A BRIEF HISTORY OF THE PHILOSOPHY OF TIME

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Chapter 1

Time and Change

We measure weight with a scale and temperature with a thermometer. When we measure time—say, with a clock—what is it that we measure? To some scholars in the ancient world, the answer was that what we call time is simply the measure of change. What is real is a changing universe; time is derived from, and is used to track, regular changes and motions. The leading proponent of this view was the celebrated Greek philosopher Aristotle, who was both Plato’s most accomplished student and himself a teacher of Alexander the Great. His philosophical opponents on this issue were Parmenides and Zeno, who denied the reality of change—and thus denied the reality of time as well.

THE ELEATICS

There was a remarkably high level of scholarly activity among the ancient peoples of the Mediterranean region around 2,500 years ago. In addition to areas of study ranging from mathematics to politics, there were a number of different schools of metaphysics (meaning schools specializing in the philosophical investigation into the nature of reality itself). One approach that many of these schools had in common was a certain emphasis on the divide between appearance and reality, and how mere appearances can be deceiving. One such influential school of thought—known as the “Eleatic” school because its proponents came from the Greek colony of Elea on the Italian coast—actually denied the reality of change. As (they would also maintain) there is no time without change, their denial of the reality of change is also a denial of the reality of time. As odd as it may sound to propose that there is no such thing as change, this theory’s proponents had some surprisingly compelling things to say in favor of this claim.

The Eleatic school of thought included two of the greatest early philosophers of nature, Parmenides and Zeno. We think that Parmenides was born around 515 BCE and lived to be at least sixty-five years old. Zeno, his student and ally, was about twenty-five years younger. The only records we have of their work are snippets quoted or discussed in the writings of other ancient and medieval scholars. In their time, though, they were very well known. Their view of reality stood in direct opposition to that of their contemporary Heraclitus, who argued that reality is characterized by unending change, with nothing constant in the world. He claimed that our awareness is always changing, and what we experience is always undergoing change—even if we don’t realize it, as when we identify a river as the same river, even though the water making up the flowing river is constantly replaced. The Eleatics, in contrast, shared one central belief that might seem radical: that all change is an illusion—that, in reality, all the world is an unchanging, timeless unity. In philosophical terms, then, they were idealists about time: Time is merely a kind of idea in the mind, rather than a thing that can genuinely be attributed to nature. What could be said in favor of such a counterintuitive notion? Quite a bit, as it turns out.
ZENO'S PARADOXES

The Eleatic denial of change is the point of Zeno’s famous paradoxes of motion. These paradoxes have fascinated scholars for thousands of years. Zeno came up with an unknown total number of these; they are variously examined by a number of ancient scholars, particularly Aristotle. The three paradoxes most often discussed, and most closely related to Parmenides’ shared assumptions about change, are known as "The Dichotomy," "Achilles and the Tortoise," and "The Arrow."

1. The Dichotomy

Suppose someone (call her Atalanta) intends to walk, at a steady pace, to the grocery store down the block. In order to arrive at the store, Atalanta must first cover half the distance to the store. This leaves her with a certain distance yet to cover. In order to reach the store from there, she must again cover half the remaining distance (one-quarter of the total distance). Having accomplished this, she must cover half the remaining distance (one-eighth the total), and so on. This means that Atalanta, in order to reach the store, must cover an infinite number of finite distances (see figure 1.1). She could not do this in a finite amount of time; therefore she would never get to the store....Of course, people successfully reach their destinations all the time, thus the paradox.

2. Achilles and the Tortoise

Zeno's second paradox of motion makes a point similar to the first. He imagines epic anti-hero Achilles—apparently known for his foot speed until his unfortunate heel injury—racing against a much slower
tortoise. Suppose Achilles gives the tortoise a head start. For Achilles to catch up to the tortoise, he must first reach the point (call it point A) where the tortoise was when Achilles started running. By that time, the tortoise will have moved forward to a farther point B and will still be progressing slowly. In order to catch up to the tortoise, Achilles must first get to point B, and the same for point C, and so on. Similarly to the first paradox, it appears that catching the tortoise will take an infinite number of steps—a series of steps we know will have no end—each of which will require a finite (albeit ever-diminishing) amount of time to accomplish. Could such a series of tasks ever be completed?
3. The Arrow

Zeno's third paradox makes a different kind of argument. Take an arrow flying through the air. Is it really in motion? It can't be, according to Zeno, for the following reason: Whether or not something is in motion should be a fact about that thing now, not a fact about it in the past (i.e., that it was somewhere else) or a fact about it in the future (i.e., that it will be somewhere else). But at any given instant, the arrow only occupies a space equal to its own size, and when something occupies only a space equal to its own size, it is at rest. Therefore the arrow cannot be in motion at any time. Because the same reasoning would apply to any object in motion, motion is impossible.

Zeno concludes that, even though it appears for all the world as if things move and change, reason and logic rule out the possibility of motion. His resolution of these paradoxes is that movement, and change in general, is an illusion. The true nature of the world (i.e., its unchanging perfection) is revealed to us when we ignore our sense experience and rely on reason alone.

ARISTOTLE'S ANSWER TO ZENO

We know about Zeno mainly through Aristotle, who resisted the Eleatic attack on the reality of change. For Aristotle, change is real: Objects move from one place to another, seasons change, ice melts, and so on. He saw a relationship between time and change, but the nature of that relationship requires some explanation.

Plato, Aristotle's teacher, had expressed sympathy for a kind of naive realism about time that simply identified time with change. In Plato's dialogue *Timaeus*, the character of Timaeus identifies time itself with the motion of the heavenly bodies (the Sun, the Moon, and the planets). He goes on to claim that time would come to an end if these bodies would cease their orbits. On this view, then, time is related to change in the sense of simply being identified with a particular set of motions. It is not clear what Plato himself really thought, but he does describe *Timaeus'* story as a "likely account" of time. Aristotle finds this doctrine unpalatable, pointing out that, even if the heavenly bodies stopped dead in their tracks, time would still be passing as long as some other things were in motion.

Nor can we simply identify time with motion or change in general, he continues. He notes that change is a contingent and local phenomenon, whereas we think of time as passing equally for everything everywhere, no matter what is going on in the immediate vicinity. Further, although changes can be slower or faster, time cannot; "slow" and "fast" are defined in terms of time, not vice-versa. So time cannot literally be change.

Rather, for Aristotle, the relationship between change and time is not one of identity, but more like the relationship between the thing measured and the means of measuring it. Time is not a process: It is just a kind of "number" or unit that can be used to describe processes in nature, analogous to the way ordinary numbers can be used to count things. In his words, "time is the number of change with respect to before and after." As with other abstract quantities, time is a kind of system that captures something real about nature without really being part of nature. If you see two sheep, there isn't really any 'twoness' out there in addition to the sheep, but that is not to say that there aren't really two of them. We can truly say that the Sun is brighter than the Moon, and that an elephant is bigger than a mouse, even though 'brighter' and 'bigger', as mere relations, aren't really things in the world like suns, moons, elephants, and mice. In the same way, we can say that a performance of *Hamlet* really is two
hours longer than a TV cartoon show, even though there are no hours out there to count. What we do is use regular motions, like the orbit of the Earth or Moon, or the ticking of a clock (in Aristotle’s time, more likely the dripping of a water clock), as units of duration, which in turn can be used to count, order, or measure other durations, motions, or changes. Time itself exists only in the sense that it is a unit system used to count, order, or measure such things. Yet this doesn’t mean that we can’t make perfectly accurate statements about the time and temporal order of events. This view about time is a variant of what is called relationism, in that it treats time as a way of thinking about how events can be objectively related to each other.

Aristotle’s theory allows an answer to Zeno that preserves change as a genuine aspect of reality. He thinks that Zeno’s paradoxes rest on a confusion between time and what it measures. For Aristotle, time is a unit of measurement used to describe changes; as such, it is a quantity that belongs more in the mathematical than the material realm. Zeno’s paradoxes, he argued, are dissolved by the fact that concepts like infinity, composition, and infinite divisibility work differently when you are talking about (merely) mathematical quantities in a stipulated mathematical realm. First, consider the paradox of “The Dichotomy” and the similar paradox of “Achilles and the Tortoise.” On Aristotle’s conception, time is like the number line, in that any segment of either of these is, potentially, infinitely divisible. You can take the ‘space’ between, say, the integers two and three and divide it in half, then in quarters, then in eighths, and so on indefinitely. He argues that what this really means is that, although you can identify infinitely many distinct points between the numbers two and three (corresponding to each possible division of that segment of the number line) and infinitely many distinct points within any smaller division of any subdivision

of that distance, the distance between two and three is not (and couldn’t be) composed of those points in the way material objects are composed of smaller parts. The stipulated rules for an abstract mathematical realm mustn’t be confused with the actual rules for physical reality. A point in Euclidean geometry has zero length, and no number of things with zero length can, in the material world, be added together to form something of finite length. Geometrical points are really just abstract boundaries on merely potential subdivisions. Similarly, Aristotle argues, for instants in time. A length of time—say, the time it takes to walk to the grocery store—is not actually composed, in the material, physical sense, of an infinite number of smaller, finite lengths of time. Zeno’s first two paradoxes of motion rest on supposing that the time it takes to get from one place to another is actually composed of an infinite number of finite lengths of time; if it were, then he would be right that any motion requires the completion of an infinite number of distinct tasks. Aristotle concludes that Zeno’s paradoxes rest on confusing time (an abstract unit system) with change (a real phenomenon that can be measured in terms of time units). The existence of these false paradoxes, he would like to say, just goes to show that he has the right analysis of time.

Has Aristotle thus solved the problem posed by the first two paradoxes? Some have claimed that Zeno’s problem was only really answered with some new mathematical ideas in the nineteenth century. Contemporary mathematics adds a concept that, if permitted to describe change itself, would more directly resolve the paradoxes. The concept of a limit allows for an infinite number of finite quantities to add up to a finite sum, in cases like the one in “The Dichotomy”: In modern calculus, the sum of \((1/2 + 1/4 + 1/8 + 1/16 \ldots)\) is said to approach, or converge on, one. This quantity is the “limit” of that particular process of addition. (In contrast,
the sum of the series \[1 + 2 + 3 + 4 \ldots\] has no limit.) If we accept that completing a motion is like reaching a limit, then neither Atalanta nor Achilles need do the impossible in order to accomplish their tasks. In one respect, this distinction meshes nicely with Aristotle's assertion that the "potential" infinity in question in "The Dichotomy" and "Achilles and the Tortoise" paradoxes is not to be confused with an "actual," extensional infinity. But where Aristotle's solution was to avoid contradiction by distinguishing between the rules for time (as a mere abstraction) and those for change (as a real phenomenon), the notion of a limit gives us the resources to describe, without contradiction, a finite sequence as actually divisible into an infinity of finite sequences. In other words, this answer doesn't depend on drawing a line between time-the-abstraction and change-the-reality the way Aristotle's does. However, this functions as a solution only if one is comfortable with the notion that one can just stipulate an answer to the paradox by simply declaring that a converging series actually converges. Can a limit be a real endpoint to a real process, or is it just a new mathematical convention that disregards the metaphysical question about time and change with which Zeno and Aristotle are struggling? Does it really help matters to say that Atalanta's progress to the store represents convergence on a limit? That wouldn't have sounded like real motion to either Zeno or Aristotle. Even if it might not be satisfying for other reasons, Aristotle's approach has the virtue of not forcing real actors to perform weird mathematical tricks.

Although Zeno's paradox of "The Arrow" appears to be making a different argument, fundamentally, Aristotle's answer to it rests on the same point, namely that "The Arrow" problem depends on the false premise that, if time is not a mere illusion, it must therefore be actually composed of instants. Zeno presumes that something in motion can only be in motion by virtue of its state at any instant. Aristotle would prefer to say that motion is motion over an interval with non-zero duration; that is why we describe motion in terms like "miles per hour" or "meters per second." By definition, an instant per se has zero duration, and so the idea of motion over an instant is incoherent: Distance traveled per zero seconds is not a rate of motion. Similarly for the notion of rest at an instant: By Zeno's reasoning, to say that something is at rest at an instant is to say that it moved zero meters in zero seconds. This description of rest doesn't make any sense either; rather, we should say that something at rest is moving zero meters per second. As with the other paradoxes, Aristotle's diagnosis is of a false paradox resting on the confusion of an abstract value (i.e., time), which is mathematically divisible into instants, with actual change, which is not literally composed of infinitesimal units of change.

The strongest virtue of Aristotle's theory is that it quickly dissolves these counterintuitive paradoxes. Further, note that he has replied to Zeno on the Eleatics' own terms (i.e., rationally). In most cases, when we want to say the world is a certain way and not otherwise, we tend to think that the best way to accomplish this is by observation and experiment. But the Eleatics' whole worldview is based on the notion that sense experience is fundamentally unreliable. Aristotle realizes that, in replying to them, it would be question-begging to rely on observation and evidence; rather, his analysis of time rests on reasoning about time and change alone, and so it is not open to any reply by Zeno that he is just begging the question as to our knowledge of the natural world.

PARMENIDEAN IDEALISM

Aristotle doesn't have too much trouble dispensing with Zeno's paradoxes. His argument against Parmenides, Zeno's fellow temporal
idealistic, is another story. Parmenides had offered a different argument altogether for the thesis that change is an illusion. Sometime in the fifth century BCE, he wrote a lengthy prose poem (existing for us only in tantalizing fragments) in which he presented a line of reasoning discounting the possibility of change—a line of reasoning that is, incidentally, particularly interesting because it is widely thought to constitute the world's earliest surviving example of extended philosophical argumentation:

As yet a single tale of a way
remains, that it is; and along this path markers are there
very many, that What Is is ungenerated and deathless,
whole and uniform, and still and perfect;
but not ever was it, nor yet will it be, since it is now together
totally,
single, continuous; for what birth will you seek of it?
How, whence increased? From not being I shall not allow
you to say or to think: for not to be said and not to be thought
is it that it is not. And indeed what need could have aroused it
later rather than before, beginning from nothing, to grow?
Thus it must either be altogether or not at all.
Nor ever from not being will the force of conviction allow
something to come to be beyond it: on account of this neither
to be born
nor to die has Justice allowed it, having loosed its bonds,
but she holds it fast. And the decision about these matters lies
in this:
when or if it is not, but what can have been decided, just as is necessary,
to leave the one unthought and nameless (for no true
way is it), and <it has been decided> that the one that it is indeed
is genuine.

And how could What Is be hereafter? And how might it have been?
For if it was, it is not, nor if ever it is going to be:
thus generation is extinguished and destruction unheard of.
(Palmer, trans.)

There are several distinct points being made in this fascinating
fragment. For Parmenides, the thought of change is the thought of
something becoming something else, which necessarily involves
the thought of something (or state of a thing, like the fading color
of a rose) going from being future, to being present, to being past.
The thought of change, then, is bound up with the thought of the
passage of time from future to present, or present to past. It is com-
mon to say that something "awaits us in the future," or "lies in our
past." This is to treat the future and past as though they are real, the
way other places are real even though you are not there to see them.
However, in our ordinary way of thinking about time, it is also the
case that the past and the future are contrasted with the present,
precisely in that the present is thought of as real and the past and
future are not—if something is real, then it is real now. If future and
past events were real now, then they would be present! So to think
of what is past or future is to think of what is not. ["And how could
What Is be hereafter? And how might it have been? For if it was, it is
not, nor if ever it is going to be."] Thus Parmenides' conclusion that
we contradict ourselves when we describe the world temporally:
Any talk about change involves talking about the past or future as
real and as not real.

To this he adds that our nonsensical talk about change gets
us into strange habits and beliefs, like talking about non-present
things, which are really nothing, as though they are something ["for
not to be said and not to be thought is it that it is not"]. Also, by
being committed to change, we are effectively saying you can get
something from nothing: Because the future is nothing, the com-
ing about of any event is a case of something coming from nothing.
Nothing could explain the existence and characteristics of a thing
arising from, literally, nothing, and nothing could explain why it
would arise then, as opposed to at some other moment [“what need
could have aroused it later rather than before, beginning from no-	hing, to grow?”]. Real change would also suggest that things can pass
out of present existence—but where would they go?

To this one could reply that there is, seemingly, another
dimension to time independent of change. What about something,
like an unmoving rock or table, that persists or endures, unchanged?
Even as we concede that there is no change, wouldn’t there still be
the time that passes as a thing endures? Parmenides anticipates this
objection. He replies that an enduring thing would have to have
temporal parts: parts that exist now, plus parts that did exist but
don’t now, and parts that only will exist. But then the thing would,
one again, both exist and not exist. An existing thing can’t have
non-existing parts [“but not ever was it, nor yet will it be, since it is
now together entire”].

The moral of this story, for Parmenides, is that change is an illu-
sion, and so the world as it appears to us cannot be real. This was
what the Eleatic school was all about: the view that the world as
we know it, consisting in a constantly shifting array of impermanent
objects and their relations and characteristics, is a matter of mere
subjective appearance. Another fragment from the poem:

...for nothing else <either> is or will be
besides What Is, since it was just this that Fate did shackle
to be whole and changeless; wherefore it has been named all
things

that mortals have established, trusting them to be true,
to come to be and to perish, to be and not to be,
and to shift place and exchange bright color. (Gallop, trans.)

Insofar as sensation leads us to accept the reality of change, our
senses are fundamentally deceptive. Our experience of motion,
change, and the passage of time is a projection of our own limited
perspective on reality. ‘Time talk’ is really incoherent, a fact hidden
by our facility with the use of tenses and other temporal language.
We see this, Parmenides would say, when we step back from what our
senses and instincts are telling us and reason coldly about whether
our assumptions really make sense. The world as it is in itself is a
singularity: unitary, unchanging, perfect.*

As extreme as its conclusions are, the Eleatic worldview should
not be dismissed too easily. What guarantee do we have that sense
experience provides an accurate picture of how the world is? It is
true that we would expect that our senses would evolve in such
a way that we are able to interact with the world around us in a
survival-enhancing way, and in turn this would seem to imply that
our belief-forming faculties tend to be reliable; after all, we would
have a tough time negotiating our environment if our beliefs about
our surroundings were frequently false. But it is less clear that deep
insight into the true nature of the world is necessary to survival, and
so it should not be taken for granted that sense perception reveals
the true nature of the real world in all its aspects. The beliefs we need
from a survival standpoint have to do with predicting what we will
experience, given what we are experiencing now, and what actions

* This might sound like a mystical or religious position, except for two key facts: First, the
Eleatics rely for their conclusions on reason and logic, rather than faith; and second, because
nothing, on their view, can come into existence, there could have been no creation of the
universe.
we take. It would be possible to be very successful at such predictions while still being quite in the dark as to whether the ways we categorize and contextualize our experiences accurately reflect reality. In the absence of more sophisticated calculations, nothing could be more natural than to think the Sun revolves around the Earth; and thinking this wouldn’t cause us any problems in our day-to-day efforts to survive and reproduce. Tomatoes are nutritious even if we believe they are vegetables; water is healthful and refreshing even if we deny it to be made up of H₂O, or lack a notion of molecules entirely. It would make sense for us to instinctively fear all snakes and spiders, even if only some types are dangerous. Similarly, the fact that thinking in terms of change ‘works’ for us doesn’t necessarily mean things really change. Maybe representing things temporally is just our way of picturing the world as best we can, given a limited perspective, a bit like the way a two-dimensional painting can suggest a three-dimensional landscape.

Aristotle has an answer to Parmenides, but it is incomplete and thus less helpful than his answer to Zeno. Aristotle agrees with Parmenides’ assertion that our use of “now” or “the present” to refer to more than an instant (as in “the present day,” for example) is problematic from a metaphysical point of view; at any given moment, part of our day would be past and part of it would be future. Taking such loose temporal talk seriously would get us into the sort of contradiction Parmenides exploits in his argument. Aristotle thinks he can resolve the problem by distinguishing between different kinds of change. His answer focuses on Parmenides’ claim that no existence can emerge from nonexistence. To this, he replies that change is not the emergence of something from nothing. All we have to do is to distinguish between the thing that changes and its configuration, its properties, or its aspects. These are what do the changing. If a person turns pale, the person does not come into being from nothing; rather, there is a persistent thing—the person—with variable attributes. So the person, in Parmenides’ terms, can be both pale and not pale without herself both being and not being. It is also true that persons can come into being, but only, Aristotle would argue, by a reshaping of an existing underlying substance, just as molten bronze can be formed into a statue. The statue is not thereby created from nothing and, if the statue is melted down, the statue does not become nothing.

Unfortunately, with this, Aristotle has not addressed the main point. The key issue is whether, when we describe change of any sort (including Aristotelian change in properties), we commit ourselves to the reality of the future from which the new situation arises, and/or the reality of a past to which it passes. But the future and past can’t be real, because what would then distinguish them from the present? If the future and past are not real, then nothing can pass from being future to being present to being past. If there is no passage, then there is no change. If there is no change, then there is no time. That was Parmenides’ fundamental problem with change and the passage of time, and Aristotle didn’t say anything to dispel this worry.

Consequently, although Aristotle may have a reasonable answer to Zeno, he does not really get to the heart of the Parmenidean argument. Parmenides’ argument, and the temporal idealism it represents, was later revisited by Augustine of Hippo. Augustine (aka St. Augustine, the fifth-century Catholic bishop), was a North African of Berber descent. He was a careful and insightful philosopher, as well as the most important early Christian theologian. He wrote an enormous number of books, but is best known for his Confessions, which combines an account of his conversion to Christianity with some very sophisticated philosophical investigations into time, memory, and cosmology.
AUGUSTINE’S THEOLOGICAL IDEALISM

Augustine was well aware of the ancient debate over the reality of time, and was very concerned with understanding our relationship to time. Augustine's primary interest in time had a theological basis. He was worried about questions like “What was God doing before creating the universe?” and “If nothing existed (but God) before the universe was created, then why create it at one time rather than another?” This last question particularly troubled Augustine: If nothing existed but God before creation, then what could have happened to, or within, God that led God to decide to create the universe at that particular moment? The new impulse that would have to have arisen at that moment suggests a change for God; but why would an eternal and perfect being want or need to change?

Augustine’s answer is to embrace a slightly revised set of arguments for idealism about time and change: Like Parmenides, he argues that time and change are subjective phenomena of human mentality.

His goal is to call our pre-critical grasp of time into question. He famously asks: “What, then, is time? I know well enough what it is, provided no one asks me. But if I am asked what it is and try to explain, I do not know.” He offers the following line of reasoning:

Of these three divisions of time [past, present, and future] then, how can two, the past and the future, be, when the past no longer is and the future is not yet? As for the present, if it were always present and never moved on to become the past, it would not be time but eternity. If, therefore, the present is time only because it moves on to become the past, how can we say that even the present is, when the reason why it is is that it is not to be? (Pine-Coffin, trans.)

So, similarly to Parmenides, the past and the future are not (now), so they are not real. Further, the present is ad infinitum analyzable into smaller and smaller durations: We can speak of the present day, but part of that day is past (and so nonexistent) and part is future (and so nonexistent). Same for the present hour, the present minute, and so on. Any time you pick out includes times that are not present; there doesn’t seem to be an actual, identifiable present time.

Yet, Augustine continues, we are aware of extended periods of time, we can compare periods of time to each other, and we are able to compare the present situation to the way things were in the past:

Nevertheless we do measure time. We cannot measure it if it is not yet in being, or if it is no longer in being, or if it has no duration, or if it has no beginning and no end. Therefore we measure neither the future nor the past nor the present nor time that is passing. Yet we do measure time.

How is our awareness of time possible, if there really is no past, present, or future for us to be aware of? This is a critical question for the temporal idealist. Augustine’s answer is that time exists only in the mind. Memory, sensation, and anticipation leave impressions on us, and it is these that are measured and compared when we make judgments about the passage of time. Nothing outside the mind really persists; rather, “the mind’s attention persists.” Memory and anticipation give our experience its temporal dimension, not the veridical perception of something outside the mind actually enduring and undergoing changes. The difference between past and future is just the difference between memory and anticipation.

Time, then, for Augustine is a human invention, and it is not to be applied either to the universe, as it is in itself, or to God—who exists in a kind of Parmenidean timeless state that Augustine calls
“eternity.” This solves Augustine’s theological problem, because questions about what God was doing before the universe was created, or why God would decide to create the universe at one time rather than another, are moot if the passage of time does not apply to God.

So Augustine, motivated by the desire to invalidate certain tricky theological questions, invokes Parmenidean temporal idealism as the solution. In the process, he raises some good questions about how we come to make judgments about past, present, and future, and the passage of time. Augustine did not realize, however, that his treatment of these questions raises a very difficult issue for the temporal idealist: How do we even come to have the concept of past, present, future, and the passage of time if we never actually experience them? Even if these judgments are false, they involve ideas that must have come from somewhere. The problem is that Augustine’s account depends on the employment of temporal concepts without explaining where they come from in the first place. Augustine talks about memory and anticipation, and how they create a kind of metaphorical ‘extension’ of the mind that stands in for temporal extension, leading to a confusion about the objectivity of time. A memory is, by definition, a representation of the past. But what gives memory the meaning it has for us? How do we recognize a memory as a memory, as opposed to, say, a product of sensation or imagination, without knowing what it means for something to be in the past? Parmenides and Augustine agree that the past does not exist, so we never actually experience the past. And it is similarly so for the future. If the idealists are right, how does the notion of the past or future get started in the first place? In the next chapter, we examine a few different ways one might go about explaining from where these supposedly false concepts come.

WORKS CITED IN THIS CHAPTER

Aristotle. Physics.
Plato. Timaeus.

Other works of relevance to the issues in this chapter

Chapter 2

Idealism and Experience

We ended the last chapter wondering where the very idea of past and future comes from, given that (a) we could never experience past or future events directly, and (b) memory and anticipation only have the meaning for us that they do because we already understand their connection to the past and future. Clearly, we do have the idea of past and future, and have no problem understanding what it means to remember or anticipate. But how we accomplish this is a different story, with a lot to teach us about the nature of time itself. In the last chapter, we saw that the metaphysical question as to whether change is real was the focus in the ancient world; in the Enlightenment era of the seventeenth and eighteenth centuries, the epistemological question as to the origin of temporal concepts became a central concern in its own right.

LOCKE’S MISTAKE

The celebrated English philosopher John Locke is probably best known for his 1690 Second Treatise of Civil Government; this was the most important early treatment of the notion of government by ‘social contract.’ But he also studied the human mind, a study that, for him, was intimately tied up with his interest in political liberty. European history for the previous thousand years and more had been characterized by claims by a few—kings or religious leaders—to have privileged access to the truth; such claims were the basis for creating dogmas and traditions that could be exploited in consolidating power. In response, Locke spent many years working on a massive examination of human ideas, language, and knowledge titled An Essay Concerning Human Understanding. His main goal in this work was to show that all human knowledge is ultimately derived from a combination of experience and reflection upon experience—and nothing more. This is a doctrine known as empiricism. The connection between empiricism and liberty, for Locke, is that empiricism undermines the claim that there are truths that religious or civil authorities have some special access to that a properly thoughtful and scientifically minded individual cannot.

As a key part of this program, Locke spends several hundred pages trying to explain how even complex and abstract ideas are ultimately derived from sense experience alone. He devotes a chapter to explaining where the basic temporal ideas of succession, duration, and eternity come from. Locke was not an idealist about time: He was a temporal realist and follower of Newton, who thought that time and space were real entities in their own right (see chapter 3). But Locke recognized that, even on the realist view, time is not an actual object of experience—it can’t be felt or seen or otherwise directly observed. So he sets out to explain how we get the idea of time from experience alone nonetheless. Here is what he has to say about the origin of the ideas of succession and duration:

‘Tis evident to anyone who will but observe what passes in his own mind, that there is a train of ideas, which constantly succeed one another in his understanding, as long as he is awake. Reflection on these appearances of several ideas one after
another in our minds, is that which furnishes us with the idea of succession; and the distance between any parts of that succession, or between the appearance of any two ideas in our mind, is that we call duration.

By a "train of ideas," Locke is just referring to any sequence of ordinary thoughts and perceptions: I see my bus coming, then I notice that my nose itches, then I scratch my nose, then I think about whether I will be late for work. His proposal is that we originally get the notion of temporal succession by reflecting upon a succession of perceptions like these, either as they occur or afterward. Supposedly, this would give us a direct experience of succession. It is important to see why this story can't be right or is at best incomplete. Locke is claiming that the idea of succession derives from a direct experience of successions of ideas. At any moment during a reflective experience of succession, wouldn't only one component of the succession be before the mind's eye? If so, then reflecting on a whole train of ideas altogether would have to involve the reproduction, in memory, of past ideas or experiences (see figure 2.1). The mere reproduction of some past experiences would not give rise to the idea of a succession: The components of the idea of a succession would have to be thought of as occurring at different times—otherwise, it wouldn't be a memory of a succession, as opposed to a single, complex thought of a bunch of overlaid mental contents. He has to be talking about a reflected-upon memory of a sequence thereby identified as such—as a memory. That is to say, he has to presume that we already understand that the sort of reflective activity going on references past experiences. A memory thought of as a memory involves already identifying something as past; but without the idea of temporal succession already in place, the notion of 'pastness' couldn't possibly mean anything to the experiencer. If

one didn’t know what it is for an event to succeed another in time, one surely couldn’t make sense of a present event becoming past by virtue of its being succeeded by another.

In summary, Locke does not explain how it is possible to recognize a succession of ideas or experiences as a succession without grasping, on some level, the concept of temporal succession. So his story about deriving the very idea of succession from experience can’t work as it stands.*

KANTIAN IDEALISM AS A SOLUTION

The great eighteenth-century Prussian philosopher Immanuel Kant probably thought more, and more deeply, about time and our awareness thereof than anybody before him. Like Locke, he was celebrated in his own lifetime for both work in political philosophy and the study of knowledge and the mind, as well as for work in moral philosophy,

* There might be a story one could tell that would explain the possibility of a direct experience of succession (see the discussion of the 'phenomenological present' later in this chapter), but Locke's account is not it.
aesthetics, and many other subjects. Some of his most interesting arguments appeared in his *Critique of Pure Reason*, a massive and difficult work the main purpose of which was to resolve skeptical concerns about claims to scientific knowledge. His project was, to a large degree, inspired by what he saw as the failure of Locke and other empiricists to account for the possibility of such knowledge. Modern science draws importantly on some key concepts like material substance, causation, and space and time. Science describes the world, at a fundamental level, in terms of these concepts. To be assured we are getting things right when describing the world using these concepts, we need to explain what entitles us to apply them to our experience. Kant recognized that Locke and his fellow empiricists never gave a satisfactory explanation for the scientific use of these foundational notions.

Kant’s answer required a reexamination of the origin of abstract ideas (in particular, those foundational ideas of material substance, cause and effect, and time and space) and the justification of scientific generalizations about the world employing these ideas. In turn, this required starting over at the beginning with a new investigation into how the mind gets going in formulating ideas about what is going on around it. His insight was that the key to understanding cognition was an understanding of the most fundamental cognitive achievement—the one that makes all coherent experience possible: the interpretation of one’s own experience in terms of time. He found that Locke’s problem with the origin of the idea of succession points the way to a solution: Time is a mere form of sensible experience, and the ordering of experiences in time derives from the mind’s own imposition of order on experience. In other words, temporal idealism (Kant’s version of it, anyway) is the solution to the problem of skepticism about the possibility of scientific knowledge.

Early on in his *Critique of Pure Reason*, Kant lays out his idealist position on space and time. He distinguishes between what we find in experience and the nature of our experience itself. Space and time are not things in themselves, he says. Rather, they are mere “forms of experience” (i.e., our manner of registering perceptions and experiences is spatial/temporal). Instead of focusing on the nouns “time” and “space,” it would be more on target to focus on the adverbial application of these concepts: In other words, we don’t experience things in time and space so much as experience them temporally and spatially. Kant’s key finding against Locke is that there is no way even to think about experience except temporally, just as there is no way to think about material objects except spatially. Locke has it backward when he proposes that the idea of time is derived from experience; rather, experience presupposes time.

Just like Parmenides and Augustine, Kant concludes that reality is itself atemporal.* Is such a thing (i.e., the atemporality of reality) even thinkable? Yes and no, Kant would say. His theory explains imagination’s inevitable failure in this regard: Because this way of experiencing things is an irreducible part of our sensibility, we literally can’t imagine any other way for things to be. Yet we can intellectually come to terms with the ideality of time. In this way, the ideality of time is like the mathematical concept of infinity: We cannot imagine the infinite (we cannot call up a mental image of, say, an infinite number of apples), but we can understand what it means. Kant thinks that an atemporal reality is something we can grasp in the abstract, even if it can never mean anything to us in practical terms.

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*Kant has been criticized for concluding that reality is atemporal just on the basis of his position that our temporal concepts can’t come from an experience of real temporal relations. Indeed, the latter doesn’t in itself mean that there aren’t any real temporal relations. He might reply that, given his understanding of what time is, it doesn’t even make sense to think of time as a concept that is applicable to a reality considered in abstraction from the way in which we experience it.*
succession is innately present in our cognitive makeup, via a set of organizational principles. Thinking in terms of a succession of experiences depends on relating those experiences to successions of events outside us; and we can only do that because we already have a certain schema built in for interpreting our sensory inputs in these terms. Part of our innate information-processing scheme is that we interpret our perceptions on the presumption that we are dealing with a world of enduring items and events, interconnected by causal relations (call this the concept of objectivity—i.e., what it means for something to belong to a world of objects of possible experience). We are guided by this scheme into imposing a pattern on experience consistent with such a world; this pattern involves sequences of events occurring in accordance with causal rules. So this is how we come to have the idea of succession: It is a pattern corresponding to the concept of objectivity itself that we ourselves impose on sense data to make them tell a coherent story.

In processing incoming perceptual data, one of the really fundamental things we have to do is distinguish between static states of affairs and dynamic events or processes. Consider two possible experiences: the experience of walking around a house and the experience of seeing a ship leave a dock. The first involves a succession of experiences of an unchanging state of affairs; the second involves a succession of experiences of an ongoing process of change (i.e., an experience of an actual succession). In either case, the experiences present themselves successively (see figure 2.2).

Strictly speaking, the contents of the experiences themselves don’t provide prima facie evidence for one interpretation (i.e., static state of affairs or dynamic event?) over another—that is, not unless you already understand the difference between a static state of affairs, experienced over time, and an ongoing event; but the ability to distinguish between the two is what is at issue. So, how are we
capable of this kind of distinction? Kant argues that the very notion of a difference between the two is coming from inside, so to speak: We are using one innate interpretive scheme in the one kind of case and another scheme in the other. Of course, the distinction between the two kinds of experience seems obvious, but that is the point: This is not something we have to figure out from scratch. The concept of succession according to a rule functions as a template for organizing my experiences in a certain kind of way, and I couldn't get this idea from experience (as Locke claimed), because this ability is a necessary condition of my making sense of my experience in the first place. Kant's conclusion is that the notion of rule-governed temporal succession must be innate and imposed by us on our own experience.

Kant's story is the most sophisticated idealist story so far. It has a certain plausibility in light of the difficulty empiricists have with explaining the origin of temporal concepts, insofar as time is not itself to be found in the contents of our experience. It bolsters the idealist case by accounting for the experience of succession (i.e., as an organizing principle of the mind) in the context of an inherently timeless reality. Kant also appreciates the fundamental importance of temporal organization to coherent experience; his account gains some credibility from the puzzle as to how we would be able to make sense of the world without some starting point—a cipher key to unlock the code—and temporal organization does seem like a reasonable candidate as just such a starting point. His account addresses Locke's experience problem, and it does so in a way that would help explain why it is so hard to put one's finger on what time is when we look for it in the world around us. In other words, it explains the ineffability of time by explaining that we have been looking for it in the wrong place: We mistakenly look for it 'out in the world,' when it is really a matter of how we organize our experience of the world.
A BRIEF HISTORY OF THE PHILOSOPHY OF TIME

It is important to note that Kant’s theorizing falls short of proof, even if it, in principle, solves a problem generated by a simplistic empiricist approach. There remain many questions one could raise for this theory, such as how and why one is constrained to interpret a subjective sequence of perceptions according to one schema rather than another, if reality itself is not doing the constraining. Further, it remains hard to accept his conclusion that the universe is not in itself temporal at all (i.e., without us, things really do not change and time does not pass). Is there an alternative theory, compatible with realism about time, which explains what Augustine did not and Locke could not?

A REALISM-COMPATIBLE ALTERNATIVE

There are alternatives to Kantian idealism in accounting for the idea of time. It wasn’t until very recently that a legitimate non-idealist alternative to Kant’s solution to the problem of the origin of temporal concepts has been proposed. Again, what is needed is an explanation of how we get the idea of past and future, and change over time, from experience without having to presume an understanding of those very things. Since the nineteenth century, cognitive psychologists have been entertaining a notion that would allow for the idea of temporal succession to be derived from experience: The proposal is that our experience at any moment directly encompasses both the present and the immediate past. If so, that means that we experience succession or change directly, without having to rely on question-begging inference or remembrance; and, if we experience change directly, then we can be realists about change.

However, a workable story along these lines has proven elusive. For example, the early-twentieth-century logician and philosopher Bertrand Russell was a supporter of this idea. He recognized the question-begging way early empiricists like Locke had accounted for the experience of time. If the concept of change comes originally from experience, then the experience of change can’t itself depend on any judgment about what has happened in the past; this would presuppose an existing grasp of time and change, and so would beg the question as to how we originally acquired the idea of time and change. That is why Locke’s explanation can’t be right. There is a difference between experiencing change and merely judging that something has changed. We have experiences that seem like direct experiences of motion or other changes; philosopher Sean Kelly calls this the phenomenon of “pace perceived.” Seeing a second hand move is not the same thing as seeing it occupy, or remembering it occupying, different locations at different times (see figure 2.3). The question is, because change is something that happens over time, how can we account for the experience of change at any moment? Are such experiences genuine, in that they are actually veridical reflections of something that is really going on? In defense of an empiricist theory of time-awareness, Russell explained the perception of motion or change as the result of our perceiving, at any moment, sense data received over a short, but extended, period of time. His view was that a sense organ, when stimulated, “goes on vibrating, like a piano string, for a while after the stimulation.” In the period during which the sensation fades, we literally perceive now what happened a short while ago. It is because of this effect that we see, for example, the movement of a second hand: We can see a second hand moving, he claims, because we literally see it, at one moment, in several places.
Russell's contemporary, H. J. Paton, pointed out that what Russell describes wouldn’t actually amount to the experience of movement or change:

[1] If in a moment I can sense several different positions of a second hand, then these different positions would be sensed as being all at the same moment. That is to say what I should sense would not be a movement, but a stationary fan covering a certain area, and perhaps getting gradually brighter towards one end. Anything else would surely be a miracle. You can’t see a sensum that isn’t there. If you see it, it is there at the time you see it.

Paton makes an excellent point. Getting some information now that was generated in the past doesn’t give you the experience of a sequence of events—unless you are able to make an inference about what you have experienced that involves assigning some of that data to the past. As we have seen, any such inference presumes a grasp of the difference between present and past, thereby begging the question as to how we come to have such concepts in the first place.

The notion of an extended phenomenological present of experience—coupled with the failure of Russell and others—has inspired philosopher Barry Dainton to support a slightly different understanding of temporal experience in his 2000 book Stream of Consciousness. He rejects the Aristotelian/Augustinian notion of an infinitesimal present: However mathematically or metaphysically correct it might be to insist that any extended magnitude (such as a temporal magnitude) is in principle infinitely divisible, he argues, the notion of an infinitesimal present has no experiential relevance. A single, infinitesimal slice of information couldn’t mean anything to a perceiver. Neither could one distinguish an infinite number of bits of information in any stretch of experience. Further, Dainton cites the ample evidence from empirical psychology that sequences of events that happen close enough together are perceived as simultaneous. Shorter sequences in experience, even if they are decomposable into distinct events in principle, just don’t matter from the standpoint of describing what we actually perceive—of what is 'present' to us.∗ If we are trying to figure out how some concepts are formed on the basis of experience, we should be focusing on the nature of our actual experience, not on what is merely mathematically describable.

Edmund Husserl and C. D. Broad popularized the notion of an extended present of awareness vis-à-vis the content of awareness. Dainton's proposal involves extending this point to acts of awareness.

∗ Remember that we are talking here about the registration of change, rather than its representation. One can represent the passage of an hour instantly by, say, simply using the phrase "one hour"; the question here is how we get a sense of the passage of time in the first place.
themselves, not just those that the act of awareness encompasses in terms of content. An infinitesimal awareness of an infinitesimal event can mean nothing to us in terms of actual experience. As Niko Strobach says, "[I]t is just as impossible to see anything at an instant as it is impossible to take a picture by opening the shutter of the lens for zero seconds." Experience itself, Dainton proposes, is constituted by overlapping, very brief, but temporally extended, acts of awareness, each of which encompasses a temporally extended streeetch of perceived events. This conception of experience seemingly would allow for the direct experience of change. If an act of awareness is itself extended, then a succession of experience contents can be directly apprehended; thus no need for inference or the application of presumed temporal concepts. Acts of awareness overlap in the sense of sharing common parts, so continuity of experience is preserved, as shown in Dainton's own schematic (see figure 2.4).*

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*Sensory perceptions, in his view, are capable of presenting an inherent dynamism as part of the fundamental experience itself: The change, say, from D to E is encompassed by a single act of awareness.

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A2. This result, if ultimately defensible, might validate Locke's project of finding the origin of the idea of change in experience.

In a related vein, Dainton's fellow British philosopher, Robin Le Poidevin, argues for a specific sense of motion, or change. He thinks the conjunction of a very recent memory with a present perception "gives rise to an experience of 'pure succession.' " Le Poidevin draws on the idea that there is no specific moment when information becomes conscious. Rather, different interpretations of what we perceive, at every moment, battle it out for a short while at what we might call a subconscious level, and a 'winning' interpretation eventually emerges. The winning interpretation is influenced by conditioned responses, ingrained anticipations, and additional information received later in the interpretive process. In other words, our brains take information accumulated over a short period of time and combine it into what we experience as a simple and direct consciousness of change.

One drawback of such theories is that they are impossible to prove, at least as of now. Dainton admits that we really have to wait for neuroscience to catch up in order to confirm his theory over Kant's, or over other competitors in cognitive psychology. This will probably be a long wait, given how much is yet to be understood about the brain.

As far as the big picture is concerned, however, the key point about these theories is that they are, at least, consistent with temporal realism. This sort of account would explain the origin of the idea of temporal succession without begging the question, as in Locke, or advertizing to idealism, as in Kant. This would not itself prove that time or change are real; but if we find this reasoning plausible, it frees us to look into the possibility that there is more to time and change than temporal idealists like Parmenides, Augustine, or Kant would allow.

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THE CONSTRUCTION OF TEMPORAL EXPERIENCE

These theories about the perception of change show that it is not necessarily futile to suppose that our basic temporal concepts are derived from experience, and thus that time and change are real. Even as we contemplate rejecting idealism about time, however, it is also interesting to note that we can empirically demonstrate several respects in which our experience of the order and duration of events is a mere construction on the part of our perceptual apparatus. At least in some contexts, our interpretation of time order appears to be just a kind of story told by our perceptual processing mechanisms, rather than a straightforward reflection of the order of events. At the minimum, this means that any non-idealist story we want to supply going forward must be tempered by these considerations.

There are a number of experimentally confirmed contexts in which it appears that something that happens earlier in one’s perceptual experience is influenced by something that happens a split second later. In other words, there can be a demonstrable difference between what is consciously perceived and the actual temporal order of raw sensory inputs. These phenomena reveal a much more complicated story of temporal processing than we might otherwise have suspected. Here are some examples:

- **The Phi Phenomenon, aka Apparent Motion**: Two alternately flashing dots near each other typically produce the illusion of a single dot moving back and forth. (Think also of marquee lights: If they move fast enough, they produce the illusion of continuous motion.) This illusion of movement is actually very odd, as one seems to see the movement before the second flash, even though before the second flash there is no reason for the illusion to occur. Further, when one dot is red and the other green, the observer can get the impression that the dot changes color in midstream. The (illusory) midstream color change seems to take place, in each case, before the second flash. Seemingly even before it is perceived to occur, the second flash is somehow influencing how the sequence is experienced. (You can easily find animations demonstrating this phenomenon online, such as at http://www.philosophyuncc.edu/faculty/phi/Phi_Colors.html.)

- **The Flash-lag Effect**: An intermittently flashing color filling a moving circle is seen as a mere crescent, while the circle is seen in its entirety. The flash, in other words, seems to lag behind the circle containing it. According to one interpretation, one’s perceptual apparatus anticipates the trajectory of moving objects and registers them as ahead of their actual position; because it is stationary, the flash does not get the same treatment. (This is another effect you can find animations for online, such as at http://www.michaelbach.de/ot/mot_flashlag/index.html.)

- **The Cutaneous Rabbit**: A subject closes her eyes and is mechanically tapped five times at a point on the wrist, then five times near the elbow, and then five times farther up the arm. (The tapping needs to be regularly timed throughout, so that there is no interruption in the pace of the tapping as it changes location on the arm.) Instead of feeling the taps at those three locations, subjects typically report feeling fifteen taps more or less equally spaced, running up the whole arm. Of course, if tapped five times at only the wrist, with no further taps, the subject reports just the five taps at the same spot on the wrist. As with the phi phenomenon, later stimuli seem to affect how the earlier stimuli are experienced.
• **Cross-saccadic Perceptual Continuity:** If you have a watch with a ticking second hand, you may experience a recurrent, momentary illusion that your watch has stopped. You look down at it, and the second hand seems to have stopped; then, after what seems like just a bit too much time, it starts ticking again. This barely noticeable yet common phenomenon has a really interesting explanation. A “saccade” is the term for the flick of one’s eyes from one visual target to another. This motion, taking perhaps a tenth of a second or so, is something we do thousands of times a day. Even though our eyes are open during a saccade, we are not really aware of the visual information available to us during the movement; if we were, it would be very disorienting. The world would seem to shift in place with dizzying speed, over and over again. What the brain does (as Yarrow et al. explain in a 2001 issue of *Nature*) instead is to effectively extend the perception of the target of the saccade “backward in time” to just before the onset of the saccade” (emphasis added). What happens is that the perceived duration of the event you are now looking at gets extended by about the same amount of time it took to move your eyes to it. The intervening information never makes it to consciousness, thus preserving a temporal continuity between pre-saccade and post-saccade perceptual consciousness (see figure 2.5). Usually, we don’t notice this effect. But where there is an external time reference like a ticking second hand, the artificial extension of the second hand’s perceived movement can sometimes make it seem as though the second hand takes more than a second to tick forward, thus the momentary illusion of a stopped watch.

![Diagram](image)

**Figure 2.5**

We need to be careful in describing just what is happening in cases like these. Is your memory playing tricks? Are intervening experiences causing you to retroactively reinterpret the perceived order of events? Is anticipation causing you to misinterpret some stimuli? Or perhaps different interpretive pathways in the brain simultaneously form multiple, inconsistent interpretations over the course of the stimulus, and one of them wins out just because it reflects the sort of interpretation that is simplest or most helpful in most situations. One can speculate on good reasons why temporal processing would have evolved to work this way. Take cross-saccadic continuity: Without it, our experience would be full of disorienting and useless visual information. In a similar vein, our need to take delays in processing into account while tracking moving objects could explain the flash-lag effect.

These surprising experiential illusions continue to receive attention, from neuroscientists and others. What are the philosophical implications?
On any account, these illusions definitely show that time order as we know it in experience does not necessarily correlate with time order in reality and can even systematically deviate from it. You would expect natural selection to generally favor accurate portrayals of reality, but evidently there are exceptions to this rule. Note that there is nothing in the phenomenological present account that would explain, even in principle, how this sort of real-time rewriting of experience is supposed to take place. It goes to show how far we have to go to give an adequate account of temporal awareness.

What we learn from these phenomena is that time order in experience is a sort of construction, which is what an idealist like Kant would like to claim. At the same time, it should be stressed that these experiments do not provide any sort of direct support for temporal idealism. The very description of these cases involves distinguishing between experienced and objective time, whereas an idealist rejects the notion of objective time altogether.

So this sort of phenomenon doesn’t prove that time order and duration is itself an invention, just that particular judgments of order and duration derive from a post-hoc process involving different cognitive and neurological modules, only some of which are primarily tasked with accuracy in representation. Thus, although these experiments create a confusing complication for realist theories of time, they teach us more about the mind than about time. Though they show that our contact with the ‘real’ time order of events is rather less straightforward than we might have thought, they do not require us to embrace temporal idealism either.

Then what about temporal realism? All we have done so far is to show that realism about time is not obviously inconsistent with what we know about time-awareness. We have yet to discuss a positive theory about what time is, if indeed it is something. Thus we turn in the next chapter to early-modern and 20th-century physical theories of the universe, revisiting the question “Is time real?”

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