

# A glossary of terms for research integrity

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This glossary is a work in progress. Suggestions for additions or improvements are welcome. Definitions of terms marked with an asterisk (\*) originally appeared in Pimple 2002.

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## Fraud – *see Scientific fraud* \*

## Integrity of the research process

Responsible Science, Vol. 1., emphasizes the integrity of the research record, but I could not find the “integrity of the research record.”

By *integrity of the research process*, the panel means the adherence by scientists and their institutions to honest and verifiable methods in proposing, performing, evaluating, and reporting research activities. The research process includes the construction of hypotheses; the development of experimental and theoretical paradigms; the collection, analysis, and handling of data; the generation of new ideas, findings, and theories through experimentation and analysis; timely communication and publication; refinement of results through replication and extension of the original work; peer review; and the training and supervision of associates and students. The traditions of skepticism, openness, sharing, and disclosure that are associated with the research process not only provide a means of identifying theoretical or experimental errors that occur inevitably in science, but also imply an obligation to maintain the integrity of the research process. Errors

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are often corrected by later research, stimulated by the skepticism of other scientists. Error, however, is distinct from actions that directly compromise the integrity of the research process. [COSEPUP 1992:17-18, emphasis in original]

See also *Integrity of the research record*.

## **Integrity of the research record**

I could not find the phrase “integrity of the research record” in Responsible Science, Vol. 1., but it does appear in more than one document. Here I quote the latest of which I am aware, the 2000 Federal definition of research misconduct, which also uses the phrases “reliability of the research record” and “the accuracy and reliability of the research record,” which go a good way to defining the term. It is also defined in contrast:

This policy is limited to addressing misconduct related to the conduct and reporting of research, as distinct from misconduct that occurs in the research setting but that does not affect the integrity of the research record, such as misallocation of funds, sexual harassment, and discrimination. This policy does not limit agencies or research institutions from addressing these other issues under appropriate policies, rules, regulations, or laws. In addition, should the behavior associated with research misconduct also trigger the applicability of other laws (including criminal law) this policy is not intended to limit agencies or research institutions from pursuing these matters under separate authorities. [OSTP 2000]

See also *Research record*.

## **Misconduct in science – see Research misconduct \***

### **Other Forms of Professional Misconduct \***

Immediately following its proposed definition of misconduct in research, Integrity and Misconduct in Research provides a definition of “Other Forms of Professional Misconduct,” as follows:

#### **2. Other Forms of Professional Misconduct**

##### **a. Obstruction of Investigations of Research Misconduct**

**The Federal Government has an important interest in protecting the integrity of investigations into reported incidents of research misconduct. Accordingly, obstruction of investigations of research misconduct related to federal funding constitutes a form of professional misconduct in that it undermines the interests of the public, the scientific community, and the Federal Government.**

**Obstruction of investigations of research misconduct consists of intentionally withholding or destroying evidence in violation of a duty to disclose or preserve; falsifying evidence; encouraging, soliciting or giving false testimony; and attempting to intimidate or retaliate against witnesses, potential witnesses, or potential leads to witnesses or evidence before, during, or after the commencement of any formal or informal proceeding.**

##### **b. Noncompliance with Research Regulations**

**Responsible conduct in research includes compliance with applicable federal research regulations. Such regulations include (but are not limited to) those governing the use of biohazardous materials and human and animal subjects in research.**

**Serious noncompliance with such regulations after notice of their existence undermines the interests of the public, the scientific community, and the Federal Government and constitutes another form of professional misconduct.**

The Commission's proposed definition of research misconduct and definitions of other forms of professional misconduct related to research will reach their full meaning when tested with real-world experience, cases, and commentaries. The Commission is relying on professional societies, research institutions, science ethics scholars, and case law to develop the interpretive context. [CRI 1991:14, emphases in original]

## **Pathological science \***

A term coined by Irving Langmuir: “Cases where there is no dishonesty involved but where people are tricked into false results by a lack of understanding about what human beings can do to themselves in the way of being led astray by subjective effects, wishful thinking or threshold interactions” (Langmuir 1989, quoted in Carroll 2000). Pathological science is a form of unintentional bias, usually used to describe incidents in which many researchers are deluded by interesting or exciting – though erroneous – findings; examples often cited are polywater, N-rays, and cold fusion.

## **Questionable research practices \***

In 1992, the Committee on Science, Engineering, and Public Policy (COSEPUP) of the National Academies proposed the concept of “questionable research practices” to elucidate and eliminate the “other serious deviations” clause in the definition of misconduct. “Questionable research practices are actions that violate traditional values of the research enterprise and that may be detrimental to the research process,” but may not be as serious as misconduct (COSEPUP 1992:28).

Questionable research practices include activities such as the following:

- Failing to retain significant research data for a reasonable period.
- Maintaining inadequate research records, especially for results that are published or are relied on by others;
- Conferring or requesting authorship on the basis of a specialized service or contribution that is not significantly related to the research reported in the paper;
- Refusing to give peers reasonable access to unique research materials or data that support published papers;
- Using inappropriate statistical or other methods of measurement to enhance the significance of research findings;
- Inadequately supervising research subordinates or exploiting them; and
- Misrepresenting speculations as fact or releasing preliminary research results, especially in the public media, without providing sufficient data to allow peers to judge the validity of the results or to reproduce the experiments. [COSEPUP 1992:28]

## **Regulatory compliance \***

This term expresses concern with following the rules (regulations and laws), including the rules of a lab, research group, department, university, state, or country.

## **Research misconduct \***

A single Federal definition of research misconduct was proposed in October of 1999 and

adopted December 6, 2000. “Misconduct” is a technical, semi-legal term designating behaviors that justify Federal intervention, and the precise definition is important.

#### I. Research\* Misconduct Defined

Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results.

Fabrication is making up data or results and recording or reporting them.

Falsification is manipulating research materials, equipment, or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.\*\*

Plagiarism is the appropriation of another person’s ideas, processes, results, or words without giving appropriate credit.

Research misconduct does not include honest error or differences of opinion.

\*Research, as used herein, includes all basic, applied, and demonstration research in all fields of science, engineering, and mathematics. This includes, but is not limited to, research in economics, education, linguistics, medicine, psychology, social sciences, statistics, and research involving human subjects or animals.

\*\*The research record is the record of data or results that embody the facts resulting from scientific inquiry, and includes, but is not limited to, research proposals, laboratory records, both physical and electronic, progress reports, abstracts, theses, oral presentations, internal reports, and journal articles.

#### II. Findings of Research Misconduct

A finding of research misconduct requires that:

There be a significant departure from accepted practices of the relevant research community; and

The misconduct be committed intentionally, or knowingly, or recklessly; and

The allegation be proven by a preponderance of evidence. [OSTP 2000:76262]

The above definition replaces two existing definitions, one developed by the Public Health Service and the other by the National Science Foundation, with one single definition and policy. The two earlier definitions essentially boil down to “fabrication, falsification, plagiarism, or other serious deviation from accepted practices.” The new definition excludes the controversial “other serious deviations” clause. The complete definitions are as follows:

##### The Public Health Service (PHS) definition:

“Misconduct” or “Misconduct in Science” means fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the scientific community for proposing, conducting, or reporting research. It does not include honest error or honest differences in interpretations or judgments of data. [PHS 1989:32449]

##### The National Science Foundation (NSF) definition:

“Misconduct” means (1) fabrication, falsification, plagiarism, or other serious deviation from accepted practices in proposing, carrying out, or reporting results from activities funded by NSF; or (2) retaliation of any kind against a person who reported or provided information about suspected or alleged misconduct and who has not acted in bad faith. [NSF 1991:22287]

In 1995, the Congressionally-appointed Commission on Research Integrity (a.k.a. the Ryan commission) submitted its report, Integrity and Misconduct in Research, proposing the following definition of misconduct, which was not adopted.

The Commission recommends that the Secretary replace the existing definition of misconduct in science with the definition of research misconduct and definitions of other forms of professional

misconduct related to research, to follow. The definition of research misconduct is based on the premise that research misconduct is serious violation of the fundamental principle that scientists be truthful and fair in the conduct of research and the dissemination of its results.

The Federal Government has an interest in professional misconduct involving the use of federal funds in research, as covered by the following definitions:

### 1. Research Misconduct

**Research misconduct is significant misbehavior that improperly appropriates the intellectual property or contributions of others, that intentionally impedes the progress of research, or that risks corrupting the scientific record or compromising the integrity of scientific practices. Such behaviors are unethical and unacceptable in proposing, conducting, or reporting research, or in reviewing the proposals or research reports of others.**

Examples of research misconduct include but are not limited to the following:

**Misappropriation: An investigator or reviewer shall not intentionally or recklessly**

**a. plagiarize, which shall be understood to mean the presentation of the documented words or ideas of another as his or her own, without attribution appropriate for the medium of presentation; or**

**b. make use of any information in breach of any duty of confidentiality associated with the review of any manuscript or grant application.**

**Interference: An investigator or reviewer shall not intentionally and without authorization take or sequester or materially damage any research-related property of another, including without limitation the apparatus, reagents, biological materials, writings, data, hardware, software, or any other substance or device used or produced in the conduct of research.**

**Misrepresentation: An investigator or reviewer shall not with intent to deceive, or in reckless disregard for the truth,**

**a. state or present a material or significant falsehood; or**

**b. omit a fact so that what is stated or presented as a whole states or presents a material or significant falsehood.**

Free scientific inquiry naturally includes proposing hypotheses that may ultimately prove to be false, offering interpretations of data that conflict with other interpretations, and making scientific observations and analyses that may prove to be in error. The Commission's recommendations pose no threat to such inquiry, which is essential to the advancement of science.

The sanctionable behaviors defined and elaborated here are not intended to limit or define comprehensively the oversight role of academic and research institutions, which are free to adopt more demanding standards. [CRI 1995:13-14, emphases in original]

## Research record

More TBA.

The research record is the record of data or results that embody the facts resulting from scientific inquiry, and includes, but is not limited to, research proposals, laboratory records, both physical and electronic, progress reports, abstracts, theses, oral presentations, internal reports, and journal articles.[OSTP 2000, note 3]

See also *Integrity of the research record*.

## Responsible conduct of research (RCR)

“For the purpose of this Notice, **responsible conduct of research is defined as the practice of scientific investigation with integrity. It involves the awareness and application of established professional norms and ethical principles in the performance of all activities related to scientific research**” (NIH 2009, emphasis in original).

## Research ethics

Definition TBA.

## Research integrity \*

In some contexts, “research integrity” refers to the extent to which publicly presented research accurately reflects the scientific findings and is not tainted by fabrication or falsification. A wider definition was proposed by Nicholas Steneck: “a measure of the degree to which researchers adhere to the rules or laws, regulations, guidelines, and commonly accepted professional codes and norms of their respective research areas” (Steneck 2002:2).<sup>a</sup>

## Scientific ethics \*

"Scientific ethics" is sometimes used to describe a subset of professional ethics -- the professional ethics of scientists (Kovack 1996; Barden et al. 1997).

## Scientific integrity

On March 9, 2009, President Barak Obama issued a “Memorandum for the Heads of Executive Departments and Agencies” with the subject line “Scientific Integrity.”

This paragraph provides the President’s plain-language description of what he means by scientific integrity:

The public must be able to trust the science and scientific process informing public policy decisions. Political officials should not suppress or alter scientific or technological findings and conclusions. If scientific and technological information is developed and used by the Federal Government, it should ordinarily be made available to the public. To the extent permitted by law, there should be transparency in the preparation, identification, and use of scientific and technological information in policymaking. The selection of scientists and technology professionals for positions in the executive branch should be based on their scientific and technological knowledge, credentials, experience, and integrity. [Obama 2009; OSTP 2009]

In short, the government’s use of scientific findings must not be compromised by political shenanigans.

## Scientific fraud \*

“Fraud” is no longer widely used in this context. It was replaced by “misconduct in science” or “scientific misconduct” because

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<sup>a</sup> TBA: I need to integrate my ORI 2013 paper here.

most legal interpretations of the term “fraud” require evidence not only of intentional deception but also of injury or damage to victims. Proof of fraud in common law requires documentation of damage incurred by victims who relied on fabricated or falsified research results. Because this evidentiary standard seemed poorly suited to the methods of scientific research, ‘misconduct in science’ has become the common term of reference in both institutional and regulatory policy definitions. [COSEPUP 1992:25]

See also *Research misconduct* \*.

## Scientific misconduct

An unfortunate alternative to *Research misconduct* \* (QV) implying that the misconduct was enacted with scientific rigor. It is not currently in use. Published example TBA.

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