

## Logic Matters – Gender and Diversity, Too

*Abstract:*

This interview features Andrea Reichenberger. Currently she holds a substitute professorship for history of technology at TUM Technical University of Munich.



She is junior research group leader at the Department of Mathematics, University of Siegen, Germany, and leads the research project “Rethinking the History of Mathematics and Physics: Women in Focus.” Reichenberger has held several postdoctoral positions, e.g., at the Center for the History of Women Philosophers and Scientists (HWPS) at Paderborn University (Germany) and in the DFG research project “Thought Experiment, Metaphor, Model” at the Institute for Philosophy I at the Ruhr University Bochum. Between 2019 and 2021, she

was a fellow at the University of Paderborn and principal investigator of the research project “Foundational research in mathematical logic – relativity – quantum physics. Case studies on the integration of women philosophers.” Reichenberger has written a book on Émilie du Châtelet (Springer, 2016) and has published many articles in journals, collected editions, and encyclopedias.

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*Andrew Schumann:* The shameful euphemism “female logic” denotes unpredictability and a lack of consistency in reasoning. It is erroneous because neither men nor women use logic in everyday life. Logic is not natural. It is not an innate ability but a technique to be mastered only through learning and training. To what extent can we equate gender and logic?

*Andrea Reichenberger:* Language is a powerful tool we can use or misuse, just like any other technique. It plays a crucial role in how we perceive the world, including ourselves and others. A big philosophical question is whether we can think and communicate without language. By using language, we not only differentiate and categorise; we also discriminate, violate, and hurt. History teaches us how the use of language is interwoven with atrocities, genocide, and war. This applies not least to political euphemisms. One might ask: What does logic have to do with euphemisms such as “female logic”? Professional logic, as learned and practiced at universities today, is a highly specialised field of research and teaching. In this context, the use of the term “female logic” would seem inappropriate and irritating. According to my opinion, combining the adjective “female” with the noun “logic” has a similar effect as combining the adjective “artificial” with the noun “intelligence.” Such word combinations invite us to ask the question of what logic is repeatedly anew. What do we mean when we talk about logic, and why does it irritate us when we speak of

female logic? One might reply that logic is unitary, independent of concrete human relations, transcends historical circumstances, and is pure thinking regardless of sex and gender.

The history of logic teaches us that the concept of logic is deeply gendered. One might object to the idea that logic is gender-neutral if we understand logic as the theory and practice of correct reasoning in terms of inferences or arguments. In this sense, the validity of an argument just states that it is not possible that the conclusion is false when the premises are true. This is just a conditional claim; it has nothing to do with the content, the circumstances of the utterance, etc. According to the widespread narrative, the validity of an argument is determined by its structure, not its content. In fact, it is a matter of dispute what “structure,” “form,” and “content” mean. Although the formalisation of logic achieved a certain clarity and precision, it had its price and limits. Many questions remained open as to whether reasoning can be reduced to a theory of inference or whether reasoning involves rationality. In the 19th century, the logician Christine Ladd-Franklin (1847–1930) protested against the philosophical doctrine that reason was masculine and intuition was feminine. The German philosopher Margherita von Brentano (1922–1995), the first woman to hold the office of vice president at the Freie Universität Berlin, once remarked that statements about the nature of those who are discriminated against are statements about the nature of discrimination. If that is true, and if you are correct that logic is a technique that can be mastered only through learning and training, then it is disputable whether logic in research and teaching practice is gender-neutral and free of bias. From this perspective, the idea that the mind has no sex (which we find in Augustine and the work of the Cartesian Francois Poulain de la Barre) functions as an ideal. It should not be confused with real-world practice.

When one reflects on this topic today, it seems to be forgotten that the distinction between *res cogitans* (mind) and *res extensa* (body) was theologically motivated. For Descartes, God was an eternal, omnipotent, omniscient, and omnipresent mind that could be understood through reasoning, but the theological context disappeared with the Enlightenment. The idea that logic was pure thinking survived, and this doctrine was often used in order to defend the “autonomous nature” of logic. Historical inquiry helps us to reflect critically on clichés and prejudices regarding what logic is and should be. Current philosophical reflections on contemporary mathematical logic have radically transformed such narratives and stereotypes. Logic is practiced and investigated as a social phenomenon in its rich diversity and multimodality.

Now, let’s come to the project “Gender & Logic,” which I developed with PD Dr Jens Lemanski at FernUniversity in Hagen. The project did not concern what logic is, can, and should be; nor was it about “female logic,” whatever that means. First, the project focused on women’s contributions to the field of logic in the late 19th and early 20th centuries (e.g., Rózsa Péter’s impact on the development of recursion theory, Johanna Piesch’s work on switching algebra, and Christine Ladd-Franklin’s work on the algebra of logic); secondly, the project aimed to explore the constitution of knowledge in light of the development of cultural techniques, notation systems, and standardisation in the history of logic (e.g., the process of standardisation of logical notations had a price, namely, the exclusion of visually impaired people from learning logic because of a lack of Braille provision).

One lesson we learned: In principle, everyone should have an equal opportunity to learn logic. Doing logic should be open for everyone as a fundamental value and human right. Once again, that is the ideal, not the practice. The value-ladenness of scientific knowledge is also evident in logic and its history.

*Andrew Schumann:* There have been many outstanding female mathematicians and female physicists. How does the history of mathematics and physics change when we focus on women?

*Andrea Reichenberger:* History is not the past. History is a story about the past told in the present, and it is supposed to be useful in constructing the future. This also applies to the history of logic, science, and technology, which is constantly being rewritten and re-evaluated in light of current developments. Logic and its history are essential parts of scientific inquiry. In this context, feminist

studies of women and gender play a crucial role. They help to correct standard narratives, they uncover multiple dimensions of gender stereotypes in scientific research, they integrate women's contributions into our picture of logic's rich and diverse history, and, in doing so, they promote gender equality and epistemic justice in current research and teaching practices.

Again, one might object that, let's say, for example, the validity of the Pythagorean theorem  $a^2 + b^2 = c^2$  eludes historicity. However, history teaches us that it is a legend that Pythagoras discovered the theorem. In fact, the theorem is far older. Maybe it is more important to mention in this context that among the Pythagoreans, *women* played an important role and participated actively in the philosophical life. And this is not just a legend.

*Andrew Schumann:* What is your position on the war in Ukraine? Is it of interest to German philosophers?

*Andrea Reichenberger:* I can't speak for all German philosophers. For me, the only alternative to war is peace, which is unenforceable; both sides must be willing to find a way to peace.

*Andrew Schumann:* How can this terrible war be stopped, then?

*Andrea Reichenberger:* I wish there were a simple answer to your question. According to my opinion, the way to peace is not just a matter of specific decision-making processes. It is often a painful process that requires goodwill and honesty on both sides. The intricate problem here seems to me not to be that simple if we try to recapitulate the situation in Ukraine. We all know that many countries are involved in this terrible war with their own socio-economic interests, but not all countries are affected by the war to the same extent. I'm not a political expert, but it seems to me that this is one of the reasons why there is no simple answer to the question of how this war can be stopped.