

7. ZENO OF ELEA

Almost everything we think we know about the life of Zeno of Elea comes from Plato's dialogue Parmenides. According to Plato, Zeno was about twenty-five years younger than Parmenides and was reported to have been his lover as well as his philosophical associate. If Plato's claims are accepted, Zeno was born around 490 BCE, and he and Parmenides visited Athens in about 450 when Socrates was a young man. (It is quite unlikely that the conversation Plato reports took place, but the chronological information from Plato may be based on fact.) The only other biographical claims about Zeno come from Diogenes Laertius' not entirely reliable Lives of the Philosophers (9.25–9); according to Diogenes Laertius, Zeno bravely resisted a political tyranny and, despite being tortured, did not betray his comrades. Zeno explores the consequences of Parmenides' claims about what-is: in his ingenious arguments he purports to show that neither plurality nor motion is compatible with Parmenides' requirements for reality. Zeno challenges the seemingly incontrovertible evidence of our senses, and his arguments have worried and fascinated philosophers from ancient times to the present.

1. (29A11, A12) Once Parmenides and Zeno came to Athens for the Great Panathenaic festival. Parmenides was quite an elderly man, very gray, but fine and noble in appearance, just about sixty-five years old. Zeno was then almost forty, of a good height and handsome to see. The story goes that he had been Parmenides' young lover. . . . Socrates and many others <were> eager to listen to Zeno's treatise, for he had then brought it to Athens for the first time. Socrates was then very young. Zeno himself read it to them. . . . When Socrates had heard it, he asked Zeno to read again the first hypothesis of the first argument. When he had read it, he said, "How do you mean this, Zeno? If things that are are many, they must therefore be both like and unlike, but this is impossible.

For unlike things cannot be like, nor can like things be unlike. Isn't that what you are saying?"

—*Zeno*: Yes.

—*Socrates*: Now if it is impossible for unlike things to be like and for like things to be unlike, is it also impossible for things to be many? For if they were many they would have impossible attributes. Is this the point of your arguments—to contend, against all that is said, that things are not many? And do you think that each of your arguments proves this?

—*Zeno*: You have well understood the purpose of the whole work.

—*Socrates*: I understand, Parmenides, that Zeno here wants to be identified with you by his treatise as well as his friendship, for he has written somewhat in the same style as you, but by changing it he is trying to make us think he is saying something else. For in your poem you declare that the all is one and you do a good job of proving this, while he declares that it is not many, and furnishes many impressive proofs. Now when one of you says it is one and the other that it is not many, and each speaks so as to seem not to have said any of the same things, though you are saying practically the same things, what you have said appears beyond the rest of us.

—*Zeno*: Yes, Socrates, but you have not completely understood the truth of the treatise. . . . It is actually a defense of Parmenides' argument against those who try to make fun of it, saying that if what-is is one, the argument has many ridiculous consequences which contradict it. Now my treatise opposes the advocates of plurality and pays them back the same and more, aiming to prove that their hypothesis, "if there are many things," suffers still more ridiculous consequences than the hypothesis that there is one, if anyone follows it through sufficiently. I wrote it in this spirit of competitiveness when I was young, and then someone stole it, so I did not even have the chance to consider whether it should be made public.

(Plato, *Parmenides* 127b–128d)

2. (A16) Zeno stated that if anyone could make clear to him what the one is, he would be able to speak of the things that are.

(Eudemus, *Physics* fr. 7, quoted in Simplicius, *Commentary on Aristotle's Physics* 97.12–13)

3. (B2) For if it should be added to something else that exists, it would not make it any larger. For if it were of no size and were added, nothing it is added to could increase in size. And so it follows immediately that what is added is nothing. But if the other thing is no smaller when it is subtracted and it is not increased when it is added, clearly the thing added or subtracted is nothing.
(Simplicius, *Commentary on Aristotle's Physics* 139.11–15)
4. (B1) If it is, each thing must have some size and thickness, and part of it must be apart from the rest. And the same reasoning holds concerning the part that is in front. For that too will have size, and part of it will be in front. Now to say this once is the same thing as to keep saying it forever. For no such part of it will be the last or unrelated to another. Therefore if there are many things, they must be both small and large; so small as not to have size, but so large as to be infinite.
(Simplicius, *Commentary on Aristotle's Physics* 141.2–8)
5. (B3) If there are many, they must be just as many as they are, neither more nor less. But if they are as many as they are, they must be limited. If there are many things, the things that are are unlimited, since between things that are there are always others, and still others between those. Therefore the things that are are unlimited.
(Simplicius, *Commentary on Aristotle's Physics* 140.29–33)
6. (A25) There are four of Zeno's arguments about motion that present difficulties for those who try to solve them. First is the argument that says that there is no motion because that which is moving must reach the midpoint before the end. . . . It is always necessary to traverse half the distance, but these are infinite, and it is impossible to get through things that are infinite. . . .
(Aristotle, *Physics* 6.9 239b9–13; *Physics* 8.8 263a5–6)
7. (A26) The second <argument> is the one called the Achilles. This is to the effect that the slowest as it runs will never be caught by the quickest. For the pursuer must first reach the point from which the pursued departed, so that the slower must always be some

distance in front. This is the same argument as the Dichotomy,¹ but it differs in not dividing the given magnitude in half.

(Aristotle, *Physics* 6.9 239b14–20)

8. (A25) For this reason Zeno's argument falsely assumes that it is impossible to traverse or come into contact with an infinite number of things individually in a finite time. For both length and time and generally everything that is continuous are called infinite in two ways: infinite in division and infinite with respect to their extremities. Now it is impossible to come into contact with things infinite in quantity in a finite time, but it is possible to do so with things that are infinite in division. For time itself too is infinite in this way. And so, it follows that it traverses the infinite in an infinite and not a finite time, and comes into contact with infinite things in infinite, not finite times.

(Aristotle, *Physics* 6.2 233a21–31)

9. This solution is sufficient to use against the person who raised the question (for he asked whether it is possible to traverse or count infinite things in a finite time), but insufficient for the facts of the matter and the truth.

(Aristotle, *Physics* 8.8 263a15–18; not in DK)

10. (A27) Zeno makes a mistake in reasoning. For if, he says, everything is always at rest when it occupies a space equal to itself, and what is moving is always "at a now," the moving arrow is motionless.

(Aristotle, *Physics* 6.9 239b5–7)

The third argument is the one just stated, that the arrow is stopped while it is moving. This follows from assuming that time is composed of "nows." If this is not conceded, the deduction will not go through.

(Aristotle, *Physics* 6.9 239b30–33)

11. (A28) The fourth argument is about equal bodies moving in a stadium alongside equal bodies in the opposite direction, the one

1. The Dichotomy is Aristotle's name for Zeno's first argument (A25, no. 6 above).

group moving from the end of the stadium, the other from the middle, at equal speed. He claims in this argument that it follows that half the time is equal to the double. The mistake is in thinking that an equal magnitude moving with equal speed takes an equal time in passing something moving as it does in passing something at rest. But this is false. Let *A*'s represent the equal stationary bodies, *B*'s the bodies beginning from the middle, equal in number and size to the *A*'s, and *C*'s the bodies beginning from the end, equal in number and size to these and having the same speed as the *B*'s. It follows that the first *B* is at the end at the same time as the first *C*, as the *B*'s and *C*'s move alongside one another, and the first *C* has completed the process of coming alongside all the *B*'s, but the first *B* has completed the process of coming alongside half the *A*'s. And so the time is half. For each of them is alongside each thing for an equal time. It follows simultaneously that the first *B* has moved alongside all the *C*'s, for the first *C* and the first *B* will be at the opposite ends simultaneously, because both have been alongside the *A*'s for an equal amount of time.

(Aristotle, *Physics* 6.9 239b33–240a17)

- 12.² (A24) If place exists, where is it? For everything that exists is in a place. Therefore if place exists, then place is in a place. This goes on to infinity. Therefore, place does not exist.

(Simplicius, *Commentary on Aristotle's Physics* 562.3–6; Aristotle, *Physics* 4.3 210b22–23, 4.1 209a23–25; Eudemus, *Physics* fr. 42, quoted by Simplicius, *Commentary on Aristotle's Physics* 563.25–28)

- 13.³ (A29) —*Zeno*: Tell me, Protagoras, does a single millet seed make a noise when it falls, or one ten-thousandth of a millet seed?

—*Protagoras*: No.

—*Zeno*: Does a bushel of millet seeds make a noise when it falls, or doesn't it?

—*Protagoras*: It does.

2. Translator's note: This argument is reported variously; what follows is the gist of the argument.

3. Translator's note: This argument is preserved in a "theatrical version," a dialogue between Zeno and the Sophist Protagoras, which is probably not the way it originally appeared.

—*Zeno*: But isn't there a ratio between the bushel of millet seeds and one millet seed, or one ten-thousandth of a millet seed?

—*Protagoras*: Yes there is.

—*Zeno*: So won't there be the same ratios of their sounds to one another? For as the things that make the noise <are to one another>, so are the noises <to one another>. But since this is so, if the bushel of millet seeds makes a noise, so will a single millet seed and one ten-thousandth of a millet seed.

(Simplicius, *Commentary on Aristotle's Physics* 1108.18–25)

13a. (Response from Aristotle) It does not follow that if a given motive power causes a certain amount of motion, half that power will cause motion either of any particular amount or in any length of time: otherwise, one man might move a ship, if the power of the ship-haulers is divided into their number and the distance that all of them move it.

(Aristotle, *Physics* 7.5 250a16–19; not in DK)

Suggestions for Further Reading

All of these entries have further bibliographies. Complete bibliographical information for collections may be found in the bibliography in the Introduction, pp. 10–12. See also the relevant chapters in Barnes; Guthrie; McKirahan; and Kirk, Raven, and Schofield.

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