Peter Smith, *Introduction to Formal Logic* (CUP, 2nd edition)

Exercises 5: Counterexamples

An initial group of examples. Some of the following arguments are invalid. Which? Why?

(1) *Many great pianists admire Glenn Gould. Few, if any, unmusical people admire Glenn Gould. So few, if any, great pianists are unmusical.*

Invalid. What can the argument be relying on other than this form of inference? –

> Many F are G
> Few if any H are G
> So: Few if any F are H

But this isn't reliable. For an instance with true premisses and a false conclusion, consider 'Many humans are over two metres tall. Few if any women are over two metres tall. So, few if any humans are women.'

(2) *Everyone who admires Bach loves the Goldberg Variations; some who admire Chopin do not love the Goldberg Variations; so some admirers of Chopin do not admire Bach.*

A valid syllogism.

(3) *Some hikers are birdwatchers. All birdwatchers carry binoculars. Some who carry binoculars carry cameras too. So some hikers carry cameras.*

Invalid. Compare the following inference which has the same shape but has true premisses and a false conclusion: 'Some men are fast sprinters. All who are fast sprinters have an athletic build. Some who have an athletic build are women. So some men are women.' So the form of inference our argument is relying on is unreliable.

(4) *Anyone who is good at logic is good at assessing philosophical arguments. Anyone who is mathematically competent is good at logic. Anyone who is good at assessing philosophical arguments admires Bertrand Russell. Hence no-one who admires Bertrand Russell lacks mathematical competence.*

Invalid. The relevant form is:

> All F are G
> All H are F
> All G are K
> So: No K are not-H

The premisses allow us to infer 'All H are K'. But the conclusion 'No K are not-H' is equivalent to 'No not-H are K' i.e. 'Only H are K' which is very different.

Compare the Russell argument, then, to 'All good philosophers are rational thinkers; all professors in the department are good philosophers; all rational thinkers are humans. So, no humans are not professors in the department.' – which can plainly have true premisses and a false conclusion, so is patently invalid.

(5) *Everyone who is not a fool can do logic. No fools are fit to serve on a jury. None of your cousins can do logic. Therefore none of your cousins is fit to serve on a jury.*

Valid. None of your cousins can do logic, so they are all fools – otherwise they would be able to do logic – hence they are not fit for jury service!

(6) *Most logicians are philosophers; few philosophers are unwise; so at least some logicians are wise.*

Invalid. Maybe all the logicians belong to the small proportion of philosophers who are unwise!

(7) *All logicians are rational; no existentialists are logicians; so if Sartre is an existentialist, he isn't rational.*

Invalid. Compare 'All women are human; no men are women; so if Jack is a man, he isn't human.'

(8) *If Sartre is an existentialist, he isn't a logician. If Sartre isn't a logician, he isn't good at reasoning. So if Sartre is good at reasoning, he isn't an existentialist.*

Valid. Here are two inferential principles concerning 'if':

I. From *if A then B*, and *if B then C*, we can infer *if A then C*.

II. From *if A then B*, we can infer *if not-B then not-A*.

We shall have a lot more to say about 'if' later, but these two principles should look intuitively reliable. (Careful though, you must distinguish the correct principle II – called 'contraposition' – from the sometimes tempting inference from *if A then B* to *if not-A then not-B*, which is horribly fallacious!)

Back to the example, first two premisses together entail that if Sartre is an existentialist, then he isn't good at reasoning, by principle I. By principle II it follows that if it isn't the case that he isn't good at reasoning, then Sartre isn't an existentialist. So it follows that if Sartre *is* good at reasoning, then he isn't an existentialist.