
Editorial

Research Ethics, Research Integrity and the Responsible Conduct of Research

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Research ethics and the responsible conduct of research (RCR) are terms that are often used interchangeably, but these are not synonymous concepts. While research ethics considers the application of research findings as well as the process of research, RCR focuses on the way the research is carried out. A related notion, research integrity, contains within it the concept of RCR; "(T)he responsible conduct of research is not distinct from research; on the contrary, competency in research *encompasses* the responsible conduct of that research and the capacity for ethical decision-making."^{1(p.9)}

Creating a climate in which research integrity thrives is an important responsibility of the research community. The community of researchers and society as a whole benefit when integrity is understood to be central to the process. But this is not accomplished without attention and effort. For example, each member of the community has a responsibility to think carefully and explicitly about the professional values and standards of the community and the extent to which they are reflected both in the various facets of his or her own professional practices, and in what is communicated to trainees and colleagues.

As is often the case, a number of papers in this issue of *Science and Engineering Ethics* address aspects of RCR.²⁻⁷ Luca Consoli examines research misconduct as it plays out in a particular case,² and Barbara Redman and her colleagues also consider research misconduct and its roots in work place pressures that can generate conflicting interests and shortcuts that fall into grey areas along the continuum from preferred to prohibited research practices.³ Dena Plemmons and her colleagues examine trainees' perceptions of the impact of teaching of RCR on attitudes toward research integrity.⁴ Other papers consider publication practices: Ronald Kostoff and colleagues investigate the prevalence of duplicate publications,⁵ and Luca Consoli,² Theodore Sheskin,⁶ and Michael Loui in a comment piece on Sheskin's paper,⁷ address aspects of recognition and responsibility associated with authorship.

All of these papers raise interesting and challenging questions for research integrity. For example, the problems raised in the Redman paper highlight the importance of reiterating that a range of accepted practices does not mean that all accepted practices are equally good or equally acceptable to everyone. Different practices may be preferable to one interested party or another for important reasons, of which only some may be recognized and acknowledged. Authorship, which is often critically important to professional advancement, is a case in point. Some researchers are more inclusive when it comes to authorship and others more exclusive. Every

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individual who has made a significant contribution to the intellectual content of a manuscript can reasonably claim a right to authorship. It is the “coin of the realm” that “buys” tenure and promotion as well as funding of research proposals. But the significance of and extent of one’s contribution can be like beauty – in the eye of the beholder. As a result authorship can become contentious, moreover there is a widespread presumption that the contribution of each author is inversely proportional to the number of authors on the manuscript masthead. This is not entirely the case because the order of authorship can contain a meaning above and beyond authorship alone: in some disciplines and circumstances the first and/or last author is presumed, rightly or wrongly, to have made the greater contribution to the work. (Though in other disciplines or research groups the order of authors is alphabetical.) This means that order of authorship can also be a matter of dispute. Note that both authorship itself and the order in which authors are listed are problematic because of the presumptions of others regarding their significance (or the presumed presumptions of others).

Recognition is one side of the coin of authorship, and responsibility is the other. Unfortunately, multiple authorship can be used to avoid or confound responsibility and accountability. While the perpetrator of research misconduct is known, the extent to which other co-authors should be held responsible is not so clear-cut.

The possibility of clarifying the extent and nature of different contributions in order to more accurately determine both the appropriate amount of recognition and the degree of accountability that accrues to each co-author is appealing. However, the research environment, like any work environment, is composed of many individuals and multiple, sometimes competing, relationships. The laboratory director, research supervisor(s), trainees, and students are all in different power relationships and the potential for conflicting interests, favoritism and abuse are almost unavoidable. Thus using a mathematical formula to determine authorship might seem to offer a solution. But differential weighting of the various elements of a research project is inevitably arbitrary. Further, numbers imply more reliability than they deliver and may be perceived or portrayed as more objective and fairer than they actually are.

Creating a climate that promotes research integrity requires awareness, openness and communication with regard to competing concerns and interests of various members of the research team, the research community and society as a whole. This takes time and effort, but everyone benefits in the long run.

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