

# Experiments in Logic and the Role of Diagrammatic Representations: A Case Study of Aristotelian Syllogistic Proof Charts

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## Abstract.

In the light of the recent turn in the philosophy of science towards philosophical analysis of scientific *practices* – a trend including also philosophy of mathematics and logic (Dutilh Novaes 2012; Carter 2019; Tytko et al. 2023) – we present a particular case study on charts used in connection with syllogistic proofs, illustrating the experimental use of such charts in the process of discovering logical results.

The related case concerns Aristotelian syllogistic proofs. Particularly, we describe how the collection of all computed alternative direct and indirect syllogistic proofs on specific charts have allowed to view the system of syllogistic logic from a different angle and hence to discover properties of it which were earlier overlooked (Wapniarski and Urbański 2025).

Drawing from a characterization of mathematical experiments (Schlimm and Fernández González 2020), we propose to extend this account to logic and to view the described case as a kind of experiment in logic (or *logical* experiment). In particular, we treat the charts in question and the properties of syllogisms read from them as components of the experimental process with an outcome and interpretation (conclusion). As tools in this experiment, we consider the charts and diagrams, as well as the proof assistant (Isabelle/HOL) used for a formal verification of the results pertaining to direct proofs (Koutsoukou-Argraki and Wapniarski 2025).

In contrast with the experimental setup described in (Schlimm and Fernández González 2020), the setup in this case includes presenting the results on charts – arranged in this form, the results revealed certain patterns, and thus the form of representation played a crucial role for the discovery of new properties. In this context, we argue that the case-study exemplifies the phenomenon of a “free ride” as characterized in (Shimojima 2015) and (Carter 2021), drawing attention to the importance of visual thinking in logic.

## References

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