

## Reading Guide #2 - Space and Time

### Parmenides' Poem

1. How does Parmenides characterize truth, opinion, and their difference?
  2. What problem does Parmenides describe for the claim that we can speak or think falsely?
  3. "What is for being and for thinking must be; for it can be, and nothing can not" (132). Explain.
  4. Why can't being come into existence? Why can't it perish?
  5. Why is change impossible?
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### Newton, from *Principia*

6. How does absolute time differ from relative time? Characterize each.
  7. How does absolute space differ from relative space? Characterize each. What is the difference between place and space?
  8. What is the relation between absolute space and absolute motion?
  9. How do fluctuations in the solar day support Newton's argument for absolute time?
  10. How do we measure space and time? Does this method support the relationalist or the absolutist?
  11. How do basic facts about space and time conflict with Cartesian accounts of motion as relative to surrounding bodies?
  12. Describe Newton's bucket experiment. What does it show, and how?
  13. Is it possible to determine true motion from our observations? Explain, using Newton's example of the spinning globes.
  14. How does Newton argue for the existence of God?
  15. Why does Newton call gravity a hypothesis? What does he believe is the status of hypotheses?
  16. How, according to Newton, do we arrive at general laws?
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### Leibniz, from *Letters to Clarke*

17. For Leibniz, what does it mean that space and time are "merely relative" (LIII.4)?
18. How does Leibniz use the principle of sufficient reason to object to absolute space? How does he use that principle to object to absolute time?
19. How, according to Leibniz, is gravity miraculous?
20. Is absolute space a substance or an attribute? Explain.
21. "Two states indiscernible from each other are the same state" (LIV.13). Explain.
22. According to Leibniz, is the universe finite or infinite?
23. How does Leibniz argue that the universe is a plenum?

Zimmerman, "The Privileged Present: Defending an 'A-Theory' of Time"

24. What conclusions (the two questions at the heart of the debate about time) does Zimmerman defend?
  25. Distinguish the A-properties from the B-relations. What is an A-theorist? What is a B-theorist?
  26. What is presentism?
  27. How might an A-theorist not be a presentist? Consider the role of the spotlight.
  28. What is the growing-block view of time? How is it intermediate between presentism and the spotlight theory?
  29. How do some A-theories have a thin conception of the present? How, according to McTaggart, is this thinness a problem for the A-theory?
  30. Why doesn't Zimmerman defend either the moving-spotlight or growing-block theory of time?
  31. How do Smith and Williamson attempt to save the spotlight and moving-block theories? Consider spatial and intrinsic properties. What problem arises for such non-presentist views?
  32. What is a truthmaker? How might an argument against presentism rely on truthmakers?
  33. How does Zimmerman respond to the truthmaker criticism of presentism?
  34. How might the theory of relativity pose a problem for presentism over choosing a three-dimensional slice of the four-dimensional universe?
  35. "A simple 'physics doesn't see it' objection to the A-theory is not a radically new kind of objection that only became available after Einstein. If relativity is to provide a powerful new argument against the A-theory, the A-theorist must be convicted of something worse than merely positing a layer of space-time structure that relativity fails to mention" (220). Explain.
  36. How is the A-theory commonsensical?
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Smart, "The Space-Time World"

37. What kinds of temporal concepts are anthropocentric? Why?
38. How does the concept of the endurance of bodies involve a fourth dimension?
39. How does the concept of the permanent in change conceal the four-dimensionality of bodies?
40. What are tenseless verbs?
41. What are four-dimensional bodies? What is a time slice of a four-dimensional body?
42. "When we think four-dimensionally...we replace the notions of change and staying the same by the notions of the similarity or dissimilarity of time slices of four-dimensional solids" (95). Explain.
43. Why does Smart encourage the elimination of 'past', 'present', and 'future'? How can we do that? Provide an example.
44. Why can't 'now' be an objective property?
45. Why might an A-theorist posit hyper-time? How might that posit lead to an infinite regress?
46. How does the theory of relativity reveal a problem with the concept 'now'?
47. Is the tenseless 'is' best defined in terms of the A-theory? Consider the fable of the king.
48. Does tenselessness entail timelessness? Explain.
49. Does ordinary language require the concept 'now'? What does Smart say about the insistence that it does?
50. Describe the puzzle of the repeated universe. How does 'here' and 'now' help us disambiguate our terms? How does Smart argue that such uses of A-theory terms are unnecessary?
51. How does the B-theory see the universe *sub specie aeternitatis*?