List of Abstracts
in alphabetical order

Giacomo Andreoletti

Acting in the Garden of Forking Paths

The Garden of Forking Paths picture of agency consists essentially of two elements. The first is to see time as branching towards the future—the future is composed of several alternative continuations of the present, viz. the alternative *paths*. The customary way to understand this first element is through a branching conception of time (see, among many others, Prior 1967, Thomason 1970, Belnap et al. 2001). The second element has to do with the role of agents living in the branching garden. The idea here is that agents sometimes have the ability to make things go the way they want. That is, the picture claims that agents (sometimes) act in ways that determine which future (which path) will be selected and actualized. That is, through their choices and actions, agents navigate their way through the garden. The Garden of Forking Paths is a seemingly attractive picture of agency, and it has gained quite some popularity or attention among philosophers working on time and/or the problem of free will (see, among many others, McCall 1994, Horty and Belnap 1995, Kane 2007, Waller and Waller 2015, Law 2023). Despite its popularity, I argue that the Garden of Forking Paths is, upon closer inspection, inherently implausible. More precisely, I argue that the Garden of Forking Paths view is incompatible with some minimal necessary conditions for agency that a proponent of the view must be committed to endorse. Here are the three necessary conditions. An agent α performs an act A (ending at m) only if: 1) at some moment prior to m, α decided to A—acts require prior decisions, 2) at some moment prior to m, alternative future courses of action were available to the agent—one can deliberate only about what is contingent, and acting implies the ability to do otherwise, and 3) some of α's mental events occurring prior to m explain why A, instead of one of the other alternatives, occurred—acts make a difference with respect to which branch is actualized. I show that independently of where in a branching structure we place the moment of choice m_C and the moment of the subsequent act m_A—the plausible options being: 1) both m_C and m_A *after* the relevant branching point, 2) m_C earlier than the branching point with m_A after it, and 3) m_C right at the branching point and m_A after it—acts cannot meet all the tree necessary conditions above. Thus, the inherent implausibility of the Garden of Forking Paths picture of agency.

Adrian Bardon

Transcendental Arguments in Philosophy of Time

Transcendental arguments [TAs] are anti-skeptical arguments focusing on necessary *enabling conditions* of the possession or employment of some kind of experience, knowledge, or

cognitive ability. Even though contemporary philosophers of time don't often use the term, there are quite a few prominent examples. The most common argument for a dynamic/A-theory position is that we have good reason to think that there is a real flow of time simply because we experience the flow of time and/or dynamic change. One recurring reply in philosophy of time has been that the flow, or passage, of time is an "illusion", similar to the way phi motion or the waterfall illusion produce the illusion of motion (e.g., Paul 2010, Dainton 2012, Gruber/ Block 2013). Yet Dummett (1960) insists that the *illusion* of passage would be impossible without dynamic change in one's own experiences. Zwart (1975) argues that the use of language (along with any conscious thought) would be impossible without the reality of the passage of time (cf. Plato in *Theaetetus*); Norton (2010) claims that any coherent, serial awareness of events would be impossible without passage. The general idea across these is that passage is real because consciousness itself would be impossible without the passage of time (i.e., classic TA-type reasoning). This overall approach is so common amongst passage realists as to practically constitute a school of thought. Critics have tried to argue that no TA can succeed without presupposing idealism (e.g., Stroud 1968). The motive to reject all world-directed TAs in this way is the same motive as the rejection of claims to synthetic a priori knowledge. But the blanket statement "No world-directed TA can succeed" is itself a synthetic a priori claim; thus blanket skepticism about TAs is self-undermining. Parmenides and McTaggart argue for the fundamental incoherence of the idea of passage. The contemporary deflationist seeks to dissolve the issue of passage phenomenology: The experience of flow, or an absolute present, is not an issue because we have no good reason to think there is any such experience. Indeed, it is difficult to see how the experience of an A-universe would differ from that of a B-universe (See Prosser, Frischhut, Deng, etc.). The experience of passage would require us to literally experience the uniqueness of the present (Miller et al. 2020), and it's difficult to see how that would work. According to the deflationist, the thought that time passes causes one to misrepresent one's experience as including passage. I discuss whether the combination of points like these entitles us to *disregard* transcendental arguments claiming that the very possibility of consciousness itself proves a real passage of time.

Marta Bielinska

Branching Time and Real Chance

Recently, many philosophers argued that the future is open and past is closed. This should be reflected in our theories of chance, in which chance is dependent on time in such a way that its value is different before and after a chancy event. In this paper, I elaborate a detailed definition of such a chance and I call it a 'real chance'. In this talk I present two popular accounts of chance – the Revisited Principal Principle by David Lewis (1980) and the Humean Objective Chance by Carl Hoeffer (2007) – and I argue that neither of them accounts for the real chance. For this reason, I develop an account of real chance and provide an ontology for this framework, which is based on the Branching Time theory. I begin by considering an

account of chance proposed by David Lewis in "A Subjectivist's guide to the Objective Chance" (1980), known as the Revisited Principal Principle (RPP), according to which:

$$P_{tw}(A) = C(A|H_{tw} \wedge T_w), \qquad (1)$$

where A is an event, P_{tw} is an objective chance distribution that obtains at the time t and the world w, H_{tw} is a complete history of the world w up to time t, T_w is a complete specification of the way that chances at any time (but for a particular world w) depend on the history up to that time, and C is a credence function. I argue that RPP does not account for a real chance in the actual world. Further, I argue that this is a direct consequence of a conjunction of two factors: (1) the fact that it is formulated in the language of possible worlds and (2) it explicitly involves time, which together support Lewis's belief that "past is no longer chancy." On the contrary, Carl Hoeffer rejected this belief about closed past and he also argued that theory of chance doesn't have to be time-dependent. On grounds of his theory, known as the Humean Objective Chance (HOC) proposed in "The Third Way on Objective Probability: A Sceptic's Guide to Objective Chance" (2007), objective chances are indifferent on time. I argue that HOC does not account for a real chance in the actual world, because it does not account for a change in the world which happens after probabilistic event: chances of getting both heads and tails are equal 1/2 not only before tossing a coin, but also after it. Finally, I present my own theory of chance, which accounts for the real chance. This theory is formulated in the formalism of Branching Time (BT), first proposed by Arthur Prior (1967). BT is usually considered to be a semantics that allows representing real possibilities within a world. I argue that it can be used to formulate new ontology, which can be an ontology of the real chance.

Craig Callender

Imaginary Numbers and Time Reversal

The need to implement time reversal via complex conjugation in quantum theory has always been a bit of a puzzle. Why should i go to $-i$ under temporal reflection when it has no spatiotemporal dimensions? I'll provide a new explanation with a divide-and-conquer strategy. For theories with beables in addition to the wavefunction, I show how the little-appreciated "quantum-looking" classical Schrodinger equation of Schiller and Rosen teaches us how to solve the puzzle. For wavefunction-only interpretations, I use work with Jacob Barandes on the Strocchi-Heslot formalism to illustrate how to extricate ourselves from this puzzle. Big picture: if I'm right, the puzzle over quantum time reversal is a by-product of bad interpretations of quantum theory.

Claudio Calosi

Presence and Delegation

I present a new (formal) theory of presence according to which, roughly, to be present at a place is for it to have a delegate located at that place. One crucial feature of the theory is that something can be present at a place without thereby being

located there. I then go on to apply such new theory to substantive philosophical cases which feature universals, social entities, persisting objects and omnipresent beings.

Christabel Cane

The Problems of Temporary Intrinsics

Relationalism explains change through relativising temporary properties to the times at which they are instantiated. Assuming Newtonian space and time, this implies that all such properties are extrinsic, as they depend on external times. This is known as the problem of temporary intrinsics, and it has supplied philosophers like Lewis (1986) with a swift argument for rejecting relationalism. However, this problem loses force when considered in the context of Einsteinian relativity. The shift from absolute space and time to the space-time paradigm implies that spatio-temporally extended objects are not entirely distinct from the times through which they persist. Indeed, I will argue that certain temporal intervals should be thought of as intrinsically instantiated by ordinary objects, and that the relationalist should therefore relativise temporary properties to such intervals Parsons (2000) suggests that temporary properties should be relativised to *times within an object's lifespan* when he advocates that a cooling poker should be thought of as hot such that it is hot in the first *n* seconds of its life. My account will flesh this idea out, by providing an explanation of how an object like a poker intrinsically instantiates intervals of time within its own lifespan. I'll consider borrowing the notion of 'proper time' from physics for this task. Specifically, the proper duration of an object as it occupies the succession of spatio-temporal points that constitute its world-line. The proper duration in this instance yields the amount of time that an ideal clock would measure when situated within the frame of reference stipulated by a given object's world-line. However, this line of reasoning will be rejected as an object does not intrinsically instantiate its world-line, given that the world-line *would* have existed, even if the object had not. Therefore, the relationalist who makes use of proper times generates an (updated, but no less significant) problem of temporary intrinsics, whereby temporary properties are relativised to an (external) spatio-temporal region, rather than to an (external) time. Instead, I'll make an appeal to the dynamical view of space-time, as endorsed by Brown (2005) and Read (2020), which implies the law-like behaviours of objects are more fundamental than the inertial features of space-time. This allows the relationalist to ground their notion of intrinsically-instantiated times in the dynamic processes that an object undergoes. Finally, I'll consider Vallentyne's (1997) criticism that intrinsic properties must be instantiated regardless of contingent physical laws. A salt, he argues, cannot be intrinsically soluble, as such solubility depends at least partially upon the (external) laws of nature. I'll adopt Vetter's (2015) dispositional analysis to circumvent this problem, advocating that the relationalist think of an intrinsic temporary property as relativised to some intrinsically-instantiated temporal interval within the lifespan of the object that instantiates it, whereby such times are grounded by the dynamical processes that the object has an intrinsic disposition

to undergo. This will restore temporary intrinsics to the relationalist's ontology, empowering them to deliver a richer and more attractive theory of persistence.

Kevin Coffey

Is Temporal Structure Curved in Newtonian Gravitation Theory?

This talk concerns a debate about the temporal curvature of spacetime within the foundations of classical gravitation. Newtonian gravitation theory is often claimed to exhibit an important symmetry with respect to its inertial structure, a symmetry that allows one to draw the distinction between inertial structure and gravitational field in indefinitely many ways. Philosophers of physics have used this fact to conclude that both features ought to be interpreted as conventional choices without underlying physical significance, and thus that there really are no gravitational fields posited by the theory. Instead, they argue, gravitation ought to be 'geometrized away' using mathematical techniques originally developed by Elie Cartan and Kurt Friedrichs.´ These techniques leave the *spatial* structure of classical spacetime Euclidean (i.e., flat), but, in a sense that can be made mathematically precise, curve its *temporal* structure. This paper provides a counterpoint to this view: I defend the postulation of a genuine distinction between inertial structure and gravitational field. I contend that the argument for the conventionality of the gravitational field—and thus for a curved temporal structure within Newtonian gravitation theory—contains an implicit premise that turns out to be false: namely, the premise that the formulation of Newtonian gravitation theory in terms of Poisson's equation is theoretically equivalent to the formulation in terms of the Law of Universal Gravitation. They are not theoretically equivalent, and I substantiate this claim by providing examples of physical systems that are models of one formulation but not the other. Moreover, I argue, attempts to reconcile the formulations succeed only at the price of destroying the symmetry upon which the conventionality argument is based. (Along the way I defend the claim that, despite current consensus, Newtonian cosmology is inconsistent. These claims are then marshaled in support of a broader philosophical lesson regarding the relationship between symmetry considerations and theory interpretation.)

Fabrice Correia

Persistence by Proxy

I recently developed a new theory of location − the Proxy Theory of Location − that I wish to apply to the characterization of endurance / perdurance distinction. At the heart of the theory is a distinction between *direct* occupants and *indirect* occupants of a system of regions − which, for the topic I will focus on, will be time or spacetime. The theory appeals to direct occupants called *proxies* to account for the possibility of multilocated objects, which count as indirect occupants insofar as they get their locations via their proxies.

On the view to be developed, enduring objects occupy time indirectly, and it is plausible to hold that at least some perduring entities, in particular events, occupy time directly. Such a view gives meat to the idea that enduring objects and events are connected to time in very different ways – the former existing "at times" and the latter existing "in time".

Siddhant Das

Quantum arrival-time problem and Bohmian trajectories

Computing the probability density of arrival, detection or flight times of a quantum particle at a detector, which is empirically well-accessible, is one of the last areas where physicists disagree about what QM should predict. Over the years, many disparate proposals have been put forward to address this problem. I will quickly examine some of the key suggestions and make the case that a Bohmian trajectory-based method is the most compelling, broadly applicable, and well-supported by existing experimental data, e.g., momentum and scattering statistics. In certain novel experimental settings, the Bohmian trajectory arrival-time distributions predict unexpected and very well-articulated features demanding experimental inspection, e.g., those suggested in [S. Das and D. Dürr, Sci. Rep. 9: 2242 (2019)]. I will discuss the key findings of this work. Time permitting, I will also comment on any possible drawbacks to the above approach, particularly those relating to the effect of the measuring devices, etc.

Nataljia Deng

An experience-based interpretation of the A versus B distinction

Time may or may not be dynamic in a way space is not; that is, time may or may not robustly pass or flow (in the A-theoretic sense in which this involves a lack of metaphysical parity between times; I'm setting aside here tenseless/B-theoretic approaches to passage). Independently of this, we may or may not perceive time as being dynamic; that is, we may or may not have perceptual experiences as of time passing. These two issues are orthogonal. The first is a metaphysical question concerning the nature of time, to which A-theorists answer 'yes' and B-theorists answer 'no'. By contrast, the second is a question concerning the contents of moment-to-moment (perceptual) temporal experiences. Thus, the following four combined positions are all available in logical space, even if some may be more defensible than others: (i) A-theory + A-theoretic experiences, (ii) A-theory + B-theoretic experiences, (iii) B-theory + A-theoretic experiences, (iv) B-theory + B-theoretic experiences. Call this the orthogonality claim.

The previous paragraph captures an implicit cornerstone of much contemporary philosophical work on time and experience. Underlying the orthogonality claim is the even more basic conviction that the distinction between dynamic and non-dynamic, A- and B-theoretic models of time, is intelligible independently of considerations relating to temporal experience. In this paper, I explore an ("(anti)realist") interpretation of the A versus B distinction on which that distinction is partly defined through an appeal to experience, and on which the orthogonality claim therefore does not hold.

This is intended as a descriptive claim about parts of the literature, not as a reform proposal. I start by arguing that it is helpful to distinguish between the B-theory as defined above (call it '(official) B'), and a metaphysically less committed claim that I'll call 'Meta-B'. B is a positive metaphysical view about the nature of reality, affirming that it lacks temporal passage. Meta-B merely rejects 'time passes', without adding that time is passage-less. B implies Meta-B, but not vice versa. Meta-B can be, and often is, held even by philosophers who are not engaging with McTaggartian ABCs or temporal ontology. I then consider the relation between experience and the A versus B distinction. I defend variations of two claims made by Prosser in *Experiencing Time*. These lead me to the (anti)realist interpretation of A versus (official) B. On that interpretation, the meaning of '(an absence of) passage' is defined partly through an appeal to experience: the A-theory is a view that posits a process partly defined through ostension ('passage is the thing that feels like *this*'), and the (official) B-theory says this process doesn't exist. I then argue that what looks like (iv) above ('deflationism'/'veridicalism') is based on Meta-B and thus makes only a minimal claim about temporal experience: the contents of (perceptual) temporal experience are not best described in A-theoretic terms. I defend this claim through a close examination of Torrengo's 'origin problem' and Hoerl's 'intelligibility problem'. The upshot is that the growing support for deflationism actually fits well with the (anti)realist interpretation.

Patrick Dawson

A-theorists should take passage to be fundamentally directionless

A-theorists believe that time robustly passes. This passage of time is directed: time passes away from the past, and towards the future. There are different ways of understanding this directedness, depending on which is metaphysically prior: passage itself, or the series of facts or events through which passage is directed. In this talk, I will argue that A-theorists should take the former to be prior to the latter. First and foremost, time simply passes. Depending on the A-theory, this could involve processes like accretion, coming-into-being, or a change in that which is present. As a result of these processes, there might *arise* an ordered series of events, such that passage can be said to be directed along that timeline. But I argue that A-theorists should reject that passage is *fundamentally* directed in time. Such ideas have been touched on elsewhere (e.g. Tallant 2010), and are consistent with a variety of dynamisms, including theories of timelessness with A-theoretic elements such as becoming or growth (Dowker 2014, Surya 2019). After raising some initial arguments for this view, I explore two notable applications. First, I argue that this view allows for A-theorists to circumvent objections centred on the *rate* of passage (Markosian 1993, van Cleve 2011). By rejecting that passage involves a progression down a metaphysically-prior timeline, A-theorists can reject that time passes at a rate. There would need to be temporal distances along such a timeline, in order for a rate to be defined in the first place. Instead, A-theorists can argue that temporal locations, distances, and rates only exist on the level of events that have already come to pass,

not among the (prior) process of passage itself. So while there *seems* to be a difference between (say) a growing block world growing at one speed, and another growing at twice that speed, this 'difference' is no more than a gauge transformation. Second, I argue that this view allows for A-theorists to more convincingly argue that temporal asymmetries, like that of thermodynamic entropy, favour A-theorists over their rivals. As things stand, there are some objections and debates about B/C-theoretic explanations of temporal asymmetry, including the past hypothesis (Earman 2006, Fernandes 2022). It's unclear that A-theorists can do better, however, since an A-theoretic explanation of T-asymmetry would require a dubious connection between the past-to-future temporal direction, and the applicability of statistical laws to physical systems. By arguing that states, first and foremost, accrete or come-into-being in a directionless way, A-theorists can argue that the laws of statistics hold over that becoming, unrestrictedly. Any *asymmetries* in those states arise from asymmetries in how newly-accreted states acquire temporal locations. So, fundamentally, entropy doesn't increase from past-to-future. Instead, entropy *simply increases* as new states come into being. A past-to-future asymmetry arises from this, not because of anything to do with entropy *per se*, but rather because new states acquire temporal locations in an asymmetric way.

Heather Demarest

Time-Asymmetric Law of Increasing Complexity

The second law of thermodynamics is a paradigmatic example of a general, time-asymmetric law of nature. It is time-asymmetric because it says that entropy tends to increase towards the future and decrease towards the past. It is general because it applies to any (sufficiently large) isolated system anywhere in the universe. While it is controversial whether the second law can be reductively explained—perhaps, as Albert and Loewer argue, by time-symmetric dynamical laws plus a uniform measure over a low-entropy boundary condition—the second law itself is general and time-asymmetric. In this paper, I argue that there is also a general, time-asymmetric law of increasing complexity. The increase in complexity over time is general. It occurs throughout the universe and at all different scales. The early universe was comprised of extremely simple entities, properties, and relations. As time went on, these entities became more complex, acquired new properties, and entered into new relations. For instance, for the first hundred thousand years after the big bang, there were no atoms at all. Now, there are over a hundred different kinds. Then, there were only a few, simple kinds of atoms, but no molecules. Now, a registry of molecules contains over ninety-million different kinds. Again, for the first billion years on Earth, there were no living things. Then, simple, single-celled organisms arose and, in turn, produced multi-cellular organisms, which gave rise to animals, intelligence, and eventually, language and technology. This increase in complexity is also time-asymmetric. While systems *can* decrease in complexity, their overall tendency is robustly toward increasing complexity. I consider three

different frameworks that purport to explain the increase in complexity. The first is the Mentaculus—a proposal by David Albert and Barry Loewer that appeals to a low-entropy initial state and statistical mechanical reasoning. I conclude that while such an account may not be inconsistent with the overall increase of complexity, it does not offer a sufficient explanatory framework for making such an increase unsurprising. This is because the relevant special science kinds cannot be easily interpreted as macrostates in the phase space of statistical mechanics. The second is Assembly Theory—a proposal by Leonard Cronin and Sara Walker et. al. that appeals to the fact that complex entities are composed of simpler parts that themselves are composed of simpler parts. According to assembly theory, there are vastly fewer actual combinations of parts than are logically possible, and this contributes to unique "paths" through possibility space that correspond to increasing complexity. I argue that this approach ignores crucial dynamical facts and problematically relies on logical, rather than physical, principles. The final account is Functional Information Theory—a proposal by Robert Hazen (and others) that appeals to the physically possible states of a system and their corresponding likelihoods of persistence in various environments. I conclude that this third account provides the best framework for developing a general, time-asymmetric law of increasing complexity.

Antony Eagle

Against Advanced Temporalizing

The problem of advanced modalizing is a challenge to modal reductionists who accept a 'spatializing' conception of possible worlds as akin to regions within a larger pluriverse, and adopt a concomitant 'restrictor' conception of possible truth as truth when matters are restricted to a possibility. In the presence of an unobjectionable inference rule allowing the derivation of possibly ϕ from ϕ, this conception leads to contradiction within the reductionist framework. Many have noted analogies between modality and tense, and some note the potential for a parallel problem of 'advanced temporalizing' to afflict temporal reductionists who accept a spatializing conception of times as regions within a larger four-dimensional block universe and a restrictor conception of temporary truth as truth when matters are restricted to a time, again given the apparently unobjectionable rule that sometimes ϕ is derivable from ϕ (Deasy 2020). However, once a semantics of natural language tense is developed in appropriate detail, and giving due consideration to a representative body of examples, there are fewer parallels between the standard modal logic and plausible treatments of tense than is often supposed. The temporal reductionist ought to accept a 'spatializing' account of time, but the simple restrictor treatment of tenses ought to be rejected. A more complex account is independently needed to accommodate parallels between tense and pronouns (noted long ago by Partee 1973, 1984), and that treatment requires multiple overt and covert temporal variables ranging over temporal intervals, not just single times. The resulting

semantics is B-theoretic, as it delivers eternal propositions as the semantic values of sentences in contexts. But it is not the simple 'moments-first' quantificational picture of tense that is often taken to characterise the B-theory.

Bahadir Eker

Situations, Change, Indeterminacy

As mundane and ubiquitous as qualitative change is, it proves metaphysically divisive. Consider a very instance of change: at first, an exotic bird called Birdie is blue, and then suddenly turns green. How is Birdie colour-wise, fundamentally speaking? The question typically receives fundamentally different answers in A-theoretic and B-theoretic frameworks. Even amongst the B-theoretists themselves, there is no consensus on how to account for ordinary qualitative change in ordinary material objects. But despite the availability of various options, it is a well-known concern about such B-theoretic accounts that they fail to take change seriously enough. Martin Pickup (2023) has recently proposed a novel account of change, which he claims to remedy this situation: his *situationalist* account is supposed to be both acceptable to Btheorists and to accommodate all the desiderata that are thought to be crucial for viewing change as a robust phenomenon. In a nutshell, the situationalist thinks that, in general, what is the case is always relative to situations. In Birdie's world, there is a situation s in which Birdie is blue, and also a different situation s' in which that very same entity is green. But the situationalist also thinks that situations enter into classical-mereological composition relations. Thus, s and s' compose a unique 'larger' situation s''. If whatever is true in s and s' is also true in s'', then the latter situation appears to contain a true contradiction. To avoid this, the situationalist rejects that complex situations 'inherit' all the truths that hold in their proper parts. In particular, according to the situationalist, when the parts 'disagree' about the truth value of a proposition, that proposition is neither true nor false in the larger situation. The source of these truth value gaps is the relative *metaphysical indeterminacy* of larger situations: as one moves from larger situations to their smaller parts, how things are becomes more and more determinate. In this paper, I take issue with two claims that the situationalist pursues. First, the kind of situation-relativity that the view involves puts it at odds with (standard versions of) the B-theory. Indeed, the view seems to reject Fine's (2005) ABSOLUTISM, something that is part and parcel of virtually all B-theoretic accounts. Second, and more importantly, the claim that ordinary qualitative change leads to metaphysical indeterminacy in larger 'chunks' of the world seems both ill-motivated and excessive. Given that the identity of s'' wholly depends on the identity of its parts, one would expect Birdie to be in s'' the way it is in s and s'; and given that Birdie determinately has a completely determinate qualitative profile in both s and s', it is unclear how it can be indeterminate in s'' whether it is any of the ways it determinately is in s and s'. The contrast between s and s' on the one hand, and s'' on the other, seems to concern the *uniformity*, rather than the *determinacy*, of Birdie's qualitative profile. As I demonstrate here, the situationalist can plausibly argue that, even though s'' inherits all the truths holding in its proper

parts, those truths may lose their original uniformity within the larger situation, without giving rise to any indeterminacy.

Nina Emery

Metaphysical Arguments from Temporal Experience

Our experience of time is often used as an input in metaphysical arguments about the nature of time. I distinguish between several different types of argument that have this general structure, some of which are familiar from the literature and some of which are relatively novel. I then show how this taxonomy can help us understand and evaluate specific arguments. Finally, I take up the question of how these arguments extend to a context in which there is an important distinction between emergent and fundamental metaphysics.

Brigitte Everett

Passage Illusionism's Intelligibility Problem and Deflationism

In recent years the view according to which it seems to us as though time robustly passes has fallen out of favor. Instead, many B-theorists have taken up a *deflationist* position. Deflationism is the view that we have no experiences as of robust passage. This is largely due to the *intelligibility problem* facing the illusionist. The intelligibility problem arises when the B-theorist holds that we have illusory experiences as of—i.e., that illusorily represent—temporal passage when in fact time does not pass. However, proponents of the intelligibility problem will say that these two claims together make *passage illusionism* unintelligible. The intelligibility problem that I focus on targets perceptual content, and I take it to be something like the following: The passage illusionist must sign up to the claim that we have experiences as of properties that are not instantiated in the actual world, and yet we cannot have experiences as of such properties. If the problem is not solvable then deflationism, as the illusionism's main rival, must be accepted. If, however, the intelligibility problem can be solved then those deflationists who sign up to their view in large part because of the apparent failure of illusionism must find alternative reasons to accept their view. I will argue that the intelligibility problem can be solved. Starting with the claim that the problem stems from the assumption that we must be in causal or co-variational (tracking) contact with any property we have experiences as of—this is the *strong naturalistic assumption*. In this talk, I will argue that the passage illusionist should reject the strong naturalistic assumption, in favour of a weaker naturalistic claim. Via some discussion of other examples of representations of uninstantiated properties, I will claim that the strong naturalistic assumption should be rejected anyway, and that doing so also allows the passage illusionist at least one viable response to the intelligibility problem. The response involves claiming that the content of an illusory experience as of an uninstantiated property can be identical to the content of the experience we would have were passage veridical, without being in tracking contact with the property. Passage illusionism is therefore intelligible, I will

claim. I then end my talk with some discussion of how both the illusionist and the deflationist can move forward in light of this.

Alison Fernandes

Two Projects on the Direction of Time

There is a deep ambiguity within the project of accounting for the direction of time. One project is an explanatory one that centres on whether we need an intrinsic asymmetry in time to explain temporal asymmetries in the world and our experience. Those in favour of an intrinsic asymmetry argue that such an asymmetry either directly explains temporal asymmetries (Zimmerman 2007; Maudlin 2007) or explanations that seem temporally neutral turn out to covertly depend on an intrinsic asymmetry (Maudlin 2007). If an intrinsic asymmetry is not required to explain temporal asymmetries, then it seems that time has at best a 'reduced direction'—a direction that metaphysically depends on the arrangement or orientation of other things. There is a second project, however, one that is not obviously tied to explanation or metaphysical dependence. This project centres on whether we should commit to an intrinsic direction of time because such a direction is evidenced by temporal asymmetries in the fundamental dynamical laws. The broad idea for proponents is that we should expect some kind of match between the features of fundamental laws and the fundamental geometry within which the laws operate (Arntzenius 2004; Arntzenius and Greaves 2009; North 2008). If the fundamental laws are temporally asymmetric, this indicates that time itself is asymmetric: an asymmetry that may warrant being called a 'direction'. Here, there is no claimed dependency of time on laws or vice versa, merely concordance in their features. In this paper, I delineate these projects and assess their relation. *Prima facie*, these projects are distinct. One could, for example, be agnostic concerning the second project but commit to time having an intrinsic or reduced direction in the first project—arguably the stance, respectively, of Maudlin (2007) and Loewer (2012). In practice, most of those defending reductionism or primitivism in the first project don't assess the arguments of the second project. However, there are two subtle ways in which these projects are linked. First, assessing the need for an intrinsic direction of time in the second project requires considering the possibility of a reduced direction of time in the first project. Arguably, a reduced direction of time can explain the roles required of an intrinsic direction of time in the second project: including allowing one to state timereversal asymmetric laws (North 2008: 202-4) and to state the theory in which the laws feature in a co-ordinate independent way (Arntzenius 2004; Arntzenius and Greaves 2009). Second, rejecting an intrinsic direction of time in both projects puts the reductionist in an unusual position with respect to naturalism. It would then turn out that, no matter what form of dynamics and boundary conditions we accept, neither time nor space *could* have features such as privileged positions or directions. If so, our reasons for rejecting a primitive direction of time, or accepting its possibility, do not depend on the form of our physical

theories but on much deeper considerations concerning what we want physical theories to do.

Kit Fine

Three dimensionalism and special relativity

It is often supposed that a four dimensional view of material things sits more comfortably with Special Relativity than the three dimensional view. I argue that the opposite is the case.

Marco Forgione

Causal Set Theory and Growing Block? Not Quite

In this contribution, I explore the possibility of characterizing the emergence of time in causal set theory (CST) in terms of the growing block universe (GBU) metaphysics. I show that although GBU seems to be the most intuitive time metaphysics for CST, it leaves us with several interpretation problems, regardless of which dynamics we choose to favor for the theory. Here, I shall consider Classical Sequential Growth (CSG) and Covariant models (COV). Classical Sequential Growth models the accretion of a causal set one element at-a-time, where each transition is characterized by a classical transition probability. The Covariant models, on the other hand, assign transition probabilities to sets of isomorphism classes of unlabeled causal sets. After a brief presentation of the theory, and dynamical models thereof, I discuss the possibility of interpreting causal set theory in terms of a block view and growing block view metaphysics. The former refers to the literature on eternalism and can be associated with causal set theory insofar as we run a causal set to its completion. The latter refers to the literature on presentism and can be applied to CST under the condition of defining a proper "line of becoming" that can distinguish between the present and everything else. I argue that discrete general covariance of the CSG dynamics does not allow us to individuate a single history of the universe (defined by a causal history of different causal sets), thereby making the claim that "the past exists" at best problematic. In addition, because the evolution of the universe in CSG dynamics leads to an outward branching causal tree, it becomes impossible to determine a proper "line of becoming", thereby blurring the presentists' claim that only the present exists. In addition, the invariance under label transformations, which is analogous to the diffeomorphism invariance of general relativity, blurs the possibility of individuating the single actual causal history of the universe, even if we were to run the causal set to completion. Similarly, the covariant approach runs into the same, if not even more severe problems, since each configuration of the universe would amount to a set of possible causal sets, thereby making the individuation of a single configuration of the universe - and thus the physical interpretation of the theory - implausible. Finally, I conclude that the difficulties of establishing a proper temporal metaphysics for causal set theory are not dissimilar to the difficulties that presentism faces with respect to relativity theories. Indeed, even if we were to adopt a spacetime functionalist view, the best we would be able to recover in

causal set theory is a local present and a partial order relation among events.

Brittany Gentry

Newtonian Time from Timeless Dynamics

The role of a time parameter is vital to physics, yet time is often taken for granted. Newtonian physics assumes an idealized time variable that is unmeasurable. In this paper, we answer calls for clearer accounts of the emergence of Newtonian time from timeless mechanical systems (Smolin 2013). Mach famously critiqued Newton's notion of time but did not provide a physical demonstration of his critique (Mach 1919). This paper explains the emergence of Newtonian time from timeless systems by using a simple system that demonstrates Mach's claims regarding time and re-articulates the relevance of those claims to current discussions of time. Mach described how to start with Newtonian mechanics and eliminate time altogether; we return to the logical consequence of not having needed time in the first place. We consider a simple three-particle mechanical system in the timeless framework of Jacobi (Lanczos 1970). Time is abstracted from paths in configuration space and can be viewed as analogous to Mach's principle of universal inertial reference frames. Our physical demonstration of how Newtonian time emerges completes Mach's arguments about clocks and time in classical, non-relativistic systems. The system's Lagrangian is defined independently of any time. We construct a clock internal to the system by selecting a particle in the system and taking multiple measures of its position. Time thus reduces to the measurement of particle positions in the system. Rather than beginning with absolute time and eliminating it, we demonstrate the logical point of Mach's critique by showing how the system need not have been formulated with ideal time to begin with and yet will birth Newtonian-like time as a feature of its dynamical behavior.

Alessandro Giordani

Navigating Time's Arrow: Presentism and the Dynamic Block Theory of Time

While a dynamic theory on time often involves treating the present as an objective property – as seen in presentism, the growing block theory, and the moving spotlight theory – this is not universally entailed by the mere fact of holding a dynamic perspective. The objectivity of the present is an additional commitment that dynamic theories may or may not make, and is notoriously challenged based on arguments resting on the implications of the theory of relativity. Although traditional views link objective time passage to an objective present, alternative conceptions based on the directionality of time and a specific understanding of dynamic systems can provide an objective framework for time passage without requiring a distinct, universal present. Thus, it seems to be possible to maintain a notion of objective time passage grounded in the ontological progression of processes, even if being present

itself is not considered an objective property. The aim of this talk is to discuss the pros and cons of admitting or rejecting the notion of an objective present by contrasting two of the most compelling dynamic theories on time: presentism and the dynamic block theory. This implies to devise an appropriate version of presentism that can withstand the best arguments against it, and to assess its scores against the dynamic block theory.

Vincent Grandjean

Diachronic Indeterminacy

The problem of diachronic personal identity finds its modern conception in John Locke's *Essay Concerning Human Understanding* (Book II, chapter 27). It can be formulated as follows: what is required for a person to persist from one time to another? More specifically, under what logically necessary and sufficient conditions a person P_1 at a time t is numerically identical to a person P_2 at a later time t^*? One paradigmatic answer to this question is called 'the psychological account (PSY)': P_1 is identical to P_2 iff P_2 remembers at t^* an experience P_1 had at t. For example, if P_1 received a punishment and P_2 remembers receiving this punishment, then P_1 and P_2 are numerically the same person. This answer reflects two widespread intuitions: (i) persons differ from ordinary material objects (e.g., chairs, computers) with respect to their persistence conditions; (ii) *experience-memory* provides the criterion of personal identity over time. However, PSY faces the challenging 'fission objection', demonstrating how P_1 can be psychologically continuous with two future persons, P_2 and P_3, simultaneously. This paper introduces a novel approach to this objection, emphasizing a type of metaphysical indeterminacy overlooked in previous literature. This approach allows for the preservation of the commonly held belief that *experience-memory* serves as the criterion for personal identity, without separating survival from identity (*pace* Parfit) or resorting to multiple-occupancy (*pace* Lewis). Specifically, I propose that a person before fission (P_1) is identical to one of the two resulting persons after fission (P_2 or P_3), but it is metaphysically indeterminate which one. According to this view, both the determinate state of affairs that P_2 is (diachronically) identical to P_1, and the determinate state of affairs that P_3 is (diachronically) identical to P_1 *exist*, but their obtaining is indeterminate. Contrarily to previous claims, this approach does not conflict with classical logic or Tarskian semantics, and aligns with David Wiggins' 'Only a and b' Principle, according to which facts about objects other than a and b are irrelevant to whether a is identical to b. Moreover, this framework can be extended to address other persistent metaphysical issues, like the ship of Theseus and the Begin Highway case. In conclusion, this paper not only addresses the fission objection effectively but also opens new avenues in understanding the nature of diachronic identity, marking a significant contribution to philosophical discussions on time and identity.

Nihel Jhou

Is a Time Machine an Amnesia (and Person-Splitting) Machine?

In numerous backward time travel narratives, the typical portrayal of a timetraveler's *experience* is as follows: a time-traveler activates a time machine and subsequently finds themselves in the past. However, one must question how well this conventional portrayal aligns with the A-theory of time, which posits that the present is fundamentally distinct from the past and future and is in a state of continual change. Surprisingly, there is scarcely any literature addressing this specific issue. In Baron & Braddon-Mitchell (2022), the authors contend that a time-traveler's experience of *continuous* time travel into the past is either misleading regarding the direction of temporal passage or challenges the universal, non-relative nature of passage. This raises issues for *presentism*, a unique form of the A-theory. I concur with their concerns, yet I propose a broader problem that applies to all variants of the A-theory, regardless of whether time travel is continuous. Consider David Lewis's story of Tim in a *Ludovician* setting and the following events: (A) Tim constructs a time machine in 2020; (B) Tim activates the time machine in 2021; (C) Tim arrives in 1921; and (D) Tim encounters his grandfather in 1922. For the purpose of this argument, only events A, B, C, and D are relevant, implying that the details between B and C are inconsequential. In other words, the issue I'm addressing is not contingent on the continuity of time travel. In this scenario, the causal sequence is clearly <A, B, C, D>. According to any reasonable interpretation of the A-theory, the sequence of temporal passage should be <C, D, ..., A, B>, aligning with the order of external time. If it were <A, B, C, D>, temporal passage would be ensnared in a cyclical loop, as Ludovician time travel does not permit alterations in world history. Thus, the causal chain in backward time travel appears to be partially inverted in relation to the sequence of temporal passage. Considering Tim's *phenomenological* sequence of temporal passage, it can only mirror either the causal sequence or the temporal passage. If it follows the causal chain, then the experience of temporal passage cannot be deemed a reliable indicator of actual temporal passage, thereby weakening any experiential arguments supporting the Atheory. If it adheres to the temporal passage, Tim's 'stream' of consciousness would be divided into two disjointed segments: first <C, D, ..., Death> and then <Birth, ..., A, B>. As the first segment does not causally precede any part of the subsequent segment, Tim essentially becomes two distinct individuals, assuming a standard psychological continuity principle of personal identity. Given that B is not an antecedent of C in the initial segment, it's improbable that Tim retains any memory of B at the time of C. This dilemma suggests that the conventional depiction of a time-traveler's experience does not align with the A-theory of time.

Andrea Iacona & Samuele Iaquinto

Quantitative Supervaluationism

According to a line of thought initially suggested by van Fraassen and then developed by Thomason on the basis of

Prior's branching time semantics, supervaluationism yields a plausible account of future contingents. Supervaluationism defines a property of future contingents—supertruth—by distinguishing between two semantic levels marked by two kinds of value assignments. At the first level—the *valuation* level—each future contingent, relative to a given moment, receives a value for each history associated with that moment. At the second level—the *supervaluation* level—the future contingent gets a non-indexed value relative to the same moment on the basis of the values it receives at the first level. The value so obtained expresses the property to be defined. The historical version of supervaluationism as an analysis of truth is *qualitative* in the following sense: the property defined at the supervaluation level is non-gradable. For each of the three values that a future contingent can take—supertruth, superfalsity, or neither—either the future contingent has it or not. We will argue that this is not the only way to go. Instead of asking whether a certain value holds for all histories at the valuation level, which is a yes/no question, one can ask for *what proportion* of histories it holds, a different question that allows for degrees. We call *quantitative* any version of supervaluationism that defines some gradable property in the second way. We will show that quantitative supervaluationism admits both an alethic and an epistemic interpretation and yields an intuitively adequate and formally rigorous account of epistemic notions such as rational acceptability.

Jenann Ismael

"The Block Universe" is nonsense

There is no more a Block Universe than there is a barber that can shave all and only those that don't shave themselves or a set of all sets that are not self-members. Time (for us) is essentially incomplete, ineluctably elusive, and ungraspable as a totality. I will clarify what this means, why it is so, and how it affects the metaphysical dispute between the friends of Becoming and the Block Universe enthusiasts. The point is connected to the general tendency in metaphysics to adopt a god's eye view of the universe and can be used to separate settings in which fiction of a god's eye view is benign and helpful from those in which it leads to philosophical confusion.

Lisa Leininger

What should become of absolute becoming?: the future of the dynamic nature of time

The concept of absolute becoming—in which future entities come into existence—should be discarded and fade away into the past as a result of being not only unscientific, but also metaphysically problematic. Thus, contrary to prevailing wisdom in the philosophy of time, a defense of the dynamic nature of time should not be focused on theories that endorse this ontological change, such as presentism or the growing block theory. Instead, we should seek to accommodate a theory of temporal passage in the context of a four-dimensional manifold. Proponents of traditional temporal passage typically

secure the dynamic nature of time by accepting "absolute becoming," which is a primitive process of coming into existence that is only endorsed by those who deny the existence of the future ("FuDs," short for "Future Deniers" in Leininger's (2023)). So, let us grant that FuDs (presentists and growing block theorists) can establish ontological change by way of endorsing absolute becoming. If this is the case, however, then what they cannot do is explain the *nature* of (qualitative) change. This is the *problem of explaining change*: FuDs cannot explain *why* things change as they do. This can be formulated in the more general worry of explaining the regularity of the world, in which causes are regularly followed by their effects. I argue that explaining this qualitative change involves cross-temporal relations to which FuDs cannot appeal. This cross-temporal relation, N, are typically understood in terms of different varieties of necessitation. The most popular understandings of N include both nomological and causal necessitation. These are the ways in which we can explain qualitative change—such as bananas changing from green to yellow as they ripen. The specific problem is that FuDs cannot explain why the event of a banana being yellow *comes into existence* after the event of that banana being green *comes into existence*. This is due to the fact that, even if N exists between these two events in some form, N cannot be the explanans in this case. The argument (in short) is as follows: N must *come into existence*. And what explains N coming into existence? The answer is that its relata come into existence. So if N's coming into existence is explained by its relata, then N cannot be the explanation for any of *its* relata coming into existence. On the other hand, if N does explain why the relata come into existence, then there is no explanation for N's coming into existence. Either way, in endorsing absolute becoming, there is something that FuDs need to, but cannot, explain. In the end, if FuDs want to establish the passage of time by appealing to ontological change in the form of absolute becoming, then it robs them of the ability to explain the nature of qualitative change.

Martin Lipman

Standpoint Pluralism and the Problem of Tensed Token Truths

This talk consists of two components: (1) an account of time called 'standpoint pluralism' and (2) the solution it offers to a problem that arises with token utterances that express tensed contents. The first component of the talk is the presentation of a view called 'standpoint pluralism about time'. The rough idea is quite simple. The view admits the tensed facts that obtain across time but adds that any representation of their tensed content makes one adopt the temporal standpoint from which they obtain. So, to illustrate, there exists the fact that it's my fourth birthday but when I represent *that it's my fourth birthday*, I thereby adopt the standpoint of the moment in time at which this is so, and hence no longer represent what things are like when you're reading this abstract. Thought is temporally immersive. This means that although reality includes all the tensed facts found at each moment in time (the metaphysics is temporally neutral), it is not possible to form

one coherent unified representation of the total content of all facts that exist and constitute the world. The metaphysics bars our ability to find one conjunctively unified total true representation of the world. The presentation of the view includes a brief discussion of how it relates to fragmentalism. In particular, I show how Finean fragmentalism could be embedded in the presented framework and how this solves a well-known issue of Finean fragmentalism, namely that it forces one to accept that the notion of '*fundamental reality*' is a non-factive notion. The second component of the talk presents a novel solution to a well-known problem that arises with token utterances that express tensed contents. Say I utter 'Lugano is sunny' at some moment when Lugano is sunny. My utterance there and then is true. One would think that this particular token utterance doesn't change what it says when Lugano starts getting cloudy, it's a *token* utterance after all, made there and then. It also seems odd to say that the utterance made *back then* is now false. If my token utterance of 'Lugano is sunny', made years ago, is still true today, and it still says that Lugano is sunny, then this may seem to imply that, today, Lugano is sunny even though it may not be sunny. After briefly discussing possible solutions and why they are not entirely satisfactory, I present the solution offered by the presented account of time. The solution is to think of the inference from the truth of the token utterance to a representation of its content in the same way as the standpoint pluralist thinks of the inference from the existence of a tensed fact to a representation of its content. These inferences involve the adoption of the standpoint of the time for which the utterance is true.

Cristian Lopez

Relational Primitivism about the Direction of Time

Primitivism about the direction of time is the thesis that the direction of time does not call for anexplanation because it is a primitive posit in one's ontology. The aim of this presentation is to defend this thesis, but on a relational basis. To do so, we introduce a new member in the family of primitivist views – *relational primitivism*. This may look strange at first glance since primitivism about the direction of time has commonly been associated with substantivalism about time, suggesting that the former entails the latter. We believe this association is just contingent, and that relational primitivism is not only metaphysically coherent, but also attractive. The structure of the presentation has two parts, a *par construens* and a *par destruens.* In the *par construens*, we argue in favour of relational primitivism. *Relationalism* puts forward a monist ontology in which there is just one kind of substance, matter, that engages in spatial and temporal relations. Space and time are not therefore independent substances, but they are derived from matter and the spatial and temporal relations it is engaged in. Spatial relations are the first type of world making relations. Spatial relations thus glue together substances in a configuration of matter. Yet, the configuration of matter is static if it does not change, but change cannot be obtained from purely spatial relations. Then, it needs to be imposed as additional structure. If the configuration of matter changes, then matter also engages in a second type of world-making relations, *temporal* relations. A changing (or dynamical) configuration of matter engages in both spatial and temporal relations. The nature of these relations must be different as the

nature of space and time is different. We argue that what is special about temporal relations is that they are directed. Therefore, the direction of change (i.e., the direction of time in a relational ontology) must be primitive. In the *par destruens*, we undermine one of the potentially strongest arguments against primitivism about the direction of time, what we call the 'Time-Reversal Argument': if laws of physics are time-reversal invariant, then the direction of time cannot be primitive. We argue that the argument is actually harmless and thereby fails to weaken primitivism on the direction of time. In particular, we claim that the argument can only be applied to a very specific kind of laws, that the implementation of time reversal across theories and models can vary yielding divergent results, and that time-reversal symmetry should be taken as a heuristic, theory-building element in physical theories, from which no metaphysical lesson should be drawn. All these reasons strengthen relational primitivism and its viability. Relational primitivism, we conclude, has two attractive features in the metaphysical landscape of philosophy of time. It enjoys the explanatory advantages of primitivism about the direction of time, avoiding the issues of reductionist approaches. It also remains parsimonious in the ontology without adding any temporal structure over and above matter and temporal relations, avoiding the issues of temporal substantivalism.

Tim Maudlin

Fundamental Dynamics for Quantum Theory: Why Complex Numbers

There are fundamental dynamical equations that govern fundamental entities and emergent dynamical equations that (approximately) describe the dynamics of emergent entities. For example, there is the classical theory of fluid dynamics based on Newtonian physics that is used to describe water waves, even though the fundamental Newtonian dynamical equation is not a wave equation. One strong suggestion of quantum phenomena such as two-slit interference is that the fundamental dynamics of the quantum state (wavefunction) must be some sort of wave dynamics. I will discuss the fundamental mathematical features of the clearest example we have of fundamental wave dynamics—the free Maxwellian electromagnetic field—and then suggest how that gives insight into the structure of Schrödinger's equation in quantum theory, including motivating both the use of complex numbers in the wavefunction and the implementation of "time-reversal" by complex conjugation.

Ulrich Meyer

Velocity and Necessity

Does an object's "instantaneous" velocity $v(t)$ describe its state of motion at t? Given its *kinematic* definition as the limit of the object's average velocities over shorter and shorter time

intervals, $v(t) = lim_{h \to 0} \frac{x\left(t+h\right) - x(t)}{h}$, instantaneous velocity appears to be partially about the object's location before and after t, which suggests that $v(t)$ is not really instantaneous. On the other hand, the *dynamic* role of velocity in our best physical theories is not the aggregate effect of its locations over time. For example, the force that a charged particle experiences in a magnetic field at time t is proportional to its velocity at that time; its velocity $v(t)$ determines how strongly the charged particle couples to the magnetic field. Most attempts at resolving this tension revise either the kinematics or the dynamics of velocity. Some authors accept that velocities are genuinely instantaneous but deny that they are determined by an object's successive location, as spelled out by the standard definition. An object's velocity is said to be logically independent of its locations over time. Others accept the standard definition of velocity and conclude that our best physical theories postulate cases of "process action" in which a temporally extended process plays a causal role that is not played by any of the instantaneous states that compose the process. On this view, our best fundamental theories are non-Markovian in that the present state of the world does not render the past causally redundant for determining its future states. This paper defends a third view, which requires no changes to either the kinematics or the dynamics of velocity. The basic idea is to read the definition of instantaneous velocity the other way around. Rather than say that the object's locations right before and after t determine its velocity at t, it argues that the value of v at t imposes necessary constraints on the object's locations at other times. This is a view on which $v(t)$ has "modal clout" in that it imposes necessary constrains on what goes on at neighboring times. But the necessitation imposed by velocity only has "infinitesimal reach." For any time t_1 , t_2, the value of $v(t_1)$ alone imposes no constraints on the object's location at t_2, which means that we do not (yet) get any logically necessary connections between the states of the world a different times. The *first* part of this short paper argues that this account of velocity is both metaphysically coherent and unavoidable if we want to take our best physics at face value. The *second* part of the paper investigates what other commitments we would have to take on board if we wanted to extend this account of "local" necessitation to an account that delivers diachronic necessitation relations between two different times t_1 and t_2. The obvious idea is to string together the local necessitations by *integrating* over all the instantaneous velocities between t_1 and t_2, but that cannot be quite the full story. The paper suggests that we would also need to endorse a particular view about the logical form of equations of motion.

Kristie Miller

Exploring People's Normative Judgements About Future Bias and The Temporal Value Asymmetry

This paper empirically probes people's judgements about whether future-bias and the temporal value asymmetry (TVA for short) are rationally permissible, obligatory, or impermissible. While philosophers are divided about the normative status of these attitudes/preferences, they have

typically agreed that non-philosophers will judge that future-bias is at least permissible, and probably obligatory, and will judge that TVA is not permissible. If this is right, it is important for two reasons. First, many researchers have argued that future-bias is a manifestation of TVA. If, however, people make different normative judgements about the two phenomena this tends to undermine this idea. Second, if it is true, it impacts theorising about the normative status of these phenomena: The assumption that future-bias is rational currently guides theorising, in that defenders of the rationality of future-bias tend to argue that its rationality is obvious, and hence must be accommodated, while opponents tend to try to show why, despite *not* being rational, future-bias *appears* to us to be rational. Yet no empirical work has been undertaken to test these assumptions about people's judgements. In the first work of this kind, we confirmed that most people judge future-bias to be rationally obligatory, and TVA to be rationally impermissible.

Maria Nørgaard

A Novel Approach to Quantum Persistence

Within debates on the metaphysics of quantum mechanics, an important question so far remains almost completely unaddressed: how do quantum systems persist? Persistence is a central issue in metaphysics, and despite the development of several formal accounts in recent years (Gilmore, 2008; Balashov, 2010; Calosi and Correia, ms), only a handful of papers have been dedicated to investigating the persistence of quantum systems (Pashby, 2013, 2016). In this talk, I present a novel account of quantum persistence based on the notion of *quantum location* (Nørgaard, ms) and compare it to the persistence account developed by Pashby (2016). I argue that these accounts provide vastly different persistence claims for quantum systems and as such provide diverging quantum ontologies. It is standard practice to define persistence in terms of exact location (Gibson and Pooley, 2006; Parson, 2007; Gilmore, 2008; Sattig, 2021): an object persists if and only if its spatiotemporal path is non-achronal – where *path* is the union of all regions r_i at which the object x is exactly located, $path_x \equiv \bigcup_{r_i} (x @ r_i)$. Hence, a persisting object is exactly located at no less than two instants of time. The issue of quantum persistence arises due to position indefiniteness; quantum systems cannot be attributed a definite coordinate vector (exact location) at all times, and it is therefore a challenge to apply the notion of *path* in the quantum realm. Pashby (2016) recognises this difficulty and provides an alternative notion of exact location tailored to the quantum domain: a quantum system is *quantum exactly located* at a region if, and only if, it is the minimal bounded region at which the system is entirely located. This modification allows him to employ the traditional view of persistence by substituting *exact location* with *quantum exact location*. With this definition in hand, Pashby takes advantage of Hegerfeldt's (1998) theorem, which says that a system must be located within a bounded region either for an infinite amount of time or for a single instant, to argue that the path of a quantum system is necessarily discrete. This leads him

to develop an ontology of quantum events. In this talk, I provide a novel account of quantum persistence by revising the traditional notion of path in terms of *quantum location* (Nørgaard, ms): a system is quantum located at a region to a degree *d* if, and only if, it is the minimal region at which the system is located with probability *d*. In contrast to *quantum exact location*, quantum location is a graded locative notion that doesn't limit location to bounded regions, and as such it does not fall prey to Hegerfeldt's theorem. Consequently, this account allows for continuous quantum paths and as such is compatible with a broader range of quantum ontologies. Using this analysis of persistence, I explore issues of location, persistence, and quantum ontology. In particular, I will address the question of how the nature of quantum persistence influences our understanding of the ontology of quantum mechanics

Laurie A. Paul

Primitive Persistence

I will argue for a view of primitive persistence through time and explore applications in modal epistemology and in computational cognitive science.

Oliver Pooley

Nomic presentism, relativity, and rates of change

Some presentists have sought to explain past and future tensed truths in terms of non-tensed facts about the present together with the laws of nature. This talk will explore the viability of this view. Specifically, I will be concerned with how such a view should respond to the challenge to presentism posed by relativistic physics and with how such a view should analyse rates of change.

Nicholas Rimell

A Pairing Problem for Minimal A-Theorists (and Beyond)

According to Meghan Sullivan's minimal A-theory: always, whatever exists always exists, but most things undergo change with respect to whether they are located in spacetime. The minimal Atheory is especially attractive since it allows for (and entails) A-theoretic change while avoiding many problems faced by traditional versions of the A-theory, e.g. (standard) presentism. But the minimal A-theory faces a serious and, so far, unappreciated problem, one akin to the pairing problem facing substance dualists. Say that, a year from now, a brand-new human will come to occupy spacetime region R. Given the minimal A-theory, there now exist many non-located entities, one of which, a year from now, will go from being non-located to being a brand-new human occupying R. Call this entity "Lucky". Why will it be Lucky, as opposed to any of the other currently non-located entities, that will come to occupy R? I say (i) that this is an intelligible question and that (given the

minimal A-theory) it must have an informative answer, but also (ii) that minimal Atheorists cannot provide such an answer. A key to my defense of (i) is to show that my question, posed to minimal A-theorists, is disanalogous to any related question that may be posed to (most) other A-theorists. A key to my defense of (ii) is to consider what I think is the best candidate answer to my question. This answer appeals to a version of origin essentialism according to which, for example, Lucky is essentially *located (if at all) as a result of the union of such-and-such ovum and suchand-such sperm* (and only Lucky can exemplify this property). I argue that this answer succeeds only if supplemented by a more extreme version of essentialism and that accepting this more extreme version undermines the motivation for the minimal A-theory. So, I reject the minimal A-theory.I end on a positive note. My argument really targets the combination of two claims: (a) always, for any x, either x always exists or x has a surrogate (e.g., the property *being identical to x*) that always exists; and (b) there is A-theoretic change with respect to what is located (in space, or in spacetime). My argument thereby provides special motivation for a number of versions of the A-theory that reject at least one of these two claims but that still share many virtues with the minimal A-theory. These range from David Ingram's *thisness presentism* – which endorses (b) but rejects (a) – to the moving spotlight view, which (as I characterize it) endorses (a) but rejects (b). I think my argument provides especially good news for moving spotlighters, for I think that – in light of the *epistemic objection* to their view – moving spotlighters must make concessions that threaten to undermine any (old) reason we have to favor their view over the minimal A-theory. The emergence of a worry that minimal A-theorists face but moving spotlighters avoid breathes new life into the moving spotlight view.

Carlo Rossi Fernandez

Processes, Particularity, and the Dynamic Nature of Reality

Continuants, as defined by Johnson (1924: xx–xxi), exists over extended periods of time and may change their properties, whereas occurrents are those entities that (i) may not continue to exist over periods of time, that is, they may be instantaneous, and (ii) are not capable of undergoing change. Examining the temporal character of particulars, i.e., the way in which they fill a time period, this categorical distinction *prima facie* gives us a way to distinguish substances from events and processes. Substances such as cats or motorcycles exist throughout extended periods of time and change their properties and parts during their existence. In contrast, events and processes sometimes exist for not more than a moment and their static nature makes them unfit to count as proper subjects of change. However, such a result has been resisted by many (Stout 1997, 2015; Galton and Mizoguchi 2009; Steward 2013), often following a line of argument that can be traced back to Alexander Mourelatos (1978). According to this line of thought, certain properties can be used to draw a distinction between mass-noun and count-noun expressions that allows us to articulate the ontological divide between events and

processes. Thus, in virtue of such properties, events are regarded as countable and temporally bounded entities, whereas processes are regarded as closer to massy non-countable entities, making them similar in some aspects to properties (Crowther 2018; Seibt 2018) but also similar to continuants in some others (Stout 2015). Accordingly, some have argued that it is obvious why processes should not be counted amongst continuant entities (Stout 1997, 2015)—or at least be conceived as part of a category of their own; others (Steward 2013, 2015) that processes display certain modal. structural properties that make them similar to substances while still being a peculiar kind of occurrent; and lastly, there are those who cast doubt on the claim that processes are continuants and even particulars (Seibt 1997, 2010, 2018; Crowther 2011, 2018). Broadly speaking, the arguments offered by the later camp attempt to show that processes have a peculiar manner of recurring in time—distinctively different from the way in which substances and events do—and that they are not countable entities. It seems then—or so it can be argued—that their view would turn processes into something similar to universal properties, for they would not be particulars given their non-countability and they would be repeatable or multi-located across space-time. In this paper I explore the consequences that such a conception of processes has, that is, as non-particulars and quasi-abstract entities, for those who are committed in some way or other to a process ontology, which allegedly is best suited to capture the dynamic or processual nature of reality. In particular, I argue that the latter conception is not entirely adequate for some of the theoretical roles assigned to processes and, more generally, that the motivation offered for thinking of processes as an ontological category in its own right is often contradictory and not easily reconcilable.

Rachel Russell

The Deflationist's Error

In recent years, some theoretical physicists and philosophers of time have begun to seriously consider the possibility that our world is fundamentally timeless. I hold that in order to seriously consider this possibility, one must begin by drawing out and putting into question basic assumptions about time and change that are made commonly by philosophers who have radically different views of time, such as A- and B-theorists. In this talk, I intend to draw out one of these points of agreement. To do so, I focus on a current debate concerning temporal ontology, namely the debate between Deflationists – according to whom debates about temporal ontology are merely verbal - and Substantialists, who defend the substance of such debates. I show that the dialectic between Deflationists and Substantialists is salient because it allows us to uncover the point at which there is agreement as between A- and B-theorists regarding time's role in tense logic. Simultaneously, I provide further motivation to support the Substantialist's case. Substantialists have argued for the substance of the A-/B-theory debate by arguing that the standard/central claims of e.g. the A- and B- theoretic views should be read as employing some combination of tenseless

predication and a most inclusive domain of quantification. I take a different approach to arguing against the Deflationist. Namely, I support the Substantialist camp by highlighting the Deflationist's error. I argue that Deflationists are misled by the fact that there *is* agreement between A- and B-theorists, just not the kind of agreement that would imply that the debate was merely verbal. By appealing to the dialectic between Deflationists and Substantialists in this way, I highlight the shared assumptions between A- and B-theorists without undermining the substance of the debate between them. I provide an account of this agreement between A- and B-theorists. Specifically, I show how A- and B-theorists can agree on the truth values of various natural language tensed claims and tense-logical principles, and yet maintain a genuine dispute. I conclude that recognising this agreement allows us to see what time minimally consists in and brings us a step closer to establishing what it would mean for our world to lack time.

Thomas Sattig

Passage in a System of Relativization

On the standard approach, temporal passage consists in change with respect to past, present, and future. In this talk, a different kind of approach to temporal passage will be developed, which does not employ the notions of past, present, and future. The starting point will be an account of spatial existence and spatial organization in terms of the familiar conception of space as a system of location. This account will be juxtaposed with an account of temporal existence and temporal organization in terms of the conception of time as a system of relativization. Passage will then be explained in terms of properties of a system of relativization.

Raul Saucedo

The Elamite Picture of Reality

Perdurantism is the view that persisting material objects have different temporal parts at different times at which they exist. One of the most influential arguments for this view is Theodore Sider's argument from vagueness, according to which perdurantism follows from an unrestricted view about diachronic composition, which he calls *universalism about minimal D-fusions* (UMDF hereafter, for short). A critical feature of UMDF it's not only a mereological thesis, a thesis about what *composes* what over time. It's also a locative thesis, a thesis about what's temporally *located* where. However, once we distinguish between these two aspects of the thesis, it becomes clear that it runs together matters of mereology and matters of location in a way that some foes of perdurantism have independent motivation to reject. Specifically, UMDF imposes constraints on temporal location that are incompatible with the existence of temporally extended simples. Friends of such simples have reason to embrace instead a *mereologically harmonious* constraint on temporal location. Such a constraint affords an independently plausible, non-arbitrary, perfectly precise restriction on UMDF, which is, moreover, compatible

with composition being unrestricted across time. A view on which temporal reality is made out of temporally extended simples and arbitrary diachronic composites thereof, where such composites have mereologically harmonious temporal locations, affords a stable, principled basis to resist Sider's argument. I have two goals in this paper. First, to articulate the above line of objection to Sider's argument. It differs from existing objections in the literature that have focused on restrictions on the existence of minimal Dfusions (*e.g.*, Balashov 2005) in that it concerns the connection between mereology and location. It also differs from objections that have focused on considerations about vagueness (*e.g.*, Noonan 2010 and Torza 2017). The dialectical neighborhood of the objection I advance here is closer to that of Eagle's 2016 objection. Eagle develops a theory of location that affords a characterization of endurantism on which UMDF is rejected on principled grounds. However, Eagle's and my objection focus on very different nonperdurantist views, which reject different premises of Sider's argument. Further, my objection doesn't rely on a theory of location that perdurantists may simply reject. For instance, it's compatible with rejecting multilocation, the possibility of which is at the heart of Eagle's objection. My second goal is to explore a view of temporal reality emerging from this objection. On this view, there are qualitatively heterogeneous temporally extended simples and arbitrary diachronic fusions thereof with mereologically harmonious temporal locations. I distinguish between three ways of developing this view to accommodate the existence and temporal features of ordinary continuants. Building upon recent discussions about metaphysical priority, I argue that only one of them— which I call the *Elamite* picture of reality— has adequate resources to do that. On this view, ordinary continuants are neither temporally extended simples nor diachronic fusions thereof. Rather, they are metaphysically derivative from the combined qualitative complexity of such simples and their fusions.

Susanna Schellenberg

The Nature of Spatiotemporal Perspectives

We each occupy a specific location in the space-time manifold. As a consequence, we each have a specific spatiotemporal perspective. Different facts are available at different spatiotemporal locations. Having a spatiotemporal perspective is the most primitive form of a subjective perspective. I argue that an organism can have such a primitive, subjective perspective without any reflexive capacities and so without the capacity for *de se* content. If my argument is right, this implies that many biological organisms other than humans can have a subjective perspective. I argue moreover that our human subjective perspective can amount to no more than such a primitive spatiotemporal perspective. While our subjective perspective can be rich and involve *de se* content, it can be primitive and akin to that of an organism cognitively less sophisticated. More specifically, I argue for a primitive form of perspectival anchoring, which allows a creature to have perspectival consciousness, without her mental states featuring *de se* content. What is at stake is the extent to

which self-awareness is needed to have a subjective perspective. I show the implications for attempts to model first-person perspectives in AI.

Jack Shardlow

Motion(less) Pictures and Temporal Appearances

In this talk, I present work connecting issues in the philosophy of mind, concerning temporal appearances, with the metaphysics of aesthetics, concerning paradigmatically temporal media (e.g., films) and their static counterparts (e.g., photographs), while incorporating an insight regarding the applicability of our perceptual verbs to each. Viewing typical moving images (e.g., films), we see what appears to be a variety of objects, subjects, and their various respective activities unfolding over time. Viewing a still image (e.g., photographs) we also see what appears to be a variety of objects and subjects, and we see them as appearing to be engaged in various activities, though we do not see what appears to be these activities unfolding over time. This should sound much like common sense. Yet, to make good sense of our experiential encounter with imagistic representations of activity, we need to say more about our talk of 'temporal appearances', and the comparisons/contrasts between the appearances presented by moving images and still images. Ultimately, I argue that we should make room for two dissociable forms of temporal appearance: a dynamic pattern of appearance of φ-ing over time, and the appearance of an object as an object that is φ-ing. One further key aim in the talk is drawing the proper distinction between still and moving images. As noted by Danto (2006, 102) and Walton (2008, 188), moving images of static scenes can be visually indistinguishable from still images of the same scene; yet the two are experienced differently. I argue that this observation can be best explained, with the two dissociable forms of temporal appearance, if – unlike Danto and Walton – we take the differentia between still and moving images to be that the latter presents a duration, while the former does not. While this might sound like common sense, in making this case I dispute claims which notable authors have said to be 'obvious' (e.g., Carroll 2021). Why accept that duration is the differentia between still and moving images? Danto, when distinguishing between our experiential encounter with still and moving images, notes that there is an important difference which is marked by our use of the verb 'to watch': we speak freely of watching the scene(s) presented in moving images, but not watching the scene presented in a still image: "This is so even if there are films in which nothing happens. ...Nothing happens... in the film... in the sense that what happens is nothing...." (2006, 102). What is especially interesting about the verb 'to watch' is that its correct application entails that not only is there a perceptual activity unfolding, but that there is something event-like – i.e., temporally extended – in the object of perception. This is why it makes sense to talk of watching a stasis depicting moving image, but not a stasis depicting still image. One can only watch by doing something which unfolds over time, and one can only watch something which has the temporal profile of

unfolding over time, something which we might say has an event-like structure.

Francisca Silva

Truth Must Presently Be Grounded

In this talk I'll defend the view that if one accepts that what is true changes in time, then what is true at a time must be grounded by what exists at that time (even though it might be located at a different time (Correia and Rosenkranz, 2020). For this end, I'll start by considering an objection that presentists and non-futurist Ockhamists have been faced with: that they cannot provide adequate grounds for contingent truths about the past and about the future. A reaction to this objection that has been gaining traction in the literature is to tense the requirement that truths be grounded. According to this strategy, truths about past events once *had* a truthmaker, and likewise truths about future happenings *will have* a truthmaker, once the appropriate time comes, rather than presently having one. I start by presenting a robust version of this strategy developed recently by Correia and Rosenkranz (2018, 2022). I then raise and develop two objections to the view: that tensing a truthmaker requirement leads us on to an infinite explanatory regress. The authors claim that while p's truth is not presently adequately explained, that it *was/will* be adequately explained. But that *p was/will be* explained is itself in need of an explanation, and likewise that this tensed proposition was or will be itself explained, and so on. The second objection has the form of a dilemma. Either one has a more liberal approach to what predicates correspond to properties and accepts semantic Lucretian properties (e.g. *going to be true*), and then to suppose that such properties are instantiated seems question-begging in a presentist or non-futurist ontology; or one takes a more conservative approach to what predicates correspond to what properties there are, rejecting semantic Lucretian properties, case in which one appeals to temporal truth coordination principles, i.e. the "truth-value links" (Dummett, 2004; Westphal, 2006), but then one ends up begging the question again. The truth-value links take two forms. The coordination link for past truths states that if *p* is now true, then *It was the case that p* will always be true. As for the coordination link for future truths, it states that if *p* is now true, then *It will be the case that p* was always true. Influential philosophers who reject bivalence would reject the latter truth-link (Prior, 1953; Łukasiewicz, 1970; MacFarlane, 2003), and it isn't at all clear that one may suppose that a presentist is able to uphold the former truth-value link, which is the very matter at issue. After presenting both objections, I show how such a strategy, if applied to modal truths (in a similar strategy to that of Heathwood (2007)), would violate any serious grounding requirement of truth on the world (Asay and Baron, 2014). Finally, I will then emphasize a second positive general conclusion concerning the grounding principle for temporal truths: that they must be grounded at the time in which they are true.

Athamos Stradis

Present Records of the Past Hypothesis

Our world exhibits a 'record asymmetry' in the sense that it contains many records of the past but not of the future. However, its fundamental dynamical laws are time-symmetric. In these circumstances, how might the record asymmetry be explained? If time-asymmetry doesn't enter the picture via the dynamics, then it must do so via some sort of boundary condition. The standard candidate is the 'Past Hypothesis', the posit that the universe began in some particular very-low-entropy macrostate. But it's one thing to acknowledge this bare logic, and quite another to actually join the dots between the universe's initial state and the record asymmetry. To this end, Albert (2000, Ch. 6) and Loewer (2007) argue that because the initial macrostate occupies a specific tiny corner of phase space, it imposes a tight probabilistic constraint on the universe's possible past macrohistories, but not on its future macrohistories. By utilising records in the present, we exploit this constraint to infer the past, for this utilisation is steered by an evolutionarily hardwired, indirect acquaintance with the initial macrostate (Albert, 2014, 162; 2016, 16-17; 2023, 355-356). Hence, the Past Hypothesis explains the constraint on past macrohistories, and this in turn explains the record asymmetry. Although this picture has faced numerous objections, many misinterpret it as a literal account of human thought when dealing with records (Frisch, 2007), and perhaps many more are aimed at the validity of the Past Hypothesis in the first place (Earman, 2006). In this paper I attempt to analyse Albert and Loewer's account in a way that's both charitable towards its con- tent and sympathetic towards their background framework. Nevertheless, whilst I agree that there exists a probabilistic constraint on past macrohistories, I do not think they can make sense of it without helping themselves to the very records they wish to explain. I will argue that this circularity is avoided if we explain the record asymmetry through a different route: via the 'fork asymmetry', a probabilistic structure connecting localised events. There are good reasons to think this phenomenon goes a long way to underwriting the effectiveness of records as windows on the past (Stradis, 2021). This will warrant some brief discus- sion, but my main focus will be on why it's a better way of linking the record asymmetry to the universe's initial state. Neither Albert nor Loewer imagines their theory of records to be a complete one, and Albert (2016, 58n4) in particular suspects that the fork asymmetry plays some role. But as we shall see, my way of looking at this structure leads to very different understanding of the record asymmetry.

Daniel Sudarsky

The relevance of conceptual problems afflicting quantum theory, to cosmology and black hole physics

We will review some of the problems in cosmology and black hole physics that turn out to be closely connected with issues arising at the foundations of quantum theory and will show that the perspective one takes regarding the latter can dramatically modify the kind of conclusions one extracts regarding the former. In my view this serves to illustrate that

contrary to the standing "lore", the focus on those foundational concerns leads to more that ``philosophical peace of mind" and it might well be what takes us to a novel stage in physics.

Emily Thomas

Victorian Concepts of Time... and Sexism

It's difficult to imagine how a metaphysic of time can be sexist. Yet I'll be arguing that the "default" Victorian concept about of time was just that: the concept didn't just concern the nature of reality; it was also deeply political, with sexist (and racist) undertones. Further, I argue that one reason Henri Bergson's alternative philosophy of time proved so attractive to women is that it upended the particularly problematic elements of Victorian time - rendering it anti-patriarchal. I'll make this case through the work of two early twentieth century philosophers of time: Karin Costelloe-Stephen, and Hilda Oakeley.

Emanuele Tullio

The Disclosing Window

According to a standard perdurantist account of predication, temporal parts are the primary bearers of the properties instantiated by perduring worms: a worm derivatively instantiates the properties that its temporal parts instantiate in the first place. Informally, a worm inherits the properties of its temporal parts – see, inter alia, Hawthorne (2006). While perdurantism is usually developed within a setting which presupposes propositional eternalism (indeed, the B-theory), there is conceptual space for developing perdurantism in a setting that accepts propositional temporalism (indeed, a setting kindred to the A-theories). I wish to explore a novel perdurantist and temporalist theory which holds that (i) all the truths about instantiation of properties by parts are eternally true, and (ii) some of the truths about inheritance of properties by worms are temporarily true. In the resulting picture, while it is always true that temporal parts instantiate their properties, it is not always true that a perduring worm inherits properties from a given temporal part: sometimes a worm inherits properties from a given part, sometimes from another. Inheritance can be figuratively described like a window which is sometimes open and sometimes closed. When open, it discloses to a worm the property-landscape of one of its parts; when closed it makes it completely inaccessible. But its openness and closure does not affect the reality of the landscapes, which remains always the same regardless of where inheritance is temporarily centred. I label this theory the Disclosing Window Theory (DW). Finally, following Deasy & Banfi (2022), within DW instants of time are to be understood as propositions providing maximal descriptions of reality including truths about inheritance: the present instant of time is the maximal proposition which is currently and temporarily true. After presenting it, I want to focus on what I take to be the major attraction of DW. My contention is that DW assumes an egalitarian stance on spatiotemporal hypersurfaces: no hypersurface is metaphysically distinguished from the

others. I argue that properties which are inherited are in no way more special than properties which used to be/will be inherited. In particular, I show that, if the metaphysical specialness at stake is understood in terms of Lewisian naturalness, inherited properties and non-inherited properties are equally natural. In order to do this, I review a number of comparative principles for naturalness, with a special focus on reference magnetism – see Dorr & Hawthorne (2013). In particular, I show that, since in the actual world there are entities for which it is easier to refer to properties which are not inherited – the temporal parts which instantiate them – inherited properties are not easier to refer to (and hence not more natural) than non-inherited ones. Thus, spatiotemporal hypersurfaces hosting inherited properties are not metaphysically more special than spatiotemporal hypersurfaces hosting non-inherited properties. I conclude that DW is an intriguing addition to those temporalist theories which – like Dorr's (manuscript) and Bacon's (2018) – are intended to introduce temporalism in the block of reality without disagreeing with B-theorists on the status of spatiotemporal hypersurfaces.

Gerardo Viera

Perception and the Naïve Conception of Time

Our naïve understanding of time involves a notion of linear time. The world seems to contain a single timeline within which events are ordered by earlier / later than relations. This timeline also exhibits various causal and epistemic asymmetries that assign a special role to the present. Together, *linearity*, *asymmetry*, and *the present*, constitute *linear time*. Where does this understanding of linear time come from? In this paper, I focus on a popular answer to this question found in philosophy and psychology that endorses *the dependency thesis*. According to the dependency thesis our understanding of linear time depends on our capacities for episodic memory. As I show, many people endorse the dependency thesis because they think an understanding of linear time requires a prior awareness of linear time, which they argue is only possible through episodic memory (Campbell, 1997; Debus, 2013; Ismael, 2016). According to some, (e.g., Green, Forthcoming), perception does not provide us with a representation of a temporally extended world, but functions to provide us with news at bout the present moment. For others (e.g., (Debus, 2013; Ismael, 2016), perception, while it may provide us with an awareness that the world is in flux – i.e. that at any given moment the world is changing – doesn't present us with linear time. Call this *the distinctiveness thesis* according to which there is a qualitative difference in how time is experienced in perception and memory. Memory presents us with linear time. Perception does not. I argue that the distinctiveness thesis is false. Perception presents us with linear time. If the dependency thesis is true, then it must be defended on other grounds. Sections 1 and 2 lay out the dependency thesis, the distinctiveness thesis, and arguments for both. Section 3 argues that we cannot settle this debate on introspective grounds. Instead, we should ask what perception must represent in order to guide action in a dynamic world. Section 4 argues that

causal and temporal perception are intertwined in experience and in guiding action, and that this intertwining explains how perception presents us with linear time. Empirical results concerning temporal and spatial illusions provide us with reasons for thinking that perceptual processes represent events as occupying a temporal interval within which perceptual systems distinguishes between events that can causally interact and those which cannot. It will be argued that the details of these perceptual processes show that a distinction between past, present, and future moments in time and events can be found in perceptual representations. Perception provides us with our initial contact with time as we naïvely conceive of it.

Christian Wüthrich

Quantum gravity between becoming and eternalism

Quantum gravity promises to have deep implications for the philosophy of time, particularly also given its suggestion that spacetime may not be fundamental. In this talk, I will trace out some lessons for the philosophy of time in light of the putative emergence of spacetime. Considering the specific cases of causal set theory and loop quantum gravity, I will argue for two conclusions. First, even if we admit becoming in causal set theory, then we will need an account of how this becoming percolates up to the macroscopic level. The resulting macroscopic becoming will likely resemble a form of worldline becoming. Second, loop quantum gravity does not undermine an eternalist metaphysics of time, so long as eternalism is properly conceptualized.

Shira Yechimovitz

The Problem of Direction in Dynamic Theories: What's the Difference Between Beginning and Ceasing to Exist?

Barry Dainton (2010) argues that the questions "is time dynamic" and "does time have a direction" must be separated. We expect changes in the sum total of reality to occur in one direction and not the other, but this is not necessary: consider a dynamic universe U, and imagine creating a duplicate, U*, and switch the direction of time. If U and U* are infact identical, then time on U does not have a direction. Dainton's main study case is the Growing Block view, and it will be the focus of this paper. I reframe Dainton's argument as follows: P1: If the Growing Block (GB) view is metaphysically equivalent to the Shrinking Block (SB) view, then the GB view does not provide time with direction. P2: The GB is metaphysically equivalent to the SB view. C: Therefore, the GB view does not provide time with direction. Metaphysically equivalent theories describe one and the same underlying reality, but in different languages, and so what appears to be a substantive disagreement can be exposed as merely a verbal one, using a translation scheme. A failure of the translation is an indication that the theories describe distinct worlds, and therefore are not metaphysically equivalent. One obvious place to look for a gap in the translation is when speaking of times that do not exist on the

block. GB assertions about times that are yet to exist, in comparison to SB assertions about times that no longer exist. The GB view existence reflects the asymmetry between the fixity of the past and the openness of the future: it is a fixed fact now that the Eiffel tower was built in 1889, and it is open when, if at all, Mars was inhabited. A SB framework preserves the fixity of the former, but it is not obvious that it can preserve the openness of the latter. If the sum total of reality used to contain colonies on Mars, it should be a done deal, even once the sum total of reality shrunk to a point where it did no longer contain them. Or at least so it seems. In order for the indeterminacy to survive the translation, one must deny the brute intuition that there is a substantive difference between beginning and ceasing to exist, and that even if a thing is annihilated from the world, it is still true that the thing used to exist, and used to be thus and so. Importantly, a true asymmetry between beginning and ceasing to exist will lead to inherent direction for all dynamic views.

Wen Yu

Temporal Biases as Person Biases

Near-bias, the kind of prudential bias of caring for one's distant future less than one's near future, is commonly found objectionable by philosophers, as mere differences in temporal distances seem to be arbitrary differences to which a rational agent should not be sensitive. Some reductionists of personal persistence, notably Derek Parfit (1984), have defended the rational permissibility of near-bias on the grounds that prudential concern need not track personal identity *per se* – which is presumed to be all-or-nothing by Parfit – rather than some more fundamental relations that may come in degrees. And since such relations tend to fade over time, one is justified to care less for her far future selves. In line with Bnefsi (2019), Braddon-Mitchell & Miller (2020), and Karhu (2023), I'd like to push the Parfitian thought one step further and suggest that a more direct vindication of near-bias can be given by reconceptualizing near-bias as a kind of *person-bias*. Roughly, the thought is that one is justified to care less for a future self of hers to the extent that there is, *literally*, *less of her* in that self. Near-bias as person-bias is especially attractive to those who think that rational concern need not be impartial interpersonally. Insofar as there is nothing objectionable for me to care less for you than for myself, there would be nothing objectionable for me to care less for my future self to the extent that she is not me. Near-bias as person-bias requires personal persistence to be a scalar notion. Assuming a broadly reductionist picture of personal persistence, I am particularly interested in how a function of *persistence to degrees* can be constructed out of the "impersonal" relations (considered as building blocks of our persistence) that cohere with the patterns of near-bias that are intuitively sensible and justifiable. Importantly, I shall argue that such a function can be made compatible with all theories of persistence over time – namely, endurantism, perdurantism, and the stage theory – although it may require auxiliary commitments that are not universally welcome. I also examine whether future-bias – the prudential bias of caring less for one's past than future – can be justified by

the same token. Future-bias as person-bias requires personal persistence to be past/future-*asymmetric*. Contra Sider (2018), I argue that perdurantists such as Lewis (1983), can readily accommodate asymmetric persistence in a similar way as the stage-theorist Sider does. On the other hand, endurantists would have serious difficulty with asymmetric persistence.