The Culture of Research and Scholarship in Mathematics: Arm's Length Letters of Evaluation

The culture of joint research and large collaborations differs among academic disciplines. This note is meant to describe its current state within mathematics and in the context of letters of evaluation for hiring, promotion and tenure.

Colleges and universities often require a number of external "arm's length" letters for promotion and tenure decisions. The precise meaning of arm's length varies depending on the institution, but it frequently includes the requirement that the letter writer not be a doctoral advisor, postdoctoral advisor, or *co-author* of the candidate.

Historically, most papers in mathematics were single-author, and it was rare for such papers to have more than two or three co-authors. This is no longer the case. An analysis of journal articles [1] shows that, between the periods 1999-2003 and 2009-2013, the number of papers with 2, 3 and 4+ authors increased by approximately 50%, 100% and 200%, respectively, while the number of single-author papers decreased slightly. In the more recent period, nearly 70% of the papers had more than one author, and there were more than 54,000 papers with 4+ authors. Furthermore, due to the focused collaborative nature of programs such as AIM (American Institute of Mathematics) and workshops such as WIN (Women in Numbers), an increasing number of young mathematicians now have the opportunity to work and publish multi-author papers with senior people in their field.

More recently, the advent of massive collaborations, such as the Polymath Project, involve, in a way heretofore not seen in mathematics, large numbers of researchers at all ranks. An unintended consequence of these very positive opportunities, especially for those working in relatively small fields, is that their institutions' rules on letter writers may then exclude many (or even most) of the top senior people in their area from writing tenure or promotion letters on their behalf. It is understood within mathematics that senior researchers who have participated with younger mathematicians in medium-to-large collaborations are nevertheless able to provide useful assessments of their junior colleagues.

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