

Reading Guide #5: Modern Empiricism  
Selections from Locke, Berkeley, and Hume on Mathematics

*Locke*

§I: On Abstraction

1. What are the meanings of words? What kinds of things can words not signify?
2. How can a term (e.g. 'gold') stand for different things for different people?
3. Why can't every particular thing have its own name?
4. How do general terms facilitate communication? How do they facilitate knowledge?
5. How do words become general? How do ideas become general?
6. Describe the process of repeated abstraction.
7. What are the meanings of general terms?

§II: On Intuitive and Demonstrative Knowledge

8. According to Locke, what is knowledge?
9. What is intuitive knowledge? Why is it irresistible?
10. How does demonstrative knowledge differ from intuitive knowledge? How does proof facilitate demonstrative knowledge?
11. Is demonstrative knowledge just as secure as intuitive knowledge? Explain the mirror analogy.
12. How are the individual steps of a proof justified?
13. Is mathematics the only subject whose propositions admit of proof? Explain.
14. What makes mathematics particularly amenable to proof?
15. Why are ideas of sensation not useful in proofs?
16. What is sensitive knowledge? Is it really knowledge?
17. "He who has not determined *ideas* to the words he uses cannot make propositions of them of whose truth he can be certain" (345). Explain.

§III: On Mathematical Knowledge

18. Why might one think that Locke's criterion for knowledge makes it all useless?
  19. How does Locke argue that our ideas are of external things?
  20. Are mathematical claims certain? What are the objects of these claims?
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*Berkeley*

Introduction, §1 - §20

1. What "abuse of language" is a chief part of philosophical confusion?
2. How do we, supposedly, arrive at abstract ideas? Provide an example.
3. How does the perception of common qualities lead to a second layer of abstraction?
4. "But then whatever hand or eye I imagine, it must have some particular shape and color." (§10)  
Explain. Why is this an argument against abstract ideas?
5. For Locke, what is the relationship between general words and abstract ideas? Does Berkeley think this establishes the existence of abstract ideas?
6. Describe Berkeley's distinction between general ideas and abstract general ideas. What does a general idea stand for?
7. How does the notion of an abstract, general idea lead to a contradiction?
8. Do we need abstract ideas to account for geometric reasoning? Explain.
9. "It must be acknowledged that a man may consider a figure merely as triangular, without attending to

the particular qualities of the angles or the relations of the sides. So far he may abstract, but this will never prove that he can frame an abstract general inconsistent idea of a triangle”

(Introduction §16). Explain.

10. How does the presupposition that each word stands for one thing lead to the doctrine of abstract ideas? Be specific.
11. How are names like variables?

Main Text §118- §132

12. How does Berkeley criticize mathematical practice?
  13. According to Berkeley, are there numbers? Explain.
  14. How is arithmetic concerned with signs rather than with things?
  15. How does Berkeley argue that extension is not infinitely divisible? How does this resolve paradoxes?
  16. “There is no such thing as the ten-thousandth part of an *inch*; but there is of a *mile* or *diameter of the earth*, which may be signified by that inch” (§127). Explain. How does this indicate the basic error of the notion of infinite divisibility, for Berkeley?
  17. Do Berkeley’s criticisms of mathematics undermine its utility? Explain.
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*Hume*

*Enquiry*

1. Distinguish relations of ideas from matters of fact. How do we learn propositions that are solely concerned with relations of ideas?
2. How does Hume argue that the contrary of every matter of fact is still possible?
3. What evidence do we use to justify our knowledge of matters of fact? What relation helps us get this evidence?
4. How does Hume argue that effects can not be discovered by examining their causes?
5. What are the goals of science, the “utmost effort of human reason” (3)?
6. Does the use of geometry in science make it *a priori*? Explain.
7. What kinds of propositions can we know by mere reasoning?

*Treatise*

8. Does Hume side with Locke or Berkeley regarding abstract general ideas? Explain.
9. Why can’t an abstract idea (e.g. of man) represent all possible qualities (e.g. of men)?
10. How does Hume argue that we can conceive of no property (i.e. quantity or quality) without a precise notion of its degrees? Why does he argue this?
11. Can we have an idea of an object without an idea of its properties? Explain.
12. How does the supposition that everything is particular entail that there are no abstract general ideas?
13. How does a particular idea attach to many different terms? How does it become general in its representation?
14. Do we have ideas of large numbers (e.g. a thousand)? Explain.
15. How is our ability to use particular ideas generally like others of our psychological capacities?
16. How do Hume’s claims about particular ideas being general in their representation facilitate his account of an ability to think about infinitely many things?
17. Can we separate, in thought, the several qualities of an object? Explain.
18. Which relations (of ideas) can support knowledge?
19. How is geometry not perfectly precise and exact?
20. How are arithmetic and algebra more precise than geometry?
21. Are our ideas of mathematical objects different from other ideas? Explain.