

- DEBORAH KANT, *Predicting axioms*.

Department of Mathematics, University of Hamburg, Bundesstrasse 55, 20146 Hamburg, Germany.

E-mail: `deborah.kant@uni-hamburg.de`.

Nowadays, philosophers do not consider mathematical axioms necessarily as self-evident statements. If not self-evident, what are the roles of mathematical axioms in mathematical practice? General ideas by Easwaran [1], Maddy ([3] and [4]), and Schlimm [2] require complementation by analyses of specific uses of axioms in mathematical practice that go beyond the question of axiom adoption. In this talk, I elaborate on the *prediction-use* of large cardinal axioms in set-theoretic practice. The prediction-use of an axiom A consists in a prediction that some statement S that is provable in $ZFC + A$ is probably provable in ZFC only; if such a ZFC-proof can indeed be provided, the prediction is confirmed.

This case study is partially based on information gathered in an interview study with set-theoretic practitioners and augmented by two examples from set-theoretic research: Borel determinacy and Cichoń's maximum. The philosophical appeal of the prediction-use consists in its twofold significance. For one, it is a heuristic use of axioms in the discovery process of mathematical proofs, useful for all set-theoretic practitioners. Secondly, referring to Gödel's ideas on extrinsic justification [5], I argue that each instance of a successful prediction-use provides a verifiable consequence of some axiom, and in this sense, an extrinsic reason in favour of this axiom.

[1] KENNY EASWARAN, *The Role of Axioms in Mathematics*, *Erkenntnis*, vol. 68 (2008), no. 3, pp. 381–391.

[2] DIRK SCHLIMM, *Axioms in Mathematical Practice*, *Philosophia Mathematica*, vol. 21 (2013), no. 1, pp. 37–92.

[3] PENELOPE MADDY, *Believing the Axioms. I*, *The Journal of Symbolic Logic*, vol. 53 (1988), no. 2, pp. 481–511.

[4] ——— *Believing the Axioms. II*, *The Journal of Symbolic Logic*, vol. 53 (1988), no. 3, pp. 736–764.

[5] KURT GÖDEL, *What is Cantor's Continuum Problem*, *The American Mathematical Monthly*, vol. 54 (1947), no. 9, pp. 515–525.