Mathematical Beauty

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Philosophers of mathematical practice have recently returned to the intriguing question of mathematical beauty. This clearly does not belong to traditional aesthetics, because of the abstractness of mathematical matter. Interestingly, mathematicians insist on its presence in mathematics and seem to grant it an important status. They regard mathematical beauty as a major inspiration and often a factor motivating their choices and preferences in practice, such as the search for more elegant proofs and solutions. Philosophers try to find an account for this very special attitude. Sceptics trumpet the fact that mathematics has nothing to please our senses, and claim that all intellectual pleasures are simply epistemic, hence non-aesthetic.

This talk aims to introduce the audience to the recent discussion, present the main actors and the main lines of play. Then it suggests a new angle on the situation from which something new can be learned to defeat a sceptic.

Using a case study from graph theory (the highly symmetric Petersen graph), this talk tries to distinguish genuine aesthetic from epistemic or practical judgements, and correct uses of the word beautiful from loose ones. It demonstrates that mathematicians may respond to a combination of perceptual properties of visual representations and mathematical properties of abstract structures; the latter seem to carry greater weight. Mathematical beauty thus primarily involves mathematicians' sensitivity to aesthetics of the abstract.

References

[1] H. Seok-Hee, P. Eades, Drawing Planar Graphs Symmetrically, II: Biconnected Planar Graphs. *European J. Combin.* **19** (1998) 707–712.

[2] D. Holton, J. Sheehan, *The Petersen Graph.*, Cambridge University Press, 1993.

[3] I. Starikova, From Practice to New Concepts: Geometric Properties of Groups. *Philosophia Scientiae* **16(1)** (2012) 16–1.

[4] I. Starikova, Why do Mathematicians Need Different Ways of Presenting Mathematical Objects? The Case of Cayley Graphs. *Topoi* **1(29)** (2010) 41–51.

[5] I. Starikova, Symmetry and Mathematicians' Aesthetic Preferences: a Case Study, in special issue. *Philosophia Mathematica* (2016) preprint.

[6] I. Starikova, Searching for a Different Perspective on Groups. *Algebra and Model Theory 9:* Collection of papers eds.: A.G. Pinus et al., Novosibirsk, NSTU Publisher (2013) 57–66.

[7] J. Barker, *Mathematical Beauty.* Special Issue (2009) 60–74.

[8] N. Zangwill, Feasible Aesthetic Formalism. *NOÛS* **4(33)** (2015) 610–629.