Philosophy of Mathematical Notation

Thursdays, 11:35am–2:25pm,   Leacock 517

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Course description. In recent years philosophers of mathematics have increasingly turned their attention to mathematical practice, i. e., how mathematics is actually being done. A characteristic feature of mathematics and other theoretical sciences is the extensive use of distinctive notations. They have been considered as 'epistemic tools' (Klein 2002), 'objects-to-think-with' (Tolchinsky 2003), or 'cognitive technologies' (Dutilh Novaes 2012) that can be manipulated almost like physical objects (Landy et al. 2014). According to this conception, the influence between thoughts and notations goes *both* ways. That is, notations do not merely represent previously thought or spoken ideas, but through their use we also change our way of thinking. Despite the ubiquitous use of notations and the fact that the term *philosophy of notation* was coined in 1885 by C. S. Peirce in his "On the Algebra of Logic: A Contribution to the Philosophy of Notations", the question of *how* particular notations contribute to mathematical thinking and progress has rarely been investigated in a systematic fashion. In this course, we will study the relevant literature on notations and carefully investigate particular mathematical notations. The primary objective of this seminar is to look for new insights into the relation between symbolic notations and mathematical thought.

Particular topics and questions to be discussed are: (1) What are notations (e. g., compared to *diagrams*)? (2) What are *specific features* notations? (3) What is the *cognitive basis* underlying the use of notations? (4) How can different notations be meaningfully *compared*? (5) What are *design principles* for notations and how are they justified? (6) How do notations affect our *thinking*? (7) What is the *philosophical relevance* of notations?

Prerequisites. Seminars are open only to graduate students and advanced undergraduate students.

Reading materials will be made available on myCourses.

Requirements & grading. It is required that students prepare for and attend the meetings, and participate in the discussions (students can miss up to 3 meetings with prior notification of the instructor without penalty). Depending on the class size, participants will give *two in-depth presentations* (45 min) of a research paper of their choice. A list of topics (with suggested literature) will be provided during the first two weeks and dates for the presentations will be determined at the third meeting (January 19). The *final grade* depends on attendance (5%), weekly discussion notes (15%), in-class presentations (30%), and a 4000–5000 word term paper (50%). Late papers will be downgraded at a rate of 1/3 of a grade per day (e. g., from A- to B+), including weekend days/holidays.