Report on activities during Honorary Research Fellowship in the Institute of Philosophy Research Center for the Humanities Hungarian Academy of Sciences

M. Rédei

I have spent the 2014-2015 academic year (September 2014 – April 2015) in the Institute of Philosophy of the Research Center for the Humanities as an Honorary Research Fellow. During the Honorary Research Fellowship I was financially supported exclusively by my home institution, the London School of Economics and Political Science (LSE): I was granted a full sabbatical year by LSE.

During the tenure of the Honorary Research Fellowship I had contacts to (and collaboration with) G. Hofer-Szabó and B. Gyenis, both in the philosophy of science research group of the Institute of Philosophy. I also had contacts to (and collaborated with) members of the administratively loose but intellectually very cohesive group of mainly young and active philosophers of science known on the international scene as the "Budapest Group", which includes, in addition to G. Hofer-Szabó and B. Gyenis, the following colleagues: Z. Gyenis[1], M. Gömöri[2] and L.E. Szabó[3].

The collaboration resulted in joint papers, joint seminar and conference talks (see below). Contacts and collaboration with some members of this group continued even after my Honorary Research Fellowship ended and are continuing still: I am working with Z. Gyenis on several papers and I am part of the research group led by G. Hofer-Szabó and supported by a 4 year National Research, Development and Innovation Office grant (K 115593).

The Research Project Statement submitted to the Research Center for the Humanities to indicate the problem areas I intended to work on during the

[1]Post Doctoral Fellow in the Renyi Institute of Mathematics at the time of my Honorary Research Fellowship; currently a Post Doctoral Fellow in the Department of Algebra of the Budapest University of Technology.

[2]PhD Student at the time of my Honorary Research Fellowship, currently a Junior Research Fellow in the Institute of Philosophy of the Research Center for the Humanities.

[3]Professor of Philosophy in the Department of Logic of ELTE.

Honorary Research Fellowship included the following:

- *Principal Principle*
  Consistency of Lewis' Principal Principle linking objective probabilities to credences in a Bayesian manner has been controversial. I planned to investigate a hierarchy of notions of consistency of the Principal Principle.

- *Bayesian Conditionalization*
  Impossibility of Bayesian conditionalization with respect to zero-probability events is regarded a conceptual difficulty in probability theory. I planned to analyze the philosophical significance of conditionalizing via conditional expectations, which is insensitive to the value of probabilities of the conditioning events.

- *Bertrand's Paradox*
  Bertrand's Paradox remains controversial in spite of many resolutions offered. Based on a recent re-interpretation of the paradox I intended to analyze its status further.

As planned, I have worked on these problems. Working was truly collaborative with members of the Budapest Group:

- The measure theoretic consistency of the Principal Principle was analyzed in a joint paper with Z. Gyenis; the paper is forthcoming in *Philosophy of Science* [4]. This paper was presented to the largest international conference of the philosophy of science profession: the biennial conference of the Philosophy of Science Association (U.S.A.) in Chicago (November 2014). I organized a symposium session at this conference, the symposium was devoted to the Principal Principle.

- We worked with G. Hofer-Szabó and Z. Gyenis on Bayesian conditionalization:

  - Our paper on the Borel-Kolmogorov Paradox [1] argues that there is nothing paradoxical in the Borel-Kolmogorov Paradox if one conditionalizes properly in the framework of the theory of conditional expectations. This paper is forthcoming in *Synthese*. LSE generously provided funds to cover the cost of *open access* to this paper.
  - In another joint paper with Z. Gyenis [3] general properties of Bayesian learning based on conditional expectations as the conditioning device are investigated and determined. This paper is submitted to *Erkenntnis*, it is currently under review.

- Further work on Bertrand's Paradox was published in the joint paper with Z. Gyenis [4]. In this paper we strengthen further the position that Bertrand's Paradox is in complete harmony with the correct intuition about how probability theory is applied to describe phenomena.

I also have cooperated with Y. Kitajima, a colleague in Japan. We published a paper [5] in which we give a complete characterization of common cause closedness of quantum probability spaces. This paper was published in the *Studies in the History and Philosophy of Modern Physics*.

All these papers acknowledge explicitly that they were prepared during the Honorary Research Fellowship.

I gave several talks based on these (and also some other, former) works during the Honorary Research Fellowship:

- Budapest-Cracow Workshop on Probability, Causality and Determinism (September 8-9, 2014; Budapest, Hungary) (two talks, prepared jointly with Z. Gyenis)
- Centre for Logic and Philosophy of Science, University of Bucharest, Bucharest, Romania; October 1, 2014
- Department of Philosophy, Harvard University (November 2, 2014, Boston, U.S.A.)
- Biennial Conference of the Philosophy of Science Association (PSA 2014) (November 6-9, Chicago, U.S.A.)
- Institute of Philosophy (ELTE) (March 25, 2015)
- Institute of Philosophy, Hungarian Academy of Sciences, April 21, 2015 This talk was the "official" Honorary Research Fellow talk.

I also have attended some events in the Institute of Philosophy (e.g. the two day international workshop "The Uses and Abuses of Mathematics in Early Modern Philosophy", March 10, 2015.)

I regard the time spent as an Honorary Research Fellow in the Institute of Philosophy as professionally productive and very pleasant socially. I wish to thank the Institute, especially Director F. Horkay-Hörcher, for honoring me with the Honorary Research Fellowship.

I also wish to thank all the members of the "Budapest Group" for their hospitality, for the discussions we had, and for the collaboration. I am proud to belong to this group and look forward to more cooperation in the future.

References

[1] Z. Gyenis, G. Hofer-Szabó, and M. Rédei. Conditioning using conditional expectations: The Borel-Kolmogorov Paradox. *Synthese*, 2016. forthcoming, DOI 10.1007/s11229-016-1070-8.

[2] Z. Gyenis and M. Rédei. Why Bertrand's Paradox is not paradoxical but is felt so. In U. Maki, S. Ruphy, G. Schurz, and I. Votsis, editors, *Recent Developments in the Philosophy of Science: EPSA13 Helsinki*, pages 265–276. Springer, 2015.

[3] Z. Gyenis and M. Rédei. General properties of general Bayesian learning. *Erkenntnis*, 2016. submitted.

[4] Z. Gyenis and M. Rédei. Measure theoretic analysis of consistency of the Principal Principle. *Philosophy of Science*, 2016. forthcoming.

[5] Y. Kitajima and M. Rédei. Characterizing common cause closedness of quantum probability theories. *Studies in the History and Philosophy of Modern Physics*, 52:234–241, 2015.