Parthenides, Zeno and Melissus, philosophers of the fifth century BC, are often grouped together by scholars. They are sometimes referred to collectively as the Eleatics, after Elea in southern Italy, the home city of both Parmenides and Zeno (Melissus came from the Greek island of Samos). The connection between them is generally taken to turn on an opaque set of views enunciated by the earliest of the three, Parmenides. Each of the three can be taken as representative of a distinct philosophical strategy. Parmenides was an innovator, in that he offered positive arguments for a novel and provocative set of views about the nature of reality. Zeno was a defender, in that he attacked those who thought Parmenides' ideas sufficiently absurd that they could be rejected out of hand. Melissus developed Parmenides' thought by arguing, often in fresh ways, for views which, while fundamentally Parmenidean, differed in some details from those originally set out by Parmenides. I will accept this framework in what follows, although this account of the relation between Parmenides, Zeno and Melissus is not universally accepted. (See Plato's Parmenides 126b–129a for the source of the view of Zeno as a defender of Parmenides; for critical discussion see Solmsen 1971, Vlastos 1975, Barnes 1982: 234–237; on Parmenides and Melissus see Palmer 2004; for a treatment of all three see Palmer 2009: Chapter 5.)

Parmenides I: the argument structure

Parmenides' poem is conventionally divided into three parts. First there is an introduction which sets the structure for the poem as a whole: Parmenides approaches a goddess who offers to teach him both the true nature of reality and a more familiar mortal perspective:

It is proper that you should learn all things, both the unshaken heart of well-rounded truth, and the opinions of mortals, in which there is no true reliance. But nonetheless you shall learn these things too, how what is believed would have to be assuredly, pervading all things throughout.

DK 28 B1.28–32 (translations throughout as in KRS)

We are fortunate that a good deal of the second part of Parmenides' poem, concerning "the unshaken heart of well-rounded truth" has been preserved, quite deliberately,
by Simplicius, a Neoplatonist philosopher and commentator on Aristotle of the sixth century AD. He had access to the poem, but recognized that copies were rare. Included amongst the passages Simplicius quotes are forty nine consecutive lines of argumentation in which Parmenides argues for a striking and highly revisionary account of the nature of reality (this is the lengthy fragment reproduced as DK 28 B8).

Far less of the third part of the poem, an account of “the opinions of mortals” has survived. There is considerable disagreement as to Parmenides’ purpose in providing this account (see Curd 1998: Chapter 3 for a discussion). I will say no more about this part of Parmenides’ poem, other than to note that any interpretation of Parmenides’ general outlook has to accommodate the fact that he did offer what seems to have been a lengthy and quite detailed account of the natural world (the surviving fragments include reference to the heavenly bodies, animal reproduction, embryology and the nature of thought, DK 28 B 10–12, 16–19).

Parmenides’ positive views are driven by an insight which is at the very heart of philosophical thinking. This is the idea that thought is a more reliable guide to the true nature of reality than perception and commonsense:

For never shall this be forcibly maintained, that things that are not are, but you must hold back your thought from this way of enquiry, nor let habit, born of much experience, force you down this way, by making you use an aimless eye or ear and a tongue full of meaningless sound: judge by reason the strife-encompassed refutation spoken by me.

DK 28 B7

This short passage is one of the few Parmenidean fragments preserved by a source other than Simplicius (the first two lines are quoted twice, with some variations, by Plato at Sophist 237a and 258d; the rest by Sextus Empiricus writing in the second century AD). We can extract the following four points concerning Parmenides’ procedure. First, Parmenides is well aware that the views he offers are very much at odds with common sense, and are highly contentious (his whole argument is a “strife-encompassed refutation,” that is, of ordinary human opinion). Second, he warns against rejecting his views simply on the grounds that they are greatly at odds with the common outlook (he warns against being guided by “habit, born of much experience”). Third, we should decide on Parmenides’ claims by thinking through the arguments he offers in their support (“judge by reason”). And fourth, Parmenides thinks that what prevents most people from understanding the true nature of reality is some sort of error concerning being and not-being (“never shall this be forcibly maintained, that things that are not are”).

How could thought establish the nature of reality? The goddess offers Parmenides a choice:

Come now and I will tell you ... the only ways of enquiry that are to be thought of. The one, that [it] is and that it is impossible for [it] not to be, is the path of Persuasion (for she attends upon Truth); the other, that [it] is not and that it is needful that [it] not be, that I declare to you is an altogether indiscernible track: for you could not know what is not—that cannot be done—nor indicate it.

DK 28 B2
This is clear in outline: there are two alternatives, one of which leads to truth and one of which is described as “indiscernible.” But what more sense can we make of the passage? The alternatives are described as “ways of enquiry.” The image is that of setting off from some starting point along an investigative enquiry into the world, resulting in an account of the nature of that world. There are two ways of enquiry because there are two starting points. The core of the first starting point is given by a single Greek word \textit{estin}, the third person singular present indicative of the verb \textit{to be}; the core of the second by the negation of the same word, \textit{ouk estin}. English requires a subject for these verbs, as provided by the parenthesized [it] in the passage quoted, but it is important not be misled by this into thinking that Parmenides has a determinate subject in view from the outset. It is preferable to understand the two “ways of enquiry” as follows (see Furth 1974). Suppose you start investigating the world around you, trying to establish what it is like. If you follow Parmenides’ first way then you will limit your claims about the world only to those which can be expressed using forms of the positive verb “[it] is”: for example, that water is wet, that there are fish in the sea and that there are elephants in distant countries. By contrast if you follow Parmenides’ second way you will limit your claims about the world only to those which can be expressed using forms of the negative verb “[it] is not”: for example, that sand is not nourishing, that sheep are not flying animals and that there are no dragons.

Given just this minimal characterization, we can see why Parmenides’ description of the two ways would also include some reference to necessity and impossibility. If you are going to follow the first way, limiting yourself to claims involving “[it] is” and abjuring those which involve “[it] is not,” then you will not be able to claim, for example, that there are fish in the sea but there need not have been—the italicized terms import the forbidden negative “[it] is not.” So you will in effect be limited to mentioning only what is \textit{and has to be} (that is, what “is … and is impossible … not to be”). Likewise \textit{mutatis mutandis} if you follow the second way: you will not be able to claim that there are no elephants in Greece but there could have been – the final italicized term is an instance of the forbidden positive “[it] is.” (See Palmer 2009 for an interpretation which places far more emphasis on the references to necessity and impossibility.)

Parmenides thinks only one of these ways of enquiry is coherent: the first way is “the path of Persuasion (for she attends upon Truth)”; the second way “is an altogether indiscernible track.” Two questions immediately arise. Why does Parmenides rule out the second as a possible way of enquiry? And what would it matter if the second way were ruled out, since surely no-one (outside a philosopher’s fantasy) would try investigating and describing the world while limiting themselves to using only forms of the negative verb “[it] is not”?

\textbf{Parmenides II: ways of enquiry}

Parmenides says something explicitly about the first question in the quoted passage: “you could not know what is not—that cannot be done—nor indicate it” (see also DK 28 B6, B7). We have here the driving thought behind Parmenides account of the nature of reality. An engaging way in to Parmenides’ thought is the following (cf. Owen 1960). \textit{Knowing} and \textit{indicating} seem to be relations, and therefore to require \textit{relata} between which they hold. Further, it may well seem plausible that one important difference between a significant bit of language, such as “tree,” and a mere noise, such as “harrumph,” is that “tree” is a sound somehow related to something in the world, whereas
“harrumph” is merely a sound produced by throat clearing. (It is another—and very difficult—question how human beings can manage to get “tree” to relate to something in the world; but the point here is just that its doing so is partially constitutive of its being significant, rather than a mere noise.) But given all that, it is very hard to see how non-existents could be known or indicated. Suppose, following the second way, I try saying “there are no dragons.” How could what I have said be true? If there really are no dragons, then “dragon” will be a mere noise, just like “harrumph.”

Of course Parmenides will be unmoved if someone points out there are things in the world for “dragon” to connect with: drawings, children’s stories or ideas in the head. For to make that move is just to allow that after all there are dragons, but that they are pictures or story-beasts, rather than giant reptilian fire-breathers. In that case, while “there are no dragons” could be significant, it would be false. But it will be impossible to express any truth correlated with that falsehood without straying from Parmenides’ second way. Suppose I say “there are no giant reptilian dragons, but there are story-dragons.” Then I have, contrary to the strictures of the second way, used the positive verb form “[it] is.”

Now recall the second question above. Why would it matter if Parmenides’ second way of enquiry were ruled out, since no-one ever does go around investigating the world while limiting themselves to using only forms of the negative verb “[it] is not”? The point of introducing the second way is to focus our minds on the problems which arise when using forms of the negative verb “[it] is not.” Of course, no-one uses only those forms. Human enquiry more typically follows a third way, using both the positive “[it] is” and the negative “[it] is not.” Investigation of the world typically churns out claims like “there are mountains to the north, but none to the south. Of those in the north, some are very high and snow capped even when the weather here is not too cold, but others have no snow, and are not impassable in the winter months …” Accepting Parmenides’ strictures against the second way plays havoc with this third way, and later in the poem Parmenides says explicitly that he is effectively ruling out two ways of enquiry:

What is there to be said and thought must needs be: for it is there for being, but nothing is not. I bid you ponder that, for this is the first way of enquiry from which I hold you back, but then from that on which mortals wander knowing nothing, two headed; for helplessness guides the wandering thought in their breasts, and they are carried along, deaf and blind at once, dazed, undiscriminating hordes, who believe that to be and not to be are the same and not the same; and the path taken by them all is backward turning.

DK 28 B6 (emphases added)

What is problematic about Parmenides’ second way is that it uses the negative form “[it] is not” rather than that it uses only that form. In that case applying the lessons learned from Parmenides’ rejection of the second way leads us to see that the third way—the way “on which mortals wander”—needs to be purged of the problematic negative form “[it] is not” if it is to be a permissible way of enquiry. Purging the third way of any uses of the negative “[it] is not,” however, leaves us with a way of enquiry which can avail itself only of the positive form “[it] is”; and that takes us right back to the first way which Parmenides mentioned, as being the only coherent way to pursue enquiry into the nature of reality.
Parmenides III: the nature of reality

Parmenides offers his own view of the nature of reality in forty-nine lines of dense and difficult argumentation: the earliest block of sustained philosophical argument preserved in the history of western philosophy. The image of a single permissible way of enquiry re-appears at the start, and is followed by an outline of the account Parmenides will champion:

There still remains just one account of a way, that it is. On this way there are very many signs, that being uncreated and imperishable it is, whole and of a single kind and unshaken and perfect

DK 28 B8.1–4

It is not possible to look in detail at all of Parmenides’ arguments. Many are opaque, and in some cases it is unclear precisely for what position Parmenides is arguing. We can, however, appreciate in a couple of cases how a Parmenidean renunciation of the negative verb form “it is not” would deliver striking conclusions about the nature of reality.

For what birth will you seek for it? How and whence did it grow? I shall not allow you to say nor to think from not being: for it is not to be said nor thought that it is not

DK 28 B8.6–9

We are debarred from saying of anything that it has come into existence. For if we suppose that something has come into existence then we are saying that there is such a thing now, but earlier on there was not any such thing. But the italicized words are a form of the prohibited negative “it is not.” So following the only permissible way of enquiry into the world will reveal that the true nature of reality excludes the type of temporary existent with which we are most familiar: dogs, oak trees, mountains. Further, if we cannot talk sensibly about something coming into existence, or—for related reasons—going out of existence, then we will not be able to talk sensibly about anything changing either. Change involves there being something new in the world. If the leaves are to have turned from green to brown, there must be brown leaves now where previously there were no brown leaves, and the green leaves which were here earlier must not be here any more (see DK 28 B8.26–28). Or again, it is hard to see that there can be any genuine variety in the world: for example, that over here there is a dog but over there there is no dog (“So it is all continuous: for what is draws near to what is” DK 28 B8.25)—indeed, many have taken Parmenides to be defending a form of monism, and claiming that reality is both undifferentiated and unique (but see Barnes 1979, Curd 1991 for criticism of the orthodox view of Parmenides as a monist; see also my later remarks on Melissus).

The interpretation and explication of any particular argument in the long fragment DK 28 B8 is certain to be contentious. Parmenides is breaking new ground, his poetic form of writing is not conducive to clarity, and he sometimes writes in what seem like figurative ways (how literally are we to take the claim at DK 28 B8.42–44 that “since there is a furthest limit, it is perfected, like the bulk of a ball well-rounded on every side, equally balanced in every direction from the center”?) The most important thing
to take from this brief survey of Parmenides' work for the present, though, is the driving idea that one cannot speak or think of what is not.

**Zeno I: the purpose of his arguments**

Most people coming upon Parmenides' poem would not be inclined to take his account of reality seriously. We can recognize that his concerns about “what is not” point to issues of philosophical importance. And we can admire the argumentative rigor which he achieved at such an early stage in the history of western philosophy. But the idea that really there is, for example, no coming into and going out of existence, no change, and no variety in the world seems ridiculous. There is much in Parmenides to disentangle, but one might think that there is no need to disentangle it in order to preserve our confidence that the familiar commonsense view of things gets the basics correct. There are things which come into and go out of existence; there are things which change, both in what they are like and in where they are; and there are lots of such things. All this seems to be obvious, and the Parmenidean alternative to be absurd.

Zeno of Elea sought to redress the dialectical balance somewhat in Parmenides' favor by shaking the confidence we all feel in the basic features of our familiar world view. Of course, if that is Zeno's purpose then we would expect his arguments to connect with and challenge our commonsense outlook, rather than make any explicit reference to Parmenides’ ideas and arguments; and in that case it will be unsurprising that Zeno could equally be treated as a freewheeling paradox-monger, out to raise problems for anyone he can. (For this view of Zeno see Barnes 1982: 231–237.)

Our earliest source for Zeno’s arguments about motion—some of which could be adapted to apply to change more generally—is Aristotle. He is concerned with the arguments insofar as they raise issues of independent interest for him about the divisibility and continuity of space and time, and so he feels no need to quote Zeno. As was the case with Parmenides, Simplicius does reproduce some of Zeno’s own words, but the evidence is that Zeno wrote a good deal more than has been preserved. I will concentrate on Zeno’s arguments concerning plurality and motion, since these relate most directly to Parmenides. But one should note that there are other arguments associated with Zeno which are not obviously tied to Parmenides’ views. (Aristotle reports a Sorites-type argument concerning perceptible sound at Physics 7.5, 250a19–25, and an argument about the existence of place at Physics 4.1, 209a23–25 and 4.3, 210b22–27.)

Our main evidence for Zeno as a defender of Parmenidean monism is the opening pages of Plato’s dialogue Parmenides (126a–130a). According to Plato’s report, Zeno's arguments concerned plurality, and had a common form. Plato gives just one example: if there are many things, then the same things are both like and unlike (Parmenides 127e–128a). No ancient explication of this argument has survived, but Simplicius provides two arguments of this type. Claiming to quote “Zeno’s own very words” Simplicius reports the argument that if there are many things the same things are both limited and unlimited (DK 29 B3). Simplicius also moves back and forth over a Zenonian argument that if there are many things then they must be both small, indeed of no size at all, and large, indeed of unlimited size (DK 29 B1, B2). It is unlikely, though, that all Zeno’s arguments were of this single form, since it would be hard (although not impossible) to force the Zenonian arguments about motion into this structure.
STEPHEN MAKIN

Zeno II: arguments about plurality

According to Simplicius the following are Zeno’s own words:

If there are many things, it is necessary that there are just as many as they are, and neither more nor less than that. But if they are as many as they are, they will be limited (peperasmena).

If there are many things, the things that are are unlimited; for there are always others between the things that are, and again others between those. And thus the things that are are unlimited (apeira).

The issue appears to be the number of things which there are. Common sense tells us that there are lots of things in the world. How many? The first limb of the argument suggests this line of thought: However many there are, there are surely a determinate number (“just as many as there are”; the contrast between the Greek peperasmena and apeira is as well captured by the translations “determinate” and “indeterminate” as by the more familiar “limited/infinite” and “unlimited/infinite”). Presumably there could have been more or fewer; but in fact, there are this many—a determinate number.

The second limb of the argument, however, suggests a Zenonian recipe for adding extra items to the world at will. Take just two of the huge variety of things we think the world contains: my garden hedge and my lawn. Why am I confident that they are two things? An appealing answer is that there is something else which separates them from one another: a flower bed in between them. But Zeno will now ask the same question about the garden hedge and the flower bed. If I answer that there is something else between them too—for example some sand—then Zeno will ask the same question about the flower bed and the sand. It looks as if Zeno has a way of adding an extra item whenever I try to focus down on just two of the things which I suppose the world to contain. Further, I am no better off in my common sense outlook if I try to stop these questions by saying that there doesn’t have to be anything which separates distinct things. For then Zeno can ask why I count my lawn as just one of a pair of things (lawn and hedge), rather than as two things: a right-side and a left-side lawn pushed right up next to one another, so that again he has a way of adding extra items to the bunch of things I think the world contains: if the world contains a plurality of things then it is an indeterminate or unlimited plurality.

There is a line of thought at work here which also features in other Zenonian arguments about plurality: the idea that once we start considering the world as a plurality it will turn out that any “single” thing we care to think of is just a collection of other things. Now since common experience presents me with an array of things in space, it may seem intuitively obvious that the world contains a plurality of different things. But the arguments preserved in the Zenonian material at DK 29 B1 and B2 take advantage of the fact that it is surprisingly difficult to handle the views about spatial extension and divisibility which underlie this intuition. There is nothing surprising in recognizing that there are some things in the world which we can break into bits (china plates, wooden planks) and other things which resist our efforts at division (lumps of diamond, grains of sand). The reasons lie in facts about the constitution of different materials (diamond is harder than china) and human capacities (humans are better at breaking things into bits than jellyfish are). However it would, by contrast, be very surprising to suppose that
some extended things in the world have smaller bits, while others have none. It is very natural to think that every extended thing has at least two bits, each half the size of the original. For since it seems plain to common sense that some extended things do have bits it will look objectionably arbitrary to suppose that nevertheless some extended things don’t. Why should it be at one size rather than another that the mere possession of smaller bits gives out?

How does Zeno extract problems from all this for the common sense idea that the world is a plurality of different things. He pushes the following question. If the world is a plurality, then what is it a plurality of? On the one hand, if everything that is extended is itself a collection of bits, then any unitary bit from which a collection is composed would have to be unextended, without any magnitude at all. As Simplicius reports it: “It has no magnitude since each of the many is the same as itself and one” (DK 29 B2.19–20). That gives Zeno one limb of the argument he is developing: “Thus if there are many things, it is necessary that they are ... small ...; so small as not to have magnitude” (DK 29 B1.10–12).

Even as a stand-alone conclusion this looks unsatisfactory. How could a world composed of things with no size ever come to contain extended things such as my table? Adding together two (or more) things with no magnitude will not produce something with magnitude. In fact Zeno relies on this last point to argue that things without magnitude couldn’t exist, for since they would add nothing, they would be nothing (DK 29 B2.8–16). But if we respond by insisting that of course the things which go together to make up the world do have magnitude, then we open ourselves to the second limb of Zeno’s overall argument. If they have magnitude, how big are they? Since anything with magnitude has bits which themselves have magnitude, it appears that anything with magnitude will have an infinite number of bits (although, as noted earlier, we will not be able to break it into all the bits it has): indeed will have an infinite number of equal sized bits, since it will have more bits than just two halves, and more than just four quarters, and more than just eight eighths, and more than just N nths for any N you like ... However if one adds together an infinite number of bits each of which has an equal size, then the result is going to be infinitely large, so that it now seems that each of the things which make up the world is infinitely large. And not only is that conclusion also unsatisfactory in its own right, but Zeno can combine it with the first limb of his argument to generate what looks like a fatal contradiction: “Thus if there are many things, it is necessary that they are both small and large; so small as not to have magnitude, so large as to be unlimited” (DK 29 B1.10–12).

Here we have a conclusion of the form which Plato identified at the beginning of his dialogue Parmenides (127e), although we cannot know to what extent Simplicius has manipulated the Zenonian material available to him in order to bring it into line with the Platonic characterization.

Zeno III: arguments about motion

Aristotle reports four Zenonian arguments concerning motion, commonly known as the Dichotomy, the Achilles, the Flying Arrow and the Moving Rows.

The Dichotomy and the Achilles rely on essentially the same idea. Aristotle’s summary of the Dichotomy is terse; he reports that it: “asserts the non-existence of motion on the ground that that which is in locomotion must arrive at the half-way stage before it arrives at the goal” (Physics 6.9 239b11–13, DK 29 A25).
If something moves then it covers a distance in doing so. But it seems impossible that something should ever cover any arbitrary distance A–B. There are two ways of posing the problem (Aristotle’s brief characterization allows for either). First, it is impossible that something should finish covering the distance A–B. For before it finishes covering A–B by arriving at B it first has to arrive at the point \( \frac{1}{2}AB \) midway between A and B; and then at the point \( \frac{3}{4}AB \) midway between \( \frac{1}{2}AB \) and B, and so on. If any distance contains two half-distances then there will be an infinite series of these midway points, and so an endless series of sub-journeys which something has to make in going from A to B before it arrives at its destination (the Achilles is essentially the same argument, except that we consider someone, Achilles, moving quickly towards a destination, a tortoise, which is moving away at a slower rate). Second, it is impossible for similar reasons that something should start covering the distance A–B. For before it gets to the point \( \frac{1}{2}AB \) midway between A and B it has to get to \( \frac{1}{4}AB \) midway between A and \( \frac{1}{2}AB \), and so on. Again there seem to be an infinite series of these midway points, and so a beginningless series of sub-journeys which something has to make in order to get going from A to B.

A rich variety of responses have been offered to this argument (see the collection of essays in Salmon 1970; also Sainsbury 1988: 5–24; Lowe 2002: 288–306). I will mention just one, which perhaps comes most immediately to mind. The Dichotomy relies on the assumption that any distance comprises two half distances. If that assumption were denied, the argument would lose its bite. Denying that assumption generates a strong form of spatial atomism, according to which there is a minimal distance D such that there just is no distance smaller than D. So once something gets to a point which is distance D away from its destination, it will not be true that it has to get to a point midway between there and its destination. There is no such midway point, since there are no distances smaller than the spatial minimum D. Now in order to avoid problems raised by variants of the Dichotomy, this response would also have to posit temporal atoms. For if it remained true that every temporal period were comprised of two smaller temporal periods then Zeno could ask how the time which something takes to cover the spatial atom could pass (since first half of it would have to pass, and then three quarters, and then seven eighths, and so on; Aristotle mentions this variant of the Dichotomy at Physics 8.8, 263a15–23). On a view like this motion would not be smooth and continuous, but more like an array of pixels on a computer screen flashing on and off for fixed periods of time, and presenting the illusion of continuity. (An atomist theory like this would also be relevant to the Zenonian arguments about plurality discussed in the preceding section.) There is debate among scholars about the history of this sort of spatio-temporal atomism (see Sorabji 1983 for a thorough treatment). I mention the view here only because it is thought by some to be relevant to another of Zeno’s arguments about motion: the Moving Rows.

Once again Aristotle’s report is highly compressed:

The fourth argument is that concerning equal bodies which move alongside equal bodies in the stadium from opposite directions—the one from the end of the stadium, the others from the middle—at equal speeds, in which [Zeno] thinks it follows that half the time is equal to its double.

Physics 6.9, 329b33–240a1 = DK 29 A28

Alexander of Aphrodisias, an Aristotelian commentator of the third century AD, provided a diagram in order to clarify the argument (DK 29 A28).
The As, Bs and Cs are equal sized bodies. The As are stationary, the Bs and Cs moving at equal speeds in opposite directions. Fig. 1 and Fig. 2 show how the positions of the bodies change over the time that it takes B1 to go past two of the As (that is, to move from being opposite A2 to being opposite A4).

How do these diagrams suggest that “half the time is equal to its double”? Aristotle, who is deeply unimpressed by this argument, says that Zeno relies on the false assumption that something moving takes the same time to pass two bodies of the same size, even if one of those bodies is stationary and one is moving. If the argument does rely on that assumption, then it may proceed as follows. Suppose the time it takes B1 to move from its Fig. 1 position to its Fig. 2 position is \( t \). During that time B1 passes two of the As. The Cs are the same size as the As. So, given the assumption Aristotle identifies, it should take twice as long for B1 to pass four of the Cs as it does to pass two of the As: namely \( 2t \). But it is clear from examining the diagrams that the interval between the arrangements in Fig. 1 and Fig. 2 represents both the time it takes B1 to pass two As (namely \( t \)) and the time it takes B1 to pass four Cs (which, given the assumption Aristotle identifies, is \( 2t \)). The deliberately paradoxical ‘half the time is equal to its double’ states the unwelcome conclusion that \( t = 2t \).

Some commentators, however, have sought a more charitable interpretation of the Moving Rows. There are two options. According to both, Zeno is trading on, rather than being muddled about, the fact that something moves more rapidly past a moving object than one which is stationary. The first possibility is that Zeno is arguing that the relativity of velocity calls into question the reality of motion. After all, if something is moving then it must be moving at some velocity or other. But if the velocity at which one thing moves depends on facts about the motion of other things, then it might seem that whether or not something is moving is not really a fact about it.

The second possibility is that Aristotle has omitted a crucial fact: that the argument is aimed at the view mentioned earlier, which adopts a strong spatio-temporal atomism in order to evade the Dichotomy argument (see Owen 1957 for this approach). Suppose the As, Bs and Cs are atomic bodies. In that case the relativity of velocity forces an embarrassing question: how many As does B1 pass in the time taken for it to get from being opposite C1 to being opposite C2? The commonsense answer would be “half an A,” since the As are stationary, while the Cs are moving, relative to the Bs. But that answer is ruled out, because since the As are of atomic magnitude there just is no such size as “half an A” (if there were we would be back to the Dichotomy). And it would hardly be an appealing response to deny that B1 ever does move from being opposite C1.

---

Fig. 1:

\[
\begin{array}{cccccc}
B4 & B3 & B2 & B1 & \Rightarrow \\
& & & & \\
\equiv & C1 & C2 & C3 & C4
\end{array}
\]

Fig. 2:

\[
\begin{array}{cccccc}
A1 & A2 & A3 & A4 & \\
B4 & B3 & B2 & B1 & \Rightarrow \\
\equiv & C1 & C2 & C3 & C4
\end{array}
\]
to being opposite C2, since it will then be wholly unclear how B1 could have got from the left of C1 (opposite A2 in Fig. 1) to the right of C1 (opposite A4 in Fig. 2).

The final Zenonian argument about motion reported by Aristotle is the Flying Arrow:

Zeno's reasoning, however, is fallacious, when he says that if everything when it occupies an equal space is at rest, and if that which is locomotion is always in a now, the flying arrow is therefore motionless

*Physics* 6.9, 239b5–7 = DK 29 A27

Imagine an arrow which is fired in the (very late) morning and hits its target in the (very early) afternoon. Consider how it is with the arrow at the un-extended instant twelve noon. At twelve noon the arrow will just be occupying an arrow-shaped area of space. But surely, Zeno will say, something occupying a space exactly its own size and shape is at rest (as we might put it: it is *in* that space). So the arrow is at rest at twelve noon. But what goes for twelve noon goes for any other instant we care to pick between its being fired and its hitting the target. So the arrow is at rest at every instant between having been fired and hitting the target, in which case the ‘moving arrow’ is really at rest.

This argument goes in two main stages. First a claim is alleged to hold concerning the arrow at any arbitrary instant during its flight. Second on the basis of that claim a conclusion is drawn about the arrow during its entire “flight.” Consequently there will at least two strategies which could be adopted in responding to the argument.

According to the first part of the argument, the arrow is at rest at noon. One might hold, however, as Aristotle did, that the concepts of motion and rest are correlates (*Physics* 6.3, 234a31–34): since motion is possible only over a period of time (because motion involves covering distance), rest would also be possible only over a period of time (because being at rest involves remaining in the same place for some period of time). That response to the argument, however, incurs weighty conceptual costs: the denial of motion and velocity at an instant put Aristotelian physics at a considerable disadvantage once those notions had been explicated by Newtonian science, and presumably this response by itself would not satisfy Zeno anyway. For if it is true that an arrow is neither in motion nor at rest at an instant then at any arbitrary instant it is true that the arrow is *not moving*. So, if the inference from what holds at any arbitrary instant contained within a period of time to what holds throughout the period of time remains unchallenged, Zeno will still be able to conclude that throughout its “flight” the arrow is *not moving* and the situation seems more, rather than less, paradoxical if we point out that at least it *isn’t at rest* either.

So some response is required to the second stage of the argument as well. Aristotle’s report of Zeno’s Arrow argument is followed immediately by his diagnosis of its main flaw:

This is false; for time is not composed of indivisible nows any more than any other magnitude is composed of indivisibles.

*Physics* 6.9, 239b8–9

The broad reference here is to Aristotle’s general analysis of continuity. We cannot think of periods of time, such as the extended lunch break, as built up from instants like twelve noon and *the one after it* etc. The trouble is that there is no *one after it*. It’s obvi-
ously not 12.01, since a more accurate clock could have displayed 12.005; and thinking of a series of more accurate clocks, each recording an instant closer to twelve noon than could be recorded by a less accurate clock, shows very clearly that there is no such instant (recall the Dichotomy argument: similarly, there is no first place the runner is at after he’s set off at noon—if there were, that’s where he would be at the first instant after noon, were there such an instant). But if instants/points/indivisibles aren’t blocks from which periods/lines/extended-items are built up, then why should anything follow about something’s period of flight from claims about an arbitrary instant, say twelve noon. No geometrical point within the view from my window could possibly have a color (which color? what would be the difference between points with different colours?); but why should anything follow about the green bushes and trees I can so obviously see? As with being colored, so with moving.

It is important not to focus Zeno’s original argument too sharply by viewing it through the lens of Aristotle’s sophisticated analysis of continuity. We moderns have an abundance of ways of referring to non-extended points of time: we have the word instant, and a rich vocabulary for picking different instants out—twelve noon, 12.00, 12.0000, t etc. But Aristotle is breaking new ground in his thinking about space, time, motion, and so on. He is creating a physics, and is reliant for his vocabulary on ordinary Greek language. One of the words which occurs in Aristotle’s statement of Zeno’s argument is the common Greek adverb nun: just as familiar and just as nuanced in its use as the English now. We cannot know how Zeno originally stated his Flying Arrow. Maybe he had a crisp statement, in the terse style of the limited/unlimited argument, which Simplicius claims to reproduce “in Zeno’s own very words” (DK 29 B3; see discussion in the preceding section of this chapter). But it is equally likely that Zeno had a varied repertoire of carefully tuned statements of his arguments. If Zeno’s purpose really was to defend Parmenides’ claims from ridicule then one can imagine rhetorically effective statements of the Flying Arrow trading on the following three facts: that arrows move quickly, that “now” refers to the present and that “now” refers indexically (the time to which a particular use of “now” refers depends on the time of that particular use). Anyone standing watching archery might think it amusing to say to Zeno: “so much for Parmenides’ changeless then?” Suppose Zeno should say: “is that arrow moving now?” By the time of the obvious reply—“yes, of course”—Zeno is doubtless in a position to say that, no, that one is now stationary in the target. Staring even harder at the next arrow fired is just going to invite more difficult questions, and is all too easy to see how someone could be maneuvered into an exasperated outburst of “all right, it’s not moving right now.” There remain difficult issues raised by Zeno’s Flying Arrow argument which are not resolved by Aristotle’s wonderful analysis of continuity (see Lear 1981, Le Poidevin 2002).

Melissus

Melissus has traditionally been thought the least impressive of the Parmenidean trinity. Aristotle judged him a much poorer philosopher than Parmenides (Physics 1.2, 185b10–12). Melissus argues for a broadly Parmenidean view of reality (although—intriguingly—he also had a considerable military reputation as an admiral; DK 30 A3), but he is no mere follower. We can identify three ways in which Melissus develops the Eleatic outlook beyond what is presented in Parmenides’ poem.

First, Melissus writes in a style far more accessible than that of Parmenides. The fragments preserved (once again) by Simplicius are in a terse, plain prose style, and
Simplicius says that “Melissus wrote in an archaic style but not unclearly” (in Phys.111.15–16). In addition to the preservation of some original Melissan material, we have two paraphrases of Melissus’ overall line of argument, both of which set out his thought in an extended deductive structure: one paraphrase is due to Simplicius, another is found in the pseudo-Aristotelian On Melissus, Xenophanes and Gorgias which some scholars have dated to the second century AD (see Mansfeld 1988).

Second, there are some areas in which Melissus makes Parmenides’ ideas clearer and more determinate. Parmenides’ views on time, for example, are nigh on impenetrable:

> It never was nor will be, since it is now, all together, one, continuous

\[ \text{DK 28 B8.5–6} \]

> And how could what is be in the future? How could it come to be? For if it came into being, it is not: nor is it if it is ever going to be in the future.

\[ \text{DK 28 B8.19–20} \]

It is utterly opaque whether Parmenides is thinking of reality as eternal, or as condensed into a unique present, or as timeless (see Schofield 1970, Matten 1986). Melissus, by contrast, at least stakes out a clear view, holding that reality is extended without limit both in time and in space (see DK 30 B2–4; however, it is sometimes unclear in particular passages whether Melissus is arguing for the unlimitedness of time, or for the unlimitedness of space, or indifferently for either).

Third, in some cases Melissus offers innovative support for views where Parmenides’ own arguments had been difficult and allusive. Parmenides thought that the true nature of reality allows for no change or motion. But his precise argument is dense:

> But changeless within the limits of great bonds it exists without beginning or ceasing, since coming to be and perishing have wandered very far away, and true conviction has thrust them off. Remaining the same and in the same place it lies on its own and thus fixed it will remain. For strong Necessity holds it within the bonds of a limit, which keeps it in on every side.

\[ \text{DK 28 B8.26–31} \]

Contrast the following from Melissus:

> And nothing of it is empty. For what is empty is nothing. Well, what is nothing could not very well exist. Nor does it move. For it cannot give way at any point, but is full. For if there were such a thing as empty it would give way into what was empty; but since there is no such thing as empty, it has nowhere to give way.

\[ \text{DK 30 B7.7} \]

Here we have an early statement of the very influential idea that motion requires empty space for things to move into, with Melissus arguing that since empty space would be nothing, and nothing does not exist, then it is impossible for anything to move.

It would be a mistake, though, to think that Melissus presents just a more straightforward and accessible version of Parmenides’ ‘weird and wonderful’ account of reality. As we have seen, Melissus does sometimes argue fairly straightforwardly for central claims
of Parmenides’ poem. Other cases, however, are less clear. We have noted earlier that there is scholarly debate about the depth and nature of Parmenides’ commitment to monism. By contrast, there is no such debate about Melissus, who argues explicitly that reality is a unique and undifferentiated whole (DK 30 B2: what is real is unlimited in both time and space; therefore DK 30 B6: there can only be one real thing, since if there were two they would limit one another; therefore DK 30 A5: what is real exhibits no variety, since difference would lead to plurality—there would be one thing qualified in one way and a different thing qualified differently). Melissus also introduces mysterious ideas of his own, whose import is not easy to understand: he argues, for example, that what is real suffers neither pain nor anguish (DK 30 B7.4–5, 16–23). And even the seemingly straightforward Melissan claims that what is real is unlimited in time and space, and full, need to be balanced against a report from Simplicius that Melissus argued that what is real is incorporeal:

That [Melissus] wants what exists to be incorporeal he makes clear when he says: “If, then, it were, it must be one; and being one, it must not have body. But if it had solidity, it would have parts, and be no longer one.”  

DK 30 B9

Finally the material preserved by Simplicius suggests that Melissus himself recognized a difference between the deductively transparent arguments, resting on Parmenidean hostility to what-is-not, and a more indirect argument aimed at those of his opponents who persisted in placing their confidence in the evidence of sense perception rather than thought—despite Parmenides’ insistence that one judge by argument, in the face of Zeno’s diagnoses of logical trouble in the common sense outlook, and unpersuaded by Melissus’ own plain and direct arguments (DK 30 B8; for further discussion see Makin 2005).

References and further reading

The standard collection of Presocratic fragments and testimonia is the three volume Die Fragmente der Vorsokratiker edited by H. Diels and W. Kranz (6th edition, Weidmann, Zurich, 1952). References in the form “DK 28 B2” are to Diels-Kranz (the first number is the chapter: 28 Parmenides, 29 Zeno, 30 Melissus; “B” indicates a fragment, “A” would indicate a doxographical report).


An alternative to Diels-Kranz is The Texts of Early Greek Philosophy: The Complete Fragments and Selected Testimonies of the Major Presocratics edited with translation and comments by Daniel Graham (two volumes, Cambridge University Press, 2010)

Related chapters

1. The world of early Greek philosophy
4. Anaxagoras and Empedocles in the shadow of Elea
5. Leucippus and Democritus
15. Plato’s metaphysics
22. Aristotle’s philosophy of nature
45. The ancient commentators on Aristotle