Commentary: Physical time within human time

Kristie Miller1* and Danqi Wang2

1Department of Philosophy, School of Humanities, The University of Sydney, Darlington, WA, Australia, 2Department of Philosophy, King’s College London, London, United Kingdom

KEYWORDS
flow, persistence, endurance, time, temporal experience

A Commentary on
Physical time within human time
by Gruber, R. P., Block, R. A., and Montemayor, C. (2022). Physical time within human time. Front. Psychol. 13, 718505. doi: 10.3389/fpsyg.2022.718505

A reconciliation

Gruber et al. (2022) and Buonomano and Rovelli (2022) aim to render consistent the picture of time delivered to us by physics, with the way time seems to us in experience. Their general approach is similar; they take the picture of our world given to us in physics, a picture on which there is no global “moving” present and hence no robust temporal flow, and attempt to explain why things nevertheless seem to us as they do, given that our world is that way. In this, they follow in the footsteps of Hartle (2005), Callender (2017), and Ismael (2017), who argue that any information gathering system (an IGUS) will, in learning to navigate our world, represent the distinctions between past, present, and future, and represent their own changing trajectory through spacetime. While we are generally very sympathetic to this approach, there are several places where we disagree.

What to reconcile?

While Gruber et al. and Buonomano and Rovelli each take themselves to be attempting to bridge the gap between two ways of thinking about our world, the gap in question is a little different. Gruber et al. take themselves to be attempting to bridge the gap between the manifest image—the image of time had by each of us in ordinary experience—and the scientific image—the image presented to us in our best science. Buonomano and Rovelli’s target is a little different. They take themselves to be attempting to bridge the gap between the way neuroscientists suppose things to be, in theorizing about how we come to represent and experience the world, or perhaps even the way neuroscientists suppose that things seem to us, in ordinary experience, and how the image of the world presented to us in the scientific image. The former is straightforwardly a claim about the manifest image. The latter is a claim about what the scientific image (neuroscience) tells us about the manifest image. In what follows we will talk directly about these claims about the manifest image.
Both Gruber et al. and Buonomano and Rovelli hold that it is part of the manifest image that time passes: that it seems to us as there is a present moment, and that which moment that is, changes. Gruber et al. express this as the claim that it seems to us as though there is a unique, changing present. In addition, Buonomano and Rovelli hold that it is part of the manifest image (according to neuroscience) that presentism is true: that is, that only present things exist (past and future ones do not) though which things are present, changes. It’s worth distinguishing two different claims that might be at issue here. The first is a claim about the way the world is presented to us in experience; the way it experientially seems to us. The second is a claim about how we take the world to be, pretheoretically; what we tend to believe about the world. We think that one aspect of their target—the presentist component—is a mistake.

**Presentism**

Ultimately, as we read them, Buonomano and Rovelli argue that the manifest image as it really is, rather than as neuroscientists suppose it to be, is consistent with the scientific image. We agree. Consider first the idea that we tend to believe that presentism is true. In fact, empirical evidence regarding people’s beliefs suggests that most people believe that past, or past and future, objects exist (Latham et al., 2019, 2020). Most people do not have a manifest image of our world as being a presentist world. We also think that Buonomano and Rovelli are right to argue that there is little reason to think that the best description of our experiences is that it seems to us as though only the present exists. The fact that we are usually perceptually aware of what seems to us to be a single moment, the present, and that what we are aware of, changes, does not show that it seems to us as though there only exist present things, any more than the fact that typically each of us is only perceptually aware of what is spatially local to us, suggests that our experiences are such that it seems as though only things that are “around here” exist. So while neuroscientists might tend to model our experiences in terms of a single, changing, present, there is nothing in our experiences themselves that suggests that we experience the world as one in which presentism is true.

**An illusion of flow**

Buonomano and Rovelli hold that our experiences are veridical experiences of a local changing indexical present. According to the block universe model we are located at multiple locations in spacetime. At different locations we have different experiences. Further, because of entropy increasing away from the low entropy big bang, there are records (such as memories) of earlier events but not later ones, so at different locations our experiences represent that at earlier locations we had different experiences. We represent that our experiences change. Buonomano and Rovelli conceive of this as having a veridical experience of a local changing present. In this, they agree with Ismael (2012, 2017) and Sattig (2019a,b), who hold that representing these experiences as changing constitutes our having a veridical experience of time flowing. More generally, many block theorists hold that we have veridical experiences of anemiac flow: the kind of flow that is present in block worlds and is consistent with physics (Dainton, 2011; Deng, 2013, 2019; Hoerl, 2014; Baron and Miller, 2018; Miller, 2019; Miller et al., 2020; Leininger, 2021). These authors deny that we have experiences of robust flow: experiences as of there being a unique present that changes, and hence they deny that our experiences of flow are illusory.

By contrast, Gruber et al. argue that our cognitive systems generate an illusion as of there being a unique changing present, where this illusion is a “more satisfying experience of physical time, [that produces] better adaptive behavior.” But we see little reason to suppose that the relevant experiences here are indeed illusory.

To be illusory, our experiences would need to represent that there is a unique present that changes. We see little reason to think they do. Consider the way we represent things as present. Perhaps we perceptually represent indexical presentness. If so, perceptual experience is tensed: it is part of the content of perception that we represent the event perceived as occurring at the time of the perception (Peacocke, 1999; Kriegel, 2009; Phillips, 2014). In experiencing what is indexically present as changing, however, our experiences are veridical: what is indexically present does change in a block world. Or perhaps we do not represent presentness at all. Hoerl (2018), holds that things presented to us in perceptual experience are not presented to us as present because our perceptual experience has no temporal viewpoint. Then we are not subject to any illusion. Since we see little reason to suppose that people represent that there is a unique global present that changes, we doubt that they are subject to an illusion of flow: instead, they have veridical experiences of anemiac flow.

**Persistence: Endurance and perdurance**

A second aspect of Gruber et al.’s account that we doubt is their appeal to the role of persistence in explaining the illusion of flow. Gruber et al. hold that endurantism is incompatible with a block world, so objects perdure. But if objects perdure then they do not persist. Since we have experiences as of objects, particularly the self, persisting, then those experiences are illusory, and they contribute to the illusion of flow.

While some argue that endurantism is incompatible with eternalism (Merricks, 1994, 1999; Barker and Dowe, 2003, 2005; Effingham and Robson, 2007; Gibberman, 2017; Baron and Miller, 2018) it is generally held that the two are compatible
(Haslanger, 1989; Sider, 2001; Miller, 2004; Brower, 2010; Eagle, 2010; Daniels, 2014; Wasserman, 2016). So we should not conclude that if our world is a block world, then objects must perdure. Moreover, even if objects do perdure, it does not follow that our experiences of persisting things are illusory. Gruber et al. write, “…perdurantism… suggests that object persistence is not veridical (Gruber et al., 2022, p. 5).” This implies that perduing objects do not persist. However, endurantism and perdurantism are accounts of persistence: they simply disagree about the way in which objects persist.

If we experience persisting objects as enduring, when in fact they perdure, then our experience would be illusory. Prosser (2007, 2012, 2016) takes this to be so, and he thinks we mistake these illusory experiences for experiences of flow. But recent empirical research by Baron et al. (2022) tends to undermine this. Baron et al. (a) found that most non-philosophers did not judge that objects endure rather than perdure, and (b) found no association between people judging that our world contains robust flow and judging that objects endure rather than perdure and (c) found that when presented with a description of an experience of time robustly flowing, people were no more inclined to judge that the world was one containing enduring rather than perduing objects.

Perhaps when Gruber et al. talk about enduring as opposed to perduing selves they really have in mind the view that there is an unchanging core persisting self rather than a series of short-lived momentary selves that have no unchanging properties. Then the suggestion is that it is because we experience ourselves as having an unchanging core, that we are subject to an illusion of flow. We take it to be an open question both whether people do experience themselves as having an unchanging core, and whether, if they do, they would mistake this as an experience of flow (as per Prosser’s suggestion) or that this would partially constitute them having an illusory experience as of flow (as we take it Gruber et al. are suggesting).

While the IGUS-driven approach has much to recommend, we are not convinced by the dualistic model on which the IGUS not only has veridical experiences of a block world, but also has adaptive illusory experiences as of time flowing. We see little reason to posit this second aspect to experience.

Author contributions

All authors listed have made a substantial, direct, and intellectual contribution to the work and approved it for publication.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher’s note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.

References

Barker, S., and Dowes, P. (2003). Paradoxes of multi-location. Analysis 63, 106–114. doi: 10.1093/analys/63.2.106

Barker, S., and Dowes, P. (2005). Endurance is paradoxical. Analysis 65, 69–74. doi: 10.1093/analys/65.1.69

Baron, S., Latham, A., Miller, K, and Oh, J. (2022). Is endurantism the folk friendly view of persistence? Available online at: https://philpapers.org/rec/ BARIET-4 (accessed August 16, 2022).

Baron, S., and Miller, K. (2018). An Introduction to the Philosophy of Time. Cambridge: Polity Press.

Brower, J. E. (2010). Aristotelian endurantism: a new solutio n to the problem of inexistence. Austral. J. Philos. 85, 633–640. doi: 10.1080/00048400701728541

Buonomano, D and Rovelli, C. (2022). Bridging the Neuroscience and Physics of Time. Time and Science

Callender, C. (2017). What Makes Time Special. Oxford: OUP. doi: 10.1093/oso/9780198797302.001.0001

Dainton, B. (2011). “Time, passage and immediate experience,” in Oxford Handbook of Philosophy of Time, ed C. Callender (Oxford: OUP). doi: 10.1093/oxfordhb/9780199258204.003.0013

Daniels, P. (2014). Occupying wall a mereological puzzle and the burdens of endurantism. Austral. J. Philos. 92, 91–101. doi: 10.1080/00048402.2013.820764

Deng, N. (2013). Our experience of passage on the B-theory. Erkenntnis 78, 713–726. doi: 10.1007/s10670-013-9489-5

Deng, N. (2019). “One thing after another: why the passage of time is not an illusion,” in The Illusions of Time: Philosophical and Psychological Essays on Timing and Time Perception, eds A. Bardon, V. Arstila, S. Power, and A. Vatakis (London: Palgrave Macmillan). doi: 10.1007/978-3-030-22848-8_1

Eagle, A. (2010). “Perdurance and location,” in Oxford Studies in Metaphysics, vol. 5, ed D. Zimmerman (Oxford), 53–94.

Effingham, N., and Robson, J. (2007). A mereological challenge to endurantism. Austral. J. Philos. 85, 633–640. doi: 10.1080/00048400701728541

Giberman, D. (2017). Bent not broken: why exemplification simpliciter remains a problem for eternalist endurantism. Erkenntnis 82, 947–966. doi: 10.1007/s10670-016-9852-4

Gruber, R. P., Block, R. A., and Montemayor, C. (2022). Physical time within human time. Front. Psychol. 13, 718505. doi: 10.3389/fpsyg.2022.718505

Harline, J. (2005). The physics of now. Am. J. Phys. 73, 101–109. doi: 10.1119/1.1783900

Haslanger, S. (1989). Endurance and temporary intrinsics. Analysis 49, 119–125. doi: 10.1093/analys/49.3.119
Hoerl, C. (2014). Do we (seem to) perceive passage? *Philos. Explorat.* 17, 188–202. doi: 10.1080/13869795.2013.852615

Hoerl, C. (2018). Experience and time: transparency and presence. *Ergo* 5, 127–151. doi: 10.3996/ergo.12405314.0005.05

Ismael, J. (2012). “Decision and the open future,” in *The Future of the Philosophy of Time*, ed A. Bardon (New York, NY: Routledge), 149–169.

Ismael, J. (2017). “Passage, flow, and the logic of temporal perspectives,” in *Time of Nature and the Nature of Time*, eds C. Bouton and P. Huneman (Heidelberg: Springer Verlag), doi: 10.1007/978-3-319-7253-2_2

Kriegel, U. (2009). Temporally token-reflexive experiences. *Can. J. Philos.* 39, 585–617. doi: 10.1353/cjp.0.0064

Latham, A. J., Miller, K., and Norton, J. (2019). Is our naïve theory of time dynamical? *Synthese* 198, 4251–4271. doi: 10.1007/s11229-019-02340-4

Latham, A. J., Miller, K., and Norton, J. (2020). Do the folk represent time as essentially dynamical? *Inquiry* 1–32. doi: 10.1080/0020174X.2020.1827027

Leininger, L. (2021). Temporal B-coming: passage without presentness. *Austral. J. Philos.* 99, 130–147. doi: 10.1080/00048402.2020.1744673

Merricks, T. (1994). Endurance and indiscernibility. *J. Philos.* 91, 165–184. doi: 10.2307/2940769

Merricks, T. (1999). Persistence, parts, and presentism. *Noûs* 33, 421–438. doi: 10.1111/0029-4624.00162

Miller, K. (2004). Enduring special relativity. *Southern J. Philos.* 42, 349–370. doi: 10.1111/2041-6962.2004.B015937.x

Miller, K. (2019). “Does it really seem as though time passes?” in *The Illusions of Time: Philosophical and Psychological Essays on Timing and Time Perception*, eds V. Artsila, A. Bardon, S. Power, and A. Vatakis (London: Palgrave McMillan), 17–33. doi: 10.1007/978-3-030-22048-8_2

Miller, K., Holcombe, A., and, Latham, A. I. (2020). Temporal phenomenology: phenomenological illusion versus cognitive error. *Synthese* 197, 751–771. doi: 10.1007/s11229-018-1730-y

Peacocke, C. (1999). *Being Known*. Oxford: Clarendon Press. doi: 10.1093/0198238606.001.0001

Phillips, I. (2014). Experience of and in time. *Philos. Compass* 9, 131–144. doi: 10.1111/phc3.12107

Prosser, S. (2007). Could we experience the passage of time? *Ratio* 20, 75–90. doi: 10.1111/j.1467-9329.2007.00348.x

Prosser, S. (2012). Why does time seem to pass? *Philos. Phenomenol. Res.* 85, 92–116. doi: 10.1111/j.1933-1592.2010.00445.x

Prosser, S. (2016). *Experiencing Time*. Oxford: Oxford University Press. doi: 10.1093/acprof:oso/9780195244433.001.0001

Sider, T. (2001). *Four Dimensionalism*. Oxford: Clarendon Press. doi: 10.1093/acprof:oso/9780195244433.001.0001

Wasserman, R. (2016). Theories of persistence. *Philos. Stud.* 173, 243–250. doi: 10.1007/s11098-015-0488-z