

## ***Methods for Research on Research Integrity: Doing Research on Sensitive Topics***

Margot L. Iverson, Department of History of Science and Technology, University of Minnesota, Twin Cities, USA; formerly with the Program on Scientific Freedom, Responsibility and Law, American Association for the Advancement of Science, USA

Mark S. Frankel, Program on Scientific Freedom, Responsibility and Law, American Association for the Advancement of Science, USA

**Keywords:** Academic environments, Deviant behavior, Evaluation research, Methodology, Science careers, Scientific misconduct

Promoting research integrity requires a greater understanding than we now have of the factors that influence the full range of research conduct. There is a dearth of empirical research addressing issues related to research integrity and misconduct in science. It is critical, therefore, that more research on these issues be supported, not only to provide useful guidance to researchers and to the formulation of appropriately measured policy, but also to stimulate a critical mass of scholars to develop research on research integrity as a legitimate field of scientific inquiry. Such research must employ rigorous research designs and methods of evaluation.

The “Session on Methods for Research on Research Integrity,” co-organized by Mark S. Frankel and Felice Levine, considered the methodological challenges faced by researchers studying research integrity and discussed research approaches best-suited to this topic. Four speakers presented different models and strategies for conducting research on research integrity and suggested promising areas for future research. The session concluded with discussion of a possible research agenda for research on research integrity. This account is a summary of the session.

### **Contextual Effects in the Study of Academic Misconduct**

Melissa Anderson, Associate Professor of Higher Education at the University of Minnesota, presented conceptual models of scientific misconduct that could be used to guide research on the role of the academic environment on research misconduct. Studying different aspects of the research context in which incidents occur can move researchers away from focusing on prevalence, which is difficult to determine and of limited utility, to examining other research questions useful to institutions trying to promote research integrity. Researchers face several methodological challenges in investigating research misconduct. Misconduct is a sensitive topic that individuals wish to keep hidden from researchers (and others), making it hard to observe, and incidents are relatively rare, making them difficult to find and compare. The academic context in which misconduct is to be studied also can create methodological difficulties. Research areas in which perpetrators of scientific misconduct

---

Corresponding author: Mark S. Frankel, Program on Scientific Freedom, Responsibility and Law, American Association for the Advancement of Science, 1200 New York Avenue, NW, Washington, DC 20005, 202-326-6793 (voice), 202-289-4950 (fax), mfrankel@aaas.org.

function can be very technical, requiring investigators to possess some mastery of the specialized subject matter (or to collaborate with someone who does). Another problem can be the autonomous nature of academic researchers, which makes their behavior difficult to observe or to confirm independently. Additionally, research integrity research is not always welcome by institutions or departments, out of fear of media or legal attention, and individuals and organizations may not cooperate with researchers.

Rather than artificially disassociating misconduct from research, conceptualizing it as linked to unavoidable research error is one way in which misconduct can be understood in the context of the research process. Error and misconduct both involve issues of intention and acceptability, with misconduct being both intentional and unacceptable, and inadvertent error being the reverse—acceptable and unintentional. Anderson identified two other categories as well, avoidable error, which is unintentional but also unacceptable, and “minor hypocrisies,” which are intentional but acceptable. Studying these categories of avoidable error and minor hypocrisies, which presumably are much more common than misconduct, may provide information on the contextual influences on misconduct that is difficult to obtain by other means. And since intent is hard to determine, some instances of avoidable error may be incidents of misconduct that have never been so identified. Other topics for further research that grow out of this linkage between misconduct and error are how scientists decide what separates misconduct from these categories, and if and how they deal with error as well as misconduct.

Another way to examine context is to consider not just the actual incident of misconduct, but rather to understand cases as having four distinct stages: the context (institutional, disciplinary, and immediate lab) in which the incident occurs, the misconduct event itself, the exposure of the misconduct, and the consequences for the perpetrator and others. This framework provides a way of considering and comparing different aspects of misconduct so that interactions between each stage can be explored. For example, what impact does the context of funding sources and mechanisms have on incidents of misconduct? Longitudinal research of patterns of interactive effects over

time presents many possible research projects. The contextual influences of the broader research environment on these four stages, from such sources as disciplinary societies, journals, industry, government policies, and elsewhere, also suggest many useful research topics.

### **Scientific Misconduct as a Form of Deviant Behavior**

Researchers who engage in scientific misconduct are behaving in a presumably deviant way that violates both legal and social norms. Conducting empirical research on research integrity and misconduct therefore requires that researchers consider the implications of studying deviant behavior in designing and conducting their research. In her presentation, Eleanor Singer, from the Institute for Social Research at the University of Michigan, discussed some methodological considerations arising from this understanding of research misconduct as a form of deviant behavior. In addition, she also presented some applications of more universal research principles to research on research integrity.

Deviant behavior is difficult to study because there are strong incentives for both perpetrators and the institutions at which it takes place to keep it hidden. This makes it difficult to observe directly, and so researchers must resort to asking subjects to report incidents. Two of the most common methods used are self-administered surveys and interviews. These are more likely to produce honest answers if the confidentiality of those participating can be guaranteed. Surveys that are self-administered, further ensuring privacy, also can improve rates of subjects' veracity. Another useful research method for some research questions is to present subjects with vignettes of ethical quandaries in research and to ask them how the researcher in the vignette would behave. Such vignettes are most useful when the type of research and the status of the researcher in the vignette parallels those of the subject, as this increases the chance that the answer will reflect their own behavior. Vignettes also can be used to study what behaviors actually are regarded as violations of standards of conduct by members of a particular field.

Like other forms of deviant behavior, opportunities to engage in scientific misconduct as well as opportunities for observing it can vary depending on factors such as the discipline of

research and the size of a department. Also, motivations for deviant behavior may vary, based on incentives and reward systems present.

Singer also presented several other principles of empirical research that are critical to producing rigorous empirical research on research integrity. Researchers must establish the questions they wish to answer with their research. To obtain consistent answers and meaningful results, terms used also must be defined. For example, since norms and definitions of research integrity and misconduct vary, these terms must be clarified so that all researchers and subjects are using a standard definition. If not, ambiguity may be introduced into the data. (Research that explores differences in norms and definitions of misconduct could be very useful in helping to interpret current data on prevalence.) The populations to be studied also must be selected so that comparisons can be made. When choosing research methods, the match between method and research question should be carefully considered. Direct observation, deliberate experimentation, questioning subjects, and analysis of official records are all possible methods, and each has advantages and disadvantages. The choice of method also involves a selection of the indicators the study will use. Official records of complaints of research misconduct, for example, will yield different information about incidence than data collected through surveys of bystanders or perpetrators. Since descriptive statistics are much more meaningful in a comparative context, it is important to consider how different parts of a study can be made sufficiently equivalent so that data can be analyzed comparatively. The research conducted by Judith Swazey, Melissa Anderson, and Karen Seashore Louis on integrity issues in graduate education is a good example of the effective application of these research principles to research on research integrity (1-2).

### **Influences on Research Integrity at Different Stages of Academic Science Careers**

Another research model that can be applied to research on research integrity is the effect of the academic environment on researchers at different stages of their careers. Although many scientists take a class on research ethics early in their training, the major influence on how they learn to conduct ethical research is usually the environment in which they work. Rachel

Rosenfeld, a Professor of Sociology at the University of North Carolina, presented a sociological framework to consider how scientists learn about ethical research practices at different career stages, what it is they learn, from whom, and why sometimes they learn the wrong lesson (i.e., unethical behavior). At each stage of a scientist's career, several nested contexts influence research integrity. In the immediate research environment, researchers are exposed to peers, mentors, teachers, collaborators, and students. Surrounding and overlapping this immediate environment are the context of department and institution and the broader context of journals, professional societies, and federal policies.

Rosenfeld discussed some potential research projects at each stage of a scientist's career, from undergraduate through senior scientist. Currently available research on undergraduates has focused on the conduct of science students in the classroom and has indicated distressingly high rates of plagiarism and fudging data. Are advanced students engaged in independent research projects more or less likely to fudge or plagiarize data in the research environment? This would be an especially interesting research topic since those undergraduates who do participate in research are more likely to continue on to graduate school than other students. For graduate students, research has suggested that the interaction between them and their mentors is critical to their subsequent ethical behavior. More research is needed on how aspects of this interaction affect the information on research integrity transmitted. The role of other graduate students, and the effect of isolation from peers on ethical behavior are other potential topics. To what extent are graduate students who interact frequently with their peers learning ethical (or unethical) behaviors from them? As researchers move from being graduate students to post-doctoral trainees to junior scientists, the broader research community context becomes more important. Journals and scientific societies may become more influential in shaping junior scientists' behavior. Do varying standards of evidence adopted by different journals influence researchers' research practices? For example, if a journal requires that all underlying data be accessible, does that have an effect on the accuracy of the researcher's analysis of the data? How does the pressure to publish affect what and how researchers conduct research? Regarding

scientific societies, how does leadership on research integrity from societies impact the behavior of members? Do society ethics codes and ethics prizes influence members? And for senior scientists, who are likely to become part of the leadership of societies and departments, how do these roles influence their own research conduct?

Contextual questions exist for each stage of a scientist's career, and studying these questions can identify the conditions under which interactions in a particular context lead to the learning of ethical or less ethical research practices. That researchers might receive mixed messages from the different contextual environments was noted by an audience member, and Rosenfeld concurred, noting that some contextual messages may promote unethical behavior and that it is important to assess how competing messages are dealt with by scientists. Another factor to consider in research is how these nested contexts affect individual researchers in different ways. A researcher's gender, race, country of origin, or sexual orientation can all impact the individual's interactions with the surrounding environment.

### **Utilizing Evaluation Research to Assess Research Integrity Programs**

Joyce Iutovich, President of Keystone University Research Corporation in Erie, Pennsylvania, presented an overview of the contributions that evaluation research can make to research on research integrity. Along with basic research, which addresses questions about causality and contributes to theory development, evaluation research provides the link between theory and practice. When research institutions and scientific societies develop research integrity programs based in part on theory, evaluation research plays an important role in assessing the effectiveness of these programs. Further, it offers a system for transferring knowledge gained through research to program improvement efforts over time.

Evaluation research is conducted within the context of social action programming. It focuses on an assessment of the implementation process as well as the outcomes for targeted groups. Process evaluation determines whether a program has been implemented as planned; outcome evaluation determines the short- and long-term impact of a program on the target group(s). To conduct a process and outcome evaluation, the

following programmatic and research design elements need to be in place.

First, program goals must be clearly defined for a specified target audience (e.g., graduate students will be made aware of the ethical standards for research and the strategies for adhering to these standards). Second, activities to achieve these goals must be designed and implemented (e.g., an educational program consisting of a one-credit course is established as a graduation requirement; it is taught every fall semester). Next, a plan for the evaluation of the program's implementation process and outcomes needs to be delineated, including measurements and instrumentation (e.g., measures of knowledge using a paper/pencil test or measures of decision making using case scenarios), timing of data collection (at the end of each course), methods of analysis (quantitative), and format for reporting the results and implications for an organization's activities, since it is essential to incorporate a system for linking knowledge gained through research to organizational planning and action.

Evaluation research assesses the overall effectiveness of an organizational program and is used to improve programming so that goals are met and resources are used efficiently. It is based on an open system's model of organizations ("open" because the organization is open to political, social, and economic influences from the external environment). As conceptualized using this model, evaluation research provides evidence, which becomes part of the continuous feedback loop that constantly works to improve programmatic efforts. Ideally, programmatic efforts that address issues and concerns related to research integrity are based on theoretical models that provide an understanding of research integrity and how to ensure it within a population of researchers and scientists. Once implemented, evaluation data on these programs are collected, analyzed, and used for program improvement. Evaluation research also provides another critical assessment of the theoretical model, which establishes the framework for the program. This further enhances theoretical development by providing evidence about what works and what doesn't work as predicted by a theoretical model.

### **Session Conclusion—Developing a Research Agenda**

Felice Levine, Executive Officer of the American Sociological Association, addressed the scope of

research integrity and misconduct concerns, the challenges for undertaking study of such issues, and the need to attract researchers with broad expertise. Also, synthesizing many of the topics raised in the presentations, she concluded by suggesting steps needed to establish a research agenda for studying research integrity.

Prior to designing an agenda, the scope of the research and related topics on research integrity and misconduct must first be determined. Along with fabrication, falsification, and plagiarism, issues of conflicts of interest, human research participants, confidentiality, authorship determination, data access/sharing, data design, and accurate representations and interpretations of data all may fall within this subject area. The complexities involved in conducting research on research integrity also must be considered. Since deviant behavior is often hidden from outside view or occurs among powerful elites, there are many challenges to obtaining empirical data on research integrity. Political concerns within and between organizations also may inhibit research. Also, since this research could benefit from research methodologies and frameworks from a variety of disciplines, attracting researchers from a broad range of disciplines is crucial. Across disciplines, important areas of expertise for such research include history and sociology of science; work, occupations, and professions; research ethics; deviance and white collar crime; decisionmaking; and organizational behavior.

Levine then presented initial steps to be taken to establish an agenda. The stakeholders in research integrity—including the individual investigators, research teams, scientific societies, potential funders, subjects to be studied, policymakers, and the public—must be identified. Data sources already available from federal agencies and other organizations as well as resources needed but not available should be assessed. Funding sources and mechanisms should be identified, and structures—including conferences, working groups, panels, and large-scale collaborations—should be set in place to provide frequent opportunities for scholars to communicate. Finally, to develop a community of researchers working in this area, a substantial investment is needed to provide educational opportunities for researchers from different disciplines and at different career stages. These opportunities could include internships for students, postdoctoral and mid-career incentives or awards, and specialized training programs.

The session ended with some questions and comments from the audience. Among the final comments was the observation that many of the presentations focused more on context than on individual behavior and that this seemed to reflect a shift from individual character to research context in understanding research misconduct. The need to include “organizational misconduct” in this field of research also was voiced.

Studying research misconduct presents several kinds of methodological challenges, including difficulties in observing deviant behavior and in conducting research in an academic environment. Researchers, institutional review boards, and funders must be sensitive to these matters and give due diligence to research design and methods. Nothing could set the field back more, even before it takes shape, than sloppy, inappropriate, or poorly designed or applied research methods.

### **Bibliography**

1. Swazey JM, Anderson MS, Louis KS. Ethical problems in academic research. *Academic Scientist* 1993; 81 (November/December): 542-555.
2. Anderson MS. Uncovering the covert: research on academic misconduct. In: Braxton JM, editor. *Perspectives on Scholarly Misconduct in the Sciences*. Columbus, Ohio: Ohio State University Press; 1999. p. 283-314.

