

## **The Culture of Research and Scholarship in Mathematics: Joint Research and Its Publication**

The culture of joint research and its publication differs among academic disciplines, and this note is meant to describe the practice within mathematics.

In recent years, there has been a noticeable trend towards greater joint publication of mathematical research. An analysis of journal articles shows that nearly 70% had more than one author [1]. Furthermore, between 1999-2003 and 2009-2013, the number of papers with 2, 3 and 4+ authors increased by approximately 50%, 100% and 200%, respectively, while single-author papers decreased slightly.

In most areas of mathematics, joint research is a sharing of ideas and skills that cannot be attributed to the individuals separately. Researchers' roles are seldom differentiated (as they are in laboratory sciences, for example). Determining which person contributed which ideas is often meaningless because the ideas grow from complex discussions among all partners. Naming a "senior" researcher might indicate the relative status of the participants, but not the relative merit of the contributions.

For this reason, mathematicians traditionally list the authors on joint papers in alphabetical order. In the 2009-2013 data, the majority of joint papers (almost 60%) list authors alphabetically and there is no general understanding of "first author publication".

This differs from other areas of scholarship, especially those that frequently involve large numbers of researchers working on a single research project. In areas of mathematics that are more closely associated to such areas, the culture and traditions may blend together.

While these traditions are familiar to mathematicians, they are often not understood by scholars in fields with different practices and this sometimes works to the detriment of young mathematicians.

[1] Analysis of MathSciNet data by AMS staff, 2015.

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