Nothing Comes Next

Cord Friebe
University of Siegen

Cord Friebe is professor of philosophy at Siegen University. His research ranges from the philosophy of physics to analytic metaphysics and Kant, with a particular focus on the philosophy of time.

There are many problems with temporal continuity, but there is a hard one for those philosophers who believe that the world is *existentially* dynamical. In particular, this holds for those who take seriously the requirement that in such a world must vary what exists unrestrictedly. As a paradigmatic case study, the paper discusses the Growing Block Theory (GBT) of time, as recently presented by Correia and Rosenkranz who consider temporal passage in the strong existential sense of the term. Then, it will be shown that their account fails to do justice to the continuity-requirement: nothing comes next. Without the time continuum, however, the *genuinely temporal* character of the dynamics gets lost: the objection of spatial analogue turns back. Finally, the paper suggests that Kantian consciousness-dependence is what one needs in order to get a genuinely temporal dynamics that really makes it distinguishable from mere variation across space.

GROWING BLOCK THEORY TIME CONTINUUM KANT

I. Introduction

I will discuss a new formulation of the Growing Block Theory of time, recently presented in the monograph *Nothing to Come* by Fabrice Correia and Sven Rosenkranz (2018). Accordingly, the world is *existentially dynamical*: only the past and the present exist, but the future has to come. The advantage of Correia/Rosenkranz's approach, to be spelled out in Section 2, is that it really takes seriously the requirement that what exists unrestrictedly (*simpliciter*) must vary with time. It therefore should be viewed as the most promising account of existential dynamics.

However, in Section 3 I will argue that the block is not constantly increasing, that the account cannot adequately represent the *continuity* of time: nothing comes next. Moreover, without the time continuum, the *genuinely temporal* character of the dynamics gets lost: against this version, one can raise the objection of spatial analogue, i.e. nothing excludes that there is such a dynamics also, but then: mysteriously, across space. In particular, the *relativistic* version of Correia/Rosenkranz's growing block view turns out to be unsatisfactory, precisely because of the lack of time continuum.

In the final Section 4, I will suggest that Kant's theory of time being originally *pure intuition* may close the gap: objective time flow is existentially continuous in virtue of, i.e. ontologically dependent on, the continuity of subjective time. Kant presents a metaphor of time that is close to the growing block view: a line insofar one draws it. Then, Kant falls down the same objection as the current approach, unless he adds that the representation of time must be accompanied by the *I think*, by self-consciousness.

The paper has a wider underlying motivation than that of providing an argument against the growing block view. I believe that any metaphysics of time that considers temporal passage in the strong existential sense of the term must answer the challenge of doing justice to the continuity-requirement. Further, I also believe, in general, that Kantian consciousness-dependence is what one needs in order to get a genuinely temporal dynamics that really makes it distinguishable from mere variation across space. Thus, the case at hand should be taken as a paradigmatic case study. – Regarding the main topic of this *Special Issue*, i.e. "Time-Continuum", the spirit of the paper can be characterized in this way: There are probably many problems with the continuity of time, but there is a hard one especially for those philosophers who believe that the world is existentially dynamical. In particular, this holds for those who take seriously the requirement that in such a world must vary what exists unrestrictedly, as Correia/Rosenkranz in fact do. Then, however, this challenge is not restricted to this particular version of the growing block view, but stands for all metaphysics being truly existentially dynamical.

II. The Growing Block Theory of Time

The *Growing Block Theory* (GBT) is intended to be the existentially dynamical ontology according to which the sum total of existence is always increasing. Always, new slices of existence appear without ever disappearing, and so the present is always new and the whole of the world is constantly growing. Intuitive as it seems, the GBT nonetheless faces various conceptual problems. The first set of problems concerns the idea of being "existentially dynamical": it will be shown, in this section, that its main difficulty can be solved by a new formulation of the GBT. The second crucial problem surrounds the idea of time continuity, namely that the block is "constantly

growing": as it turns out, in the following section, this difficulty remains unresolved even with the most promising account at hand.

To clarify the GBT, it is helpful to contrast it with the *Moving Spotlight Theory* (MST). [1] For, as we will see, the MST does not have the difficulties under discussion. The contrast shows that not all notions of dynamism are subject to the first criticism. The argument only affects an *existentially* dynamical ontology, as GBT. Further, the second criticism does not affect the MST. Its notion of continuity is based on Cantor's set-theoretical account of the continuum, whereas the intended GBT-continuity cannot (see the following section). Time-Continuum faces a particular problem within existentially dynamical ontologies. According to the MST, it varies temporally what is *objectively* present. Therefore, it can be considered as a *dynamical* ontology. However, this temporal variation occurs across the block universe, "given" as much as according to eternalism, the static ontology of time. The objective variation of what is present is not a variation of what exists; the MST-ontology is accordingly not existentially dynamical. By contrast, defenders of the GBT must argue that it varies temporally not only what is objectively present but also what exists. Then, the problem is that the notion of what exists is ambiguous: also eternalists surely believe that dinosaurs and computers are located at different times, and so they could accept, in some way or other, the GBT-idea that the world as of some time is larger than the world as of an earlier time. The question hence arises whether proponents of the GBT really can distinguish their view from reasonable eternalism.

1 The MST combines the block universe view (eternalism) with the idea that an objective, irreducible property of presentness is moving across the block. In the last couple of years, this theory has found new friends; see Cameron (2015) and Deasy (2015). The standard reference for good-old eternalism is Mellor (1998).

One way of spelling out this difficulty requires the distinction of two different conceptions of existence, namely "existence *simpliciter*" and "existence@". [2] The first captures the non-perspectival sense of being in the domain of *unrestricted* quantification. Applied to spacetime physics, one can say that something exists *simpliciter* iff it is located somewhere in spacetime, at some spacetime point p or other. If spacetime as a whole is static (i.e. not growing), this expresses the idea of the block universe. The second sense of existence captures the merely *perspectival* sense of being located at a given time, applied to spacetime physics: of being realized with respect to a given, particular spacetime point p_0. [3] Eternalism is, therefore, analogous to modal realism according to which something exists *simpliciter* iff it is located somewhere in the whole of possible worlds, i.e. iff it is located in some possible world or other, whereas something exists@ iff it is located within a given, particular possible world. Then, proponents of the GBT must argue that it varies temporally what exists *simpliciter*. For, a mere variation@ can and should be allowed by eternalists as well. However, the long-lasting most famous proponent of the GBT characterizes his own view in such a way that every eternalist could accept for her block universe view: «what exists as of one time, differs from what exists as of another» (Tooley 1997, 16; see the reply in Mellor 1998, 83). In such a way, there is no temporal variation of what exists *simpliciter* but only a variation@, i.e. a variation of what exists from one temporal perspective compared with what exists from another temporal perspective. This is compatible with the view that the block universe as a whole is static (i.e. eternalism), but that, restrictively

2 It is very close to similar distinctions in Sider (2001, 59) and Lewis (2004, 3-4); for more details see Friebe (2018, sec. 1).

3 Depending on the specific spacetime structure, everything located on an absolute plane of simultaneity (containing p_0), or everything located outside the lightcone of p_0, or only the event located at p_0 itself may be considered as existing in this perspectival sense.

speaking, what there is with respect to one spacetime point differs from what there is with respect to another. Thus, the challenge for proponents of the GBT is to spell out the (constant) growing in terms of existence *simpliciter*. [4] Recently, Correia and Rosenkranz (CR 2018; CR 2019) have presented a significantly improved version of the GBT. According to them, Tooley et al. conflate two different commitments: a rather trivial one, shared by everyone, with a substantial one being characteristic for the GBT. Consider the following statement (example taken from CR 2019):

4 In the words of the grounding father of the GBT:«"the essence of a present event is, not that it precedes future events, but that there is quite literally nothing to which it has the relation of precedence» (Broad 1923, 66).

> "Broccoli is presently to be found somewhere, but was nowhere to be found in 800 BC."

This sentence is true. It is so in virtue of merely *empirical* reasons. Therefore, it should be accepted as true by every philosopher. Here, on the other hand, is the substantial commitment:

> Broccoli is presently something, but was nothing in 800 BC."

This sentence is true or false not only on empirical grounds but can be accepted as true only by non-eternalists (presentists included). In terms of the foregoing, the latter sentence expresses that with the appearance of Broccoli has changed what exists *simpliciter*.

Correia/Rosenkranz themselves go a different way of spelling out the difficulty at issue: they don't accept the assumption that there are different senses of existence and instead hold that the alleged perspectival sense of existence is nothing over and above "location". One should carefully distinguish, they argue, between "temporal existence" and "temporal location", which leads to the counterintuitive way of talking that, e.g., Dinosaurs exist *now* but are located somewhere else, at some time in the past. Moreover, the whole account is idiosyncratically written in Timothy-Williamson-(2013) language, which makes the reconstruction not easier. Undoubtedly, however, the advantage of their approach is that now there is a GBT on the market according to which it really varies what exists *simpliciter*.

Formally, the growing block universe can fully be captured by the following two principles (with $E!$: "exist"; G: "always in the future"; T: "time"; At: "shift"; H: "always in the past"):

$(P_1)\ E!x \rightarrow GE!x$

$(P_2)\ Tx \rightarrow At\ x, H\neg E!x$

To understand the formulas, one should notice that:

1. Every predication/quantification is *tensed*.
2. Principles allow prefixing by *any* combination of the universal quantifier and 'Always'.
3. $E!m \rightarrow \mathcal{T}E!m$; with $\mathcal{T}$: 'true *simpliciter*'.

Accordingly, the sentence "$E!x$" is shorthand for: Always, $\forall x$ Always, $E!x$, and so $E!x$ should be read as: "Always everything always exists now". This is Williamson's

characterization of "permanentism", i.e. eternalism. It is always true *simpliciter* that dodos exist now ('although' they are now located in the past).

Correspondingly, GBT's first principle "(*P*1) $E!x \rightarrow GE!x$" should be read as: "Always everything will always in the future be something." Nothing never ceases to exist. Further, GBT's second principle "(*P*2) $Tx \rightarrow At\ x, H\neg E!x$" should be read as: "Always every time at itself was nothing before, i.e. is new." At itself, every time is freshly added to the block. Consequently, for times (and residents in time), [5] $E!m$ is true *simpliciter* although not always true. Therefore, what exists *simpliciter* varies temporally, along the idea of freshly added slices of existence that never cease to exist. To sum up, the dialectics is that there is a future for existentially dynamical ontologies. Not only varies what exists@ – in some perspectival sense from *t* to *t'* –, as it could be satisfied also by eternalism, but it varies what exists unrestrictedly. However, there is a second requirement to be satisfied: the variation must be *continuous*, otherwise it is not really temporal. The following is devoted to this second problem.

5 Throughout the paper, I assume that everything being said holds likewise for past, present, and future times and for past, present, and future residents (things, objects, events).

III. GBT's Problem with the Continuity of Time

The GBT, as it stands, is intended to capture the idea that «the sum total of existence is *always* increasing» (Broad 1923, 66). [6] The block is conceived of as «*constantly* growing without ever eroding» (CR 2018, 44), so that time «*constantly* passes» (CR 2018, 66), in the existential sense of the term. Thus, the GBT not only is intended to be an existentially dynamical ontology of time but also to do justice to the continuity of time. [7] In this section, it will be shown that even the most promising account of the GBT cannot do this latter job. Further, it will be argued that, without an adequate representation of the continuity of time, the temporal character of the existential dynamics gets lost.

6 The italics in the quotations of this section are always mine.

7 A discrete sequence such as "2, 4, 6, 8, [...]" is (strictly) *monotonous* but not "*constantly* growing", as it is assumed for the growing block universe.

To begin with, look carefully at Correia/Rosenkranz's way of translating Broad's slogan that the block is always increasing into their language: «always *there is* a new resident of time that was nothing before» (CR 2018, 36). On the grammatical surface, the expression «*is* [always] *increasing*» sounds dynamical, while «[always] *there is* [something new]» sounds static, but Correia/Rosenkranz apparently believe that also ontologically *increasing* is essentially *being new*; *always growing* is nothing other than *always being greater*. However, this is wrong. For, the continuity of growth is not guaranteed by always being greater.

The problem is that the last moment, the edge of being, will not have an *immediate* successor. Either there will be a gap between the newest moment and all the older ones, or together with the newest moment infinitely many other new moments (simultaneously?) appear. This criticism seems to be an old-fashioned, Aristotelian defence against Cantor's account of the continuum, but in fact it is crucial for this (and, presumably, for all) existentially dynamical view(s) of time. By contrast (again), the MST does not have this problem.

For, the MST presupposes (in CR's terms) "permanentism", i.e. $E!x$. the *simpliciter*-existence of past, present, and future times (and residents in time). It, therefore, assumes the existence of Cantor's continuum of (space-)time points. Then, the

MST is distinguished from eternalism by the additional claim that some time is objectively present. This property of presentness is assumed to move *constantly* across (space-)time, so that it could be the case that proponents of the MST also have the difficulty of doing justice to the continuity-requirement. That in fact they have not can be seen in the context in which Correia/Rosenkranz seek to avoid a *frozen* present for the MST – an ontologically distinguished moment of time that, unfortunately, is always the same. Formally:

$$\exists x(Tx \,\&\, x \text{ is present} \,\&\, H\neg(x \text{ is present}) \,\&\, G\neg(x \text{ is present}) \,\&\, \forall y(Ry \,\&\, y \text{ is present} \rightarrow y\ L\ x))$$

Interpretation: «It follows that always there is at most one time that is present. It likewise follows that a given time is only ever present once, and hence that always a distinct time is present» (CR 2018, 73).

Apparently, the given formula alone cannot exclude a somehow jumping present, i.e. a *non-continuous* motion of presentness. However, in the MST nothing differs substantially from Cantorian mathematics: taken the given formula together with a notion of precedence, some ε/δ-like definition will do the job of avoiding the jumping present. For every ε, there will be a δ such that [...], so that the present is moving continuously, in the ε/δ-sense of the term. This might work, thanks to the eternalist assumption that guarantees non-empty neighborhoods of every moment that is present.

Contrariwise, in the adequate GBT any neighborhood of the (new and) last moment of time is half-sided empty:

FIG 1 Screenshot of the growing block: Around the edge of being, the neighborhood is half-sided empty

As Correia/Rosenkranz frequently stress, it is really nothing to come. Everything in the past (within the block) exists, but nothing regarding the future. The term "existence" is unique, so that regarding the future nothing is *real* in some other sense of being. The sentence "*E!m*" is, if true, true *simpliciter* although not always true, which means that constants do not always refer, they do not necessarily have referents. Correia/Rosenkranz apply non-classical, 'free' logic in order to get the intended existential dynamics. All this is good, but the consequence is that the neighborhood of the present is half-sided empty.

No ε/δ-like definition can therefore be applied to get the continuity of growing, nothing comes next. In other words: the present is considered simply to be the new and last moment of existence, but it has no inherent motion, it is not directed towards the future. The lacking continuity apparently goes hand in hand with a lack of temporal directionality. Prima facie, the block represents a certain time direction by virtue of constantly becoming greater. However, this is illusionary. *Dynamics* rather comes from nowhere, the adding of fresh slices of existence apparently is *orthogonal* to the alleged direction of the growing. The block, in particular the edge being, is not acting while becoming greater, whereas "growing" suggests that the edge of being (or, the block) is doing something. In this way, the temporal character of the existential dynamics gets lost.

I will explain this further in the last section. Let me firstly add a different argument that shows that, even though Correia/Rosenkranz's GBT-dynamics really is existential in the sense that it varies what exists *simpliciter*, there is no reason

to believe that this existential variation really is *temporal*. For, against the account one can raise the objection of *spatial analogue*, i.e. the argument – usually presented against eternalism – that everything said about time can also be said about space, which shows that the distinguishing character of time is missing.

Look again at the two principles of the GBT:

(P_1) $E!x \rightarrow GE!x$
(P_2) $Tx \rightarrow \text{At } x, H\neg E!x$

Now, one can construct a spatial analogue by substituting all the temporal notions with non-temporal ones. Here is it (with ▲ and ▼ meaning 'everywhere in the upper [lower] side'; and with *s*: "place"):

(P_1) $E!x \rightarrow \blacktriangledown E!x$
(P_2) $Sx \rightarrow @x\blacktriangle\neg E!x$

One gets an existential dynamics across space: everywhere everything everywhere in the spatial upper-side (of it) *continues* to exist; and for any spatial location *s*, at *s*, everywhere in the lower-side of *s*, *s* did not *yet* exist. *Simpliciter*-facts change across space. Counterintuitive as it may, nothing in the GBT-account at hand forbids that.

Moreover, Correia/Rosenkranz themselves construct a *relativistic GBT* in precisely this spatial-analogous way (see CR 2018, chap. 9). With regard to Special Relativity, they rightly hold that «we must make spacetime-points our basic points of evaluation», but wrongly conclude that

> [we must] appeal to no objective structure of spacetime other than the fourfold division, determined by each such point, between that point itself, those points in the causal past of it, those in the causal future of it, and those in the elsewhere region of it. (CR 2018, 135)

Instead of appealing only to the lightcone-structure of relativistic spacetime, one would expect, from a non-eternalist perspective, that (the concepts of) timelike curves and proper times also are included into the objective structure: "proper-time" is usually considered to be the fundamental notion of time.

By contrast, Correia/Rosenkranz claim that «variation in what exists, if any, must accordingly be understood as variation across spacetime rather than time» (CR 2018, 136). In particular, this claim has to be understood as the rejection of the idea that there is variation along a timelike curve. For, this would be variation across (proper-)time rather than unqualified spacetime. In this way, so-called *spatiotemporaryism* [8] turns out to be an existentially dynamical ontology lacking the temporal character. In more detail, Correia/Rosenkranz distinguish – along the literature on the Putnam/Stein-controversy – between «pointy relativistic GBT» and «bow-tie relativistic GBT» (CR 2018, 150). Both versions have the two principles in common; with ▲ and ▼ now meaning 'everywhere in the upper [lower] lightcone', and with *s* now meaning "spacetime point". They disagree as to whether the elsewhere regions are populated or not, e.g., the pointy-version affirms: "at any given spacetime-point, the elsewhere region is unpopulated" (CR, 2018, 149).

[8] "Temporaryism" is their term for "non-eternalism" (opposed to "permanentism"). "Spatiotemporaryism" is hence opposed to the (relativistic) block universe view, in their terms: "«the *spatiopermanentist* view according to which, everywhere in spacetime, what exists also exists everywhere else in spacetime» (CR 2018, 136).

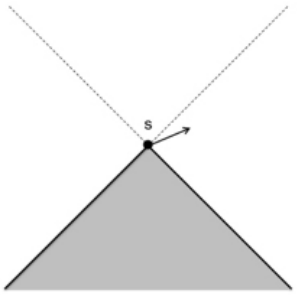

FIG 2 Pointy relativistic GBT: Possibility of spacelike 'growing'

With regard to the pointy-version, the first principle "$E!x \rightarrow \blacktriangledown E!x$" says that everywhere everything everywhere in the causal future (upper lightcone) still exists, and the second principle "$Sx \rightarrow @x\blacktriangle\neg E!x$" says that for any spacetime-point *s*, at *s*, everywhere in the causal past of *s*, *s* did not yet exist. Therefore, Correia/Rosenkranz suggest:

> Accordingly, at *s*, *s* is 'new' on any particle's trajectory passing through *s*, while it continues to exist on this trajectory even after the latter has passed through *s*. Let us call this kind of view *relativistic GBT*. (CR 2018 149)

Now, my objection goes as follows. The "particle's trajectory" – meant: a certain *timelike* curve through *s* – has been introduced arbitrarily. Nothing in the account forbids, i.e. there is no contradiction with the two principles, to assume a *spacelike* curve through *s* along which the block should *grow*. Then, *after* the curve has passed through *s*, *s* does not *continue* to exist, which after all does not contradict the first principle that only says that everywhere in the causal future *s* still exists. The point is that by saying that along a trajectory something "continues" to exist, "after" something has passed, one uses a temporal language stemming from the concept of proper-time (of that trajectory). This, however, is unjustified, given only the two principles.

The possibility of spacelike *growing* clearly shows the spatial analogue of the allegedly temporal passage, but one can avoid this with the bow-tie version according to which, at any spacetime-point, the elsewhere region is completely populated.

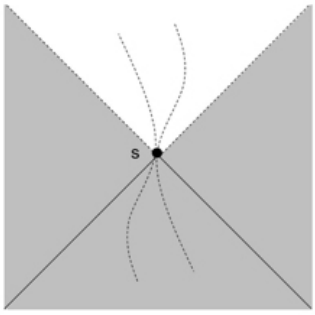

FIG 3 Bow-tie relativistic GBT: Infinitely many timelike directions

With regard to this version, the block cannot grow in spacelike direction, because therein everything already exists. However, the two principles hold relative to "any" particle's trajectory (timelike curve). There are *infinitely many* such trajectories passing through *s* and, again, the question arises: what happens *next*, how does the block grow? Nothing comes next!

Here, the problem not only is that the neighborhood around *s* is partly empty but also that there are infinitely many directions in which the block could possibly grow. All timelike curves through *s* are ontologically on a par, no one is privileged, so that without further assumptions the proponents of the GBT cannot tell in which way fresh slices of existence should be added. There are many ways to do so. This shows that the (missing) continuity of time is closely connected with the (missing) direction of time.

Therefore, I conclude that, without an adequate representation of time continuity, time directionality gets lost and so the temporal character of the intended existential dynamics as well. Something has to be done to close the gap. In the final section, I will suggest that Kantian consciousness-dependence of objective time flow could help.

IV. Kant's Consciousness-dependence of Time

Usually, non-eternalists claim that temporal *experience* depends *explanatorily* on the objectively dynamical time. The assumption is that our experience and our perception are tensed (see, e.g., Soteriou 2013, chap. 4): one has the subjective impression of the passage of time. Given this, many philosophers believe that one can only understand this fact, i.e. one can only explain our experience/perception, if one grants that objective time, in some way or other, also has the characteristics of passage. [9] Given the foregoing, I take the opposite path: it is objective time that depends on time consciousness. However, this dependence is not (only) explanatory; I will not (only) argue that we can only understand that, e.g., Special Relativity is talking about objective time given our temporal experience/perception, our time consciousness. Rather, the dependence (also) is *ontological*, i.e. there only can be objective passage of time thanks to (in virtue of; grounded by) the consciousness of time. Apparently, the analytic metaphysics of time cannot do justice to the *continuity* of time, i.e. to its *genuine* dynamical character, even if one considers the most promising account of an existentially dynamical ontology. [10] Now, the idea is that consciousness provides the missing link, namely so that the *objective* continuity of time *ontologically* depends on time consciousness.

Such a consciousness-dependence is essentially Kantian. Firstly, Kant famously claimed that (subjective) time – time as pure intuition – is a condition of (the possibility of) the experience of objects or events in (objective) time. This makes objective time *explanatorily* dependent on subjective time: one can only arrive, *a posteriori*, at an understanding of objective temporal relations and temporal becoming because of subjective time, given *a priori*. Also famously, then, Kant provides a link between epistemology and ontology expressed by the slogan that the conditions (of the possibility) of experience also are conditions of the objects of experience (see, Kant 1781, A 111). This makes the temporal location of objects, temporal relations between objects, and the temporal becoming of (objective) events or processes *ontologically* dependent on the same conditions of their (possible) experience. Kant's critical metaphysics can be summarized by the idea that metaphysical statements – such as that "there is objective temporal becoming" or that "there is objective causality (necessary connection) between events" – are in fact justified (against Hume), but only if they can be linked with the conditions of experience (against 'dogmatic' metaphysicians such as Leibniz or Aristotle). [11] Applied to the purposes of this paper, temporal continuity is, for Kant, "empirically real" – objective, in the sense needed – but "transcendentally ideal", i.e. originally subjective. About temporal continuity, and closest to the GBT, consider the following quotation: [12]

9 Of course, there are also many *eternalists* who disagree and argue that the perceived passage can be explained, 'although' the objective world is a (tenseless) block universe; see Deng (2017) and Sattig (2018).

10 To be fair, the MST seems to be safe at this point. As said, for dialectical reasons the MST appears in this paper as the contender that does not face the difficulties at issue.

11 This characterization of Kant's metaphysical project can also be found, e.g., in Allais (2015).

12 For a similar reading of this quote, see Prauss (2019).

> [time] cannot be made representable to us except under the image of a line, insofar as we draw it (Kant 1787, B 156)

In philosophical reasoning, Kant says, one needs an "image" in order to make time representable to us. Philosophical reasoning is partly metaphorical, and, for an adequate philosophical understanding of time, one needs the spatial analogue of "a line". Purely conceptual reasoning – as it were with Cantor's set-theoretical account in mind – is apparently not sufficient. Time is so peculiar, because it is originally pure intuition, that one must use intuition also while reasoning about time.

Then, Kant argues, the (needed) spatial analogue of a line is misleading (or, at least, risky): indeed, it does the intended job only "insofar" as one draws the line. Otherwise, the dynamical aspect of time gets lost. Only the drawing of the line – not the line as such – can be an image that makes the passage of time representable to us. This remark should be taken as evidence for the fact that, for him, time order is dependent on time direction. For, a (spatial) line can represent the temporal *order* of earlier/later-than only dependent on the (temporal) *direction* of drawing it.

Thus, for Kant, time directionality is more fundamental than time order. Kant is a non-eternalist: eternalists, by contrast, have less problems with the spatial analogue since they claim that time order – the B-theoretical relation – is the fundamental feature of time. Again, the MST is the most illuminating contender, because it makes mostly plausible that non-eternalists must hold contrariwise that time direction is the fundamental feature of time. In MST, some Cantorian set of points, such as a timelike curve in spacetime, represents a merely antisymmetric, irreflexive, and transitive order that turns into a temporal B-series of earlier/later-than only dependent on the A-theoretic, directed motion of the objective presentness. The crucial problem with the GBT under discussion is that it has an order of precedence but not a notion of directionality. However, every version of non-eternalism should consider time direction as fundamental. [13] Now, let me focus on the impression that Kant's claim is close to the GBT. Apparently, for Kant, while being drawn, the line is always increasing. However, if "drawing" is nothing other than "adding fresh slices", the problem of the next moment is still to be solved. As it seems, also Kant faces the difficulty that the direction of increasing (along the board) differs from the direction of adding slices (crosswise/perpendicular to the board). What we make representable to us by drawing a line, is apparently not a line inherently extending but a line always being made greater by the stick in our hand. This directionality-problem directly leads to the continuity-problem: strictly speaking, again, the newest stuff on the board either creates a gap to the rest of the line, or cannot be pointlike, i.e. it adds at once a (small) line, not being progressively drawn. This would be the end of the story if one considers time as *originally objective*, in Kant's terms: as "transcendentally real".

13 See for a defense of this fundamentality claim, also with respect to General Relativity, Friebe (2016).

Taken in isolation, the given quote talks about "real time" in the sense of current analytic metaphysics. If so, Kant, as well, can be confronted with the problem that the intended existential dynamics of time cannot be continuous: nothing comes next. Given the context of Kant's work, however, "time" does not mean (analytic) "real time", i.e. transcendentally real time, but rather "objective time", i.e. empirically real time. Then, this same time also is, for Kant, transcendentally ideal, i.e. *originally subjective*. [14] This is the source of a solution to the problem of the time continuum: the last moment, i.e. the edge of the line,

14 Note that Kant here is not talking about time as purely subjective (as pure intuition), but about objective time as originally

must be *accompanied* by consciousness.With regard to everything subjective, i.e. regarding every representation (intuitions; concepts) in us, Kant holds – again, famously – that:

subjective; otherwise the assumption that Kant's claim is close to the GBT would be nonsense.

> The *I think* must be able to accompany all my representations. (Kant 1787, B 131)

Otherwise, the unity of the (transcendental) subject could not be established. Applied to the case at hand, this would mean that the *I think* must be able to accompany the representation of time, i.e. pure intuition. Self-consciousness, expressed by "I think, [...]", establishes the unity of time. The unity of time is nothing other than the *continuity* of time, expressed by the drawing of the line, but not sufficiently so without being accompanied by the *I think*.

Transferred to the objectivized time – being no longer mere intuition but empirically real, i.e., so to speak, "actualized intuition" (=appearance): by consciously accompanying the last moment, the unity (=continuity) of the present could be established. There is no longer a discontinuous gap, since there really will be *no next* moment. The last moment, the edge of being, becomes its own, genuine direction of becoming. [15] There will be no next moment, because the alleged "next last moment" still is (and will be) the only last moment, in its activity of actualizing subjective time. This activity of actualizing subjective time essentially is time direction (not time order). It closes the gap of discontinuity, and so projects the direction of motion from the stick in our hand into the line that, by now, is inherently self-extending in the desired direction of the future. [16]

15 But: what about the past moments? Is this still an articulation of the GBT or, instead, of presentism? – I would answer to these questions: it is neutral with regard to the GBT/presentism distinction, but it suggests that the past of the growing block is not simply an eternalist-like block. The GBT is not simply a combination of eternalism (regarding the past) and presentism (regarding the future), but its past still is dynamical in the sense that the whole block is extending.

16 Probably at this point, Kant needs the capacity of imagination: what appears is present (as actualized intuition) and, grounded on the actuality of such appearance, the imagination makes the future possible; see also Rosefeldt (2019) for the claim that Kant additionally needs the imagination of time.

V. Conclusion

Even the most promising account of an *existentially* dynamical ontology cannot explain how time *constantly* passes. Without the time continuum, however, the *genuine* temporal dynamics gets lost; the existential dynamics falls down the spatial-analogue objection. Kantian consciousness-dependence closes the gap by making objective time flow ontologically dependent on a subjective condition of experience: time as pure intuition (and imagination).

Although the paper focused on a specific variant of the GBT, the arguments given are perhaps sufficiently flexible as to also justify a more general suggestion: if one is after an ontology of temporal passage in the existentially dynamical sense of the term, the continuity/directionality of time provides the most serious challenge. The requirement can (only?) be satisfied by grounding objective time in subjective time, given a priori.

Bibliography

Allais, L. (2015). *Manifest reality. Kant's idealism and his realism*. Oxford/New York: Oxford University Press.

Broad, C. D. (1923). *Scientific thought*. London: Routledge.

Cameron, R. (2015). *The Moving Spotlight. An essay on time and ontology*. Oxford: Oxford University Press.

Correia, F. & Rosenkranz, S. (2018). *Nothing to come. A defence of the growing block theory of time*. Cham: Springer (Synthese Library).

Id. (2019). Temporal existence and temporal location. *Philosophical Studies*, *online-first*.

Deasy, D. (2015). The Moving Spotlight Theory, *Philosophical Studies*, 172 (8), 2073-2089.

Deng, N. (2017). Temporal experience and the A versus B debate. In I. Philips (Ed.), *The Routledge handbook of philosophy of temporal experience* (239-248). London: Routledge.

Friebe, C. (2016). Time order, time direction, and the presentist's view on spacetime. *Kriterion: Journal of Philosophy*, 30 (2), 91-106.

Id. (2018). Metaphysics of laws and ontology of time. *Theoria, 33 (1)*, 77-90.

Kant, I. (1781/87). *Critique of pure reason*. Transl. and ed. by P. Guyer & A.W. Wood (1998). Cambridge: Cambridge University Press.

Lewis, D. (2004). Tensed quantifiers. In D. Zimmerman (Ed.), *Oxford studies in metaphysics* (3-14). Oxford: Oxford University Press.

Mellor, D. H. (1998). *Real time II*. London: Routledge.

Prauss, Gerold. (2019). Zur Begreifbarkeit der Ausdehnung von Zeit und Raum. *Kant-Studien,* 110 (3), 397-412.

Rosefeldt, T. (2019). Kant on imagination and the intuition of time. In G. Gentry & K. Pollock (Eds.), *The imagination in german idealism and romanticism* (48-65). Cambridge: Cambridge University Press.

Sattig, T. (2018). The sense of temporal flow: a higher-order account. *Philosophical Studies*, *online-first*.

Sider, T. (2001). *Four dimensionalism: an ontology of persistence and time*. Oxford/New York: Oxford University Press.

Soteriou, M. (2013). *The mind's construction*. Oxford: Oxford University Press.

Tooley, M. (1997). *Time, tense, and causation*. Oxford: Clarendon Press.

Williamson, T. (2013). *Modal logic as metaphysics*. Oxford: Oxford University Press.