1 Descartes and Newton

What is Descartes' account of "motion in the strict sense"? What are its principal weaknesses and how does Newton's alternative definition of motion overcome them?

Reading

Descartes, *Principles of Philosophy*, Part II, esp. §§10–39, in *The Philosophical Writings of Descartes*, vol. I, translated by Cottingham, Stoothoff and Murdoch (CUP, 1985). Useful selections are reprinted in N. Huggett (ed.) *Space from Zeno to Einstein* (MIT Press, 1999), Ch. 6. (Also available online via *Past Masters* under 'Continental Rationalists: Descartes–Spinoza–Leibniz'.)

Newton, *Mathematical Principles of Natural Philosophy*, the "Scholium to Definition VIII", paras. 0–7. This is reproduced in Alexander (ed.) *The Leibniz–Clarke Correspondence* (Manchester University Press), pp. 152–60, and in Huggett (ed.), Ch. 7.

Newton, 'De Gravitatione', in *Unpublished Papers of Isaac Newton*, translated and edited by A.R. Hall and M.B. Hall (CUP, 1962). Some relevant sections are reprinted in Huggett (ed.), Ch. 7.

D. Garber, 'Descartes' physics' in J. Cottingham (ed.), *The Cambridge Companion to Descartes* (CUP, 1992), pp. 286–334, especially §§3–6.

H. Stein, 'Newton's Metaphysics', in I. B. Cohen and G. E. Smith (eds), *The Cambridge Companion to Newton* (CUP, 2002), pp. 256–307, especially pp. 256–72.

Further reading

B. Dainton, *Time and Space* (Acumen, 2001), Ch. 10, §§1–3; Ch. 11, §1–2.

J. B. Barbour, *Absolute or Relative Motion?* vol. 1 (CUP, 1989) [a.k.a. *The Discovery of Dynamics* (OUP, 2001)], Ch. 8, §§5–8 and Ch. 11, §3.

N. Huggett, *Space from Zeno to Einstein*, commentaries to Ch. 6 and to Ch. 7, §§1–3 only.

R. Rynasiewicz, 'By Their Properties, Causes and Effects: Newton's Scholium on Time, Space, Place and Motion—II. The Context', *Studies In History and Philosophy of Science* **26** (1995): 295–306.

H. Stein, (1967), 'Newtonian space-time', *Texas Quarterly* **10** (1967), 174–200. Reprinted in Robert Palter (ed.) *The Annus Mirabilis of Sir Isaac Newton 1666–1966* (MIT Press, 1970), pp. 258–84, and in Butterfield, Hogarth and Belot (eds) *Spacetime* (Ashgate, 1996), pp. 79–105.

2 The rotating bucket and the globes

Do Newton's discussions of the rotating bucket experiment and of the globes thought experiment provide the basis of an argument for the existence of absolute space? Is this what Newton intended them to be? If not, what was his intention?

Reading

Newton, *Mathematical Principles of Natural Philosophy*, the "Scholium to Definition VIII", paras. 8–14.

N. Huggett, *Space from Zeno to Einstein*, commentary to Ch. 7, §§4–5.

J. B. Barbour, *Absolute or Relative Motion?* vol. 1 (CUP, 1989), Ch. 12, §5.

R. DiSalle, 'Newton's philosophical analysis of space and time' in I. B. Cohen and G. E. Smith (eds), *The Cambridge Companion to Newton* (CUP, 2002), pp. 33–56.

R. Rynasiewicz, 'By Their Properties, Causes and Effects: Newton's Scholium on Time, Space, Place and Motion—I. The Text', *Studies In History and Philosophy of Science* **26** (1995): 133–53.

Further reading

B. Dainton, *Time and Space* (Acumen, 2001), Ch. 11, §3.

J. N. Butterfield, 'The Leibniz–Clarke Correspondence: Lecture notes', part B, pp. 8–13 (§VII), available from: http://users.ox.ac.uk/∼alls0074/

R. Laymon, 'Newton's Bucket Experiment', *Journal of the History of Philosophy* **16** (1978): 399–413.

T. Maudlin, 'Buckets of Water and Waves of Space: Why Spacetime is Probably a Substance', *Philosophy of Science* **60** (1993): 183–203, esp. §§1–4.

J. Earman, *World Enough and Space-time* (MIT Press, 1989), pp. 61–73, 81–4.

P. Horwich, 'On the Existence of Time, Space and Space-Time', *Noûs* **12** (1978): 397–419, §III.

3 Leibniz on space

"I have many demonstrations, to confute the fancy of those who take space to be a substance, or at least an absolute being" (LEIBNIZ). Explain and assess Leibniz's arguments against the reality of space.

In writing your essay you should consider the following specific topics/questions:

- What are Leibniz's arguments, what is their logical structure and are they sound?
- What, exactly, is Leibniz's positive account of space and time?
- What are Clarke's replies to Leibniz's arguments?
- Leibniz and Clarke also discuss atomism. What does each say? What is the relationship between the arguments they employ about atomism and those concerning space?

Reading

The Leibniz–Clarke Correspondence

N. Huggett, *Space from Zeno to Einstein*, commentary to Ch. 8.

L. Sklar, *Space, Time and Spacetime* (University of California Press, 1976), pp. 161–81.

T. Maudlin, 'Buckets of Water and Waves of Space: Why Spacetime is Probably a Substance', *Philosophy of Science* **60** (1993): 183–203, §3.

Further reading

B. Dainton, *Time and Space* (Acumen, 2001), Ch. 10, §§4–7; Ch. 11, §§4–5.

P. Horwich, 'On the Existence of Time, Space and Space-Time', *Noûs* **12** (1978): 397–419, esp. §V.

J. Earman, *World Enough and Space-time* (MIT Press, 1989), pp. 111–28.

Graeme Forbes, 'Places as Possibilities of Location', *Noûs* **21** (1987): 295–318.

E. Vailati, *Leibniz & Clarke* (OUP, 1997), Ch. 4.

R. Rynasiewicz, 'By Their Properties, Causes and Effects: Newton's Scholium on Time, Space, Place and Motion—II. The Context', *Studies In History and Philosophy of Science* **26** (1995).

4 The Identity of Indiscernibles

'To suppose two things indiscernible is to suppose the same thing under two names' (Leibniz). What does Leibniz mean by this? Is he right?

Reading

The Leibniz–Clarke Correspondence (see Alexander's introduction, pp. xxii–xxiii for specific references).

Leibniz, *First Truths* (a.k.a. *Primary Truths*) in Loemker (ed.) *G. W. Leibniz: Philosophical Papers and Letters* (Reidel, 1969). (Also available online via *Past Masters* under 'Continental Rationalists: Descartes–Spinoza–Leibniz'.)

A. J. Ayer, 'The Identity of Indiscernibles' in his *Philosophical Essays* (Macmillan, 1954).

M. Black, 'The Identity of Indiscernibles', *Mind* **61** (1952): 153–64. Reprinted in Max Black, *Problems of Analysis* (Cornell University. Press, 1954), pp. 204–16, and in Kim and Sosa (eds) *Metaphysics: an Anthology* (Blackwell, 1999).

D. Pears, 'The identity of indiscernibles', *Mind* **64** (1955): 522–7.

P. Forrest, "The Identity of Indiscernibles", *The Stanford Encyclopedia of Philosophy*, Edward N. Zalta (ed.), http://www.seop.leeds.ac.uk/entries/identity-indiscernible/.

Further Reading

G. Rodriguez-Pereyra, 'Leibniz's Argument for the Identity of Indiscernibles in his Correspondence with Clarke', *Australian Journal of Philosophy* **77** (1999): 429–38.

B. Russell, *The Philosophy of Leibniz*, Ch. 5.

I. Hacking, 'The Identity of Indiscernibles', *Journal of Philosophy* **72** (1975): 249–56.

B. Mates, *The Philosophy of Leibniz* (OUP, 1986), Chs 7 and 9.

P. F. Strawson, *Individuals*, Ch. 4 ("Monads").

J. A. Cover and J. O'Leary-Hawthorne, *Substance and Individuation in Leibniz* (CUP, 1999), Ch. 5.

General Tips

5 Leibniz on Necessity and Contingency

EITHER: What is Leibniz's account of necessity and contingency?
OR: "To say that God can only choose what is best is effectively to deny him freedom of choice." Can Leibniz answer this objection?

Reading

The Leibniz–Clarke Correspondence, especially Leibniz's 5th letter and Clarke's reply.

Leibniz, 'First Truths' in Loemker (ed.) *G. W. Leibniz: Philosophical Papers and Letters* (Reidel, 1969). (Also translated as 'Primary Truths' in Ariew and Garber (trans. and eds), *G. W. Leibniz: Philosophical Essays* (Hackett, 1989) which is available online via *Past Masters* under 'Continental Rationalists: Descartes–Spinoza–Leibniz'.)

G. H. R. Parkinson, 'Philosophy and Logic' in N. Jolley (ed.), *The Cambridge Companion to Leibniz* (CUP, 1995).

B. Mates, *The Philosophy of Leibniz* (OUP, 1986), Chs 4–6.

Further Reading

G. W. Leibniz, *Discourse on Metaphysics*, esp. §13.

E. Vailati, *Leibniz & Clarke* (OUP, 1997), Ch. 3.

D. Fried, 'Necessity and Contingency in Leibniz', *Philosophical Review* **87** (1978): 575–84. Reprinted in Woolhouse (ed.) *Leibniz: Metaphysics and Philosophy of Science* (OUP, 1981), pp. 55–63.

J. Bennett, 'Leibniz's contained-predicate doctrine' in his *Learning from Six Philosophers*, vol. 1 (OUP, 2001), pp. 312–34.

General Tips

- Your essay should not be much longer than about 2000 words (an excellent essay might well be shorter).
- Set out the main thesis of your essay at the start.
- Conclude your essay with a restatement of the main thesis/theses that you have argued for and a summary of the way in which you have argued for it/them. Indicate any outstanding problems.