

Reading Guide #16 - Field's Dispositionalism

Hartry Field, from *Science Without Numbers*

Hartry Field, "Introduction: Fictionalism, Epistemology, and Modality"

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1. According to Field, what is the best argument for the claim that mathematical statements are true?
2. How does Field propose to show that we need not believe that mathematical statements are true?
3. What is nominalism? What problem arises for nominalism?
4. What is the standard nominalistic approach to mathematics? How does Field's fictionalism differ?
5. Describe the Quinean doublethink objection to fictionalism. How does Field avoid that criticism?
6. How is Field's nominalism not finitist, or operationalist?
7. Must each particular mathematical object be applicable in science for the indispensabilist to believe in its existence? Explain.
8. How are subatomic particles theoretically indispensable?
9. What are impure abstract entities? Why are they important in explaining the applicability of mathematics?
10. What is Principle C?
11. In what way, for Field, is mathematics empirical?
12. How is Field's view about mathematics like and unlike the positivists' view?
13. How is arithmetic useful in facilitating nominalistic inferences? (Consider the aardvark/bug example in Chapter 2).
14. What is a representation theorem? How does Hilbert's representation theorem facilitate inference within Euclidean geometry?
15. How might Hilbert's uses of space-time points seem troublesome for the nominalist? How does Field reply?
16. How is physical structure different from mathematical structure? Consider their differences regarding revisability.
17. Contrast substantialism, reductive relationalism, and eliminative relationalism. Which view does Field hold, and why?
18. What is the logic of Goodmanian sums? Why is it important for Field's project?
19. What role does attractiveness play in Field's nominalistic reformulation of Newtonian gravitational theory?
20. Distinguish the metric and synthetic approaches to axiomatizing gravity. Which is precedential for Field's reformulation of Newtonian gravitational theory?
21. Why are synthetic formulations of physical theories more illuminating than metric approaches?
22. "The role [a real number] plays [in a scientific explanation] is as an entity *extrinsic to the process to be explained*...Surely then it would be illuminating if we could show that a purely intrinsic explanation of the process was possible, an explanation that did not invoke functions to extrinsic and causally irrelevant entities" (43). Explain.

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23. Describe two different anti-platonist views and their differences.
24. What is fictionalism? What do they say about mathematical claims that the realist calls true?
25. How does the fictionalist invoke conservativeness instead of truth?
26. What does Field call the positive and negative components of fictionalism?
27. What is anti-platonism with a non-standard (or non-literal) construal of mathematical theories? What problems arise for it? What does this position share with Field's fictionalism?
28. What is the main source of arguments for platonism?
29. In what ways might the platonist rely on an analogy with sense perception to defend the initial plausibility of some mathematical claims? What two reasons does Field provide for doubting the analogy? (Focus on the Feyerabend example.)
30. How is the indispensability argument an inference to the best explanation?
31. How do inferences to the best explanation underlie our arguments for the existence of unobservables?
32. "[T]he Quine-Putnam argument is not merely that just as there are good explanations in which the postulation of unobservables is essential, so too are there good explanations in which the postulation of mathematical entities is essential..." (17). Why not?
33. "[F]or any good extrinsic explanation there is an intrinsic explanation that underlies it" (18). Explain. How, specifically, does this principle of intrinsic explanation apply to the case of mathematical explanations?
34. What differences in roles do mathematical and physical entities have in physical theories?