Is Absolutely Everything Known Empirically (by Peter Gibson) - the main points

1. Empiricism is a theory, of how our ideas are formed
2. Locke and Hume asserted that all of our ideas come from experience
3. Experience is more than just the five senses
4. Weak empiricism is obviously right, so comparing strong with very strong is the interesting bit
5. The disagreement among empiricists is over the status of abstractions and the very general
6. Experience doesn't seem to contradict the purest ideas
7. 'Relations of ideas' is one theory, and is 'strong' because the ideas are all rooted
8. Logical positivists introduce two distinct classes of knowledge, one based on the 'analytic'
9. They can then 'fence off' the non-empirical knowledge into a harmless area
10. Chess is an exemplar for the status of maths and logic
11. Hume is stronger than logical positivism, because his ideas are not fenced off
12. Strongest version says experience even covers higher level truths and concepts
13. The strongest of all versions fails, because whimsical ideas are obviously beyond experience
14. Therefore we need a line between the serious and the trivial ideas
15. Serious mathematics and logic seem to connect to nature
16. We can't just invoke logic in general, because there are contradictory systems
17. We'll skip the fancy ones, and consider classical prepositional logic
18. The empirical basis of logic is unprovable, but might offer a unified and coherent picture
19. Aristotle might have liked naturalistic logic, but Frege rejected it
20. Frege particularly disliked explaining logic in psychological terms
21. Frege believed in a platonic third realm of abstract objects
22. Most logicians take either the Fregean (platonist) or the logical positivist (conventionalist) view
23. Russell was rare in trying to connect logic to experience
24. He defended a realist view of the Laws of Thought (in 1912)
25. He defended a psychological view of the logical connectives (in 1940)
26. Basic principles about trees, he claimed, reflect the trees, not our thoughts about them
27. However, 'not' and 'or' seem to reflect psychological experiences of denial, questioning or dilemma
28. Logic can be presented as natural deduction, which uses rules, no hidden assumptions and justified steps
29. Some rules are primitive in standard logic, but even those will reduce to natural deduction form
30. Natural deduction gets logic down to the basics, so it is perfect for examining its links to experience
31. We might also consider reducing arithmetic and geometry (and anything else) to experience
32. Long before formal logic, people made assumptions and then gave them up ('assumption')
33. They routinely combined things and separated them ('and')
34. They introduced options, and they bypassed them ('or')
35. They denied things that had been asserted ('not')
36. Their use of evidence introduced and eliminated 'if-then' thinking ('arrow')
37. They could understand double negation, and translate it into assertion ('not not')
38. Fregeans will say that all of these things describe an abstract reality parallel to nature
39. Logical positivists will say we have invented all of these for our convenience
40. It is, of course, undeniable that we can invent any silly concept we like
41. So if logic connects to experience, is that about reality or about psychology?
42. Frege said psychology is error-prone, but logic is ideal and only concerns truth
43. For that reason, it is better to defend the basis of logic in the real world
44. Being rooted in reality will ensure the ideal of truth that Frege believed in
45. The world seems to contain disjunctive facts, conjunctive facts, conditional facts and negative facts
46. It may be that animals have purely logical thoughts
47. Nevertheless, language and symbolism tidy logic, and expand it to areas very remote from experience
48. Set Theory begins reasoning from groups of objects, but ends up with stupendous concepts of infinities
49. Empiricists should say that the tools all derive from experience, but can then be used in very fanciful ways

Ayer, A.J. (1936) Language Truth and Logic. Penguin, (logic as convention)
Bostock, David (1997) *Intermediate Logic.* OUP 1997 (Ch. 6 reduces all of logic to natural deduction)
Hume, David (1748) Enquiry Concerning Human Understanding, (logic as relations of ideas)
Lemmon, E.J (1965) *Beginning Logic.* Nelson 1965 (basic logic as largely natural deduction)
Mill, J.S. (1843) *System Of Logic.* (2.6.2 on arithmetic as experienced in pebbles)
Prior, Arthur (1960) The Runabout Inference Ticket', in *Philosophical Logic,* ed P.P. Strawson. OUP 1967 ('tonk' as absurd convention in logic)
Russell, Bertrand (1912) *The Problems of Philosophy.* OUP 1980 (Ch. 7 on laws of thought as natural)
Russell, Bertrand (1940) *An Inquiry into Meaning and Truth.* Penguin 1962 (Ch 5 on connectives as psychological)
Sextus Empiricus (c. 180 CE) *Outlines of Pyrrhonism,* ed/tr. Bury, R.G. Prometheus 1990 (quotes Chrysippus)

Natural Deduction Rules

If logic is presented as ‘natural deduction’, you start from nothing except rules for introducing or for eliminating the various symbols of the logic. Every step of a proof can be spelled out in this way.

	introduction rule	elimination rule
Assumption ‘A’	**For the sake of argument you may assume P.**	**You may stop assuming P, if what you have proved no longer relies on P.**
and ‘∧’, ‘&’ or ‘.’ [conjunction]	**P,Q / P&Q** **If you are given P and you are given Q, you may derive their combination.** *‘Moore is here; Russell is here. So Moore-and-Russell are here.’*	**P&Q / P P&Q / Q** **If you are given the combination of P and Q, you may derive either of them separately.** *‘Moore-and-Russell are here. So Russell is here’*
or ‘v’ [disjunction]	**P / PvQ Q / PvQ** **If P is given, you may derive P-or-Q. If Q is given, you may derive P-or-Q.** *‘Russell is here, so Russell or Moore are here’.*	**PvQ, P→R, Q→R / R** **If P proves R and Q also proves R, and P-or-Q is given, you may derive R.** *‘If Russell is here a genius is present; if Moore is here a genius is present. Either Russell or Moore are here. So a genius is present’.*
not ¬ [negation]	**If P is given and Q is proved, and not-P is given and Q is proved, you may derive Q.** *‘Russell’s presence means the conference is good. His absence also means the conference is good. So the conference is good’.*	**If P is given and not-P is given, then you may derive Q.** *‘If Russell is here and Russell is not here, then I’ll believe anything you like!’*
arrow (if-then) → [material implication]	**If P is given and then Q is proved, you may derive P→Q.** *‘If Russell is here then Moore is here. So Russell’s presence implies Moore’s presence’.* [conditional proof]	**If P is given, and P→Q is given, you may derive Q.** *‘Russell is here, and that implies that Moore is here. So Moore is here’.* [modus ponens]
not not ‘¬¬’ [double negation]	**If P is given, you may derive not not-P.** *‘Russell is here, so Russell is not not-here’.*	**If not not-P is given, you may derive P.** *‘Russell is not not-here, so Russell is here’.*