MATHEMATICAL EVIDENCE AND ARGUMENT

Historical, philosophical & educational perspectives

Interdisciplinary Symposium

March 16th – 18th, 2017

University of Bremen

Prof. Dr. Christine Knipping, University of Bremen

Prof. Dr. Eva Müller-Hill, University of Rostock

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Venue

MZH 6120

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About the Symposium

In all scientific disciplines, what counts as "evidence" is of central importance. The kinds of evidence considered sufficient can be seen as differentiating one science from another, perhaps more so than the objects of study. Evidence in mathematics has always been considered to be of a unique kind exemplified in Euclid's Elements. These arguments are complete deductive derivations from axioms. Much work done at the beginning of the twentieth century went into establishing arithmetic, algebra and analysis on a similar foundation, and works such as Frege's Foundations of Arithmetic added formalisability as a further characteristic of mathematical evidence.

It has been claimed, however, that the arguments employed in mathematical practice are not typically complete, axiomatic and formalisable. Since Lakatos first offered a critique of "Euclidean methodology" fifty years ago, much attention has been paid to the nature of mathematical evidence, from a wide range of perspectives. Nevertheless, the image of mathematics presented in schools and held by many mathematicians, scientists and philosophers still accepts that mathematics evidence consists of, at least in principle, complete, axiomatic and formalisable arguments.

The aim of this symposium is to examine the nature of mathematical evidence from a range of perspectives, drawing on historical and current mathematical research and teaching practice. The participants have been chosen not only for their interest in this topic but also for the variety of approaches they take to it.

Symposium Program

16th March 2017

09.00 – 09.15	Introduction (Christine Knipping, Eva Müller-Hill)	
09.15 – 10.15	**Andrew Aberdein** (Florida Institute of Technology)	
10.15 – 10.30	Coffee Break	
10.30 – 11.00	Discussion	
11.00 – 12.30	Section I	**G. Nickel**: Aspects of Freedom in Mathematical Proofs (30+15 min) **M. Rathgeb**: Carroll`s Tortoise and Achilles – in classroom (30+15 min)
12.30 – 14.00	Lunch Break	
14.00 – 15.30	Section II	**C. Rittberg & B.V. Kerkhove**: Finding out about mathematical practice, but how? (30+15 min) **D. Sommerhoff & S. Ufer**: Validating mathematical proofs – an analysis of validation criteria used by secondary and university students (30+15 min)
15.30 – 15.45	Coffee Break	
15.45 – 17.40	Section III	**E. Müller Hill**: A reconstruction matrix for explaining processes (30+15 min) *Short Coffee Break (5-10 min.)* **K. Hein**: Investigating and fostering student´s pathway to deductive reasoning (20+10 min) **L.E. Andersen**: Acceptable Gaps in Math Proofs (20+10 min)
17.40 – 18.00	Questions & Remarks	

17th March 2017

09.00 – 9.45	Stimuli from the day before & Plenary discussion	
9.45 – 10.45	**Maria Alessandra Mariotti** (Università di Siena)	
10.45 – 11.00	Coffee Break	
11.00 – 11.30	Discussion	
11.30 – 13.00	Section IV	**D. Reid**: Evidence of generality (30+15 min) **L. Kempen & R. Biehler**: Generic proofs at tertiary level (30+15 min)
13.00 – 14.30	Lunch Break	
14.30 – 16.00	Section V	**E. Brunner:** The Role of Representations in mathematical argumentation and Proving Processes: A psychological Perspective (30+15 min) **S. Antonini**: Impossible figures and contradictions in a DGE between evidence and mathemtical theory (30+15 min)
16.00 – 16.15	Coffee Break	
16.15 – 17.40	Section VI	**A. Baccoglini-Frank**: The delicate balance of instrumented abduction between evidence and argumentation in a DGE (30+15 min) *Short Coffee Break (5-10 min.)* **Ch. Papadaki**: Finding the clues: Students' perspective on mathematical evidence (in geometry) (20+10 min) **E. Vallejo-Vargas**: An example of Proof-based teaching: Understanding the rules of signs when multiplying integers (20+10 min)
17.40 – 18.00	Questions & Remarks	

18th March 2017

09.00 – 10.30	Section VII	**S. Spies**: The role of the aesthetics for mathematical evidence (30+15 min) **C. Knipping & J. Cramer**: Participation in Argumentation (30 + 15 min)
10.30 – 10.45	Coffee Break	
10.45 – 11.45	Plenary Discussion & Information on publication proposal	
11.45 – 12.00	Closing Remarks	