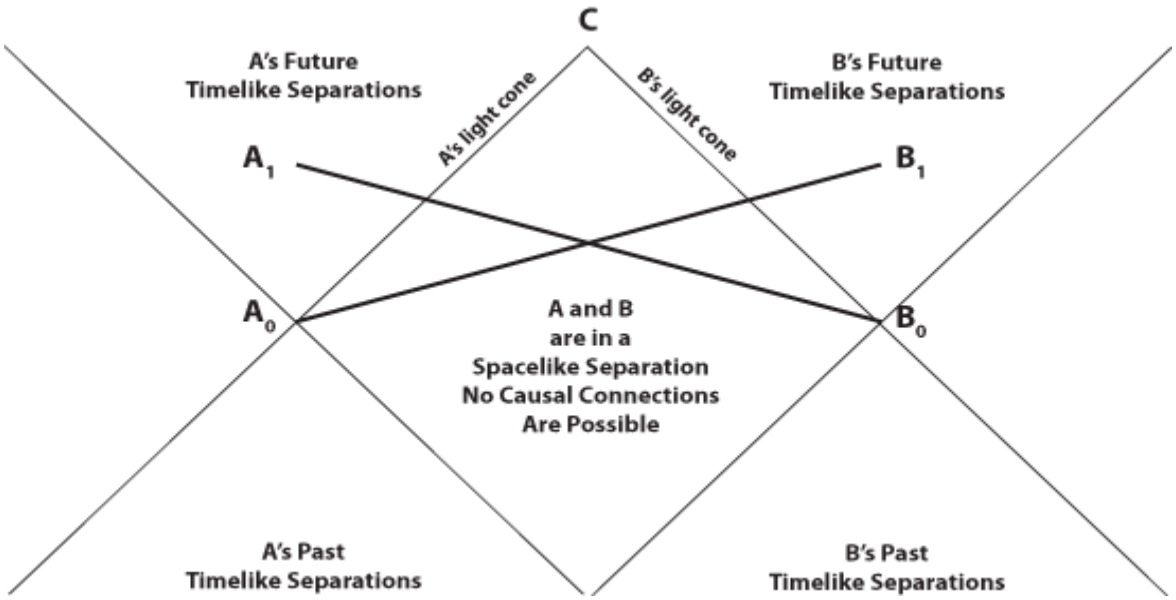

Figure 1. Relativity of Planes of Simultaneity.

According to the moving observer A at A0:

- B1 is now
- B1 is in the future for B at B0

According to the moving observer B at B0:

- A1 is now
- A1 is in the future for A at A0

It does not follow that since A at A0 experiences B1 as the now and B at B0 experiences A1, which is in the future for A at A0, as the now that A1 is now for A at A0 nor does it follow that

since B at B0 experiences A1 as the now and A at A0 experiences B1, which is in the future for B at B0, as the now that B1 is now for B at B0. The light postulate of SR is the primary reason that these things do not follow. The light postulate puts a speed limit *c* on the speed of light in all inertial frames of reference in empty space. Taking into account the relativity postulate of SR, which states that in all inertial reference frames the laws of physics are the same, and seeing as A and B are spacelike separated, in order for either B at B0 to influence A at A1 or for A at A0 to influence B at B1, the signal would have to travel faster than the speed of light. As long as the light postulate holds, there will be no fact of the matter as to whether B1 or A1 is now or in the future. The relationship between A and B in figure 1 therefore demonstrates the main claim of the relativity of simultaneity: distant simultaneity depends on an observer's frame of reference rather than being absolute.

Seeing as A-theoretic, dynamic accounts employ a notion of absolute simultaneity, they directly conflict with SR's relativity of simultaneity. In contrast, the lack of any absolute times and absolute distinctions between the past, the present, and the future entailed by a B-theoretic, block universe allows for the relativization of simultaneity central to the relativity of simultaneity. According to both SR and a B-theoretic, block universe, 'now' is nothing more than an indexical that points to a temporal frame of reference, along the same lines as 'here' is an indexical that picks out a locational frame in space.

When the reasoning behind the relativity of simultaneity is applied to every temporal perspective in the universe, the result is that all times must be said to equally exist according to SR. This is because every possible observer experiences the moment they occupy as existing and each observer has an equal claim to what moment in fact exists. As represented by Minkowski space-time, this means that time in SR is to be considered another dimension, akin to

the three spatial dimensions. Just as Spain and Andromeda exist even though we are located in Paris, the year 1535 and the year 2100 exist[17] even though we are located in 2020. The dimensionality of time corresponds with the B-theoretic, block universe ontological equality of all times. It is, though, at odds with the A-theoretic, dynamic views of presentism and the growing block theory, which respectively hold that only the present exists and that only the past and the present exist. While the dimensionality of time is in a sense at one with the existence of the past, the present, and the future that is key to an A-theoretic, dynamic view such as the moving spotlight theory, it is at variance with the moving spotlight theorist's allegiance to both the specialness of the present and the absolute division between the past, the present, and the future. It is for reasons such as these that the B-theoretic, block universe is thought to provide a better match for SR than A-theoretic, dynamic accounts.

2.2.3. Arguments from Metaphysics.

As with arguments from science, my suggestion will be that, on the whole, the relevant arguments from metaphysics back the B-theoretic, block universe. To defend this, I will outline three metaphysical pros of a B-theoretic, block universe over worlds governed by an A-theoretic, dynamic conception of time. The first two pros are familiar territory within the literature. The third is a consideration that seems to be important but finds less attention within the literature.

First, a B-theoretic, block universe does not have to face the potentially insurmountable challenges inherent in explaining why and how it is that an ontologically special present moves, renews, or grows. Providing a coherent and non-mysterious analysis of the workings of the movement, renewal, or growth of the present is a very difficult task since all attempts to do so

[17] That is, of course, as long as the timeline of the world in fact extends this far.

seemingly ground out in metaphor (see Williams 1951). For example, in an attempt to explain the movement of the present from the past to the future, the moving spotlight theorist may propose that the present is to be thought of as an illuminated moment of time that, similar to a beam moving over a row of house fronts, "lights" up the timeline as it travels (see Broad 1923). This description of the movement of the present may help to conceptualize the moving spotlight theory, but it leaves many questions answered. What, we might wonder, in the actual world corresponds with the illuminated present? Why does the present move? Is there force acting on the present? What happens to entities and events in the past and the future when they are not present? One metaphysical advantage of the B-theoretic, block universe is that it does not have to deal with the extra explanatory burden imposed by the dynamic nature of A-theoretic, dynamic accounts.

A second pro of the B-theoretic, block universe is that it can ground past and future truths in the existence of the past and the future. A contingent truth such as *Aristotle existed* uttered in 2019, for instance, would be made true by something in the world – namely, the existence of Aristotle – that is a part of reality over two thousand years later than the point on the world's timeline where Aristotle can be found. An A-theoretic, dynamic view such as presentism would not be able to ground the truth of *Aristotle existed* in the existence of the past. The inability of presentism to ground truths about the past and the future in the past and the future themselves has been termed the "grounding objection" against presentism (see Asay & Baron 2014 or Mozersky 2011).

Two things to keep in mind about the grounding objection are that, for one, it might not be as convincing when applied to the future and, in addition, it is not clearly an objection to all A-theoretic, dynamic accounts. If one is comfortable with there being no truths about the future,

the grounding objection can be restricted to past. While presentism seems to be the obvious target of the grounding objection, there may be a sense in which it can be advanced against other A-theoretic, dynamic views. The future version of the grounding objection straightforwardly applies to the growing block view insofar as it posits that the future does not exist. Seeing as the future version of the grounding objection is on less secure footing than the past version, this may not be a great worry to the growing block theorist. Although I am not aware of any detailed discussion of this point, it seems that both the growing block view and the moving spotlight theory are susceptible to a variation of the past version of the grounding objection since they are committed to the diminished reality of the past in comparison to the reality of the present. It might be argued that diminished existence is enough to ground past truths. It is, though, not clear whether diminished reality would necessarily lead to diminished truth and, if so, what it means for something to be a diminished truth. Hence, both the growing block theorist and the moving spotlight theorist would need to tackle a few questions before successfully showing that their theories can fully evade the grounding objection. The B-theoretic, block universe theorist is not laden with such a task since they endorse the equality of all times.

A third point that recommends the metaphysics of the B-theoretic, block universe is connected to the persistence of objects over time. There are two main theories of persistence over time: perdurantism and endurantism. An object is said to perdure if only a temporal part of it exists at any given moment of time. An object is said to endure if throughout its existence it exists as a whole from one moment of time to another moment of time. The block universe theory is typically thought to support perdurantism, while endurantism is usually partnered with an A-theoretic, dynamic view (see Hawley 2001, Lewis 1986 and 2002, Quine 1950)[18]. What I

[18] This, however, is not always the case. Mozersky (2015) offers a version of the B-theory that supports endurantism, for example.

want to propose is that there is *prima facie* motivation to think that perdurantism is more successful than endurantism at capturing the way that objects present themselves in the world.

Only a part of an object O, strictly speaking, exists at any given moment according to perdurantism, but the temporal slices of O all nevertheless add together to carve out a unique place in space-time for O. As a result, O in its temporal totality is an amalgamation of all of the time slices of O. This means that the intrinsic properties of O need not be captured by any individual time slice of O. Perdurantism therefore provides a way to understand both the essential connectedness and the intrinsic variation of the properties of objects over time that is central to our understanding of worldly existence. Said another way, perdurantism does a good job of capturing the feeling we have that an object, such as a person, is more than they are at any given moment of time and that there is something that connects the different parts of an individual life across time into a coherent whole.

Endurantism is arguably well-equipped to deal with the unity of objects over time but struggles with the variation of objects over time. Because an object O endures by being wholly present at each moment it exists, as long as O has an extended temporal duration, there will be a connection between O at different times. This is because O is the selfsame object at any time it exists. The selfsame nature of O at different times, though, arguably precludes the intrinsic variation of O's properties over time given that it would be inconsistent to say that that which stays the same over time also varies over time. In this way, endurantism, unlike perdurantism, appears not to be suited to the changing of objects over time in a consistent manner. If one would like to preserve the mind-independence of change, the standard account of persistence offered by the B-theoretic, block universe therefore seems to be a better option than the standard account of persistence offered by A-theoretic, dynamic views.

3. Conclusion.

The discussion so far has furnished a basis from which to think that the B-theoretic, block universe presents a more successful overall semantic and ontological account of time than A-theoretic, dynamic accounts. Even if one agrees both that the majority of scientific and metaphysical considerations fall on the side of a B-theoretic, block universe and that the experiential considerations do not decide between the two views, one might nonetheless still lament the idea that the passage of time is mind-dependent. Can it really be the case that time would not pass without conscious beings? Is it plausible to separate mind-independent change from mind-independent temporal passage such that the first can exist without the latter? Is there no way to detangle the faulty account of mind-independent temporal passage endorsed by A-theoretic, dynamic accounts from the idea of the mind-independent passage of time in itself, such that the mind-independent passage of time can be made compatible with the B-theoretic, block universe? Those who are largely convinced by the arguments in support of the B-theoretic, block universe and yet not completely comfortable boldly asserting that the passage of time is a figment of conscious minds might be left fumbling for some way to reconcile the mind-independent passage of time with the B-theoretic, block universe.

Taking a page from Mauldin (2007), one way to combine the B-theoretic, block universe with the mind-independency of temporal passage would be to argue that the mind-independent passage of time is a brute fact about the world that does not require any explanation. The obvious downside of this route is that it makes the passage of time a very mysterious phenomenon. The only answer that can ever be given to questions connected to why it is that time really passes will be that time just does in fact really pass and there is nothing more to be said on the matter. A more illuminating path might be to, following theorists such as Mozersky

(2015) and Savitt (2009), advance a minimalist account wherein the explanation of and basis for mind-independent temporal passage is found in and consistent with the non-dynamic nature of the B-theoretic, block universe. If it could be shown that such an account is able to capture key aspects of our experience of time, then a positive – and not just a neutral – case could be made for the B-theoretic, block universe based on arguments from experience.

NON-DYNAMIC TEMPORAL PASSAGE

1. Introduction.

Within the philosophy of time, it has traditionally been the case that those who believe time really passes also think that the passage of time is a dynamic phenomenon (see Markosian 1992). While I want to argue that time really passes, I believe that the passage of time is not a dynamic process. This may seem like a counterintuitive view. What does it even mean to say that temporal passage itself involves no movement, flow, or becoming? My aim is to take some initial steps in providing a satisfactory answer to this question.

I start by introducing the two broad camps with a stake in the debate over the status of passage: dynamic theories and the block universe. My suggestion will be that, while there is reason to favor the ontological framework of past, present, and future provided by the block universe, neither the standard versions of dynamic theories nor the standard formulation of the block universe offer a satisfactory account of temporal passage. In place of these standard views, I will argue for a non-dynamic account of the mind-independent passage of time that is compatible with the block universe. In order to pre-empt claims that the non-dynamic account of temporal passage I offer is worrisomely disconnected from our experience, I outline some similarities between our pre-theoretic understanding of the passage of time and a non-dynamic account.

With some of the general features of a non-dynamic view of temporal passage in hand, I next introduce and defend my favoured non-dynamic account. According to the rudimentary version of this account, the mind-independent passage of time is a matter of entities and events being temporally located farther from or closer respectively to the high entropy and the low

entropy boundaries of our block universe, whereupon time passes for an entity or event E insofar as it has an extended temporal existence. Importantly, my non-dynamic account will end up being a very sparse view of passage, which adds nothing of metaphysical weight to the basic block universe. It will find the basis for mind-independent temporal passage in the structural resources and contingent modal features of the block universe we happen to inhabit. I conclude by considering some of the implications of and a potential issue with my account of the mind-independent and non-dynamic passage of time.

2. Does Time Really Pass?

Most philosophers will presumably allow that there is a sense in which time passes. There is, though, no universal agreement concerning the nature of such passage. Dynamic theorists typically hold that temporal passage is mind-independent (see Prior 1962). Block universe theorists, on the other hand, usually argue that it is mind-dependent (see Price 1996).

All dynamic theorists will hold that there is an *active* aspect to time. The active nature of dynamic theories is why they are coined 'dynamic'. Defence of the mind-independency of temporal passage is linked with the belief that time has an active nature insofar as it objectively flows, progresses, or, say, renews itself. That is why dynamic theories often go together with the mind-independency of temporal passage. Another key characteristic of dynamic theories is that they give ontologically special status to the present. The present, so it is claimed, is in some significant sense more real than either the past or the future and it is the present that does the flowing, progressing, or renewing. Dynamic theories are often intertwined with the A-theory. As a result, dynamic theories are standardly committed to there being genuine A-properties such as *being present* and *being future*. Since entities and events are constantly becoming less and

less future, then present, and then more and more past, entities and events are continually changing with respect to their A-properties. Examples of dynamic theories include presentism (see Bourne 2006), the moving spotlight theory (see Skow 2009), and the growing block theory (see Broad 1923)[19]. These views are generally thought to accord well with common-sense.

Denial of the mind-independency of temporal passage is accompanied by the suggestion that the movement of time is an illusion, perhaps a figment of conscious minds. Defending the equality of all times, the block universe theory is a model of ontological fairness that conceives of time as one dimension of a four-dimensional universe wherein the past, present, and future all exist. Although they are independent theories, the block universe is frequently associated with the B-theory[20]. Block universe theorists who champion the B-theory will find themselves devoted to the fundamental reducibility of A-properties to the B-relations of earlier than, simultaneous with, and later than. In contrast to dynamic theories, the block universe theory arguably fits better with our best physical theories than our everyday discourse (see Dainton 2010). The block universe is commonly thought to be supported by special relativity insofar as it is strongly suggested by the relativity of simultaneity, for example. The relativity of simultaneity tells us that sometimes there are no absolute facts about whether two events happen at the same time. This is in tension with the idea that there is an absolute present, an already-completed past and an as-yet unreal future, but it fits well with the block universe. Some have proposed that certain dynamic accounts can be formulated so as to be compatible with theories such as special

[19] Presentism holds that only the present exists and time passes insofar as the present changes or renews itself. According to the moving spotlight theory, the past, present, and future all exist and time passes as the "illuminated" present moves from the past to the future. The growing block view posits that only the past and present exist and time passes as the present edge of the block expands bringing the non-existent future into existence.
[20] Silberstein et al. (2018) offer a helpful discussion of the relationship between, on the one hand, dynamic theories and the A-theory and, on the other, the block universe and the B-theory.

relativity[21]. Yet, when it comes to the specialness of present moments and the dynamic passage of time, the block universe and our fundamental physics are widely taken to be on the same page (see Silberstein et al., 2018). Both do without positing anything like the objective, ontologically special present that is required for a flowing or moving picture of time itself[22].

Where does all of this leave us? Is there a way to provide a consistent view that does not relegate temporal passage to mind-dependency and is based in the metaphysical view often thought to be the most compatible with the science of our world? I believe that we can in fact offer a coherent account of the mind-independent passage of time in the block universe. Toward this end, my primary task in what follows will be to argue for a revised version of the standard block universe view of the passage of time.

3. The Mind-independent and Non-Dynamic Passage of Time.

One thing to note at the outset is that the reason why the block universe theorist typically denies that the passage of time is a real feature of our world is that they follow the dynamic theorist in supposing that the passage of time must be a dynamic phenomenon. Since, without even getting into the complications with trying to supply a coherent account of dynamic passage, there is no room for genuine movement or becoming in the "static" block, the block universe theorist has no option but to reject the mind-independent passage of time and instead relegate temporal passage to the mind.

[21] Skow (2009) argues that the moving spotlight theory can be made compatible with special relativity and Hinchliff (2000) claims that presentism is a tenable view even in a relativistic setting, for instance.

[22] The idea being that both physics and the block universe lack many features associated with dynamic theories and our everyday conception of time. While this general claim is presumably uncontroversial, it has been proposed that quantum mechanics may be more hospitable to such features than relativity (see Callender 2017).

In contrast to the standard block universe approach to temporal passage, my suggestion is that we should set aside some of our preconceptions of what temporal passage ought to be and instead look to the block itself for guidance. Doing so, I believe that we will find that there is a ready, albeit perhaps not what we expected, account of the mind-independent passage of time that we have been overlooking, with our blinders on so to speak. This is not to say that we must completely redefine the passage of time away from its use in our everyday language. It is also not to say that the difference between dynamic and non-dynamic passage is merely a matter of definition. It is, however, to say that when we throw into question and set aside certain features of our pre-theoretic dynamic notion of temporal passage, we are left with something akin to it, yet without many of its problematic characteristics.

3.1. Some Initial Groundwork.

One way to highlight the difference between the view that I will be arguing for and other possible views is to point out its place within the available options for the fundamental nature of the passage of time. These options include:

The passage of time is: Mind-Independent Dynamic	*The passage of time is:* Mind-Independent Non-Dynamic
The passage of time is: Mind-Dependent Dynamic	*The passage of time is:* Mind-Dependent Non-Dynamic

My aim is to argue for the option in the top right column. This option finds little support within the literature and the version of it that I defend below is by and large a novel contribution. As it is defended by the standard A-theoretic, dynamic theorist, the option in the top left column is difficult to reconcile with both the science and metaphysics of our world. The option in the bottom left column finds strong opposition from our experience. While the bottom right column is an open option, I am not aware of anyone who has defended such a view and I will not be examining it here.

Although in the minority, there have been B-theorists who have followed the standard A-theoretic, dynamic theorist and argued for a version of the top left column – the view that the passage of time is mind-independent and dynamic. Maudlin (2007), for instance, is a block universe theorist who defends what:

> …ought to be a most uninteresting conclusion, but one that has somehow managed to become philosophically bold: time does pass. Its passage is not an 'illusion' or 'merely the product of our viewpoint' or 'an appearance due to our special mode of perception'. Its passage is not a myth. The passing of time may be correlated with, but does not consist in, the positive gradient of entropy in the universe. It is the foundation of our asymmetrical treatment of the initial and final states of the universe. And it is not to be reduced to, or analyzed in terms of, anything else. (p. 142)

Whereupon, it turns out that on Maudlin's view:

> The passage of time is an intrinsic asymmetry in the temporal structure of the world, an asymmetry that has no spatial counterpart. It is the asymmetry that grounds the distinction between sequences which run from past to future and sequences which run from future to past. (…) The passage of time underwrites claims about one state 'coming out of' or 'being produced from' another. (p. 108/110)

The view that I will present below takes a page from of Maudlin in that it is a block universe theory of time which argues that time really passes. My view will also draw a close connection between the entropy gradient of the block universe, the asymmetry in the boundary conditions of the block universe, and the passage of time. Nevertheless, there are a few notable differences between a view like Maudlin's and the view that follows.

Maudlin claims that the passage of time is a fundamental and irreducible fact about the structure of our block universe. In contrast, one of my main aims is to provide a plausible account of the underlying basis for the mind-independent passage of time in the block universe. Doing so, it is hoped, will remove some of the mysteriousness inherent in positing that the passage of time is a brute fact about the world. Another difference is to be found in Maudlin's characterization of the passage of time as underwriting states "producing' or 'coming out of' other states. While Maudlin maintains that time itself does not move or flow, his talk of production does seem to introduce an active and dynamic element into the temporal dimension of the block universe. The account that I will offer is strictly in line with the standard formulation of the block universe, and thus contains no active or dynamic elements. Lastly, in defining the passage of time as an intrinsic asymmetry of the temporal dimension, Maudlin arguably equates the passage of time with the direction of time. Although I do agree that there is a close

connection between the passage and direction of time, my argument will ultimately be that the passage of time supplies the explanatory basis for the direction of time.

As a way to mitigate potential concerns that any account of non-dynamic passage will be worryingly disconnected from our ordinary usage of the term 'temporal passage', it might help to set out some connections between our everyday, pre-theoretic usage of the term and a non-dynamic usage. It is presumably uncontroversial to say that our ordinary usage of 'temporal passage' is both motivated and underwritten by our experience of the passage of time. If this is the case, then any similarities between our ordinary usage and a non-dynamic usage of the term 'temporal passage' will also serve to highlight a correspondence between our experience and the non-dynamic passage of time. Demonstrating such a correspondence is important because it shows that the non-dynamic theorist can use the metaphysics of our world to account for aspects of our experience of time. Since one of the major objections advanced against the standard block universe picture of the passage of time is that it endorses a metaphysical picture that runs afoul of our experience of time, a non-dynamic account of the mind-independent passage of time could help the block universe theorist with one of its main historical stumbling blocks.

The primary difference between our pre-theoretic conception of temporal passage and a non-dynamic conception of temporal passage is that the former both incorporates dynamic language and meshes well with a dynamic way of viewing the world, while the latter is both articulated in non-dynamic language and suited to a non-dynamic world. The two conceptions are therefore working from inherently disparate paradigms. Despite this difference, there are central aspects of our pre-theoretic notion of temporal passage that can be captured by a non-dynamic account. In order to show that this is in fact the case, I next outline seven commonalities between our pre-theoretic conception of the passage of time and a non-dynamic

conception of the passage of time. Both views should be taken to be mind-independent analyses of temporal passage.

Starting with pre-theoretic connotations surrounding the passage of time, it seems to me that the following holds true:

Pre-theoretic understanding of the term 'temporal passage': In looking to provide a working definition of what it means to say that time passes, it seeks to describe the mechanism by which time passes. In no particular order, some of the key features of this mechanism include:

(I) It is a phenomenon whereby moments get taken up from the future and added to the past.

(II) A standout feature of it is that the present is of momentary and fleeting duration.

(III) It cannot be put to a halt and its workings are irrevocable.

(IV) It offers a way to distinguish that which belongs to the present from that which belongs to the future or the past.

(V) Anything that exists in time and has duration experiences it.

(VI) It acts as a signpost to count the years, days, and minutes (i.e. the moments) of existence.

(VII) It is distinctive to time and is something that distinguishes it from space.

With these features in hand, we can turn to non-dynamic temporal passage:

Non-dynamic understanding of the term 'temporal passage': Also seeks to describe the mechanism by which time passes. Supposing that tensed language can be reduced to a tenseless meta-language[23], some of the key features of this mechanism include:

(I)* It is a phenomenon whereby more time can be said to be earlier and less later (i.e. time is added to the past and subtracted from the future).

(II)* The now is of a finite and limited extension.

(III)* It exists eternally and tenselessly.

(IV)* It offers a way to distinguish that which is earlier from that which is later (i.e. to distinguish that which belongs to the present from that which belongs to the future or the past)

(V)* Anything that is extended in time experiences it.

(VI)* It acts as a signpost to distinguish the years, days, and minutes (i.e. the moments) of existence.

(VII)* It is distinctive to time and is something that distinguishes it from space.

A point worth stressing is that the difference in the paradigms behind (I)-(VII) and (I)*-(VII)* underscores the idea that by definition no non-dynamic account will ever be able to supply metaphysics that directly account for our experience that days "flow", hours "drag on", or that the progress of time itself cannot be "stopped". If this is what one demands of a theory of passage, then the only available options are going to be the A-theoretic, dynamic ones. What a non-dynamic account can offer is way to identify other basic aspects of our experience of

[23] More will be said on this below.

temporal passage in the world itself. This is enough to conclude both that non-dynamic passage directly vindicates central features of our experience of time and that our experience of time gives support to non-dynamic passage. The experiential import of non-dynamic passage is therefore a clear improvement over the illusory accounts of temporal passage proposed by traditional block universe theorists.

Excepting (III) and (III)*, the similarities between (I)-(VII) and (I)*-(VII)* are all seemingly straightforward. (I) and (I)* capture the feeling that the passage of time acts as the umpire of the past, present, and future. (II) and (II)* correspond to our experience that the present is limited in duration. (IV) and (IV)* get at the feeling that without the passage of time it would make little sense to say that there is a difference between that which is present, that which is past, and that which is future. (V) and (V)* support the experience that if something exists in time, then it will undoubtedly be subject to the passage of time. (VI) and (VI)* connect to our conventional use of the passage of time in accounting for the time that is given to us. (VII) and (VII)* buttress our experience that, while time passes, space does not pass. The connection between (III) and (III)*, however, is a bit winding.

(III) holds that the passage of time is a phenomenon that cannot be stopped[24] and that the influence it has cannot be changed or reversed. That the passage of time cannot be stopped according to our common understanding of it seems clear. While it may feel like some moments drag on forever and others speed by much too quickly, I do not think anyone would seriously propose that a defining feature of the workings of temporal passage is that it can be stopped and started on command, at will, or even randomly. It also seems central to our understanding of the passage of time that it cannot be flipped or altered. We neither believe that we are able to wake

[24] Here we might want to add the caveat that this holds for matter travelling at subluminal speeds.

up one morning to the experience of moments that have passed awaiting our future experience nor think that temporal passage can be shuffled or mixed up insofar as a random moment that has passed, for example, can suddenly make an appearance in the present in any form other than recollection.

(III)* proposes that the passage of time is a phenomenon that is essentially untensed and exists as it does, in its totality, eternally. To say that the passage of time is a tenseless phenomenon is simply to say that it neither relies on nor brings about an ontologically fundamental distinction between absolute and objective notions of past, past, and future. Although we may in general find it easier and more intuitive to talk in terms of past, present, and future, it is important to keep in mind that these notions do not, according to the block universe theorist, strike a real divide between three distinct aspects of time. Instead, as long as the block universe theorist is also a B-theorist, what is past can be reduced to that which is earlier than a given moment, what is present can be reduced to that which is simultaneous with a given moment, and what is future can be reduced to that which is later than a given moment[25]. Reducing tensed language to a tenseless metalanguage, we end up with a semantic view wherein the truth value of our propositions is had *simpliciter* rather than at times (as would be the case with a tensed semantics). Given that propositions have their truth value simpliciter, a proposition does not change its truth value over time. An instance of such a reduction would be reducing the tensed sentence "It snowed today" to the tenseless sentence "It snowed on 29 December 2017"[26]. On a tenseless picture, the passage of time is therefore fundamentally connected to the earlier

[25] I will address why it is plausible to assume that the block universe theorist will also be a B-theorist in section 4.
[26] Although it is not a topic I will be focusing on in this project, for more on the semantics of time see, for instance, Farkas (2008), Mozersky (2015), or Prior (1968).

than relation[27]. What, though, might it mean to say that the passage of time is a phenomenon that exists eternally?

The reading of 'eternal' that I want to endorse is one wherein an eternal entity is an entity that exists throughout all time. If time has a beginning and an end, then such an entity exists from the beginning to the end of time. If time has no beginning or end, then such an entity exists forever[28]. According to this reading, the eternally existing totality of events and facts that makes up our world exists at every moment. Importantly, this does not mean that events such as the snowstorm of 2015 exist *in* every moment, but rather that at every moment the totality of events and facts which they form a part of exists. This coincides well with the idea that the block universe is itself "all there". If this is indeed the right way to interpret the eternal existence of the four-dimensional block, it should also be the correct way to understand the passage of time in the block. The reason for this is that the passage of time would, as a feature of the eternally existing temporal dimension, also be itself eternally existing. If this is the case, then what is meant by the claim that the passage of time exists eternally is that it is a phenomenon that exists throughout all of time.

Bringing everything together, the main similarity between (III) and (III)* rests in the binding and unremitting nature that both ascribe to the passage of time. For, just as (III) proposes that the passage of time is an irrevocable phenomenon that continues as long as there is

[27] As with the relation between the block universe and the B-theory, I will have more to say on the nature of this connection in section 4.

[28] See Oaklander and Smith (1995) for a detailed discussion of the various ways to understand the notion of 'eternal'. Oaklander and Smith ultimately endorse a reading of eternal wherein an eternal entity, while not independent of time, exists apart from it. Such an entity contains time within it and yet does not exist in time itself. A full analysis of Oaklander and Smith's account would take much more room than there is space for here. However, in short, their understanding of eternal existence seems flawed to me insofar as it implies that events, such as my finishing *Life and Fate* in 2017, do not exist in time but rather merely contain time. This understanding of eternal is arguably at odds with the block universe, which holds that all entities and events that make up the totality of entities and events are ontologically on par.

time, (III)* holds that the passage of time is an eternally existing phenomenon relating the permanent ordering of moments along the temporal dimension of the four-dimensional block.

These opening thoughts are meant to provide some initial general clarification of what it might mean to say that the passage of time is both mind-independent and non-dynamic. I now turn to the specifics of my account of the mind-independent and non-dynamic passage of time in our block universe.

3.2. MNDP.

There are a few points worth re-emphasizing about the account of mind-independent and non-dynamic temporal passage that follows:

- First, it is motivated by both the block universe picture of time and our experience of time.
- Second, it accepts the block universe as the correct account of the fundamental ontology of space and time. It neither adds to nor augments the basic four-dimensional manifold that is the block.
- Third, it is a very sparse account of temporal passage.

With these provisos, we can start by marking a distinction between two ways of thinking of the block universe:

View from Nowhen: This is the view which encompasses the entire block universe itself and stands outside the block with all of the moments that make up the block spread out before it. It is the 'eternalist' viewpoint of the block.

View from the Block: This is the view of an observer from within the block. It has to go through the moments one by one and experiences the moments as would, say, a human being. It is the everyday, experiential viewpoint of the block.

Neither the View from Nowhen nor the View from the Block are meant to be literal interpretations of a perspective which is able to view the block universe. They are, instead, meant to be devices which serve to highlight that there is an important difference between thinking of the block *sub species aeternitatis* and thinking of the block from a vantage point within the block itself. Another way to draw the contrast is to say that the View from Nowhen is a way to think about the content of the block that does not change between differing temporal perspectives, while the View from the Block is a way to think about the content of the block that is relativized to a temporal frame of reference[29].

While all of time can be said to have "passed" if you are thinking of it from the View from Nowhen, it has, from any individual point in the manifold itself, not all passed (i.e. time can still be said to be "running its course"). As a result, although the passage of time is a single phenomenon, there will be two different ways to describe it depending on which perspective we are considering it from. Nevertheless, I want to argue that from either perspective the reality is that the passage of time is a mind-independent and non-dynamic phenomenon that exists

[29] See, for instance, Ismael (2015) for further discussion on the general idea behind the distinction between the View from Nowhen and the View from the Block.

eternally and tenselessly. Below is the general structure that I want to propose for such an account.

The embarkation point is an asymmetry that is brought out by the explanatory power inherent in the temporal boundary conditions of the universe (see Maudlin 2007). Assuming that the fundamental physical laws of our world are deterministic, in order to give an account of the total state of the world we will need both the laws and the boundary conditions. I will work from the model that:

> **Boundary Q:** Q is in a state of very low entropy and as we work in time from Q to R entropy increases.
>
> **Boundary R:** R is in a state of high entropy and as we work in time from R to Q entropy decreases.

As a way to present my view of passage as simply as possible, I am for the moment assuming that our block universe is fully temporally bounded. I will, however, have more to say about the boundedness of space-time when I address some of the potential issues with my account in section 4.

To see the explanatory import of the relationship between the boundaries we can begin by noting that, in order to account for the actual world, we need the constraints we place on whichever boundary we choose to determine the other boundary to be specifiable apart from what comes about as a result of the laws themselves. As described by Maudlin (Ibid):

> …in order to account for the universe as we see it, we need more than the laws: we need a constraint on one of the boundaries. That constraint, together with the operations of the laws, then suffices to account for the nature of the other boundary. But in order for this to work *the constraint must itself be specifiable independently of what will result from the operation of the laws*. (p. 132)

What Maudlin is pointing out is that we are able to determine, with relative freedom, the conditions of one of the boundaries by both specifying the constraints on the other boundary and finding a unique global solution to the laws. The boundary that is to determine the other boundary, however, cannot be reliant on the determined boundary together with the laws of nature since, in order for it to be the determining boundary, its conditions must be identifiable independently of any sort of temporal evolution of the laws themselves.

Applying the explanatory asymmetry of the boundaries to Q and R, it turns out that Q meets the requirements for a determining boundary while R meets the requirements of a determined boundary. Remembering that Q is in a state of very low entropy and R is in a state of very high entropy, the idea underlying the explanatory asymmetry between Q and R is further brought out by Maudlin in the following (Ibid):

> The initial state is atypical because it has low entropy, i.e. because it occupies (relative to the natural measure) a very very very small volume of phase space. One can characterize this atypicality without any mention at all of how such a state will evolve. The final state, however, is microscopically atypical in a way that can *only be characterized in terms of how it will 'evolve' through time*. It is microscopically atypical

> because temporal evolution in one direction from it will lead, over a very long period of time, to monotonically lower entropy. (p. 132/133)

Whereupon:

> Even though the laws themselves might run perfectly well in reverse, even though the time reverse of the final state might give rise to the time reverse of the initial state, we cannot specify an independent, generic constraint on the final state that will yield (granting the final microstate is atypical) ever decreasing entropy in one direction. (…) The atypical final state is accounted for as the *product of an evolution from a generically characterized initial state* in a way that the initial state cannot be explained as a product of evolution from a generically characterized final state. (p. 133)

Although Maudlin speaks in terms of initial and final states and for the moment I want to avoid temporally ordering the relationship between Q and R, Q fits the specifications of the initial state and R fits the specifications of the final state. The constraint we placed on Q – namely, that it is in a state of very low entropy – is a condition that will not come about as a result of R and the laws. The constraint we placed on R – namely, that it is in a state of very high entropy – will come about as a result of Q and the laws. This is because we can explain a state of high entropy from the laws together with the assumption of a state of very low entropy. We are not, on the other hand, able to explain a state that is in very low entropy from the laws together with the assumption of a state of very high entropy. To see why there is this asymmetry in the

explanatory power of Q and R, we need to say a bit more about the second law of thermodynamics.

Classical thermodynamics makes it a necessary truth that entropy increases. This means that it rules out the possibility of occasional, isolated instances of entropy decrease. The statistical definition of entropy is equivalent to the classical thermodynamic definition of entropy to within Boltzmann's constant[30]. Applying statistical methods to the thermodynamics of large systems of particles, we end up with the result that it is overwhelmingly likely that the entropy of an isolated system will increase over time. This is because, according to statistical mechanics, entropy is a measure of the probability of the distribution of the microstates of a macroscopic system. The greater the probability of the arrangement of the microscopic states of a macroscopic system, the higher the entropy. Seeing as there are many more disordered than ordered microscopic states[31], the odds are extremely high that from any temporal slice of an isolated system the entropy of that system will increase. From here on, I will be working with a statistical reading of entropy in the second law and the assumption that our universe is itself an isolated system[32].

Connecting the second law to the explanatory power of the temporal boundaries of our world, we end up with the following:

(i) According to the second law it is overwhelming likely that from any temporal slice the entropy of our world will increase.

[30] $k=R/N_A$ (where R = the gas constant and N_A = the Avogrado constant).
[31] We could also put this in terms of thermal energy available to do work or information available, instead of referring to the order and disorder of a system.
[32] For more on the relationship between thermodynamics, statistical mechanics and entropy see, for instance, Swendsen (2017).

(ii) Boundary Q is in a state of very low entropy.

(iii) As we work away from Q in time entropy increases.

(iv) Boundary R is in a state of high entropy.

(v) As we work away from R in time entropy decreases.

(vi) Combining (i), (ii), and (iii), we have a consistent way to explain (iv).

(vii) Combining (i), (iv), and (v), we do not have a consistent way to explain (ii).

From (i)-(vii), it follows that the explanatory resources of our world are powerful from Q to R but not from R to Q.

My account so far has two pieces:

- The distinction between the View from Nowhen and the View from the Block
- The asymmetry in the explanatory power of Q and R

At this juncture, it may rightly be wondered what these two features have to do with the passage of time. The answer is that, assuming that the "static" temporal dimension of the block is extended beyond a single moment of time, combining the View from Nowhen – the view from which all times are equally real – with the explanatory asymmetry in the temporal boundary conditions of our world should lead us to conclude that time passes from Q to R and not from R to Q. To see why this is, we can start by noting that the passage of time supplies the overall difference between past-to-future and future-to-past. Given that time passes from Q to R, the past-to-future runs from Q to R. If time were to pass from R to Q, then the past-to-future would run from R to Q. To this we can add the idea that the explanatory relationship between Q and R,

which works from Q to R but not from R to Q, is one wherein the explanans is always in the past of the explanandum insofar as the explanans is the antecedent condition for the explanandum. Hence, if the passage of time is that which distinguishes past-to-future from future-to-past and if the explanatory asymmetry between Q and R runs from past-to-future, then time must pass from Q to R and not from R to Q.

In what follows, my task will be to expand on and defend the details of this analysis of the connection between, on the one hand, the View from Nowhen, the View from the Block, and the asymmetry in the treatment and explanatory power of Q and R and, on the other hand, the mind-independent and non-dynamic passage of time. I start by providing a working definition of what I mean by the mind-independent and non-dynamic passage of time. I then home in on why it is that the passage of time is the appropriate mechanism by which to differentiate past-to-future from future-to-past.

The account of the mind-independent and non-dynamic passage of time that I want to defend is:

> **The Mind-independent and Non-dynamic Passage of Time (MNDP):** From any moment M within the block universe there is time between M and Q and M and R (unless M is the moment at either end of the block). If there is more time between M and Q than there is between M and R, then more time can be said to have passed than if there is less time between M and Q than there is between M and R. Time passes for an entity or event E insofar as it exists for and occupies more than one moment M between Q and R.

Applying MNDP to the distinction between the View from Nowhen and the View from the Block:

> *MNDP and the View from Nowhen:* From the perspective of the View from Nowhen, all moments of time are equally real and accessible, i.e. all of time is spread out before this view. There is a distinction of the block between Q and R, and, viewing time *sub specie aeternitatis*, the view from Nowhen can "view" all of time passing. There is a sense, then, in which we can say that for the View from Nowhen all of time has passed.

> *MNDP and the View from the Block:* From the perspective of the View from the Block, the present moment is experienced as real while the past and the future are felt to be in some significant sense less real than the present. This view gets at the intuitive view of an observer in the block. If the View from the Block has any sort of continued existence beyond a moment, then there will be moments that it has visited and moments that are still to be visited. As long as its existence is extended beyond a single moment in the block, time passes for the View from the Block.

In turning toward an answer to why it is that the passage of time supplies a distinction between past-to-future and future-to-past in the block, we can begin by noting that when we combine:

(a) The idea that all of time is equally real and there is a difference in the treatment and explanatory power of the boundary conditions needed to produce the actual block universe we inhabit.

With the claim that:

(b) More time has passed if we are closer to boundary Q than boundary R (as described above), while less time has passed if we are closer to R than Q. Time passes for an entity when it exists at more than one moment M of time.

We end up with:

(c) If an entity or event E exists at all moments M_I, M_{II}, and M_{III} and from E's frame of reference:

- M_I is closer to Q than R in relation to M_{II} and M_{III}
- M_{II} is closer to R than Q in relation M_I
- M_{II} is closer to Q than R in relation to M_{III}
- M_{III} is closer to R than Q in relation to M_I and M_{II}

then, insofar as less time has passed for E when is it is closer to Q than when it is closer to R, moments closer to Q than M_I will be in the past for E while moments closer to R than M_{III} will be in the future for E. While this is the general idea, it should be noted that we could be more

specific by stating exactly which moment M_I, M_{II}, or M_{III} from which we are considering E. From what has been said, we can define past-to-future versus future-to-past as:

Past-to-future vs. future-to-past: The past-to-future for E is from M_I to M_{III} and the future-to-past for E is from M_{III} to M_I insofar as the following is true:

(i) The above relations between M_I, M_{II}, and M_{III} and Q and R hold.

(ii) The passage of time is a phenomenon whereby more time resides in the past as more time passes and less time resides in the future.

(ii) was an undefended supposition first introduced during the discussion of the link between our pre-theoretic understanding of temporal passage and non-dynamic temporal passage. It is meant to be taken as an intuitively appealing general feature of the passage of time. The claim being that an important and defining characteristic captured by both our everyday, pre-theoretic thinking and a non-dynamic account is that the passage of time not only marks a distinction between what is past and what is future but provides us with information about how much time has passed for any given entity or event. Remembering that all talk of 'past' and 'future' reduces down to the earlier than relation, we can get an idea of how much time has passed in connection to an entity or event E between moments M_A and M_B, for instance, by referencing the amount of time between M_A and M_B in relation to Q and R.

One might object that (ii) builds the direction of time into the definition of the passage of time. In reply, it can be pointed out that there does indeed appear to be a close connection between the passage and direction of time. While I do not want to say that this connection is one

wherein the direction of time is contained within the passage of time, I do think that they are not independent phenomena. I will have more to say about this relationship below, but at this point I want to emphasize that, rather than being a worry, this potential concern with (ii) actually seems to get at something important about the nature of time.

In sum, in being the mechanism by which more or less time can be said to be past or future, the passage of time informs us of the amount of time that is in the past and the amount of time that is in the future in relation to the frame of reference of any given entity or event. The distinction between past-to-future and future-to-past is therefore defined by referencing the passage of time with respect to the frame of reference of any given entity or event E. As a result, there is no absolute past, present, or future according to MNDP. In line with special relativity, that which is considered past from one frame of reference may be past, present, or future from a different frame of reference.

Figure 3 offers an illustration of MNDP as exhibited by E's existence in the block:

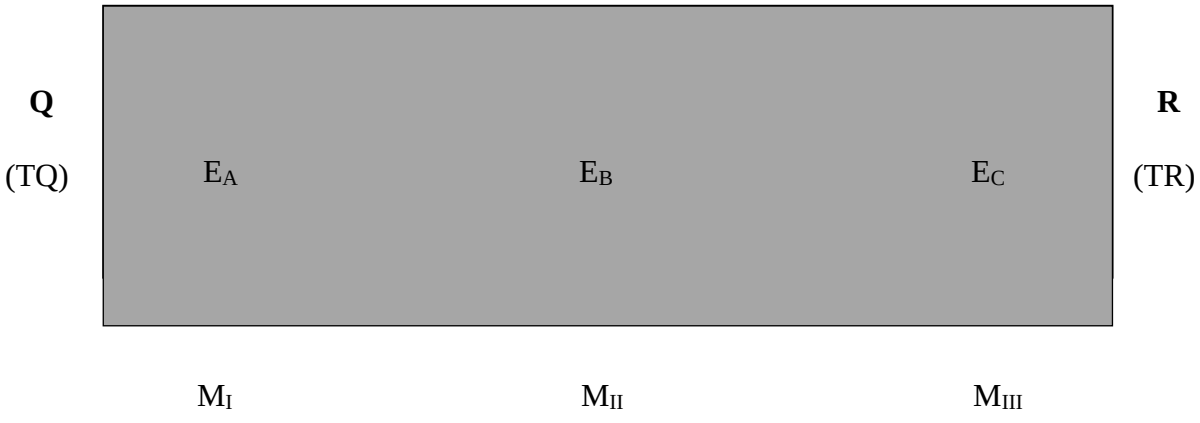

Figure 3: MNDP[33]. Less time has passed for E_A than for E_B and E_C. More time has passed for E_B than E_A and less time has passed for E_B than E_C. More time has passed for E_C than for E_B and E_B[34].

As previously noted, MNDP is a very minimal statement of the passage of time. It is, nevertheless, rich enough to supply substantial answers to the following three pivotal questions about temporal passage:

- *What is the basis of the passage of time?*
- *What does the passage of time itself amount to?*
- *What does the passage of time explain?*

The first question asks what, if anything, explains the passage of time. Is there something to which we can point that underlies temporal passage? Whether it turns out to be reducible to facts about the psychology of human beings, facts about the fundamental ontological structure of the world, or even a brute fact in itself, every theory of the nature time must, if it is to be an adequate theory, offer some commentary on the basis of the passage of time. The exposition provided by MNDP is that the passage of time, as a real feature of our world, has a basis in both the necessary ontological structure of the block universe (i.e. the framework of spacetime provided by the four-

[33] Picking out the location of E_A, E_B, and E_C is not meant to separate the block into an absolute, objective, and universe-wide division between M_I, M_{II}, and M_{III}. Instead, pointing at the temporal location of E_A, E_B, and E_C in the block should be treated indexically.

[34] E_A, E_B, and E_C can be thought to represent either separate entities/events or different temporal parts of an entity/event E.

dimensional manifold) and the contingent features of the block we find ourselves inhabiting (i.e. the boundary conditions and the entropy gradient).

The second question asks for a description of the passage of time. How might we succinctly characterize temporal passage? According to MNDP, the answer to this question is extremely simply, perhaps deceptively so. It follows from MNDP that the passage of time itself amounts to the occupation of entities and events at successive moments in the block, whereupon more time has passed for an entity or event E at temporal locations of its existence that are closer to the high entropy boundary than the low entropy boundary and less time has passed for E at temporal locations of its existence that are closer to the low entropy boundary than the high entropy boundary. Time passes for E so long as E has an extended temporal existence in the block. There will be a difference in description depending on whether we are thinking of temporal passage from the View from Nowhen or from the View from the Block.

The View from Nowhen "sees" the world as a global permanent arrangement of entities and events existing at different moments of spacetime. All of these entities and events, if they have any temporal extension, will exist in fixed relations both with their own temporal slices and the temporal slices of other entities and events. Since the View from Nowhen is a – fictional – perspective of the entire block, it will have a global view of the temporal dimension and will therefore conclude that temporal passage is a unified phenomenon that encompasses everything that is to be found in time. The View from Nowhen, consequently, informs us that time passes for an entity or event E as E changes – in a non-dynamic sense[35] – its temporal position in the block. The View from the Block, on the other hand, provides a local perspective on temporal passage. If this view belongs to a conscious observer, then we can say that time passes as

[35] I will expand on this notion in section 4.

conscious experience changes. If this view belongs to an event or a non-conscious entity E, then we can say that time passes as E undergoes either an internal change or an external change with respect to its relation to other entities or events.

The third question asks about the significance of the passage of time. What work does temporal passage do in accounting for and helping us to understand the world? The answer according to MNDP, which has been described in detail above, is that the passage of time explains the distinction between past-to-future and future-to-past in our block universe. This, in turn, allows us to make sense of claims along the lines of: A is earlier than B, A is simultaneous with C, and B is later than C. Given that it explains why there is a difference between that which is earlier and that which is later in our block universe, MNDP also provides a plausible explanation for why our world just so happens to have a temporal dimension that is directed. There are two steps to the connection MNDP draws between passage and direction:

> *Step 1:* The passage of time explains the distinction between past-to-future and future-to-past. This means that it explains the difference between earlier-to-later and later-to-earlier.
>
> *Step 2:* Time has a direction insofar as some moments and their accompanying entities and events come earlier than other moments and their accompanying entities and events. The arrow of time is thus grounded in the asymmetry provided by the earlier than relation.

From step 1 and step 2, it follows that:

Conclusion: The passage of time provides an explanation for the direction of time.

Furnishing the explanatory basis for both the earlier than relation and the direction of time, the account of temporal passage contained within MNDP is explanatorily powerful.

4. Implications of and a Potential Concern with MNDP.

I begin this section by addressing some of the implications that follow from MNDP's description of temporal passage and its account of the explanatory significance inherent in temporal passage. I then consider and respond to a potential concern for MNDP that arises from its treatment of the basis for temporal passage.

4.1. Implications of MNDP.

There are two substantial implications of MNDP that are worth highlighting. First, MNDP suggests that there is a very close connection between the passage of time and change. Second, if the block universe theorist is a B-theorist, they are going to want to endorse MNDP rather than the standard block universe account of temporal passage. While the first implication may seem innocuous or even fitting, the second implication is apt to strike some readers as distasteful.

The relationship between the passage of time and change contained within MNDP is brought out by its description of temporal passage. If the passage of time itself simply amounts to entities and events occupying different moments at different times in the block, then the passage of time is either identical to non-dynamic (a.k.a. B-theoretic) change or is in some way essential for such change. Non-dynamic change holds that what it is for something to change is merely for it to have one set of properties at one time and a different set of properties at an earlier

or a later time. For instance, at time T1 a light is red and at a later time T2 the same light is green.

Given both the description of temporal passage proposed by MNDP and the definition of non-dynamic change, I want to argue that the following are characteristics of the relationship between the passage of time and change:

- The passage of time is not identical with change
- The passage of time is necessary for change
- Change is sufficient for the passage of time

These three characteristics are arguably a *prima facie* attractive way of thinking of the connection between the passage of time and change. Upon quick reflection, there does seem to be something agreeable in the idea that the passage of time and change are distinct phenomenon. One might, for instance, try to ground this contrast in the idea that change belongs both internally to entities and events and to the external relationship that holds between entities, events, and their surroundings, while the passage of time belongs solely to the world at large. That the passage of time is necessary for change finds support from the plausible claim that things around us and, indeed, the world itself would not undergo change if time did not pass. Lastly, that change is sufficient for the passage of time might be said to come from our sense that if there is change, then surely time must pass. Although these initial thoughts on temporal passage and change are stated in dynamic terms, they can be translated into the non-dynamic language of MNDP.

According to MNDP, the reason that the passage of time is distinct from change is grounded in the explanatory import of temporal passage. Granted that the passage of time is the basis for the earlier than relation and given that change requires the earlier than relation, the passage of time and change cannot be one and the same thing. Stated another way, the passage of time, insofar as it marks the differentiation between past-to-future and future-to-past, allows for the distinction between that which is earlier and that which is later while, since non-dynamic change is fundamentally a matter of properties being had at one time that are not had at an earlier or later time, change depends upon their being a way to differentiate that which is earlier from that which is later.

The explanation of the distinction between the passage of time and change offered by MNDP also contains the answer as to why passage is necessary for change and change is sufficient for passage. If, on the one hand, change relies on the earlier than relation and if the passage of time supplies the earlier than relation, then change will require the passage of time, and hence there will be no change without the passage of time. If, on the other hand, change is a matter of entities and events having different properties at one time than they did at earlier or later times and if the passage of time itself boils down to the occupying of entities and events at different moments in the block, a difference in the properties belonging to an entity or event E at one time in comparison to E at an earlier or later time will be enough to conclude that E resides at different moments in the block. Importantly, the argument is not that the passage of time is the *cause* of E's having different intrinsic properties. Rather, the claim is that the passage of time brings about a change in the extrinsic relational properties of entities and events, which may also be accompanied by a change in the intrinsic non-relational properties of entities or events.

In concluding the discussion of the first implication, it is worth mentioning that the standard block universe theorist will agree that the passage of time is a distinct phenomenon from change. They will, though, want to allow for non-dynamic change in a world wherein the passage of time is mind-dependent. This means that they will strongly disagree with both the claim that the passage of time is necessary for change and the claim that the passage of time is sufficient for change. Nevertheless, if these claims are, as I have suggested, consistent with both the block universe we happen to inhabit and supported by our experience of the world, then MNDP will have a clear advantage over the standard version of the block universe. Not only will it be able to provide an account of the block universe that vindicates important features of our experience that time really passes, it will provide a justification for the feeling both that change would not occur unless time passes and that there is change where time passes.

The second implication that follows from MNDP's description of and commitment to the explanatory significance of temporal passage is that the block universe theorist, assuming they are a B-theorist, should be motivated to accept MNDP. The connection between MNDP and the B-theory rests in the earlier than relation. Since they are committed to the irreducibility of the tenseless earlier than, simultaneous with, and later than ordering of the B-series, the B-theorist will only be able to endorse a theory that can account for the fundamentality of the earlier than relation. MNDP provides such a theory. Further, if MNDP's claim that the passage of time provides the mind-independent basis from which to distinguish that which is earlier from that which is later is correct, then the passage of time, in providing the general basis for the earlier than relation, is essential to a key aspect of the B-theory. The standard version of temporal passage in the block universe would not meet the demands of the B-theory since it holds that the passage of time is mind-dependent. The B-theoretic block universe theorist should, then, prefer

MNDP to the standard block universe account of temporal passage since they are going to want to find a mind-independent way to distinguish that which is earlier from that which is later and this means that they are going to need to find an objective grounding for the earlier than relation.

At this point, it may be countered that there is no reason to presume that the block universe theorist will also be a B-theorist. Why can the block universe theorist not, for instance, commit to the existence of the four-dimensional block while denying that the moments in the block are related by the earlier than relation? What I want to suggest is not that there is no way for one to be a block universe theorist without being a B-theorist. That line of reasoning would seem to be plainly misguided seeing as one might, for example, combine the block universe with some sort of moving spotlight that divides the block into the A-theoretic tensed distinctions of absolute past, present, and future. What I do want to propose is that it is reasonable to assume that the block universe theorist will most likely also be a B-theorist. The block universe provides a becoming home for both the eternalist continuum and the relational earlier than, simultaneous with, and later than ordering of the B-theory. In addition, unless they are willing to accept that no moment, event, or entity is earlier, simultaneous with, or later than any other moment, event, or entity, the earlier than relation will be given a place in the block universe theorist's account of time. Without such a distinction, the block universe theorist would be left with something akin to McTaggart's C-series insofar as they would have a series stripped of its temporal relations. This would leave them unable to account for mind-independent change, a situation in which most block universe theorists would presumably be unhappy to find themselves.

4.2. A Potential Concern for MNDP.

Seeing as it relies heavily on the temporal boundaries, one potential issue for MNDP surrounds the question of what becomes of the status of temporal passage if our world happens to either not be fully temporally bounded or to be infinite in spatiotemporal extent.

One way for the world to be temporally unbounded would be for one of the spatiotemporal ends of the block to be unbounded. This would be the case if one of the ends of the block was a singularity while the other was infinite in extension. This option would coincide with a cosmological model such as the Big Bang theory. Evidence for a big bang comes from the 'red shift' phenomenon, which tells us that the universe is expanding. The implications of an expanding universe being such that (LePoidevin, 2003):

> If galaxies are receding from each other, then they can hardly have been doing this forever. Suppose we are watching a vastly speeded-up film of the universe running backwards. What we see are galaxies getting closer and closer. Eventually, all matter is concentrated into a tiny space. Now we run the film forwards and we have a picture of what was memorably described by the British cosmologist Fred Hoyle as 'the Big Bang'. (…) Thus the red shift phenomenon provided evidence (now regarded as equivocal) that the universe had a beginning. (p. 75)

While this account of the Big Bang nicely portrays the event in question, in order to fully harmonize it with the block universe we would have to keep in mind that there is no active receding or coming into being. All that the block universe provides us with is a set array of flip-book-like moments composing the block. All dynamic talk is thus relegated to a potentially

useful metaphorical device. Neither observationally supported nor as widely endorsed as the Big Bang theory, the other option for a partially unbounded universe is a cosmological model along the lines of the Big Crunch theory. Exactly how such a model would play out in a block universe is an interesting question. If the block was only bounded on one end by the Big Crunch and infinite spatiotemporally on the other end, we might imagine there being a reversal in the metric expansion of space at some point in the block which leads to a cosmic scale factor of zero.

Regardless of which end of the block we posit as bounded and irrespective of how we end up describing the end which is bounded, MNDP can be slightly modified to fit with a partially bounded block universe. So long as there is an objective distinction between the bounded and unbounded ends of the block, we can use this difference to orient the non-dynamic passage of time on the manifold. As a way to demonstrate how it is that non-dynamic temporal passage and a partially bounded block universe are compatible, I will again bring in boundaries Q and R. As a reminder:

> **Boundary Q:** Q is in a state of very low entropy and as we work in time from Q to R entropy increases.
>
> **Boundary R:** R is in a state of high entropy and as we work in time from R to Q entropy decreases.

Let us assume, then, that we have two universes:

> **Universe 2:** Universe 2 is bounded on one end by boundary Q and infinite in spatiotemporal extension at the other end.

Universe 3: Universe 3 is bounded on one end by boundary R and infinite in spatiotemporal extension at the other end.

Following the model presented in figure 3, figure 4 and 5 represent universe 2 and universe 3 respectively:

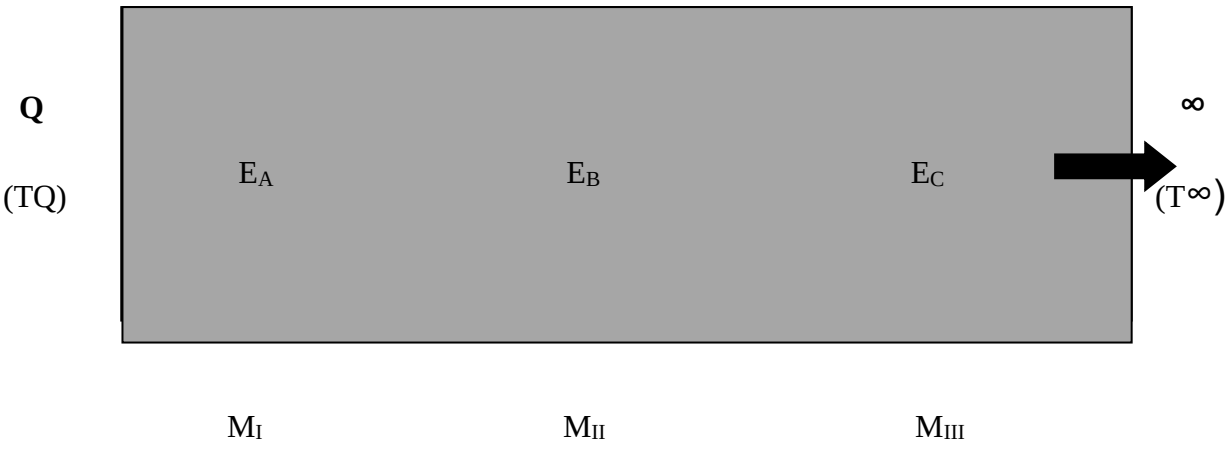

Figure 4: MNDP in Universe 2.

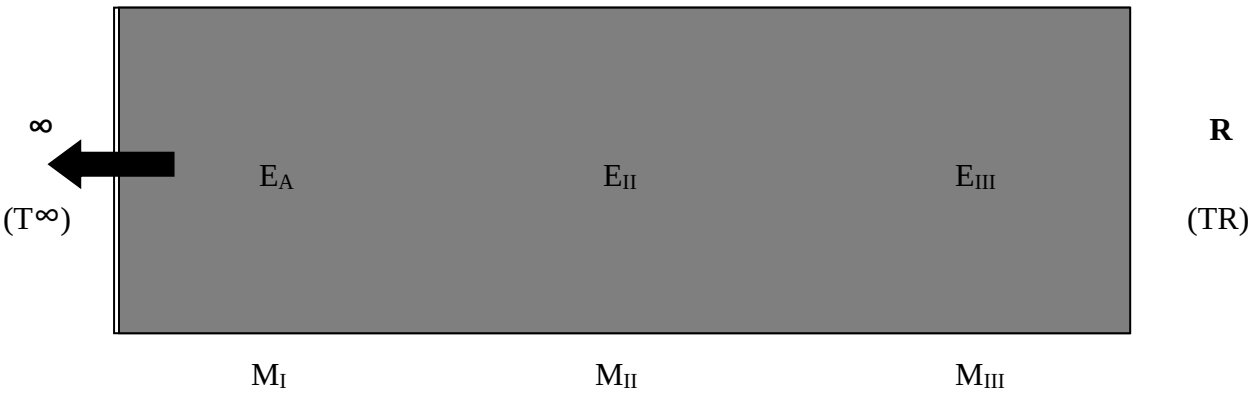

Figure 5: MNDP in Universe 3.

In order to demonstrate how MNDP works in universe 2 and universe 3 we need to find a basis for the orientation of the non-dynamic passage of time in the two universes. In universe 2, there is one end of the block that is in a state of very low entropy from which the overall entropy of the universe increases as we get farther away from it and one end of the block that is unending. Given this depiction of universe 2, we might wonder if and how it is possible for entropy to increase without end. Would it not be the case that universe 2 would eventually reach thermodynamic equilibrium? The right response here seems to be that, even if universe 2 reaches thermodynamic equilibrium, time and space can nevertheless continue infinitely. The objective distinction between Q and the infinite end of the block, which allows us to place the non-dynamic passage of time in universe 2, would also remain. Along the same lines as our original universe, which was bounded by Q and R, if universe 2 is to amount to the familiar world we see around us and we want to be able to explain it as such, then MNDP must operate from Q to ∞ and not from ∞ to Q. Adapting MNDP to universe 2, we end up with:

> **The Mind-independent and Non-Dynamic Passage of Time in Universe 2 (MNDP2):** From any moment M within block universe 2 (except the moment at end Q) there is time between M and Q and time between M and ∞. If there is more time between M and Q, then more time can be said to have passed than if there is less time between M and Q. Time passes for an entity or event E insofar as it exists for and occupies more than one moment M between Q and ∞.

Stated another way, the idea behind MNDP2 is that the closer an entity or event E is temporally to Q the less time will have passed for E and as E is located temporally farther from Q the more time will have passed for E. What about universe 3?

As with universe 2, we can begin by positioning the passage of time in universe 3. The only difference between universe 2 and universe 3 is that universe 2 is partially bounded by Q while universe 3 is partially bounded by R. This means that in universe 3 what we have to work with is a boundary that is in a state of high entropy from which entropy decreases rather than a boundary that is in a state of low entropy from which entropy increases. The opposite concern that arose for universe 2 arises for universe 3. How can it be that entropy infinitely decreases? Once again, the way that universe 3 can avoid this issue is similar to the way that the opposite concern was avoided in the case of universe 2. Specifically, supposing that the entropy of universe 3 has reached the lowest point possible, if time and space can both continue to exist in such a state, then there does not seem to be any worry that ∞ can in fact not be infinite[36]. Continuing to the passage of time in universe 3 and applying the reasoning we used in the case of universe 2 to universe 3, MNDP will tell us:

> **The Mind-independent and Non-Dynamic Passage of Time in Universe 3 (MNDP3):** From any moment M within block universe 3 (except the moment at end R) there is time between M and R and time between M and ∞. More time can be said to have passed if there is less time between M and R than if there is more time between M and R. Time

[36] This discussion, however, does seem to be more in line with a substantivalist metaphysics of spacetime and that might be a worry for some.

passes for an entity or event E insofar as it exists for and occupies more than one moment M between ∞ and R.

Turning the reasoning used in universe 2 on its head, the idea behind MNDP3 is that the closer an entity E is temporally to R the greater will be the amount of time that has passed for E, and as the temporal location of E is situated farther from R the less time will have passed for E.

Another way for the world to be unbounded would be for both ends of the block to be unbounded. Notwithstanding that the name 'block universe' would seem somewhat unfitted to it, we can outline such a world as:

Universe 4: Neither end of universe 4 is bounded. It is limitless in spatiotemporal magnitude.

We are not able to rely on either Q or R to help guide us in placing the non-dynamic passage of time in universe 4. We can, though, think about the nature of universe 4 and the character of its infinite spatiotemporal extent. Instead of focusing on the relation between M and Q and R as we did when considering universe 2 and universe 3, in universe 4 we might be able to appeal to the relation between M and the temporal expanse surrounding M. The following line of thought uses the relationship between M and its temporal surroundings to place MNDP in universe 4:

The Mind-independent and Non-Dynamic Passage of Time in Universe 4 (MNDP4): From any moment M within block universe 4 there is time between the maximum entropy state and the minimum entropy state. If there is less time between M and the

minimum entropy state of the universe, then less time can be said to have passed and if there is less time between M and the maximum entropy state, then more time can be said to have passed. Time passes for an entity or event E insofar as it exists for and occupies more than one moment M between the minimum and the maximum entropy state of universe 4.

In short, MNDP4 holds that the closer an entity or event E is temporally to the overall minimum entropy state of universe 4 the less time will have passed for E and the closer E gets to the maximum entropy state the more time will have passed for E.

Figure 6 offers a depiction of MNDP4.

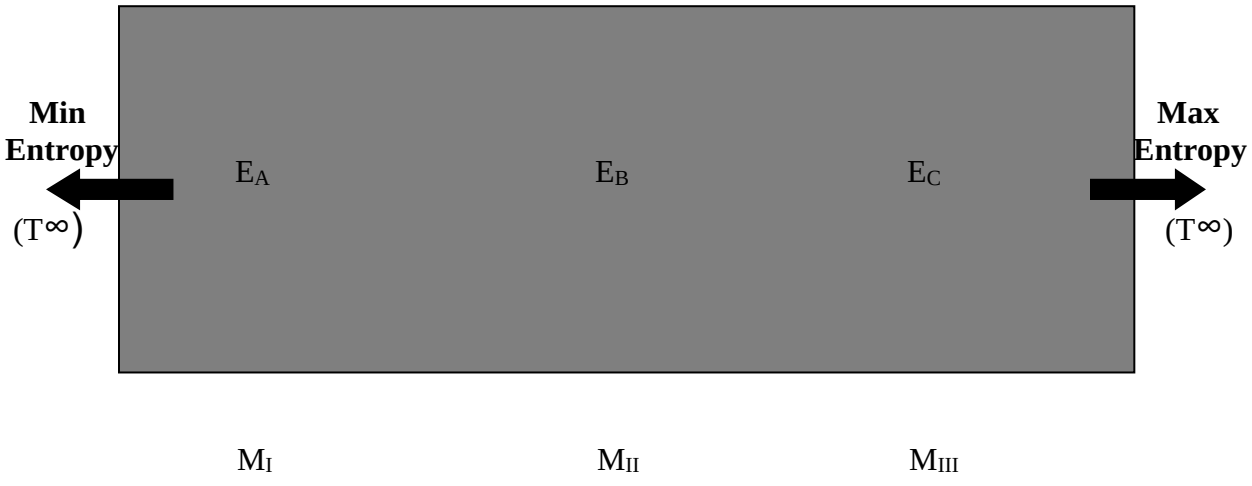

Figure 6. MNDP in Universe 4.

One difference of note between MNDP, MNDP2, MNDP3, on the one hand, and MNDP4, on the other, is that as it stands MNDP4 is a rougher account of the passage of time than the other three views. What is meant by this is that MNDP4's reliance on overall minimum

and maximum entropy states provides a less specific way to determine how much time has passed for any given entity or event than the boundaries utilized by MNDP, MNDP2, and MNDP3. In particular, we might want to know exactly which areas within the overall maximum and minimum entropy states of universe 4 are to be referenced if the amount of time that has passed for any given entity or event E is to be determined.

Two responses can be made to the vagueness inherent in MNDP4. If we are content to have a bit of inexactness in our account, we could embrace the indefiniteness of MNDP4 and stipulate that enough information is garnered by ascertaining whether, for a given entity or event E, more or less time in general has passed. This might be done by referencing the overall minimum and maximum entropy states of universe 4 in broad strokes. If we would rather a more precise account, we could specify a fixed reference point within the overall minimum and maximum entropy states of universe 4 in relation to which the passage of time is always to be understood and measured. No matter which alternative is preferred, the point to take away is that there are ways to deal with MNDP4's seeming problem with imprecision.

5. Conclusion.

My goal has been to build on the conception of temporal passage incorporated by the most influential theories within the philosophy of time. The account on offer is based in the ontology of the block universe theory yet follows dynamic theories in positing that the passage of time is a real feature of the world. Contra dynamic theories, however, it conceives of this passage as non-dynamic.

CONCLUDING THOUGHTS

While the four papers presented here are on different themes and may serve as stand-alone projects, they are connected by the overarching goal to understand the nature of time at its most fundamental level. The first two papers offer a negative appraisal of existing theories in the philosophy of time. *Temporal Passage in a Fragmented World* suggests that neither tensed nor tenseless understandings of fragmentalism can furnish a coherent basis for the mind-independent passage of time. *Norton's Objective Temporal Passage* maintains that Norton's block theoretic inspired account of the mind-independent passage of time is ultimately burdened with more issues than benefits. The second two papers offer a positive addition to the existing literature in the philosophy of time. *A Defense of the B-Theoretic, Block Universe* presents an overview of some of the foundational issues found in the literature on time and argues that the weight of these considerations supports the B-theoretic, block universe over A-theoretic, dynamic accounts. *Non-Dynamic Temporal Passage* introduces a largely novel view of the passage of time in the block universe, which finds grounds for mind-independent temporal passage in the ontological resources of the standard block universe.

Work on these four papers has left me with many new and unanswered questions. Taking the papers in turn, some of these questions include:

Temporal Passage in a Fragmented World:

- Can we make sense of the mind-dependent passage of time in a fragmented world?
- How might Fine respond to Lipman's tenseless fragmentalism?
- If none of the standard theories in the philosophy of time can clearly produce a winning account of the passage of time, how are we to decide between them?
- How might fragmentalism be able to account for our everyday experience of time?

Norton's Objective Temporal Passage:

- How does Norton's view compare to other block universe views that hold that time really passes, such as Maudlin's and the view I present in *Non-Dynamic Temporal Passage*?
- How might we further defend the view that the passage of time is not an illusion since it shares none of the main features of familiar illusions?
- What else might psychological studies of time perception have to tell us about the possible illusory status of the passage of time?
- Does humanity share the same pre-theoretic understanding of time? How might factors such as culture and age influence our understanding and experience of the passage of time?

A Defense of the B-Theoretic, Block Universe:

- What else do scientific theories other than SR and GR, such as quantum mechanics, tell us about the passage of time?
- Which of the A-theoretic, dynamic views is the most compatible with the science of our world?
- How might the B-theoretic, block universe theorist who is an endurantist respond to my claims about the relationship between perdurantism and the B-theoretic, block universe?
- How ought we weight experiential, scientific, and metaphysical arguments? For instance, should our experience of time count for more, the same as, or less than scientific considerations of time?

Non-Dynamic Temporal Passage:

- Does MNDP entail that there are some possible block universes where time does not pass? If so, which universes will these be specifically and is such an implication a downside of MNDP?
- What does MNDP have to say about causation? How might this relate to MNDP's views on the direction of time and the entropy gradient?
- What more might MNDP have to say in accounting for our dynamic experience of time? What support can it find from psychological studies of time perception?
- How else might MNDP deal with worries that it merely offers a redefinition of the passage of time and neither a substantial nor viable account of true temporal passage?

Inspired by some of the lingering questions left open from *Non-Dynamic Temporal Passage*, I have been working on a paper called *Experience and Non-Dynamic Temporal Passage*. My aim in this paper is twofold. First, present and argue for the claim that my version of the mind-independent and non-dynamic passage of time in the block universe is able to provide metaphysical grounds for important aspects of our experience of time unaccounted for by the metaphysics of the standard block universe account of temporal passage. Second, offer a psychological motivation and explanation of the features of our experience of temporal passage, such as its dynamic character, that are not captured by my non-dynamic account. Accomplishing these two aims will take me deeper into both the phenomenological and psychological aspects of temporal passage. From this basis, I would like to develop a project on the general explanatory relationship between, on the one hand, the physical and metaphysical foundation and, on the other hand, the experiential and psychological output of a theory of time. My goal will be to show how psychological and experiential facets of time can be directly explained by their underlying physical and metaphysical descriptions.

Lastly, one of the side issues that I have been interested in throughout the process of my writing is the practical implications that might follow from and connect with our scientific and metaphysical basis of time. Along these lines, I have been putting together a paper *Freedom in the Block* that argues against the possibility of any conception of free will capable of grounding responsibility in the block universe that we inhabit. Following theorists such as Double (2000), Smilansky (2002), and Pereboom (2001)[37], I suggest that libertarian free will is an illusion. Unlike many of these other theorists, however, I propose that questions of free will and responsibility can be answered apart from any considerations related to determinism and indeterminism. Specifically, I aim to show that, whether or not determinism is true at the microscopic and macroscopic levels, the macroscopic world in which we reason and act is constrained by the ontology of time afforded by the block universe. It is this ontological structure of time that precludes both libertarianism and any type of compatibilism able to sustain our everyday, intuitive notion of responsibility. While this project is still evolving, my tentative conclusion is that, given the block universe that we inhabit, we ought to believe and act as if free will and responsibility are not genuine features of the world. Nevertheless, I think that responsibility and punishment can come apart to a certain extent, and thus there may still be justifiable non-retribution-based repercussions for behavior that is harmful and destructive. An interesting line of inquiry that results from this conclusion concerns the psychological basis for the illusions of free will and responsibility. In the end, the best way to understand free will and responsibility in the block universe might be to draw an analogy between these two notions and the standard B-theoretic conception of the passage of time.

[37] Double, R. (1990). *The Non-Reality of Free Will*. Oxford: Oxford University Press.
Pereboom, R. (2001). *Living Without Free Will*. Cambridge: Cambridge University Press.
Smilansky, S. (2002). *Free Will and Illusion*. Oxford: Oxford University Press.

REFERENCES

Asay, J. & Baron, S. (2014). The Hard Road to Presentism. *Pacific Philosophical Quarterly*, 95, 314-335.

Bourne, C. (2006). *A Future for Presentism.* Oxford: Oxford University Press.

Bouton, C. (2017). Is the Future Already Present? The Special Theory of Relativity and The Block Universe. *Time of Nature and the Nature of Time*, 89-121.

Broad, C.D. (1923). *Scientific Thought*. London: Routledge & Kegan Paul.

Callender, G. (2017) *What Makes Time Special*. Oxford: Oxford University Press.

Crisp, T. (2007). Presentism, Eternalism and Relativity Physics. In W.L. Craig & Q. Smith (Eds.). *Einstein, Relativity and Absolute Simultaneity* (262-278). New York: Routledge.

Dainton, B. (2010). *Time and Space.* Quebec: McGill-Queen's University Press.

Dasgupta, S. (2015). Substantivalism vs Relationalism About Space in Classical Physics. *Philosophy Compass*, 10, 601-624.

Dennett, D.C., and Kinsbourne, M. Time and the observer: The where and when of consciousness in the brain. *Brain and Behavioral Sciences*, 15, 183-201.

Farkas, K. (2008). Time, tense, truth. *Synthese*, 160, 269-284.

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

Fine, K. (2006). The Reality of Tense. *Synthese*, 150, 399-414.

Hawley, K. (2001). *How Things Persist*. Oxford: Oxford University Press.

Hinchliff, M. (2000). A Defense of Presentism in a Relativistic Setting. *Philosophy of Science*, 67, 575-586.

Hofweber, T., & Lange, M. (2017). Fine's Fragmentalist Interpretation of Special Relativity.

Nous, 51, 871-883.

Ismael, J. (2015). From Physical Time to Human Time. *Cosmological and Psychological Time*, 23, 107-124.

Le Poidevin, R. (2003). *Travels in Four Dimensionalism.* New York: Oxford University Press.

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

Lipman, M.A. (2018). A Passage Theory of Time. In K. Bennett & D.W. Zimmerman (Eds.). *Oxford Studies in Metaphysics: Volume 11* (95-122). Oxford: Oxford University Press.

Markosian, N. (1992). On Language and the Passage of Time. *Philosophical Studies: An International Journal for Philosophy in the Analytic Tradition*, 66 (1), 1-26.

Maudlin, T. (2007). *The Metaphysics within Physics*. Oxford: Oxford University Press.

McTaggart, J.E. (1908). The Unreality of Time. *Mind*, 68, 457-474.

Mellor, D.H. (1981). *Real Time*. Cambridge: Cambridge University Press.

Mellor, D.H. (1998). *Real Time II*. New York: Routledge.

Minkowski, H. (1908). Space and Time. In M. Saha (Trans.). *The Principle of Relativity* (37-91). London: Methuen and Company (1923).

Moritz, V.G. (1997). It Seems Like Only Yesterday: The Nature and Consequences of Telescoping Errors in Market Research. *Journal of Consumer Psychology*, 6, 1-29.

Mozersky, J. (2011). Presentism. In C. Callender (Ed.). *The Oxford Handbook of the Philosophy of Time* (122-144). New York: Oxford University Press.

Mozersky, J. (2015). *Time, Language, and Ontology.* Oxford: Oxford University Press.

Norton, J. (2010). Does Really Passes. *Humana. Mente: Journal of Philosophical Studies*, 13, 23-34.

Oaklander, N.L. & Smith, Q. (1995). *Time, Change, and Freedom*. London: Routledge.

Pooley, O. (2013). Subtantivalist and Relationalist Approaches to Spacetime. In R. Batterman

(Ed.). *The Oxford Handbook of the Philosophy of Physics*. Oxford: Oxford University Press.

Price, H. (1996). *Time's Arrow and Archimedes' Point: New Directions for the Physics of Time*. Oxford: Oxford University Press.

Price, H. (2011). The Flow of Time. In C. Callender (Ed.).*The Oxford Handbook of the Philosophy of Time* (276-311). Oxford: Oxford University Press.

Prior, A. (1962). Changes in Events and Changes in Things. In E. Magalhaes & N.L. Oaklander (Eds.). *Presentism: Essential Readings* (45-56). Lanham: Rowman & Littlefield.

Prior, A. (1968). *Papers on Time and Tense*. Oxford: Oxford University Press.

Prior, A. (1970). The Notion of the Present. *Stadium Generale*, 23, 245–248.

Prosser, S. (2007). Could we experience the passage of time? *Ratio*, 20, 75-90.

Rocchesso, D., and Guillaume, L. (2013). Evidence for a spatial basis in the perception of sequences of brief tones. *The Journal of Acoustical Society of America*, 133, 346-350.

Savitt, S. (2009). The Transient Nows. In W.C. Myrvold & J. Christian (Eds.). *Quantum Reality, Relativistic Causality, and Closing the Epistemic Circle: Essays in Honour of Abner Shimony* (349-362). New York: Springer.

Savitt, S. (2016). Kit Fine on Tense and Reality. *Manuscrito*, 39, 75-99.

Schindel, R., Rowlands, J., Arnold, D.H. (2011). The oddball effect: Perceived duration and predictive coding. *Journal of Vision*, 11, 1-9.

Silberstein, M., W.M. Stuckey, & T. McDevitt (2018). *Beyond the Dynamical Universe: Unifying Block Universe Physics and Time as Experienced*.

Skow, B. (2009). Relativity and the Moving Spotlight. *The Journal of Philosophy*, 106, 666-678.

Smart, J.J.C. (1964). *Problems of Space and Time*. New York: Macmillan Publishing Co.

Swendsen, R. (2017). Thermodynamics, Statistical Mechanics and Entropy. *Entropy*, 19, 603-625.

Williams, D.C. (1951). The Myth of Passage. *The Journal of Philosophy*, 15, 457-472.

Zimmerman, D.W. (2005). The A-Theory of Time, The B-Theory of Time, and 'Taking Tense Seriously'. *Dialectica: International Journal of Philosophy of Knowledge*, 59 (4), 401-457.

Zimmerman, D.W. (2008). The Privileged Present: Defending an "A-Theory" of Time. In J. Hawthorne, T.Sider & D.W.Zimmerman (Eds.). *Contemporary Debates in Metaphysics* (211-225). Malden: Blackwell Publishing Lt.