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Metaphysics

Zeno 2

1 Introduction

Recall again Zeno's overall argument against the existence of motion.

1. Space is infinitely divisible or not infinitely divisible.
2. If space is infinitely divisible, motion is impossible.
3. If space is not infinitely divisible, motion is impossible.
4. Therefore, motion is impossible (From 1-3).

2 Premise 3

This handout will proceed by discussing premises 3. See Handout 1 for discussion of premises 2 and. Zeno offers two distinct arguments for premise 3 that again come in the form of paradoxes. The strategy for each is similar. We will fist assume that space is not infinitely divisible, then prove that certain absurdities follow. If an assumption leads to an absurdity, we know the assumption is false.

3 The Stadium Paradox

> The fourth argument is that concerning equal bodies which move alongside equal bodies in the stadium from opposite directions—the ones from the end of the stadium, the others from the middle—at equal speeds, in which he thinks it follows that half the time is equal to its double. . . . (Aristotle, *Physics*, 239b33)

Suppose these rows of blocks represent some chariots in a stadium. The Bs are stationary. The As are moving from left to right. Use 'D' for the last block in the row of As. The Cs are moving towards the Bs from right to left. Use 'E' to name the middle block in the Cs. Suppose also that the As and Cs are traveling at the same speed.

	T1	
	DAA	–>
	BBB	
<–	CEC	

	T2	
–>	DA	A
	BBB	

	T2	
C	EC	<–

Compare Times 1 and 2. Suppose they are separated by a one minute interval of time. In this interval, D has passed one B block and two C blocks. Zeno thinks this is paradoxical. It is unclear why. For our purposes, let us assume the following:

1. There is a smallest possible length, *S*
2. The length of each block is S.
3. There are no gaps between the blocks.
4. The blocks move with constant velocity.

It took 1 minute for D to pass two C blocks. It should take 30 seconds to pass one C block and become level with E. Suppose D passes one C block after 30 seconds. How many B blocks has it passed? Try filling out the diagram below to answer that question.

	T3	
–>	DAA	
	?	
C	EC	<–

T3 describes the moment that D and E are level. The paradox arises because of the relationship that D stands in to the Bs at the moment D and E are level.

Suppose that someone claims that D has passed *half of one B block.* Let this half be called *H*. What is H's length? You cannot, on pain of contradiction, claim that H has a length less than S. We have assumed that S is the smallest possible length, so H cannot be shorter than S.

This way of stating the paradox assumes that the length of time between T1 and T2 can be divided in two, i.e., 1 minute is divided into two 30 second intervals. Suppose that time is also atomic, that there is a smallest interval of time, a single quantum of time. Suppose also that the motion between T1 and T2 takes a single quantum of time. If this is correct, there is no T3 (which was half the interval between T1 and T3.)

Paradox still threatens. During a single quantum of time, D and E will have passed each other (as is seen in T2), but there is no moment at which they are level as is described in T3: since T1 & T2 are separated by the smallest possible interval of time, there can be no moment of time between them—it would be a interval of time smaller than the smallest interval of time. Conversely, if one insisted that there is some moment when they are level, then this shows that our supposed quantum of time was not the shortest finite interval. We could then run the argument against taking into account this supposed new smallest interval.