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Objectivity of Research: Ethical Aspects

1. Introduction

This article elucidates the generally accepted idea that scientists should strive to be objective. It provides a definition of 'objective research,' describes the evolving debate concerning objectivity, examines the foundations of objectivity in science, and discusses some of the principles of conduct relating to objectivity, such as honesty and openness. In exploring this subject, the article addresses several topics related to objectivity, such as error and bias, peer review, cooperation and trust in science, conflicts of interest, social responsibility, and the moral limits of objectivity.

2. What is Objective Research?

The phrase 'objective research' has several different meanings in the social sciences and humanities. We often think of objective research as research that is *unbiased or impartial*. Thus, an objective researcher (or project, report or study) is like a judge who attempts to give a fair hearing to both sides of a legal dispute. The objective judge listens to both sides of a dispute without giving undue consideration to either. We also think of objective research as *value-free* i.e., as research that is unaffected by moral, economic, social, political, or religious values. Thus, an objective researcher is like a judge who attempts to make decisions based on legal and empirical evidence without allowing his values to affect his judgment and reasoning. We also think of objective research as *reliable or trustworthy*. Thus, an objective researcher is like a thermometer that reliably reports the temperature. We can trust the thermometer's report. Finally, we also think of objective research as research that is *factual or real*. Objective theories (hypotheses or concepts) are theories that correctly depict facts or real phenomena, and they can be contrasted with fiction, propaganda, speculation, and fraud. All of these conceptions of objective research capture some important aspects of our use of this phrase; there are a variety of ways of understanding objectivity (Harre and Krausz 1996). For the purposes of this article, objective research can be defined as research that is: (a) unbiased or impartial, (b) value-free, (c) reliable or trustworthy, or (d) factual or real.

3. The Evolving Debate about Objectivity

The notion that scientists have ethical duties to be objective is hardly a modern invention. Scientists and philosophers who laid the foundations for the modern scientific method, such as Francis Bacon, Rene Descartes, Galileo Galilei, and William Harvey, all viewed science as objective inquiry. Editors of the first scientific journals instituted peer review in order to publish articles based on objective evidence and reliable methods (LaFollette 1992). Charles Babbage (1970) was perhaps the first scientist to emphasize the ethical component of scientific objectivity in print. He coined the terms 'fudging,' 'cooking,' and 'trimming' to describe some of the unscrupulous research practices he observed in England in the 1800s. In the last half of the 1900s, powerful discoveries and inventions, such as atomic power, the computer, and genetic engineering, have compelled researchers to recognize the social impacts of science and technology and the

relationship between objective inquiry and moral responsibility (Shrader-Frechette 1994).

In the last two decades, politicians, the press, and the public have raised questions about scientific integrity and ethics as a result of highly publicized cases of misconduct in science and questionable research practices (Broad and Wade 1993). Some of these episodes include allegations of fraud, plagiarism, misappropriation of funds, and exploitation of subordinates, as well as controversies concerning secrecy, conflicts of interest, patents, and the funding of science. In response to these concerns, funding agencies, professional associations, and research institutions have adopted codes of ethical conduct in science that address issues relating to objectivity and other aspects of scientific integrity and ethics (Sigma Xi 1986, American Association for the Advancement of Science 1980, Panel on Scientific Responsibility and the Conduct of Research 1992, Committee on the Conduct of Science 1994).

While this debate about ethical duties concerning objectivity was taking place, many scholars and scientists began to question the idea that science is or can be objective. This controversy about the objectivity of science is also not new—the ancient Greek philosophers developed accounts of objective knowledge in response to sophistry and relativism—but its twentieth-century incarnation has spurred an extensive inquiry into the nature of scientific method and practice. Inspired by Thomas Kuhn's monumental work on the history of science, *The Structure of Scientific Revolutions* (1962), scholars from the social sciences and humanities have challenged the traditional view of science as objective knowledge. According to these scholars, otherwise known as 'constructivists' scientific research is strongly influenced by moral, economic, historical, social, political, or religious interests or values (Shapin and Shaffer 1985, Latour and Woolgar 1986). Defenders of the traditional view have responded to these critiques with their own arguments (Kitcher 1993, Gross and Levitt 1994). These debates about the objectivity of science—the so-called 'science wars'—have migrated from the halls of academia to the outside world, and they have received considerable attention from the press.

For the purposes of this article, this debate is relevant insofar as it has some bearing on the ethical aspects of objectivity in research. With this in mind, it is important to realize that strong versions of constructivism may be incompatible with the idea that researchers have ethical obligations to be objective, since it makes little sense to claim that a person has an ethical obligation that he cannot fulfill. If it is impossible to at least strive to be objective, then the claim that researchers have ethical duties to be objective is moot (Resnik 1998). While it is important to acknowledge and understand factors that can undermine or compromise objectivity in research, this article will assume that it is at least possible for researchers to strive to be objective, even if they often fall short of this ideal.

4. *Foundations of Research Ethics*

Ethical duties in science stem from two main sources: (a) the scientific profession itself, and (b) society at large (Resnik 1998). Ethical standards (or norms) promote the aims and goals of science in several ways. Many standards promote the advancement of human knowledge. For example, honesty in science is important in obtaining truth and avoiding error and deception. Other ethical standards play a key role in promoting cooperation and trust among scientists by creating institutional structures that direct individual interests toward common goals (Merton 1973). For example, authorship practices reward researchers for their efforts and ingenuity, insure that publications meet standards of quality and originality, and hold researchers accountable for their contributions.

Scientists also should adhere to ethical standards in order to promote social values, uphold the public's trust in science, and secure the public's support for research. For example, data fabrication can lead to harmful social consequences, especially if the fabricated results pertain to applied sciences like medicine or engineering. Data fabrication can also be construed as a form of lying, which is widely regarded as immoral. Data fabrication violates the public's trust in science because the public trusts that scientists will not fake data. Finally, fabrication can undermine the public's support for science if people become concerned about unethical conduct among researchers and decide to shift government funds to other programs, such as education or healthcare.

5. *Ethical Principles and Objectivity*

There are a variety of ethical principles (or standards) that promote objectivity in research. The principles discussed below should be viewed as general guidelines instead of absolute rules. They must be elaborated, assessed, and interpreted before they can be applied to particular situations or cases.

5.1 *Honesty*

The principle of honesty implies a general prohibition against falsifying, fabricating, or misrepresenting data, results, or other types of information pertaining to scientific publication. Honesty applies to a variety of other aspects of research, such as grant proposals, peer review, personnel actions, accounting and finance, expert testimony, informed consent, media relations, and public education. As mentioned previously,

honesty plays a key role in the search for knowledge and in promoting cooperation and trust among researchers. Few scientists or scholars dispute the importance of honesty and most people understand what it means to fabricate or falsify information pertaining to research. However, a few points of clarification will be helpful.

5.2 Error, Bias, and Disagreement

First, it is important to distinguish between dishonest research and error. Dishonesty implies the intent to deceive; error does not. Making an honest mistake in recording or analyzing data should not be equated to faking data. Although errors and dishonesty often have similar results, i.e., the deception of an audience, they arise from different motives. However, scientists also have an obligation to avoid making errors, since errors can also damage the quest for knowledge and undermine cooperation and trust among researchers. Although mistakes are, and always will be, a part of science—scientists are human beings, after all—excessive or egregious errors should be denounced as a form of negligence, since these errors have detrimental effects on research or its practical applications.

Scientists have an obligation to prevent errors by carefully scrutinizing and reviewing their own work and the work of others. Although some errors result from haste or sloppiness, more subtle follies are due to systematic errors (or biases) and self-deception. For example, since the 1800s, racial and ethnic biases have plagued research on human intelligence. More recently, self-deception (or simple carelessness) was probably at work in the cold fusion research conducted by Stanley Pons and Martin Fleischmann. Scientists also have a responsibility for reducing the effects of error by publishing errata, corrections, retractions, or apologies. Although the peer review system is not perfect, it can play an important role in reducing errors. Hence, reviewers and editors have ethical responsibilities pertaining to objectivity (LaFollette 1992).

It is also important to distinguish between dishonesty and disagreement. Researchers often have fundamental disagreements about methods, concepts, and theories. Scientists may disagree about research results (or their significance) without viewing their opponents as dishonest. Before an act can be judged to be dishonest, researchers must have some agreement on what constitutes the honest application of methods, concepts.

5.3 Misrepresentation of Data

The concept of 'misrepresentation,' unlike 'fabrication' and 'falsification,' is neither clear nor uncontroversial. Most scientists will agree that fabrication is making up data and falsification is changing data. But what does it mean to misrepresent data? As a minimal answer to this question, one can define 'misrepresentation of data' as 'communicating honestly reported data in a deceptive manner.' But what is deceptive communication? The use of statistics presents researchers with numerous opportunities to misrepresent data. For example, one might use a statistical technique, such as multiple regression or the analysis of variance, to make one's results appear more significant or convincing than they really are. Or one might eliminate (or trim) outliers when 'cleaning up' raw data. Other ways of misrepresenting data include drawing unwarranted inference from data, creating deceptive graphs of figures, and using suggestive language for rhetorical effect.

However, since researchers often disagree about the proper use of statistical techniques and other means of representing data, the line between misrepresentation of data and 'disagreement about research methods' is often blurry. Since 'misrepresentation' is difficult to define, many organizations have refused to characterize misrepresenting data as a form of scientific misconduct. On the other hand, it is important to call attention to the problem of misrepresenting data, if one is concerned about promoting objectivity in research, since many of science's errors and biases result from the misrepresentation of data.

5.4 Conflict of Interest

In order to promote objectivity in research, it is important for scientists to minimize the effects of financial, personal, professional, and political interests that may potentially undermine their ability to conduct and evaluate research. Conflict of interest has emerged as an important ethical concern in science in this century as many researchers now have significant financial interests in their work (Macrina 1995). Private support for research and development (R&D) has risen steadily since 1970. Today, industry provides over $100 billion in R&D funding in the United States alone, and it is expected that the trend toward the privatization of research will continue. Scientists working in the private sector receive remuneration in the form of salary, stock options, or royalties. Even researchers funded by governments or universities can have significant financial interests in the form of patents or copyrights. Although financial, and other, interests do not invalidate research—good research can still occur in troublesome circumstances—research that is conducted when conflicts exist is more likely to be biased or unreliable. For example, a scientist whose research is sponsored by a pharmaceutical company is more likely to publish results that favor the company than a scientist who is not working for the company. Even when research is not biased, the presence of a significant conflict can create the perception of a bias. For example, if people learn that a food company has sponsored research demonstrating the health benefits

of its fat free potato chip, they may believe that the research is biased, even if it is not. Conflicts of interest can arise in experimental design, publication, peer review, personnel decisions, expert testimony, media interviews, and other aspects of science (Resnik 1998).

How should scientists deal with conflicts of interest? First, scientists should disclose actual or potential conflicts of interest to those parties who may be affected by these conflicts. Most journals and funding organizations now require researchers to disclose sources of funding and potential conflicts of interest. Sometimes these disclosures are made available to the public when articles are published. Disclosure can help buffer the impact of bias by allowing reviewers, scientists, and the lay public to scrutinize and question research that may be affected by economic, social, or political interests. Second, although it is not possible to avoid all conflicts of interest, researchers have a duty to avoid those conflicts that cannot be corrected by peer review or may have a dramatic impact on science or society. For example, researchers should not review a grant application if the applicant is a close friend or bitter enemy. The decision to avoid a potential or actual conflict of interest, also known as 'recusal,' can promote objectivity by removing a researcher from a situation that could create a bias or the perception of bias.

5.5 Openness

Since openness provides scientists with a reliable defense against error, bias, self-deception, dishonesty, and other phenomena that can threaten objectivity, it is an important ethical principle in research. Openness promotes objectivity in several ways. First, it enables researchers to criticize each other's work. Criticism can occur before, during, or after peer review. Frequently, the most important criticism takes place before an idea appears in print. Second, openness helps researchers make effective use of human and technological resources. Problems can be solved more effectively when researchers cooperate with each other than when they work in isolation (Merton 1973).

Although openness is an important ethical principle in research, it often conflicts with personal or institutional interests. Sometimes researchers refuse to share data in order to protect scientific priority or intellectual property rights. For example, a researcher who is developing a new product may decide not to share preliminary data until they have applied for a patent. A researcher who discovers a new phenomenon may not disclose the discovery until the paper has been accepted for publication. Sometimes researchers refuse to share data in order to protect their reputations. For example, a scientist may decide to not share preliminary results from a study until they have had enough time to verify and analyze those results. Researchers may refuse to share data because they have signed a contract with a corporate sponsor not to disclose data without prior authorization. Since many different parties—government, industry, colleagues, the media—may seek to obtain scientific information, it is likely that researchers will often face difficult choices when deciding how and when to share information.

6. The Moral Limits of Objectivity

While objectivity is one of science's most important principles, it should be acknowledged that this norm sometimes conflicts with other ethical duties, such as the obligation to protect human subjects and social responsibility (Shrader-Frechette 1994). For example, anthropologists may refuse to publish or disclose information in order to protect and promote the welfare of the human populations they are studying. In psychology, researchers have a duty to keep information about human subjects confidential in order to protect their privacy, dignity, and autonomy. An ecologist who is interviewed by the media must choose between their desire to advocate for the environment and their scientific duties to remain objective. Although scientists should strive to be objective, there are some situations where scientists should relax their commitment to objectivity in order to promote other moral and social values.

See also: Ethical Dilemmas: Research and Treatment Priorities; Objectivity, History of; Objectivity: Philosophical Aspects; Research Conduct: Ethical Codes; Research Ethics, Cross-cultural Dimensions of; Research Ethics: Research

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