

MANY CHEERFUL FACTS

presents

Falsifying Choice

a talk by Kenny Easwaran

11:10 am - 12:00 on Wednesday, April 5th, in room 1015.

We all remember (from the presentation a few weeks ago, at least) that the Axiom of Choice is necessary for proving many useful and (seemingly) true propositions in many areas of mathematics. The problem with it is just that it looks somewhat more questionable than the other axioms of set theory, and that it can't be proven from them.

In this talk, I will show exactly why it can't be proven. To do this, I will start with a model satisfying all the axioms, and then use a group action to define a submodel that satisfies all the rest of the axioms but fails to satisfy Choice. Technically, I will work from a slightly weaker set of axioms than ZF, to give an independence proof dating back to 1938. The full independence proof is not much harder, but requires the technical machinery of forcing (which I discussed here in the fall), and thus did not arrive until 1963.

No familiarity with the axioms of set theory is presupposed.

*I am the very model of a modern Major General,
I've information vegetable, animal, and mineral,
I know the kings of England, and I quote the fights historical
From Marathon to Waterloo, in order categorical;
I'm very well acquainted, too, with matters mathematical,
I understand equations, both the simple and quadratical,
About binomial theorem I'm teeming with a lot o' news,
With many cheerful facts about the square of the hypotenuse!*

- Gilbert & Sullivan $P \circ P$