MAKING SENSE OF MATHEMATICAL COUNTERFACTUALS

ALAN BAKER

On many standard accounts, counterfactuals with impossible antecedents are all vacuously true. Since mathematical truths are (presumably) necessarily true, this poses a problem for the evaluation of counterfactual claims with mathematical subject matter. Either such claims are uniformly uninteresting, or we need a better account of counterpossibles. In this talk I will survey various examples of mathematical counterfactual reasoning, by both mathematicians and philosophers, and investigate the uses to which such reasoning is put. Examples include reductio-style hypotheses ('If there were only finitely many prime numbers, then...'), meta-mathematical claims ('If arithmetic were complete, then ...'), and counterarithmetical claims ('If 117 were prime, then ...'). I will argue that a successful analysis of certain kinds of mathematical counterfactual has the potential to inform various current debates, including what makes some proofs more explanatory than others, and whether there are mathematical explanations of physical phenomena.