Society for the Teaching of Psychology (APA Division 2)
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SCIENTIFIC MISCONDUCT: AN ANNOTATED BIBLIOGRAPHY

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Research has suggested that scientific misconduct may be partially socialized during the undergraduate years (Keith-Spiegel, Lee, Spiegel and Zinn-Monroe, manuscript in preparation). For example, many undergraduate students believe that they will get better grades on their experimental projects if they can produce statistically "significant" results. Students also allow sympathetic situational factors to excuse unethical scientific practice.

To encourage the coverage of scientific values and misconduct, we have created a resource bibliography of interesting, quality articles and books from the popular and scholarly literature that could be integrated into lectures or used as the bases for student reports.

Bechtel, H. K., & Pearson, W. (1985). Deviant scientists and scientific deviance. Deviant Behavior, 6, 237-252.
An interesting look at scientific fraud from three sociological perspectives on deviance. Rather than accepting the "bad seed" argument, the authors present scientific fraud as an "elite occupational deviance" resulting from a "conflict between goals and the ability to achieve them through legitimate means." The increasingly business-like approach to science seems to have legitimized the use of deviance in science. There has been a "reorientation away from the traditional values of disinterested inquiry."

Begley, S. (1993, March 22). The meaning of junk. Newsweek, 62-64.
A 1991 California appeals court ruled that only scientific evidence that is "generally accepted and published in peer-reviewed journals is admissible in court." The ruling has divided scientists into those who support the ruling as a deterrent to the practice of poor scientific practice and those who oppose the ruling on the grounds that a good deal of junk science currently exists in peer-review journals and a lot of good science never gets published. Arguments supportive of both positions are presented.

Bell, R. (1992). Impure science: Fraud, compromise, and political influence in scientific research. New York: John Wiley and Sons, Inc.
Money has a major influence on scientific behavior. As competition for grants and pressures to produce increase, “doctoring” of data may also increase. Colleagues are resistant to report perpetrators because the entire organization may lose credibility or funding. The author examines the roles of the peer review system, referee system, and replication in detecting misconduct. Bell suggests that conflicts of interest often hinder the preventative aspects of the system. For example, often the whistle blower is punished for speaking out. Bell sums up with prospective changes.

Ben-Yehuda, N. (1986). Deviance in science. The British Journal of Criminology, 26, 1-27.
An extensive and clearly written article on several characteristics of the scientific community that may lead to misconduct. Specifically, the author examines problems in the self-correcting nature of scientific research, lack of replication, high levels of specialization that hinder self-correction, institutions that suppress investigations, punishments that are usually mild, reward systems that induce people to cheat, and differences between what constitutes deviance and error. The author uses excellent case examples to clarify his points.

Broad, W. J., & Wade, N. (1982, November). Science's faulty fraud detectors. Psychology Today, 51-57.
An ineffective three-tiered system of scientific self-correction is suggested as the source of increased fraudulent practice. The peer review system appears not well controlled. The peer review process may be subject to bias toward recognized name institutions as well as toward research that is in accord with the referee's views. The case of Marvin Spector is used to illustrate the failure of replication, the third-tier of scientific self-correction in preventing scientific fraud.

Broad, W. G. (1981). Fraud and the structure of science. Science, 212, 37-41.
Ideally, scientific research should be self-correcting and, therefore, protect against fraud. Unfortunately, due to a lack of replication and a professional "immunity from scrutiny," protection from fraud may not prevail. Historically, philosophical views of science have included the notion that "small cheating is essential to the advancement of science." It is further suggested that fraud may not be occurring more frequently than in the past, but is rather reported with greater frequency. Increased whistle blowing and more aggressive self-policing may be the result of increased competition. Several policing measures are suggested.

Broad, W. J. (1982). Harvard delays in reporting fraud. Science, 215, 478-482.
A critical account of the manner in which Harvard University handled the case of Dr. John Darsee. It suggests that Harvard ignored Dr. Darsee's fraud for 6 months and only took action against him after inquiry from the National Institutes of Health. This article is interesting yet disconcerting to read.

Broad, W. J. (1982). Report absolves Harvard in case of fakery. Science, 215, 875-876.
Explanation is given as to why Harvard was cleared of wrong-doing in the Darsee case. The article suggests, however, that the investigating committee, which included a majority of Harvard employees, was less than aggressive in its investigation. The Harvard panel suggested several steps that might reduce the occurrence of research misconduct. The recommendations presented include: careful examination of the credentials of prospective researchers, detailed and explicit procedures for handling data, closer and more frequent scrutiny of work in progress, attempts at replication in the same laboratory, discouragement of secrecy, greater emphasis on quality and significance of research rather than on quantity, and closer personal interaction between faculty and fellows.

Brown, A. S., & Murphy, D. R. (1989). Cryptomnesia: Delineating inadvertent plagiarism. Journal of experimental psychology, 15, 432-442.

Evidence clearly supportive of the existence of a phenomenon called "cryptomnesia" is presented. Cryptomnesia is the objective presence of a memory in one's conscious which, subjectively, is not recognized as a memory but rather as a new phenomenon being experienced for the first time. Cryptomnesia has been used as a defense in both scientific and musical plagiarism cases.

Cronan-Hillix, T. (1988). Teaching students the importance of accuracy in research. Teaching of Psychology, 15, 205-207.
Students have not been sufficiently trained to understand that correctness, precision, and attention to detail in research are critical. In an effort to bring this point home to students, Cronan-Hillix assigns failing grades to students whose results sections in research papers include even one error. Students may make corrections and re-submit for re-grading, although resubmitted papers are reduced one letter grade. Such an approach helps "produce better researchers and a more accurate science."

Cronan-Hillix, T. (1991) Teaching students the importance of accuracy in research: A reply to McDonald and Peterson. Teaching of Psychology, 18, 101-102.
The author reaffirms the view that reward and punishment are effective in teaching students to pay attention to details in their research. These perhaps harsh methods have been effectively utilized by the author.

Flanagan, M. F., & Robinson, B. (1978). The secrecy game revisited. American Psychologist, 33, 775-776.
Empirical support for Dunnette's (1996, American Psychologist, 21, 343-352) assertion that psychologists often fail to report significant pieces of information in their research articles. Notably missing from a large number of articles were means and standard deviations, sex of subjects, information about whether subjects were volunteers or non-volunteers, and whether or not deception was used. Secrecy has implications for attempts at replication and assessment of internal validity. Two recommendations for correction of secrecy problems are presented.

Freedland, K. E., & Carney, R. M. (1992). Data management and accountability in behavioral and biomedical research. American Psychologist, 47, 640-645.
The complexity of obtaining and storing data in computer systems may result in honest mistakes on the part of the researcher. Carelessness on the part of the researcher may lead to further errors. However, researchers are accountable for their carelessness. Often data sets are difficult, if not impossible, to interpret when investigating cases of possible fraud. Further hampering these investigations is the lack of investigators who are well trained in statistical analysis. The authors support the creation of mandated guidelines for record keeping and data storage. Additionally, researchers should be taught data management skills. This article is recommended for graduate students and professors.

Friedman, P. J. (1989). A last call for self-regulation of biomedical research. Academic Medicine, 64, 502-504.
Several suggestions to improve the climate within which scientific research takes place are presented. The recommendations include active involvement of research faculty in setting standards of research practice, formal institutional oversight, limitations on the number of publications research faculty can present for promotion and appointment decisions a

(promoting quality over quantity), and more active participation of the National Institutes of Health in ensuring that funding is provided only to institutions that have established policies which promote ethical research practice. A number of other recommendations are outlined in this article.

Friedman, P. J. (1992). Mistakes and fraud in medical research. Law, Medicine, and Health Care, 20, 17-25.
Friedman argues that it is difficult to distinguish between research misconduct that should and should not be prosecuted. A balance must be struck between the acceptance of "common, petty deception" and protecting scientists from "guardians of purity," while protecting the public from research fraud. Friedman describes a spectrum of scientific misrepresentation with petty deception being at one end and fraud being at the other end.

Gift, A. G., Creasia, J., & Parker, B. (1991). Utilizing research assistants and maintaining integrity. Research in Nursing and Health, 14, 229-233.
This article makes specific suggestions for research assistant supervisors to maintain ethical research practices. The hiring and contracting of research assistants (RAs) should be comprehensive, and the duties of the RAs should be written out. A sufficient amount of time should be allocated to orient the RA to the research project. Reliability and validity checks on the RA's work should be conducted. The supervisor should frequently visit the lab, sometimes unannounced. Furthermore, to reduce errors, two individuals should be present when the data are entered manually. Fatigue and frustration of assistants should be considered.

Greenberg, D. S. (1988, December, 6). Academic fraud is no longer a family affair. Los Angeles Times, 7.
On the heels of the infamous Darsee case, Harvard University forced Dr. Shervert Frazier to resign after being accused of plagiarism. Dr. Frazier, 68 and near retirement, was handled in a stern manner. The Dr. Darsee case has apparently made Harvard University "especially sensitive" following accusations of heel-dragging in investigating Dr. Darsee.

Hilts, P. J. (1981, March 4). Science confronted with "crime waves" of researchers faking data in experiments. Los Angeles Times, 6.
A short yet comprehensive article which uses the fraud case of Dr. John Long to discuss a number of important issues related to scientific misconduct. Dr. Long claimed to have produced Hodgkin's disease cells in the laboratory when, in fact, they were owl monkey cells. Included in the discussion is an explanation of Dr. Long's transgression, Dr. Long's explanation of his behavior, the negative impact that Dr. Long's fraud had on the research of Hodgkin's Disease, and the National Institutes of Health's view of the extent of the research fraud problem.

Holden, C. (1987). NIMH finds a case of serious misconduct. Science, 235, 1566-1567.
The author outlines the charges of misconduct against Dr. Stephen Breuning, a psychologist who researched the uses of psychoactive drugs with the mentally retarded. Charges included inventing raw data and publishing results from experiments which were never run. The failure of two universities to aggressively investigate Dr. Breuning, even though he had shown a pattern of questionable behavior, is discussed. The results published by Breuning were utilized in social policy making which is one of the primary dangers in unethical research.

Hunt, M. (1981, November 1). A fraud that shook the world of science. New York Times Magazine, 1-6.
An interesting article which chronicles step by step how an investigation into scientific fraud took place. Specifically, the article tracks the case of Drs. Soman and Felig, two researchers at Yale University, who were accused of plagiarizing a paper submitted to a journal on which one of the accused served as a referee, a paper which was rejected for publication. The two researchers were also accused of fudging their data. The article also delineates reasons for fraud, the public perception of scientific fraud, and the aftermath of fraud.

Jensen, A. R. (1978). Sir Cyril Burt in perspective. American Psychologist, 78, 449-503.
Examines Cyril Burt's data anomalies in detail. Jensen argues that Burt's inconsistencies are just "human error." Students will need an understanding of correlational analysis in order to understand this article. (This article should be read along with McAskie (1978), referenced below, who suggests that Burt perpetrated willful misconduct.)

Kalichman, M. W., & Friedman, P. J. (1992). A pilot study of biomedical trainees' perceptions concerning research ethics. Academic Medicine, 67, 769-765.
The authors present the results of a survey of 2,010 biomedical trainees. Respondents were asked about their perceptions of unethical research practices and the extent to which they were exposed to training in the ethics of scientific investigation. Fully one half of the respondents indicated that they had either observed research misconduct, personally engaged in unethical behavior themselves, or were willing to massage or cook data to get a paper published or win a grant. Almost one quarter of the respondents indicated that they had received no training in research ethics. Interestingly, prior exposure to ethics training was not correlated with past or potential unethical behavior. The authors suggest that either research ethics are not effectively ingrained at the postgraduate level, or the training provided may be inadequate.

Knight, J. A. (1984). Exploring the compromise of ethical principles in science. Perspectives in Biology and Medicine, 27, 432-441.
The author suggests that institutional pressures to obtain grants, societal pressure in the form of high expectations for scientists, and the personal pressure to achieve success all might lead a scientist to perpetrate fraudulent research. However, the author believes that fraudulence and dishonesty in scientific research is the exception not the rule.

Lafollette, M. C. (1992). Stealing into print: Fraud, plagiarism, and misconduct in scientific publications. Berkeley, CA: University of California Press.
Lafollette provides an extensive review on the complex issues of misconduct in science. She examines the controversies related to defining fraud. For example, many scientists believe that "deliberate deception" is a separate issue from "carelessness." The author presents some guidelines to clarify the situation. Issues of authorship and attribution are discussed. Additionally, she provides an overview of environmental pressures, investigations, and "whistle blowers." Lafollette provides an excellent contribution that is easy for everyone to read.

Marsa, L. (1992). Scientific Fraud. Omni, 14, 38-43, 82-83.
A number of factors are suggested to be operating in scientific research which are creating a climate in which scientific fraud is more likely to occur. Such factors as science's increasing

failure to be self-correcting, poor treatment of whistle blowers, increased competition for funding dollars, and pressures to produce, contribute to this climate. The article ands on a hopeful note, however, presenting several steps the National Institutes of Health and National Science Foundation are taking to reduce the occurrence of misconduct.

McAskie, M. (1978). Carelessness of fraud in Sir Cyril Burt's kinship data? A critique of Jensen's analysis. American Psychologist, 72, 496-497.
McAskie logically replies to Jensen's (1978, see reference above) claims that Sir Cyril Burt was merely careless. Jensen suggests that if Sir Cyril Burt was fabricating data, he would have done so more carefully. McAskie argues that fabrication is not always so carefully done. Jensen also suggests that Burt's results were consistent with other studies in the area. McAskie suggests that the results can be manipulated to achieve any result one wants to achieve. Lastly, Jensen reported that he simply could not find any fraudulent data. McAskie suggests that Jensen simply missed evidence suggestive of fraud related to the difference between numbers falling randomly and numbers which appear to be manipulated.

McDonald, C. S., & Peterson, K. A. (1991). Teaching commitment to accuracy in research: Comment on Cronan-Hillix (1988). Teaching of Psychology, 18, 100-10
The authors criticize Cronan-Hillix's (1988, see reference above) practice of giving failing grades for research papers in which there is even one error. A mastery-oriented approach to teaching an appreciation for accuracy in research is proposed. This is interesting reading for teachers of research methods.

Myers, C. (1991, June 19). NIH regulations on scientific misconduct said to contain no significant changes. The Chronicle of Higher Education, 15, 17.
The Public Health Service is taking public comments on the procedures of the National Institutes of Health in dealing with scientific misconduct in research financed by the United States government. NIH regulations were voided by a U. S. District Court, which found that the NIH regulations had not gone through the required federal rule-making procedure that included allowing public comment. Critics charge that the regulations proposed by the NIH do not provide sufficient due process to scientists charged with misconduct. For example, scientists are not permitted to cross-examine their accuser, nor is there an appeal process.

Myers, C. (1991, April 3). NIH report on misconduct may lead colleges to deal with charges more aggressively. The Chronicle of Higher Education, 21, 24.
A brief outline of the fallout from the NIH investigations of research conducted under Dr. David Baltimore. Baltimore, a Nobel Laureate, was accused of fudging data. The reports, finding misconduct on the part of the research team, led members of Congress to suggest that universities and the NIH be more aggressive in dealing with charges of misconduct. Illustrates how the interactions of universities, the NIH, Congress, and the courts have impinged on the issue of research misconduct.

Miller, D. J., & Hersen, M. (1992). Research fraud in the behavioral and biomedical sciences. New York: Wiley.
Scientific misconduct is not a new problem of the twentieth century, but its contemporary effects may be more detrimental. The ethical and legal aspects of scientific misconduct are discussed. This book presents accounts of the specific cases of John Darsee, Elias Alsabti, and

Cyril Burt. Personality and environmental explanations are considered as well as the effects of fraudulent behaviors. Preventative measures are suggested.

National Academy of Sciences (1992). Responsible Science: Ensuring the integrity of the research process. Washington, DC: National Academy Press.
The authors review the variables that determine the legitimacy of the research process. The focus of this book is on the reporting and handling of alleged misconduct. The authors address the complex issues in defining fraud. Suggestions about encouraging ethical practices and appropriate consequences are offered.

Petersdorf, R. G. (1984). A matter of integrity. Academic Medicine, 64, 119-123.
Peterson suggests that the hyper-competitive pre-medical and medical school environments contribute to the unethical behavior which occurs in medical practice and research. Medical students have been found to have lenient attitudes toward fraudulent practice. Fraud and misconduct are, therefore, suggested to be the result of an acculturation process which has gone awry. Several suggestions to improve the establishment of standards for conducting investigations into allegations of misconduct.

Relman, A. S. (1983). Lessons from the Darsee affair. The New England Journal of Medicine, 208, 1415-1417.
This article includes an interesting discussion of trust as an underlying tenet in research enterprises. Although many are of the opinion that science is self-correcting, the author suggests that the Darsee case indicates this may not be true. A number of recommendations are put forth to protect against fraudulent research practices. These suggestions include closer supervision of young investigators, setting standards of intellectual honesty, and greater involvement of co-authors in their projects.

Sigma Xi. The Scientific Research Society (1984). Honor in Science. Triangle Park, North Carolina: The Scientific Research Society.
This excellent booklet argues that "ethical research behavior depends on group attitudes, as well as on individual behavior." Within this context, the booklet discussed the importance of conducting research with integrity, while describing unethical research practices such as trimming, cooking, forging, and misuse of statistical techniques. An argument for whistle blowing is presented, which includes suggestions for appropriate ways to confront scientific fraud as well as caveats to consider before doing so.

Smith, R. J. (1991) Scientific fraud probed at AAAS meeting. Science, 228, 1292.
A panel of academic officials and scientific journal editors agreed that the incentives for prolific publishing have created a climate in which unethical behavior is rewarded. Large laboratories lose control over what employees are doing--in some cases, ignoring questionable behavior so as to not lose funding. Cases of fraud have been found at the most prestigious universities where the pressure to publish is the greatest. Younger scientists tend to be the ones who conduct unethical research. Those who have been found to commit fraud have done so during periods of prolific publishing.

Stoler, P. (1976, March 8). Review of the book Skin Deep by J. Hixon. Time.

The author suggests that Dr. William Summerline, who was charged with misconduct, was himself a victim of the "grant game" where money tends to be awarded to researchers who show positive results. The research system is "fueled by anxiety and dependent on immediate success." This "lopsided philanthropy" motivates the conduct of poor science.

Swazey, J. P., Anderson, M. S., & Lewis, K. S. (1993). Ethical Problems in Academic Research. American Scientist, 81, 542-553.

The authors surveyed faculty and doctoral students about their experiences with unethical behaviors in their universities' chemistry, civil engineering, microbiology, and sociology departments. They discovered three types of unethical behaviors: fabrication/falsification or plagiarism, poor record keeping or honorary authorship, sexual harassment. Over half the faculty and a large portion of the graduate students had at least two personal experiences with misconduct. Though falsification and plagiarism occurred the least, it is not rare enough to be explained via the "bad seed" argument. Different departments experienced different ethical problems. The authors point to competition and lack of resources as associated with higher levels of misconduct.

Teich, A. H. (1992, January 22). Discussions of setting science priorities are filled with misunderstandings. The Chronicle of Higher Education, 52.

With a shrinking pie of research funds, many are suggesting that science set priorities. Misconceptions abound about how science is dealt with in the budget process. Priority-setting should be based on balanced information and moderation of irresponsible scientific claims. It is probably impossible for one set of scientific priorities to exist. However, scientists can provide critical information to budgetary decision-makers to help ensure that the right priorities are set.

U.S. Department of Health and Human Services (1993). NIH Guide for Grants and Contracts, 22, 1-4.

The National Institutes of Health (NIH) reports findings of scientific misconduct which have occurred in research funded by the NIH. Information included in the reports are the researcher's name, place of employment, description of the misconduct, and the penalty assessed by the NIH. These could be used for case discussions. Some of the cases discussed involve highly complex scientific projects not related to psychology. For more information contact: NIH Guide, Printing and Reproductions Branch, National Institutes of Health, Room B4BN23, Building 31, Bethesda, Maryland 20892.

Van de Kamp, J., & Cummings, M. M. (1987). Misconduct and fraud in the life sciences. National Library of Medicine Literature Search, 87-14. U.S. Department of Health and Human Services.

Several hundred citations in the area of deception and misconduct are presented. No synopsis of citations is offered. The publication may be ordered by sending a gummed, self-addressed label to: Literature Search Program, Referee Section, National Library of Medicine, 8600 Rockville Pike, Bethesda, MD 20894.

Wheeler, D. L. (1991, July 3). U.S. has barred grants to 6 scientist in past 2 years. The Chronicle of Higher Education, A1, A6.

Although the Department of Health and Human Services' Office of Scientific Integrity has been operating since 1989, a number of criticisms have been leveled against it. Included in these criticisms are a low number of investigations that have found wrongdoing, lenient penalties, and a lack of responsiveness to whistle blowers.

Wheeler, D. L. (1991, May 15). NIH office that investigates scientists' misconduct is target of widespread charges of incompetence. The Chronicle of Higher Education, A5, A8.
The Office of Scientific Integrity at the National Institutes of Health, which is charged with investigating charges of scientific misconduct, has come under fire for inefficiency, lethargy, leniency, and disorganization. Further compounding the problems of this watchdog agency is a lack of general agreement in the scientific community as to what constitutes the standards of scientific misconduct.

Wong, P. T. (1981). Implicit editorial policies and the integrity of psychology as an empirical science. American Psychologist, 36, 690- 692.
The author suggests that editorial practices may encourage data fraud and impede its detection. Publishers' resistance to negative criticism decreases the reporting of failed replications. Also, sound studies are often not considered for publication if the manuscript is submitted with even one grammatical error. Lastly, views that are contradictory to the latest fad are often dismissed and are not published. All these factors hinder the development of science.

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* Contributions: Patricia Keith-Spiegel served as the project chair and editor. She also identified and acquired the material to be abstracted. Keith Aronson and Michelle Bowman wrote the abstracts.