Introduction

Time is an incontrovertibly central feature of our lived experience, and yet the concept itself is notoriously hard to define. We structure our daily lives using clock time. We plan for our long-term futures with the expectation that those abstract futures will become present, concrete, realities. We contextualise our life’s events within narratives formed from our past experiences, although these experiences have vanished into the irretrievable past. Time, then, is of fundamental importance to our conceptualisation both of our identities and of the world we inhabit. Yet when asked ‘what is time?’ many might struggle to give more than a superficial definition. This is reflected in the intellectual study of time, and its remarkable failure to provide many conclusive answers to even the most basic temporal questions.

It has been noted by several scholars that the philosophy of time is rather unusual in that most of its core problems have not been conclusively resolved. Why is this so? One reason might be that there are several competing ways one could go about answering questions about the nature of time. One might take a metaphysical approach by attempting to articulate, using logic and rational arguments, exactly of what temporal reality consists. One might take a linguistic approach, assessing our use of temporal language and what this might reveal about the underlying temporal structures that language seeks to describe. One might take a psychological approach using introspection on our temporal phenomenology, or, more recently, psychological experiments on time perception. Or, one could take a scientific approach, using observational data and mathematical formalism to form a physical theory of time. The problem is, each of these approaches yields different, sometimes incompatible, results.

In the distant past, philosophers disagreed completely about what metaphysics revealed about time. Some argued that the universe is constantly in flux (and therefore time passes) whilst others claimed that reality (including time) is static and unchanging. Many modern thinkers are in similar disagreement. Our temporal experience seems to indicate that time does pass, whereas some of our most successful empirical theories say the opposite. One’s endorsement of a temporal theory may well depend upon whether one believes experience or physics should cast the deciding vote between rival explanations. Perhaps the issue is that we are fundamentally limited by our inability to step outside of the bounds of time and examine it from an external, objective, perspective.

Whilst this problem is not going away, trying to find answers to these ancient and open questions is still a valuable pursuit, especially for the theist. For one, the universe is fundamentally temporal. Therefore, most important theological questions are at least tangentially related to the nature of time, as these issues...
concern the relation between creature and creator. For example: is God within
time, experiencing it as it unfolds? Or is God outside of time, viewing all
moments at once? In the former, God is immanent but subject to time’s passage.
In the latter, God is sovereign but distanced from creation. One’s understanding
of the nature of time will inform how one goes about answering these theo-
logical questions.

Philosophy, however, is no longer the only method by which one can
approach temporal reality. The natural sciences are now expertly equipped
with both observational data and highly fine-tuned equations that allow a far
more precise probing of time than had previously been possible. Indeed physics,
specifically Einstein’s special and general theories of relativity, indicate that
time is one dimension of the more fundamental spacetime. The most widely
accepted ontology of spacetime is that all spacetime points (all spatial and
temporal locations) tenselessly exist, with none having a more metaphysically
privileged status than any other. In other words, a so-called B-theory or block
universe view of reality is correct. On this view, time does not really pass.

The nature and structure of spacetime are deeply relevant to how specific
doctrines should be understood, though this is a far less well-studied area than
‘God and time’ more generally. Consider the Christian notion of personal
salvation, namely the type of salvific process that happens (or at least begins
to happen) in an individuals’ spatio-temporal lifetime. Such a process requires
an objective change or transformation from fallen to saved. If time does really
pass, then the Christian doctrine of personal salvation is relatively unproblem-
atic. An individual can change from being fallen to being saved throughout the
course of their life, and this change is substantiated by the objective temporal
passage that renders ‘falleness’ past and ‘salvation’ present. Yet if time does
not pass, and change is not objective, then a personal salvific transformation
from fallen to saved is problematised. One can no longer say which of the
incompatible properties one possesses – individuals are both fallen and saved
because both states exist simpliciter and neither state can claim objective
priority (at least from a temporal perspective).

The doctrine of eschatology also faces problems. If time does not pass, and
all moments of time tenselessly exist, then the entirety of the spatio-temporal
universe always exists and can be redeemed eschatologically by God as
Christian doctrine describes. No problem there, then. If time does pass,
however, and the past vanishes into obscurity, then physical theories predicting
that the universe will end either in heat death (freeze) or a big crunch (fry)
raise serious questions about the plausibility of eschatology traditionally
understood. Neither ‘freeze’ nor ‘fry’ can accommodate bodily resurrection
or the eschatological transformation of physical reality into a ‘new creation’
(2 Corinthians 5:17) as people, objects, and events will have disappeared into the non-existent past and been rendered irretrievable by the destruction or degradation of the universe.

Therefore, the metaphysics of time and the physics of spacetime are highly relevant to certain core components of both Christian theology and the philosophy of religion. In this Element I will sketch out some of leading arguments in the philosophy and physics of time, particularly those that relate to spacetime. Although these are foreshadowed in classical temporal metaphysics, modern physics brings these problems into sharp relief. I will explore these issues from the perspective of the interdisciplinary field of Science and Religion, giving particular consideration to the challenges raised for the nature of God and the coherence of the interrelated Christian doctrines of salvation and eschatology.

This Element is both an introduction to the physics and metaphysics of time and a jumping-off point for understanding how these can – and in fact should – inform both Christian theology and the philosophy of religion more generally. I will argue that the nature of spacetime raises particular and pressing problems for Christianity, such as those briefly alluded to above. In order to engage in a dialogue of this kind, I believe that science and theology must be translated into a common language. That language is philosophy. As Paul Tillich astutely remarked: ‘the point of contact between scientific research and theology lies in the philosophical element of both’ (Tillich 1951: 21). The method and content of this Element, then, will be largely philosophical.

Taking seriously a realist interpretation of spacetime and the physical theories that support it raises highly significant questions about the nature of God, the nature and scope of human salvation, and the possibility of eschatological redemption for all physical creation. Thus, spacetime offers a rich and dynamic resource for understanding the Christian doctrines of salvation and eschatology in the context of contemporary physics and the problems that arise therein. Whether the theist can respond is yet another of the philosophical study of time’s open questions; one which I hope the reader will be better equipped to answer after reading this Element. In order to understand the rich and dynamic relationship between God, salvation, and spacetime, we must begin by laying the metaphysical groundwork. To that task we now turn.

1 The Metaphysics of Time

It makes sense to begin with metaphysical reflections on the nature of time for three reasons. First, these discussions pre-date physical approaches to examining time, and so beginning here makes chronological sense. Second, temporal metaphysics provides conceptual apparatus that will help situate the physics
of time in the broader contexts that are of concern in this work. Third, up until
the twentieth century, philosophical reflections on time were frequently inter-
twined with theology. Thus, the history of temporal metaphysics is highly
relevant to any exploration of the relationship between God, salvation, and
spacetime.

1.1 Time in Ancient Philosophy

Metaphysical reflections on time’s nature can be traced back to the pre-Socratic
philosophers Heraclitus and Parmenides, each of whom was writing around the
fifth century BCE. Parmenides was committed to a static temporal ontology of
being, whilst Heraclitus advocated a dynamic ontology of becoming. Though
neither developed a fully fledged theory of time by contemporary standards,
their radically conflicting ideas about central metaphysical issues are, in many
ways, mirrored in temporal metaphysics today.

Heraclitus maintained a proto-empiricist commitment to the reliability of
sensory experience in relaying facts about the external world. We perceive
everything as constantly changing with the passage of time, and this experience
should be trusted (even though our ordinary language and logic are largely
unable to adequately describe it). Thus, Heraclitus developed a doctrine of flux
whereby impermanence is universal. Everything is in a constant state of transition—we
can never encounter the same object or person twice, for all things are always
changing. In short, the only constant is change itself.

As we only have disjointed excerpts of his work, a certain amount of
reconstruction of his views has been necessary. Indeed, Heraclitus’ most
famous soundbite, ‘one cannot step twice in the same river’, is documented
not in a primary source but in Plutarch’s On The ‘E’ at Delphi (392b) and Plato’s
Cratylus (402a). The fragmented form through which we receive his writings
means that one cannot be certain of Heraclitus’ views. It is, however, generally
accepted that he was committed to a dynamic ontology that emphasised the
ubiquity of impermanence (Hoy 2013).

Heraclitus’ contemporary Parmenides, who is generally understood to be the
father of metaphysics, held the opposing view that reality is ultimately singular,
unified, and unchanging. His metaphysical writings also survive only in
fragments. Nevertheless, what we do have indicates that Parmenides was
a monist who believed reality was comprised of a single, unchanging, substance.
In rejecting change as no more than an illusion, he stood in opposition to Heraclitus.

Parmenides argued that change requires the passage of time because an entity
possessing different properties at different times necessitates some objective
change between those times. If we claim that some entity will change in the

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future, then we claim that the future is real and can generate new entities or new properties of existing entities (as something cannot come from nothing). Yet we contradict ourselves by elsewhere thinking of the future and past as non-real – if something is real, we think of it as real now, if something is in the future then it is not yet real and if it is in the past then it is no longer real. So, to think of the past and future is to think of what is not. Otherwise, nothing would distinguish the future from the present. Parmenides concludes, therefore, that nothing can come into or go out of existence, nor can entities objectively change, without committing simultaneously to both the existence and non-existence of the future. But the future cannot both exist and not exist. Therefore, talking temporally leads to contradiction, and time and change cannot be mind-independently real features of reality.

Further arguments to this end were developed by Parmenides’ student Zeno who devised a series of famous paradoxes commonly known as ‘Zeno’s Paradoxes’. These paradoxes of motion, received primarily through Aristotle’s writing on them, were devised to unearth a fundamental inconsistency in our common understanding of both motion and change. Consider the paradox of The Dichotomy, which involves an athlete running a race. In order to finish, the runner must first cover half the distance between the starting point and the finish line; however, to reach the halfway point she must travel halfway between her starting point and the halfway point. This process of dividing the race into segments that must be traversed can be repeated ad infinitum, leading to the conclusion that the runner must cover an infinite number of finite distances in a finite amount of time. This insurmountable task means she could never complete the race. But, of course, people never encounter such problems in the real world, and therein lies the paradox. Parmenides and Zeno conclude from this (and other similar paradoxes) that although it appears to us that the world contains motion and change, reason and logic rule out the possibility of either being mind-independent features of reality (Bardon 2013: 10–12; Strobach 2013).

Aristotle, whose writings on the nature of reality shaped the Western intellectual landscape for many centuries, rejected Zeno’s paradoxes and their denial of change (and thus also of time). To understand his argument, we must first set out how he characterised time. Aristotle’s definition of time is typically translated as the ‘number of motion according to before and after’ (Aristotle Physics 219b 1–2). The Greek word kinesis, however, encompasses more than just motion, referring also to qualitative changes such as a change in colour (Strobach 2013: 30). According to Aristotle, then, time is the numerical measurement of motion and/or change. He also argued that without change of any kind, we would not be aware of the passage of time. From this we can infer that Aristotle understood time as relational – we use time to count, order, and measure durations of and
changes between events, but time is not independent of these. If everything in the universe vanished or stood still, time too would cease.

Aristotle’s refutation of Zeno’s paradoxes claims that they rest on a conflation between time itself (an abstract numerical measure) and the things it measures (concrete change and motion). If time is a unit of measurement, then it is a mathematical quantity that does not necessarily correspond perfectly with material objects. The Dichotomy, Aristotle argued, confuses the infinite divisibility of numerical values (i.e. that there are an infinite number of values between the integers 1 and 2) with the idea that physical objects such as racetracks are comprised of an infinite number of smaller and smaller physical parts. Similarly, with units of time, whilst one can infinitely divide the numbers used to measure temporal duration, this does not mean that any given duration is actually composed of an infinite number of finite units of time. Zeno’s paradoxes fail to distinguish between the abstract numerical system one uses as a temporal measure and the concrete reality, namely change, that is being measured in units of time. Thus, Aristotle maintained the existence of change, and the inextricable connection between it and time (Bardon 2013: 12–17).

Aristotle and Heraclitus’ commitment to a dynamic conception of reality can be read as seminal forms of contemporary theories of time that assert temporal passage as fundamental. The Parmenides-type view is echoed in current theories of time that deny temporal passage, re-imagine our common-sense understanding of change, and do away with an objective distinction between tenses. This latter position claims that all moments of time eternally coexist in a so-called block universe. It is worth noting that there are important differences between these ancient disagreements about the nature of temporality and debates happening between modern theories of time. Nevertheless, these embryonic explorations of whether reality changes or not were important first steps in the philosophical quest to understand the nature of reality and the temporal dimension by which it is structured.

1.2 Time in Medieval Philosophy

The philosophy of the medieval period (or Middle Ages) was characterised by a deep religiosity, and most notable contributors to the study of time were writing from an explicitly theistic standpoint. It is in the writing of these scholars that contemplating the relationship between God and time, and time and theology more generally, really began. In this section I will sketch out the views of four leading contributors to medieval discourse on the nature of time: St Augustine of Hippo, Anicius Manlius Severinus Boethius, Anselm of Canterbury, and St Thomas Aquinas.
St Augustine of Hippo (354 CE–430 CE) was a Christian philosopher writing during the transition period between late antiquity and the medieval era. Whilst Augustine technically falls just outside the boundaries of the medieval period, his thought was so influential in shaping medieval theology that he can be appropriately placed in this section. We find Augustine’s thoughts on the nature of time in the autobiographical Confessions in which he engaged philosophically with his conversion to Christianity. He introduces the topic of time by noting that it is elusive and hard to define: ‘what, then, is time? If no one asks me, I know: if I wish to explain it to one that asks, I know not’ (Augustine 2005). Importantly, Augustine distinguishes between divine eternity and created temporality – the former is true time experienced by God, whilst the latter is an imperfect but necessary consequence of our creaturely predicament.

The temporal content of Confessions cannot be neatly placed under a single temporal theory of the kind that dominates contemporary analytic philosophy (see Section 1.3). Perhaps this is due to the self-professed difficulty with which Augustine grappled with time. In various places he uses language consistent with a dynamic temporal ontology and in other places he seems to claim that such dynamism is only a perceptual quality of the mind. We remember the past and anticipate the future, directly experiencing only the present. It is in the mind, specifically in the cognitive states of memory, attention, and anticipation, that we measure time’s passing and conceive of a difference between the tenses. Augustine seems to have believed that such dynamic experience, fragmented as it is into past, present, and future, is a consequence of our creaturely limitations. God created the universe, including time, out of nothing, and is not subject to change as temporal beings are. For the perfect and immutable God, there is no distinction between tenses; nothing passes, and all moments are held together in a timeless present. Divine time is eternal (atemporal, durationless, unified) and stands over and above, and is ontologically superior to, created time. Whilst our senses ‘flutter between the motions of things past and things still to come’, God dwells in ‘the glory of everfixed eternity’ – these states are radically different in kind and cannot be compared (Augustine 2005).

It is precisely this idea that divine time is not mind-independently dynamic or tensed that has led some scholars to place Augustine’s thought within the class of static theories of time (Helm 2014: 147–54). Augustine believed that the omniscient God saw reality as it truly is. If God does not experience time dynamically, and our creaturely experience of temporality is subjective, then one may infer that Augustine understood mind-independent time as static and unchanging. On this view, all moments of created time exist simpliciter and with equal ontological status. God has perfect knowledge of all moments of time because all moments of time exist tenselessly in front of him (so to speak).
He knows them simply by observing them. Nevertheless, Augustine’s views on time are complex and multifaceted, and he does not unambiguously fit into the static or dynamic camp. What can be said with certainty, however, is that he believed in a fundamental ontological distinction between created time and divine eternity, and that the former is (at least mind-dependently) tensed and dynamic whilst the latter is neither.

Anicius Manlius Severinus Boethius (c.475–7 CE–c.526 CE), more commonly known simply as Boethius, was also a key figure in the transition between late antiquity and the Latin medieval period who had a seismic influence on medieval thought. His masterpiece, Consolations of Philosophy, was written whilst he was in prison, under sentence of death, on the false charges of treason and performing magic. Born into a wealthy family, Boethius was well-educated in matters of Greek philosophy, and his work contains unmistakable Platonic and Stoic influences. Unlike Augustine, who wrestled with the impenetrability of both time and eternity, Boethius viewed time, eternity, and their relationship, as relatively straightforward and unproblematic.

Boethius defined eternity as ‘the complete possession all at once of illimitable life’, going on to say that ‘this becomes clearer by comparison with temporal things. For whatever lives in time proceeds as something present from the past into the future, and there is nothing placed in time that can embrace the whole extent of its life equally’ (Boethius Consolation: Book V, Prose 6). From this definition Eleonore Stump draws out four components: (1) anything eternal has a life, (2) the life of an eternal being cannot be limited by beginning or end, (3) eternity involves infinite duration, (4) an eternal being possesses all its life at once, meaning it cannot be temporal (Stump 2003: 133–4).

This definition, which formed the foundation of all subsequent medieval reflections on eternity, was developed whilst thinking through the problem of divine foreknowledge. God is omnipotent and so knows all things, including future events. Yet if God knows what I will do before I do it, then it seems as though I am not really freely making a choice (as I could have done nothing else). As freedom is integral to moral and soteriological responsibility, this is a significant concern. Boethius solved this problem by arguing that God has perfect knowledge of the future because he is outside of time and views all events tenselessly. He compared God’s apprehension of all temporal events to the vision one might have of a landscape atop a mountain.

According to some interpreters, Boethius’ view is notably distinct from the view that because God is outside time, he experiences no kind of temporality at all. God’s mental life is neither bounded by creaturely temporality nor completely divorced from time altogether. Whilst we experience the present as a tiny fleeting instant, God holds all moments of time together at once in the eternal...
divine present of beginningless, endless, infinity. This defines two modes of existence – creaturely existence which is temporal (viz. dynamic, tensed, ordered by relations of before and after), and divine existence which is eternal (viz. possessing all life at once in the eternal present). Some have understood the eternal present as atemporal *simpliciter*, namely a durationless instant, whilst others have argued that it is a (seemingly contradictory) atemporal present of infinite duration. In the 1980s, Eleonore Stump and Norman Kretzmann defended and developed this latter interpretation in conversation with Einstein’s theory of relativity with intriguing, though not uncontroversial, results (see Section 3.3) (Stump and Kretzmann 1981: 433).

Anselm of Canterbury (1033–1109) also reflected on the relation between divine eternity and creaturely temporality. Along with other medieval thinkers, Anselm was committed to the doctrine of divine simplicity whereby God is a perfect metaphysical unity, his nature is equal to his attributes, and he is not comprised of parts (temporal or otherwise). Rather, God is the uncaused cause – being itself – who set the world into motion with his creative volition. This means that neither his personhood nor his experiential perspective can be split into ‘what is’, ‘what has been’, and ‘what will be’.

From divine simplicity follows divine immutability. In *Proslogion* Anselm presented his famous definition of God as a being than which no greater can be conceived (which has since been developed into the ontological argument for God’s existence). If God is a perfect being, then he cannot change, because any change would necessarily be a form of degeneration. As change is inextricably bound-up with time, a changeless God cannot be temporal. Anselm partook in the medieval consensus that, on the basis of these doctrines, God must be timelessly eternal.

There is an ongoing debate amongst interpreters as to Anselm’s views on the structure of created time. Brian Leftow, for example, reads Anselm as a proponent of the doctrine that only the present (and present things) exist – the past and future are unreal. He refers to Anselm’s definition of the present as ‘fleeting’, and his description of that present as passing away into the not-present, to make his case (Leftow 2009: 297–8). Katherin Rogers, however, reads Anselm as arguing that reality is comprised of a four-dimensional ‘block’ in which all moments of time and points in space tenselessly exist. Anselm writes that God sees all moments in time at once, which Rogers interprets as an ontological commitment to the coexistence of all times. Our temporal experience of a fleeting present is, on her view, a consequence of creaturely limitations and is devoid of ontological content (Rogers 2007: 3). A third reading simply denies that Anselm was in the business of temporal metaphysics at all, arguing that he was actually concerned with purifying the notion of divine eternity from
imperfections imposed upon it by creaturely language (Bobier 2021). I encourage the interested reader to wade through this hermeneutical quagmire and decide for themselves Anselm’s conception of time.

St Thomas Aquinas (1225–1274) is the medieval philosopher-theologian whose enduring impact on Christian theology is second to none. His writings on time can be delineated into two points of focus: his discussion of divine eternity, and his treatment of the relation between God and temporal creation. He develops his understanding of the former apophatically – God has no beginning or end, God does not experience succession or change, God does not experience temporality as he is always in the eternal now. Along with most other medieval philosophers, Aquinas endorses both Boethius’ definition of eternity and the classical theological doctrines of divine simplicity and immutability, leading him to the same conclusions as Anselm. Aquinas’ interpretation of Boethian eternity, Eleonore Stump argues, is one of infinite duration, rather than an atemporal, eternal, instant (Stump 2003: 135–6).

Aquinas’ views on the relation between God and creation have more positive content. Once again influenced by Boethius, he considers this issue in the context of the problem of divine foreknowledge and human freedom. And, like Boethius, he solves the problem by claiming that all times (past, present, and future) are present to God at once. In this way, God atemporally knows all temporal events, including the free choices of human agents. This can be imagined using the analogy of a circle. As a point at the centre of a circle is related to all points on the circle’s circumference, so too can God be said to be simultaneous with, and thus have perfect knowledge of, each point in temporal reality that is laid out before him. Nor does God have to experience succession, a temporal property, in order to experience all moments of dynamic time and know how these are related to each other. He writes:

> God, however, is wholly outside the order of time, stationed as it were at the summit of eternity, which is wholly simultaneous, and to Him the whole course of time is subjected in one simple intuition. For this reason, He sees in one glance everything that is affected in the evolution of time, and each thing as it is in itself, and it is not future to Him in relation to His view as it is in the order of its causes alone (although He also sees the very order of the causes).

(Aquinas Commentary, I Peri Hermeneias: Lesson 14)

For this reason, William Lane Craig has conjectured that Aquinas is a so-called temporal B-theorist, meaning that he believed all moments of time coexist and temporal reality can be reduced to fixed temporal ordering relations between events (see Section 1.3). Craig makes this claim by arguing that God’s apprehension of all events at once is not merely an epistemic consequence of