BOOK REVIEW

Samuele Iaquinto & Giuliano Torrengo:
Fragmenting Reality: An Essay on Passage, Causality, and Time Travel
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1. Introduction: Flow Fragmentalism

This book offers a comprehensive overview and a compelling defense of what the authors label *Flow Fragmentalism*, a particular version of the theory of time known as fragmentalism (cf. Fine 2005, 2006). Stepping back a little, we can divide the various philosophical theories on the nature of time into two broad families: tensed theories of time (or A-theories) and tenseless theories of time (B-theories). Tensed theories take tense to be a fundamental aspect of reality. For instance, an A-theorist would typically say that reality is composed, among other things, of irreducible A-properties, such as the objective *pastness* of Caesar crossing the Rubicon or the objective *presentness* of me typing this sentence. Tensed theories are usually said to be *dynamic*, as they portray reality as changing and passing in a robust way. For instance, now that you are reading this sentence, the objective presentness of me writing *that* sentence is gone and no longer part of reality.

On the other hand, tenseless theories of time hold that alleged tensed aspects of reality can and should be reduced to more fundamental tenseless formulations. Typically, a tenseless theorist would explain away the pastness of Caesar crossing the Rubicon by saying that, on a fundamental level, what we have is not the event of Caesar crossing the Rubicon possessing the property of being past. Rather, it is simply that the event of Caesar crossing the Rubicon is *earlier than* my current temporal perspective, here in 2024, as I am writing this. For a

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tenseless theorist, the fundamental earlier-than relation among times does most of the explanatory work in accounting for the nature of time. As such, tenseless theories are considered *static* theories of time. To appreciate why, it suffices to note that if event A is earlier than event B, this is always the case and is not subject to change.

Flow Fragmentalism, the view defended in this book by Samuele Iaquinto and Giuliano Torrengo, stands in the first camp. It is a tensed theory of reality. However, it is a *non-standard* form of tense realism. To appreciate the peculiar (and intriguing) character of Flow Fragmentalism and its non- standard aspect, it is useful to contrast it with standard tensed theories. Standard forms of tensed theories include *Presentism* (the view that only what is present exists), the *Growing Block Theory* (the view that what exists is either past or present), and the *Moving Spotlight Theory* (the idea that nothing comes into existence or goes out of existence, yet the fabric of time is "illuminated" by a continuously moving objective present).

Flow Fragmentalism, on the other hand, is a non-standard form of A-theory. I will use a toy example to illustrate their view. Consider a universe composed only of two times, *t1* and *t2*. Socrates is sitting at *t1* and standing at *t2* . What is part of temporal reality according to Flow Fragmentalism? The fundamental ingredients are *tensed* facts – this makes Flow Fragmentalism a tensed theory of time – such as the fact that Socrates IS sitting and the fact that Socrates IS standing. (I use the present tense in capital letters to highlight that we are "taking tense seriously" and not merely describing a B-theoretic fact such as the obtainment of something at a particular time *t*, since such a B-theoretic fact is not part of reality according to the flow fragmentalist.)

A second ingredient of the view is the idea that reality is unique: there is only one reality. This forces the flow fragmentalist to give up coherence. Under Flow Fragmentalism, reality is not coherent, as it contains contradictory facts. Reality is constituted by the fact that (look at *t1* in the example above) Socrates IS sitting, and hence also by the fact that he IS not standing. But reality is also constituted by the fact that (look at *t2*!) Socrates IS standing. Reality is unique and incoherent. However, coherence reappears when we take the perspective of fragments, i.e., maximally coherent collections of tensed facts. Reality is unique (and incoherent), but it comes in (coherent) pieces: the fragments.

To illustrate the fundamental aspect of Flow Fragmentalism, Iaquinto and Torrengo draw a distinction between *constitution* and *obtainment*. In their view, the former is an absolute notion, whereas the latter is a relative one. Tensed

facts *constitute* reality "period" – i.e., in an absolute sense and without relativization to times – while tensed facts always *obtain* within a certain fragment. In the example, the fact that Xanthippe IS standing and the fact that she WILL be sitting obtain within fragment$_1$, whereas the fact that she IS sitting and WAS standing obtain within fragment$_2$. Nonetheless, all those facts constitute reality in an absolute sense.

The third ingredient of Flow Fragmentalism is the claim that no fragment is privileged. The different fragments are pieces of a unique reality, and all fragments are born equal, with the same metaphysical standing (cf. p. 39). As Iaquinto and Torrengo emphasize, Flow Fragmentalism endorses the principle of Neutrality: with respect to what facts constitute reality, no time is privileged (cf. p. 20). In other words, all fragments and all times are metaphysically on a par. This is perhaps the crucial element that makes Flow Fragmentalism a non-standard tensed theory, as it brings it somewhat closer to tenseless theories of time. After all, for a B-theorist as well, no time is privileged, and all times are on a par.

2. Book Outline

Here's the outline of the whole book. The introduction provides the setup: the main assumptions are laid out and made explicit, and the reader is introduced to the debate in which Flow Fragmentalism is a contender – namely, tensed vs. tenseless theories and standard vs. non-standard tensed theories. Chapter 1 provides the foundations of Flow Fragmentalism. The theory is carefully presented, and a formal semantics is provided – this is especially useful, as some of the distinctions in Flow Fragmentalism are subtle and nuanced (e.g., obtainment vs. constitution). The formal language the authors provide makes explicit the implications and commitments of the view. Chapter 1 also offers a "derivation" in seven steps showing how Flow Fragmentalism can account for, and most importantly *explain*, the passage of time.

The subsequent chapters address some of the most common topics in the metaphysics of time and explore how Flow Fragmentalism can address them. Chapter 2 deals with the open future. Here, Iaquinto and Torrengo develop a branching-time version of their Flow Fragmentalism. They also make a distinction between the *ontological* openness of the future – roughly, the future is open because it doesn't yet exist – and *topological* openness – there are many futures, hence the openness. The branching version of Flow Fragmentalism brings together elements from both the ontological and the topological conceptions, and

it does so once again with the distinction between obtainment and constitution. In a nutshell, their idea is that the future can be open in an ontological sense from the point of view of obtainment – within a fragment, future events do not exist, even though we have the obtainment of future tensed facts – while from the point of view of constitution, we have topological openness – there are multiple futures.

Chapter 3 discusses cross-temporal causation. Here, Iaquinto and Torrengo address an aspect that is *prima facie* problematic for Flow Fragmentalism. Causation seems to be intrinsically a cross-temporal relation. However, tensed facts are understood as being confined and sealed within their respective fragments. How, then, can they interact in a causal manner across different fragments? To overcome this problem, the book proposes introducing a *pseudo* earlier-than relation. Relations between events, including causal relations, are reduced to internal relations that occur in different fragments. Crucially, internal relations are not existence-entailing, and this allows Flow Fragmentalism to account for causal relations without relying on external cross-temporal relations.

Chapter 4 generalizes Flow Fragmentalism to the case of special relativity. Often, discussions in the metaphysics of time assume Newtonian time and its notion of absolute simultaneity for the sake of simplicity in exposition. Here, Iaquinto and Torrengo make the noteworthy effort to adapt their Flow Fragmentalism to relativity. The final chapter deals with the case of time travel, both in the Ludovician (non-past-changing) case and in the non-Ludovician (past-changing) version. Flow Fragmentalism has little to add to the Ludovician case, but it definitely offers advantages over competitors in the case of past-changing time travel. Past-changing time travel models that involve an eternalist ontology coupled with an objective present (e.g., Hudson & Wasserman 2010, Bernstein 2017, and Effingham 2021) typically suffer from the problem of zombies, i.e., people who exist at a time but never have the "privilege" of being illuminated by the objective present. Here, Iaquinto and Torrengo show how Flow Fragmentalism can accommodate non-Ludovician time travel without incurring the problem of zombies who never were, nor will ever be, present.

As shown, the book does many remarkable things. The main objective of the book, though, is to provide an explanatory account of the passage of time. This is arguably the main strength of Flow Fragmentalism and its non-standard nature. Standard versions of tensed theories, Iaquinto and Torrengo argue, posit the passage of time as a primitive aspect of temporal reality. Consider, for instance, standard dynamic presentism and a frozen version of presentism – i.e.,

one in which there is only a present time, but it never ceases to be, nor is it replaced by a "new" present. The presentist, in order to avoid the collapse of their theory into frozen presentism, needs to posit as a primitive the fact that there is a "self-propelled" and freeze-avoiding present that constantly makes reality dynamic. Flow Fragmentalism, on the other hand, has the theoretical resources to explain the phenomenon of passage. This is the main advantage of Flow Fragmentalism over standard rivals.

I will not enter here into the details of the account of the passage of time in Flow Fragmentalism, but let us see some of the key ideas. What explains passage in Flow Fragmentalism? As mentioned, Iaquinto and Torrengo want to avoid a picture in which the present is a sort of "unmoved mover", i.e., something that brings dynamicity to reality without itself being moved (or "pulled and pushed", in their terminology) by something else, which in turn would be capable of explaining the movement of the present. Rather, they exploit the non-standard aspects of the theory to explain passage. Given that, in their view, all fragments have the same metaphysical status (given neutrality), they are able to explain the obtainment of a future tensed fact within a fragment by virtue of the obtainment in the future of the corresponding present tensed fact— likewise for past-tensed facts. More precisely, Torrengo and Iaquinto account for passage with *Fragmentalist Flow*.

> **Fragmentalist Flow**. Within $fragment_x$, $TENSE_n$ ϕ because within $fragment_{x+n}$, ϕ.

The operator TENSE here is a shorthand for the irreducibly tensed metric operators WAS and WILL, while *n* refers to the temporal interval between fragments. Following the example of Socrates sitting at *t1* and standing at *t2*, as an instance of Fragmentalist Flow, we'd have that "within *fragment₁*, WILL(1) Socrates stands because within *fragment₂* Socrates stands." Similarly, in the direction of the past, we'd have that "within *fragment₂*, WAS(1) Socrates sits because within *fragment₁* Socrates sits." What is crucial in the principle and its instances is the explanatory role of the because operator. Each fragment finds grounds for its tensed facts from what obtains in the corresponding fragments. This allows Iaquinto and Torrengo to say that, from the perspective of each time, "there is a push from the past and a pull from the future," which captures and explains the passage of time (cf. p. 40).

Before moving to some potential objections, let me stress some remarkable aspects of this book. For starters, the chapter on relativity theory, where

Iaquinto and Torrengo make their theory compatible with relativity, is particularly noteworthy. This is not only because of the quality and clarity of the chapter, but also because analytic metaphysics of time does not engage enough (or not always) with our best scientific theories. One would expect metaphysics to be least compatible with our best science, but this is not always the case. Some work in metaphysics does not engage (or does not engage enough) with scientific theories. It is thus particularly noteworthy that the book develops a relativistic version of Flow Fragmentalism.

Another aspect that I find remarkable is how the authors are transparent and precise about their methodology, assumptions, and goals of their argumentation. The introduction is a point of reference in this respect. The assumptions are laid out in a clear manner, and the context of the debate is presented succinctly but clearly. Moreover, Iaquinto and Torrengo lay out the details of the methodology of their scientifically informed metaphysics in great detail.

The third remarkable aspect (though the list could go on) is the rigor and precision with which the arguments in the book are carried out. The arguments are clear and cogent, and it is (relatively) easy to follow them. Moreover, when an argument is controversial, Iaquinto and Torrengo acknowledge it, while also considering what an opponent could say. This adds to the overall argumentative strength of the book.

3. Objections

In this section, I want to raise three potential objections. I think that all of them are related to the following. As we have seen before, Flow Fragmentalism is a non-standard view. Its non-standardness derives from the fact that Flow Fragmentalism is a hybrid view – it takes elements from standard tense realism (fundamental tensed facts, for instance) as well as elements from tenseless views (see the principle of neutrality). In general, hybrid views have the advantage of being able to take the best from two opposing worlds and provide a synthesis that avoids problems which pester the opposing camps. Hybrid views, if you will, embrace the Aristotelian maxim that virtue lies in the mean. On the other hand, a potential problem of hybrid views is that they risk collapsing into one of the two sides. I will argue that their account of passage, in my view, risks collapsing into anaemic passage – "passage" which is nothing more than the earlier-than relation.

The first worry I have is rather small, while the second one may be more substantial. The book talks about the *specialness* and the *egalitarian* intuitions.

The first refers to the idea that the time you are experiencing right now is special or privileged. This is the idea, dear to the A-theorist, that there is a metaphysically privileged time, i.e., the present. On the other hand, the egalitarian intuition is the idea, dear to the B-theorist, that all times are born equal and are metaphysically on a par – there is no privileged time. What I find odd is not that Iaquinto and Torrengo seem to want to do justice to *both* intuitions. After all, Flow Fragmentalism is a hybrid view, and as such, it must locate itself in the middle of the two camps. What I find odd is rather that they treat what they call the "egalitarian intuition" as an *intuition* in the first place, in order to then argue that their view does justice to both intuitions (cf. p. 7). I would argue that there is no such thing as the egalitarian intuition. Most (almost all?) people do not seem to have the intuition that all times are equal, or all equally existing, or all on a par. Typically, one would pre-theoretically think that only the present is special. Considerations about egalitarianism regarding times come from either scientific theories (relativity) or philosophical and B-theoretic considerations. As a consequence, I do not see how it could be a virtue of the theory to capture the egalitarian *intuition.*

My next objection is about the account of passage that Flow Fragmentalism provides. As we saw above, the account is based on the principle of Fragmentalist Flow (see section 2). The account has many merits, but I nonetheless want to raise an objection against it. In short, I will argue that the fragmentalist passage collapses into anaemic passage. Consider this passage from the book (p. 40): "…the flow of time is not given by a self-propelled present, but rather by the fact that from the perspective of each time there are a push from the past and a pull from the future that explain how reality is globally updated."

The main advantage of the view, as I see it, is that it does not take passage as an unexplainable primitive. Flow Fragmentalism *explains* passage in terms of Fragmentalist Flow and its explanatory "because" operator. However, I wonder whether the resulting picture provides a satisfactory explanation of passage.

To illustrate my criticism, consider a finite universe constituted by, say, 10 fragments. Suppose fact A obtains in *Fragment$_5$* and in no other fragment. Given Fragmentalist Flow, we have that within fragment$_4$, WILL$_1$ A because within *fragment$_5$*, A. Likewise, we have that within fragment$_6$, WAS$_1$ A because within *fragment$_5$*, A. These causally explanatory links provide the "pushes and pulls" – this talk of pushes and pulls should be taken as more than a metaphor, given its frequent appeal – providing reality with the dynamic feature of passage. *Fragment$_5$* is pushed from the past and pulled from the future. But consider

that the view also includes Neutrality: All fragments are metaphysically on a par, and none of them is privileged. So, *Fragment₄* is as well pushed from its past and pulled from its future, *Fragment₆* is pushed from its past and pulled from its future, and so on. All fragments are equally pushed and pulled, so they are all "moving" in the same direction and at the "same speed." But if they are all "passing" in the same way and for the same reasons, it seems as though, from a global perspective, reality (the totality of fragments) features no passage at all. Reality is just static.

To illustrate the point, consider an analogy with an actual object moving in space. Suppose the object is composed of 10 parts, and they all move with the same velocity. Absent an absolute frame of reference, we could equally describe the 10 parts as moving or as simply being static, depending on the frame of reference. There is no intrinsic movement in the 10 parts. Similarly, for the fragments that compose a universe, it is conceptually difficult to imagine an absolute background against which the passage of time could be said to obtain.

Lastly, I want to consider Iaquinto and Torrengo's response with respect to the Update Test (cf. p. 43–45). In essence, the test runs as follows: Take a theory and the reality it is supposed to describe. Write down how reality is according to the theory. Wait some time. Write down again how reality is according to the theory. The test is passed if the second description is different from the first one. The test is meant to check whether a theory genuinely captures robust passage. Clearly, a standard B-theory does not pass the test – descriptions of reality will feature statements like "Socrates sits at $t1$, Socrates does not sit at $t2$," and that's not going to change. Standard A-theories, on the other hand, will pass the test: A presentist, for instance, would first describe reality as featuring Socrates sitting, wait some time, and then provide a different description, one featuring Socrates not sitting.

As Iaquinto and Torrengo point out, Flow Fragmentalism does not pass the test. Both in terms of constitution and obtainment, reality is always described in the same way. We would have, always, that the fact that Socrates sits and the fact that Socrates does not sit both constitute reality, and that within *fragment₁*, the fact that Socrates sits and WILL not sit both obtain. This description is not going to change over time. Thus, the flow fragmentalist description of reality does not pass the update test. To this, Iaquinto and Torrengo reply that the update test is unfair. But I am not sure their arguments against the fairness of the test are fully convincing. To undermine the legitimacy of the update test, they use the following analogy: A theory about a constantly updating reality

does not need to be itself constantly updating, just as a theory about vagueness does not need to be itself vague (cf. p. 45). I am not sure this analogy is fitting. Granted, a theory about microscopic reality does not need to be itself microscopic, but I'm not sure this has much bearing on the distinction between static and dynamic theories of time. Secondly, to rebut the update test objection, the authors stress that Flow Fragmentalism features fundamentally tensed facts and Priorian operators, which can account for robust passage. But one of the (arguably correct) criticisms of Iaquinto and Torrengo's towards standard tensed theories, such as those that attempt to explain passage in terms of Priorian operators, is that they cannot fully explain passage. Yet here they seem to appeal to standard resources to undermine the Update Test. Moreover, in standard tensed theories, tensed facts obtain in an absolute way, whereas in Flow Fragmentalism they obtain only relative to a fragment. This aspect risks making the whole picture static, since if a tensed fact obtains relative to a fragment f, it will always be the case that it obtains relative to fragment f.

4. Conclusion

In conclusion, *Fragmenting Reality* by Iaquinto and Torrengo is a highly insightful and rigorously argued work that provides a novel perspective on the metaphysics of time. The authors successfully offer a clear and precise account of time's passage while engaging with both A-theoretic and B-theoretic theories. Scholars working in the metaphysics of time, as well as those interested in causation and related topics, will find this book a valuable and thought-provoking contribution that advances our understanding. Its clarity, rigor, and innovative approach make the book an essential reading for anyone engaged in these areas of philosophy.

Acknowledgements

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