Is Pluralism in the History of Mathematics Possible?

Jacques Bair, Alexandre Borovik, Vladimir Kanovei, Mikhail G. Katz, Semen S. Kutateladze, Sam Sanders, David Sherry, Monica Ugaglia, and Mark van Atten

This letter is in response to the article "A Question of Fundamental Methodology: Reply to Mikhail Katz and His Coauthors," by Archibald et al. in the *Mathematical Intelligencer* [1]. That article was written in reaction both to our earlier article "Two-Track Depictions of Leibniz's Fictions" [3] in the same journal, and to other work of ours.

We have argued that in addition to procedures that can be adequately described in purely Archimedean settings, Leibniz (as well as Cauchy and others) used procedures that exploit genuine infinitesimals, that is, what to him were mathematical entities.

Archibald's coauthors Richard Arthur and David Rabouin have argued that the term "infinitesimal" as used by Leibniz does not refer to a mathematical entity, and is, rather, stenography for exhaustion-type arguments in the style of Archimedes. We have compared the two approaches in [3] and, in particular, presented evidence for our interpretation.

Archibald et al. make a number of false claims concerning both [3] and other publications of ours. Lack of space prevents us from responding in full. A more detailed response appears at [2].

In closing, it is ironic that Archibald et al. should claim that:

> [O]ver the years, it became clearer and clearer that our interlocutors do not care much about rational discussion and scientific dialogue from *different perspectives* ... The latest example of that approach is provided by a paper ... "Two-Track Depictions of Leibniz's Fictions" [1, p. 2] (emphasis added).

"Two-track depictions" [3] is devoted specifically to making explicit a pair of *different perspectives* on Leibniz's calculus, so as to stimulate rational discussion and scientific dialogue.

Archibald et al. do little to clarify the "Question of Fundamental Methodology" of their title, namely that the history of mathematics, like mathematics itself, could benefit from a plurality of approaches.

References

[1] Tom Archibald, Richard T. W. Arthur, Giovanni Ferraro, Jeremy Gray, Douglas Jesseph, Jesper Lützen, Marco Panza, David Rabouin, and Gert Schubring. A question of fundamental methodology: reply to Mikhail Katz and his coauthors. *Mathematical Intelligencer* 44:4 (2022), 360–363. https://doi.org/10.1007/s00283-022-10217-7.

[2] J. Bair, A. Borovik, V. Kanovei, M. Katz, S. Kutateladze, S. Sanders, D. Sherry, and M. Ugaglia. Historical infinitesimalists and modern historiography of infinitesimals. To appear in *Antiquitates Mathematicae*. https://arxiv.org/abs/2210.14504, 2022.

[3] M. Katz, K. Kuhlemann, D. Sherry, M. Ugaglia, and M. van Atten. Two-track depictions of Leibniz's fictions. *Mathematical Intelligencer* 44:3 (2022), 261–266. https://doi.org/10.1007/s00283-021-10140-3, https://arxiv.org/abs/2111.00922 MR4480193.

Jacques Bair, HEC-ULG, University of Liege, 4000 Liege, Belgium. E-mail: j.bair@ulg.ac.be

Alexandre Borovik, School of Mathematics, University of Manchester, Oxford Street, Manchester M13 9PL, UK. E-mail: alexandre@borovik.net

Vladimir Kanovei, IITP RAS, Moscow, Russia. E-mail: kanovei@googlemail.com

Mikhail G. Katz, Department of Mathematics, Bar Ilan University, Ramat Gan 5290002, Israel. E-mail: katzmik@math.biu.ac.il

Semen S. Kutateladze, Sobolev Institute of Mathematics, Novosibirsk State University, Novosibirsk, Russia. E-mail: sskut@math.nsc.ru

Sam Sanders, Department of Philosophy 2, RUB Bochum, Bochum, Germany. E-mail: sasander@me.com

David Sherry, Department of Philosophy, Northern Arizona University, Flagstaff, AZ 86011, USA. E-mail: David.Sherry@nau.edu

Monica Ugaglia, Il Gallo Silvestre, Località Collina 38, Montecassiano, Italy. E-mail: monica.ugaglia@gmail.com

Mark van Atten, Archives Husserl (CNRS/ENS), 45 rue d'Ulm, 75005 Paris, France. E-mail: mvanatten@ens.fr

https://doi.org/10.1007/s00283-022-10248-0