2016

For the Sound Development of Science

The Attitude of a Conscientious Scientist

Abridged Edition of the Text edited by JSPS

https://www.jsps.go.jp/j-kousei/data/rinri.pdf

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Section I: What Is a Responsible Research Activity?

1. Responsible Research Activity: Why Now?

Science is built upon a foundation of trust. Scientists believe that they and their colleagues "have gathered data carefully, used appropriate analytic and statistical techniques, and reported their results accurately."[1] The general public also believes that "scientific research results are an honest and accurate reflection of a researcher's work."[1] If such trust were to be shaken or lost, science itself would lose its foundation.

Unfortunately, there have been incidents of research misconduct such as data fabrication and falsification as well as improper use of research funds. Some of them have been reported in the media.

With this background, this textsummarizes the standards that each scientist needs to understand and abide by to ensure the sound advancement of science.

To advance science, nothing is more important than freedom in carrying out research. While various rules and restrictions on research activities exist, research activities must not be impeded by these rules or by a misunderstanding of them. When scientists maintain these standards autonomously, it becomes possible for them to conduct their research freely and independently without incurring excessive external interference.

2. Responsibility for Proper Research Conduct within Society

2.1. Science and Society

(omitted)

2.2 Responsibility to Science and Society

(omitted)

2.3. Research Integrity

Scientific research is built upon the assumption that scientists can trust one another's research. Scientists must, therefore, exercise integrity in proposing ideas, making plans, submitting applications, conducting research, and reporting results. Scientists generally get recognition for their work based on the role they play in publishing or presenting their research results. Concurrently, scientists are also held accountable for the content of their papers.

Scientists need to evaluate correctly and respect the research results and work of other scientists. Scientists are required to assess and/or criticize the results of their fellow scientists while, at the same time, accepting humbly criticism of their own research, and to maintain an honest and constructive exchange of ideas.

Scientists also need to actively participate in mutual evaluations among peers within the scientific community, particularly in their areas of expertise.

2.4. Compliance with Laws and Regulations

In research activities where human subjects[3] are involved as participants, it is necessary to respect their individuality and human rights, to give them sufficient explanations, to respect all agreements, and to ensure that any disadvantages will not exceed the advantages.

Not only in areas of research that involve human and/or animal subjects, but also in areas where the environment could be negatively impacted or where the research involves dangerous substances, laws, regulations and guidelines are stipulated for a variety of research activities. Scientists engaged in such research need to first acquire a thorough understanding of the regulations related to their research, to get properly trained in the proper procedures, and to take utmost care to comply with the regulations.

2.5. Role of Scientists in Society

Just as it is important for scientists to understand what society expects to science, it is also important that science be understood by society. To this end, scientists need to participate actively in dialogues and exchanges with the public.

In 2013, the Science Council of Japan issued a "statement," which included a renewed proposal for a "Code of Conduct" and added a section entitled "Science in Society." This statement declares that it is not enough for scientists to just properly do their everyday research; rather, they need to bear in mind a concept of "science in society," taking responsibility for making scientific contributions to society.

3. What Is Demanded of Scientists Today

In order for science conducted in Japan to maintain its trust both domestically and internationally and to make global contributions, maintaining research integrity is above all most important. Accordingly, each research institution is required to train and educate its members in research ethics, helping them to acquire a deeper understanding of integrity in scientific research.

Notes and References: ----------

1. National Academy of Sciences. On Being a Scientist: A Guide to Responsible Conduct in Research: Third Edition. Translated by Satoru Ikeuchi, Kagakudojin, 2010.

3. "Human subject" (*hikensha*) is a term generally used in the medical field to refer to a person involved in an experiment or study, while the term "research participant" (*kenkyu taishosha*) is more generally used in the fields of psychology and human genetics, though these two terms refer to the same persons. In this book, we use the word "human subject" except when sentences are focused on psychology and human genetics, in which case we use the term "research participant."

Section II: Planning Research

1. Introduction

(omitted)

2. Value and Responsibility of Research

2.1. Purpose of the Research: What Research Is For

As one begins to prepare a research plan, his/her first and foremost question should be: "What is this research for?" In today's world, knowledge and technology produced by research in virtually all field have the ability to impact society and the environment. The code of conduct issued by the Science Council of Japan states the following on this point.

(Basic Responsibilities of Scientists)

1. Scientists shall recognize that they are responsible for assuring the quality of the specialized knowledge and skills that they themselves create, and for using their expert knowledge, skills and experience to contribute to the health and welfare of humankind, the safety and security of society, and the sustainability of the global environment.

2.2. Appropriateness of Research

Every research project needs to be scientifically appropriate. To validate the scientific appropriateness and originality of a research plan, a careful review and analysis must be made of what research has already been done in that area. It is also necessary to consider how the objectives of the planned research comply with the ethical standards and the code of conduct established by related academic societies and institutions.

2.3. Shared Objectives in Joint Research

When a number of scientists work together as a group or team to do research, it is important that the members have a common understanding of the research's purpose and objective, acquired by discussing fully what each wants to pursue via the project. In addition, the objectives are to be aimed at increasing knowledge that is "beneficial to humankind."

It is also important that all scientists involved agree at the initial stages of planning on the ownership of data and other intellectual properties, the decision-making method for presenting the results, and how to decide on issues related to acknowledgements, credits, and authorships, including the main authors and collaborating authors.

3. Freedom in Research and What Is to Be Protected—Safety, Health, and Welfare of Humankind and the Sustainability of the Environment

3.1. What Is to Be Protected

It is not to say that anything should be allowed in the name of scientific research. One

should never forget that freedom in research is to be guaranteed only so far as the research fulfills its responsibility of protecting those things that are to be protected. Science is expected to make contributions to the health and welfare of humankind, safety and security within society, and the sustainability of the global environment. Therefore, when conducting research these values are expected to be protected.

For instance, the Kakenhi (Grant-in-Aid for Scientific Research) application form has a section entitled "Protection of Human Rights and Compliance with Laws and Regulations", which indicates that the objects to be protected by these measures include the following:

- Protection of human rights
- Informed consent
- Confidentiality of personal information
- Compliance with laws and regulations related to human life ethics
- Compliance with laws and regulations related to safety
- Approval of an ethics review committee

3.2. What Is to Be Protected in Research with Human Subjects

(omitted)

3.3. Safety Consideration in the Research Environment

When writing a research plan, one must pay attention to the safety of not only oneself but also of the co-investigators and research collaborators.

Many experimental research projects involve drugs and other chemical substances. To use chemical substances safely, one needs to fully understand the dangers associated with them and have knowledge of related laws. Among chemical substances, of particular importance is the handling of radioactive materials, which requires special knowledge and caution.

As life science research undergoes rapid advancement, more and more laboratories are handling organisms that are toxic to the human body and/or the environment. Concerning issues involving bio-hazards and bio-safety, members of research laboratories who actually handle organisms need to have sufficient knowledge, but also do all those who work in nearby laboratories and related staff members of the university.

4. Measures to Avoid Conflicts of Interest

Guidelines of the Ministry of Health, Labour and Welfare :

A conflict of interest specifically refers to a situation wherein, due to a financially profitable relation with an outside entity, for example, fair and appropriate judgment, which is necessary for public research, is compromised or appears to be possibly compromised to a third person.

When fair and appropriate judgment is blocked, data can be falsified, certain corporations could get special treatment, research could go on despite reasons to suspend it, and/or other

results could follow.

"Financially profitable relation" refers to a relation in which a researcher receives compensations or other benefits from an institution other than the one he or she is affiliated with for research.

5. Security Consideration

5.1. Security Export Control of Subtleties and Other Technologies

Some information and technologies owned by a research institution or a university can possibly be applied to weapons of mass destruction (nuclear, biological, or chemical weapons, missiles, etc.) or to conventional weapons. If these somehow reach certain nations or get into the hands of terrorists, the consequence could be of tragic proportion in some part of the world. The research results, originated with pure motives, may be used for developing weaponry in an unexpected manner, thus it may be subject to regulatory restrictions under the law[5].

From the standpoint of international security, export of goods that can possibly be applied to weapons of mass destruction is subject to regulations in most countries around the world, including Japan, based on international agreements. Management of technology provision is also carried out under these agreements. This is referred to as "security export control," and Japan has established and implemented a management system based on the "Foreign Exchange and Foreign Trade Act" (hereafter referred to as "FEFTA"). This law applies to all goods or technologies subject to the restrictions of a country, even for research/education purposes. It even applies to providing a restricted technology within a country. Scientists and their affiliated institutions that violate these laws are subject to penalties.

Some specific examples of violations that could occur are as follows: Research training given to an overseas student or an international scientist, joint research done with a foreign university or company, taking research documents out of a lab, a foreign national coming to Japan for a plant tour or visit, a foreign scientist giving lectures that are not open to the public. Particularly in doing international joint research, there is a strong possibility that experimental equipment is loaned out, that data and technical information is sent/received via the Internet, and that scientists are invited and trained.

5.2. Dual-Use Issues

Originally, the term "dual use" in science and technology referred to the possibility that a particular technology could be used for both consumer (commercial) and military purposes. Dynamite is indispensable in civil construction, but it can also be used as a powerful weapon. Conversely, the Internet and GPS are good examples of technologies that were originally developed for military purposes but are now used for commercial purposes.

The report by The Science Council of Japan specifies that it is the responsibility of scientists

to ensure that their own scientific results are not used for purposes contrary to the welfare and safety of humankind. In the "Statement: Code of Conduct for Scientists—2013 Revised Version," the main points of this report are reflected;

(Dual Use of Scientific Research Outcomes)

6. Scientists shall recognize that there exist possibilities that their research results, contrary to their own intentions, may be used for destructive actions, and shall select appropriate means and methods as allowed by society in conducting research and publicizing the results.

6. Compliance with Laws and Regulations

In conducting research, scientists must remember to comply with research-related rules including the law. There are also a variety of laws, regulations and guidelines on handling obtained data, such as the Act on the Protection of Personal Information.

Furthermore, scientists are required, in accordance with accepted social norms of modern countries, to refrain from exercising bias based on race, gender, position, ideology, belief, or religion in their research, education and organizational activities. They must rather treat everyone fairly based on scientific methods while respecting their individual freedom and human dignity.

Notes and References: ----------

5. Security Export Control Policy Division, Trade Control Department, METI.
http://www.meti.go.jp/policy/anpo
For research institution, see: METI. Guidance for the Control of Sensitive Technologies for Academic Institutions, Revised ed. 2010

Section III: Conducting Research

1. Introduction

When a research project requires human subjects, scientists must possess a full understanding of their "responsibilities" as scientists.

Clinical research in medicine is the field having the most rigorous standards. It is helpful for scientists in other fields to consider these standards, since medicine is historically the first profession (group of intellectuals) to be created; doctors and other groups of specialists in medicine-related fields established a research code of conduct, which can be also applied to research in other fields.

2. Informed Consent

2.1. Concept and Necessity of Informed Consent

The “Ethical Guidelines for Clinical Studies” established by the Ministry of Health, Labour and Welfare states that informed consent “means the consent that a person who is a candidate for inclusion as a subject of a clinical study, after having been fully informed of the design of the study by researchers or equivalent persons and having fully understood the significance, objective(s), method(s), etc. of the study, gives at his/her own discretion consent to participate in the study and approval of the procedures for handling the human specimens and equivalent materials.”

Informed consent is one of the specific processes necessary to protect the most important concept of “respect for persons.

The “Ethical Principles for Medical Research Involving Human Subjects” (1964, most recently revised in 2013) issued by the World Medical Association (WMA), the so-called “Declaration of Helsinki.”, includes all “identifiable, human subject and data” as being subject to these principles and that they include data obtained by interviews and surveys without directly contacting a real person physically[3].

2.2. Components and Procedures of Informed Consent

Informed consent has three essential components: being “fully informed,” participation at one’s “own discretion,” and giving “consent.” These correspond with the three components of informed consent described in the Belmont Report[2]: information, comprehension, and voluntariness.

2.2.1. Information

Information necessary to being fully informed must be disclosed to the participant so that s/he can make an informed decision. Such information includes but is not only a “paragraph containing the order and methods used in the research, its objectives, expected risks and benefits, possibilities for other methods (if treatment accompanies the research), and the fact that the subject may, at any time, ask questions or terminate his/her participation.” It also is to include information on the method used in selecting the subjects and information on the principal investigator of the research project.

2.2.2. Comprehension

Even if sufficient information is given, a subject candidate would not be able to comprehend the information or rationally exercise his/her free will if the way in which it is presented is complicated or confusing or if the items are listed in rapid succession. One should think of a way to explain the information in an easy-to-understand manner, considering the candidate’s knowledge level and age.

2.2.3. Voluntariness

Informed consent is established only when the subject voluntarily agrees to participate in research.

Scientists affiliated with a university or other educational institution should avoid using their own students, on whom they have strong influence, but rather try to find subjects who are other than their students. Should this not be possible, the scientist may approach his/her own students but only after a reliable method is used to confirm that they would participate at their own free will.

2.2.4. Items to be considered in obtaining informed consent

(omitted)

3. Protecting Personal Information

One of the points that should be explained when obtaining informed consent is how the subject's personal information is to be protected. Not only must this be considered sufficiently out of respect for the subject's dignity, in modern society leakage of personal information and privacy infringement can lead to dire consequences.

3.1. Definition of "Personal Information"

In the "Act on the Protection of Personal Information," the term "personal information" is defined as "information on a living individual, which can identify the specific individual by name, date of birth or other description contained in such information (including information that can be compared with other information and thereby identify the specific individual.)"[8] This includes information already made public in addition to information known to a limited group of people, including information contained in images and sound.

3.2. Linkable Anonymizing and Non-Linkable Anonymizing

(omitted)

3.3. Scientists' Responsibility for Personal Information in Conducting Research

: "Ethical Guidelines for Clinical Studies"[10]

(1) When presenting research results, the subjects shall not be identifiable.

(2) Personal information shall not be used beyond the scope necessary to accomplish the purpose of its use specifically explained to the subject when obtaining informed consent.

(3) Personal information shall not be obtained using an improper method.

(4) Effort shall be made to maintain personal information accurately and current within the scope necessary to accomplish the purpose of its use.

(5) Safety management shall be implemented to ensure that personal information is not leaked, lost, or damaged.

3.4. Handling Personal Information in the Humanities and Social Sciences

(omitted)

4. Collecting, Managing, and Processing Data

4.1. Data and Their Importance

Data comprise "all types of information based on facts, used for rational deduction."[11] The

importance of data in research is obvious; without data, there could be no research.

To assure the reliability of data in scientific research, one must make sure

(1) that the data are obtained based on appropriate methods,

(2) that the data collection does not involve intentional wrong-doing or mistakes due to negligence, and

(3) that the data obtained are properly stored and their originality is maintained.

4.2. Purposes of Lab Notes

In experimental fields, data are generally recorded in the so-called "lab notes" (sometimes referred to as research notes or experiment notes). Well-maintained lab notes that contain data and ideas recorded in an appropriate manner serve at least three crucial roles. First, they prove that the research has been conducted fairly and properly. Second, when the research produces a result, the lab notes can prove its originality. Third, they make the data and ideas transparent in the laboratory and in the research group, serving as a tool for sharing and effectively applying the data, i.e., a tool for "knowledge management."[12]

4.3. What Makes the Best Lab Notes

Useful lab notes are those in which the scientist has clearly recorded

(1) what was done, why, how, and when it was done,

(2) where the experiment materials and samples are kept,

(3) what phenomena occurred (or did not occur),

(4) how the scientists interpreted the facts, and

(5) what the scientists will do next.

The best lab notes are stated to be

(1) easy to read,

(2) well organized,

(3) recorded accurately without omission,

(4) contain information sufficient for replication,

(5) satisfy the requirements set by funding agencies and affiliated institutions, and

(6) properly stored so that only authorized personnel can see them, and duplicates are made in case something should happen to the original notes.

4.4. Lab Notes: Items to Record, Methods of Recording

Important points for writing lab notes are summarized as follows[16]:

(1) Entries should be in chronological order.

(2) Notes should have no blanks. Cross out any blank spaces and completely avoid inserting sentences.

(3) Prior entries should never be corrected later. Any correction should be written on the page for the day when the correction is made.

(4) Entries should be managed according to “date” and “title” (convenient if they are linked to the table of contents).
(5) Abbreviations and special terms should be recorded with explanations for a third-party reader (good to add a “list of abbreviations” and “glossary” at the beginning).
(6) Objectives, logical reasons, and plans should be briefly stated for new plans and when the experiment is about to begin.
(7) Entries should be written in enough detail for a third party to replicate the experiment.
(8) Entries should be written so that (if they are separated) the reader can easily see the order in which the sections follow each other.
(9) Results and observation items should be recorded immediately.
(10) If a result (or something else) is attached, the person recording it, as well as the date and the signature of a witness, should be written on the attachment and the notebook page.
(11) If attaching a document is difficult, the location and the name of the attachment should be recorded in the notes and the attachment stored separately, with cross reference to each other.
(12) Facts such as data should be clearly distinguished in writing from ideas and conjectures such as observations.
(13) In joint research, entries should be written with an awareness of to whom ideas and proposals belong.
(14) Discussions in meetings should also be recorded.
(15) Each page should contain the name of the person writing the entry and a witness’s signature and date.

4.5. Managing Lab Notes (Data)

Even when lab notes are taken appropriately, clearly recording data and ideas obtained in the research, the reliability of the lab notes and their value as evidence could be lost if the notebook is poorly managed.

Fundamentally, lab notes do not belong to an individual; they are considered to belong to the institution (e.g. research institution) that provides the research environment and funding. Therefore, they should be managed appropriately in accordance with the rules of that institution. In institutions where the research members come and go frequently, such as universities, it will be necessary to create a management system that also includes training of new members. Access to the lab notes should be limited, and the notebooks should be kept in a locked cabinet.

Lab notes are extremely important to scientists as a record of the experiments and research they have conducted. These notes are more than just an intellectual compilation of their own research processes and ideas. As lab notes can provide validation and evidence after a paper is

presented, each research institution must establish policies on the method and duration of their storage.

For a long period of storage, the responsibility should not fall on the individual scientists or laboratories, but rather on the larger institution.

5. What Is Research Misconduct?

5.1. Definition of Research Misconduct

Three types of conduct are defined as research misconduct all over the world, not just in Japan: They are fabrication, falsification, and plagiarism, sometimes abbreviated "FFP."

However, internationally speaking, research misconduct is not limited to FFP; rather, the trend is toward questioning increasingly more deviant behaviors. The "European Code of Conduct for Research Integrity" lists many of them, including not explaining profit, violating confidentiality agreements, missing informed consent; deviating from clear, ethical, and legal requirements such as in abusing research subjects or misusing materials, attempting to hide misconduct, and taking retaliatory action against whistleblowers.

MEXT formulated the new "Guidelines for Responding to Misconduct in Research" issued in August 2014, which defines FFP as especially grave research misconduct. The new guidelines stipulate that the following measues are to be taken against specific acts of misconducts.

3. Responding to Specific Research Misconduct

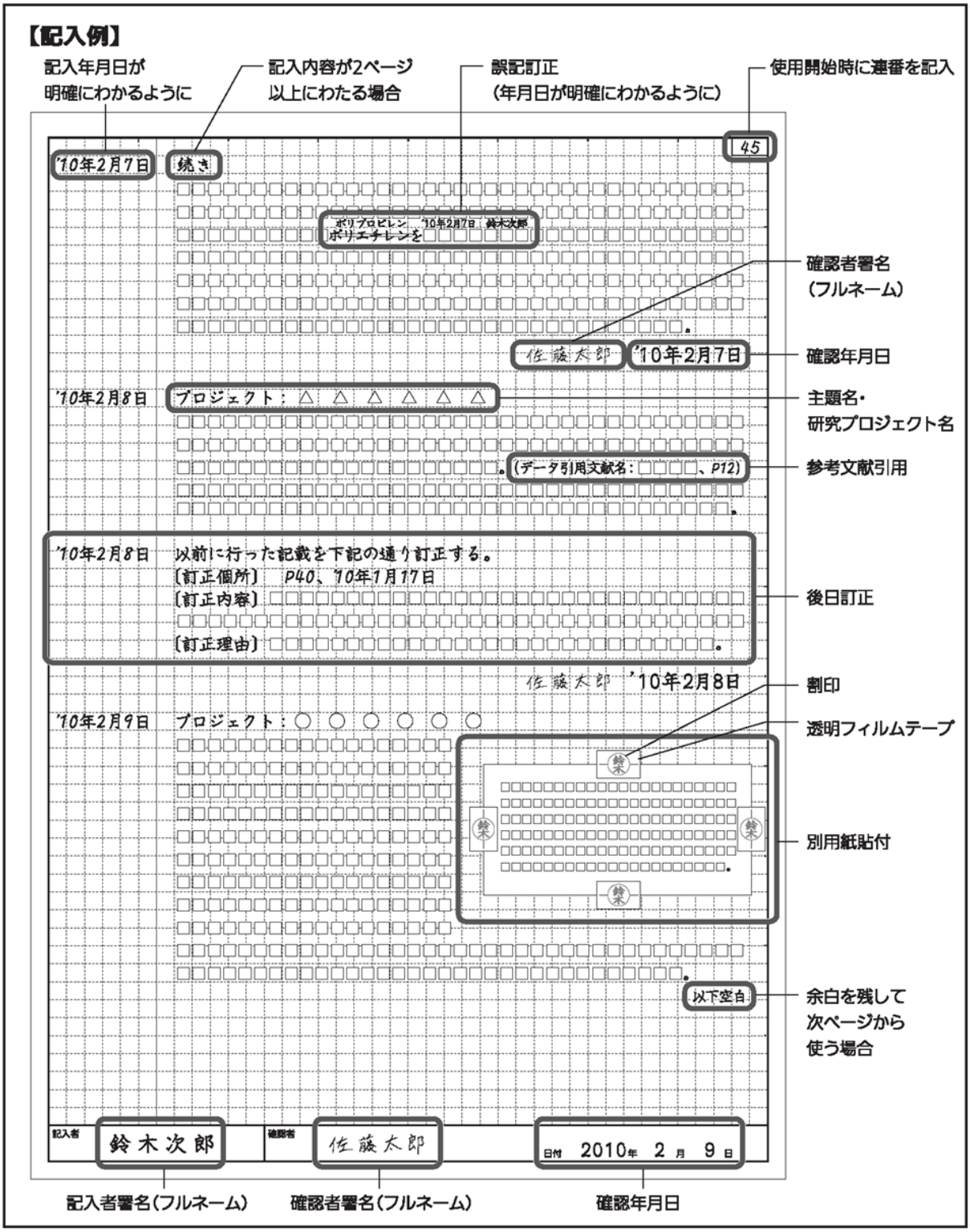
(1) Applicable Types of Research Misconduct, etc.

(2) Applicable researchers

The researchers to whom this section applies are researchers who conduct the research activities defined in (1) above.

(3) Applicable misconduct (specific research misconduct)

The misconduct to which this section applies is the fabrication, falsification, or plagiarism of data or research findings, etc., contained in a submitted research paper or other published research results (hereinafter "specific research misconduct"), either willfully or due to gross neglect in the basic duty of care expected to be exercised by researchers.



(a) Fabrication

Making up data or research results, etc.

(b) Falsification

Manipulating research materials, equipment, or processes to change data or results obtained from research activities.

(c) Plagiarism

Appropriating the ideas, analyses, analytical methods, data, research results, research paper(s), or words of other researchers without obtaining the permission of the researchers or giving appropriate credit.

5.2. Examples of Fabrication and Falsification

(omitted)

5.3. Examples of Plagiarism

"Plagiarism" is an act that betrays the trust. Plagiarism is one type of false authorship; it suggests a lack of the ethical character "honesty" of the infringing scientist and is a serious violation of occupational ethics.

So then, what constitutes plagiarism? An obvious example is the act of using large parts of someone else's paper, without properly citing it, as if writing them as one's own work. But there are other forms such as a university professor looking at an unpublished paper of his graduate student and publishing an idea found in the preprint as his own idea; this constitutes plagiarism of an idea. In recent years, the widespread use of the Internet makes it possible for one to simply copy parts of a published paper or a website and paste them onto his/her own draft (referred to as "copy-and-paste"), possibly contributing to the rise in plagiarism. In experimental research, a different type of problem exists: not citing sources of published papers when documenting materials and methods used in one's own experiments.

5.4. Citing Sources

When using someone else's research results, one must cite that source so that the reader can reference it. Using someone else's results without citing the source constitutes plagiarism. When citing sources, a scientist must clearly specify which parts belong to him/her, the author, and which parts belong to other scientists.

Plagiarism is not limited to writing. When one uses an idea or technology obtained through reviewing a paper or a grant application, as in insider trading, such an act constitutes plagiarism. Even if one attends a public lecture and later uses an idea presented by the speaker without proper permission of the speaker, it may constitute plagiarism.

6. Avoiding Questionable Research Practices

In promoting integrity and responsibility in research activities, there are certain "values" shared by all fields of research. The "Singapore Statement on Research Integrity" (2010) lists the following four principles as these "values."

· Honesty in all aspects of research
· Accountability in the conduct of research
· Professional courtesy and impartiality in working with others
· Good stewardship of research on behalf of others

Fabrication, falsification and plagiarism are not the only intentional misconduct in research. Situated between research integrity and research misconduct are so-called "questionable research practices" (QRPs), which are also feared to threaten the credibility of research.[24]

The National Academy of Sciences of the United States says following concerning "QRPs":

· Not keeping critical research data for a certain period of time
· Inappropriate management of research records
· Problems in the writing of the author of an academic paper
· Refusal to provide research materials and/or data
· Insufficient research training, exploitation of students
· Dishonest presentation of research results (especially to the media)

7. Duty of Confidentiality

(omitted)

8. Responsibilities of the Principal Investigator

(omitted)

Notes and References: ----------

2. HH, The Belmont Report
http://www.hhs.gov/ohrp/humansubjects/guidance/belmont.html
3. Declaration of Helsinki Translated by Japan Medical Association
http://www.med.or.jp/wma/helsinki08_j.html
8. Article 2 of the Act on the Protection of Personal Information
http://www.caa.go.jp/planning/kojin/houritsu/index.html
10. Ministry of Health, Labour and Welfare, Aforementioned Ethical Guidelines: p. 10
11. Francis L. Macrina ed., Scientific Integrity Third Edition, ASM Press, p. 271 (2005).
12. Yasushi Okazaki and Koichi Sumikura, "How to write your laboratory notebook" (Revised version), Yodosha, p. 11 (2011)
16. Yasushi Okazaki and Koichi Sumikura, "How to Write Your Laboratory Notebook" (Revised version), Yodosha 79 (2011)
24. Gorazd Mesko and Aleksander Koporec Oberckal, "Questionable Research Practices: An

Introductory Refection on Causes, Patterns and Possible Reponses," Varstvoslovje. 12 (4): 440-457 (December 2010)

Section IV: Presenting Research Results

1. Presentation of Research Results

1.1. Importance of Presenting Research Results

(omitted)

1.2. Announcement Using Mass Media

(omitted)

2. Authorship

2.1. Responsible Presentation

To be responsible, research must be honest, accurate, efficient, and objective, all of which must also be maintained in the presentation of its results. The effectiveness of research presentations is evaluated based on what the scientist has clearly stated with respect to the following three points:

What the scientist did (methods)

What the scientist discovered (results)

Where the results will lead the scientist (discussion)

As standards to be satisfied in the responsible publication of research results, the Office of Research Integrity (ORI) in the United States lists the following three as "minimum" standards in its "ORI Introduction to the Responsible Conduct of Research,"[3] although it states that it is "not as easy as one might anticipate to meet these expectations."

A full and fair description of the work undertaken

An accurate report of the results

An honest and open assessment of the findings

2.2. Credit for Research Results

Recognition of a scientist's contribution to research is called "credit." This includes authorship, indicating who has written a given paper. Other ways of giving credit are "citations" of research by other authors and listing the scientists who contribute to a research study in the "acknowledgements." All of these are to recognize the contribution of named scientists. Such credit is also important for evaluating the contributing scientists and enabling other scientists to evaluate the subject research.

The authors of an original paper (the first published with the results) in an academic journal receive credit as the original inventors or discoverers. Receiving such credit implies that the scientists have made contribution to the advancement of research. The scientific community will then continue to advance that research based on the results presented by the scientist. This becomes a criterion for evaluating individual scientists, and can make a significant difference in their careers (e.g. getting jobs or promotions) and in securing research funding.

2.3. Authorship and Responsibilities

Authorship is accompanied by duties and responsibilities. Authorship also implies that the writer guarantees that the research is free of errors and falsehoods and is of good quality.

2.4. Who Should Be Listed as Authors

Given the responsibilities of authorship, whose names should be listed as the authors of a paper is an extremely important question. Obviously, anyone who has made an important contribution to the research reported in the paper is entitled to be listed as an author, while those who did not are not so entitled.

The International Committee of Medical Journal Editors (ICMJE) has drawn up uniform requirements for manuscript submission,[4] which stipulate the following four criteria for one to be listed as a paper author.

(1) Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work;

(2) Drafting the work or revising it critically for important intellectual content;

(3) Final approval of the version to be published;

(4) Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

People who do not satisfy these conditions are to be, for instance, included in the "acknowledgements." A person who was only involved in acquiring research funding, supervising a research group, or doing overall coordination does not satisfy the requirements of authorship. It is appropriate for such persons to be included in the acknowledgements.

2.5. List of Authors

Many papers list multiple names as their authors. In such cases, if a particular author only contributed to or is accountable for a specific part of the research, this fact must be disclosed.

There are various traditions regarding the order in which authors are listed. In some disciplines, authors are listed in order of their importance, while in others, the author having the most important role may be listed first or last—the order varying significantly from field to field with no clear rules. The order to be used in the author list should be discussed among the authors themselves, taking into account the tradition in that particular field of research.

3. Improper Authorship (omitted)

3.1. Gift Authorship

3.2. Ghost Authorship

4. Improper Presentation Methods

4.1. Duplicate Posting, Duplicate Publication

(omitted)

4.2. "Salami Slicing" in Publishing

(omitted)

4.3. Improper Referencing of Prior Research

Scientific research is built upon the accumulation of research results previously obtained by other scientists. When one conducts research, it is, therefore, important to carefully take into account prior research. The same applies when writing a paper.

4.4. Acknowledgements

(omitted)

5. Copyright

5.1. What Is a Copyright?

Copyright is a right granted automatically, without any required procedures such as application or registration, to a person who creates a work. A work is defined as a "production in which thoughts or sentiments are expressed in a creative way and which falls within literary, scientific, artistic or musical domains,"[10] but also includes, as examples, novels, music, art works, films, and computer programs.[11] Furthermore, it spans much more, including paragraphs, figures, charts, diagrams, photographs, illustrations, lectures, speeches, newspaper articles, and magazine articles, and articles in books and academic journals that scientists use on a regular basis.

5.2. When Using Someone Else's Copyrighted Material

When preparing and using a secondary work that copies or modifies someone else's work, generally one must first obtain permission from the owner of the copyright of that work.[12] The copyright of a work published in a journal or other publications normally belongs to the publisher, so an author may need to obtain permission from the publisher to use that article even if it was written by the author him/herself. When a scientist's research results are reported in a newspaper or other media, s/he may want to share the report or coverage by including it on a website. However, before the actual article or report is transferred to the website, the scientist must first obtain permission from the newspaper or media company. When a research paper is published in a journal, the author may want to include/transfer its summary or table of contents on/to his/her website; however, in this case as well it may be necessary to first obtain permission. Whenever someone makes secondary use of a work, it is necessary to look up the rules and guidelines stipulated by the owner of the copyright and use the work appropriately.

5.3. Secondary Use When No Permission of the Copyright Owner Is Necessary

There are, however, situations where no permission is needed from the copyright owner for secondary use of a work.[14] In the following cases for example, no permission is needed unless

transfer is expressly prohibited: Use of a work excluded from the protection of the Copyright Act by a national law or a local ordinance, duplication for a personal use, and use of a work whose copyright-protection period has expired.

When "quoting" someone else's work or using part of someone's work for educational or examination purposes, no permission is necessary as long as proper procedures are observed.

5.3.1. Quotations

A practice whereby an author refers in his/her own work to a portion of someone else's work is referred to as "quotation." According to the Copyright Act, it is permissible to quote from a work "already made public" provided that it is "compatible with fair practice" and "to the extent justified by the purpose of the quotation such as news reporting or research critiquing."[15]

If the following requirements are satisfied, permission from the copyright owner is not necessary.

(1) the work being quoted has already been made public (including disclosure on the Web)

(2) the quotation is necessary (including, for example, using someone else's work to corroborate one's own theory)

(3) the portion being quoted is expressly indicated (the quoted portion is indicated by means such as quotation marks or a different font so as to be clearly distinguished from the author's own work)

(4) the work being quoted is not modified without permission

(5) the author's work is primary while the quoted portion is secondary

(6) the source is clearly cited.

One must pay close attention as any use of another's work without meeting these requirements constitutes a violation of the Copyright Act and could be considered plagiarism as research misconduct

5.3.2 Secondary Use of a Work for Educational or Examination Purposes

(omitted)

Notes and References: ----------

3. Nicholas H. Steneck, ORI Introduction to the Responsible Conduct of Research (web version) (Translated by Shigeaki Yamazaki), Maruzen Publishing (2005)
http://ori.hhs.gov/ori-introduction-responsible-conduct-research

4. International Committee of Medical Journal Editors (ICMJE), Recommendations for Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals (Updated December 2013)
http://www.icmje.org/icmje-recommendations.pdf

10. Article 2 of the Copyright Act (Act No. 48 of May 6, 1970)
11. Article 10 of the above Act
12. Articles 26, 27 and 28 of the above Act
14. Article 30 through 50 of the above Act
15. Article 32 of the above Act

Section V: How to Conduct Joint Research (omitted)

1. Rise in Joint Research and Background
2. Challenges in International Joint Research
3. Points to Remember in Joint Research
4. Positions regarding Graduate Students and Joint Research

Section VI: Appropriate Use of Research Funds (omitted)

1. Introduction
2. Responsibilities of the Scientist
   2.1. Understanding Rules Concerning the Use of Public Research Funds
   2.2. Cooperation to Ensure Proper Use of Research Funds by Research Institutions
   2.3. How to Process Private Subsidies
3. Examples of Improper Use of Public Research Fund
4. Measures Taken against Improper Use of Public Research Funds
   4.1. Return of Public Research Funds Connected to Improper Use
   4.2. Limitations on Eligibility to Apply for Competitive Funding
   4.3. Disciplinary Actions within Research Institutions
   4.4. Miscellaneous
5. Conclusion

Section VII: Contributing to Quality Improvement in Scientific Research (omitted)

1. Peer Review
   1.1. Role of Peer Review
   1.2. Peer Review of Research Papers and Research Grant Applications
   1.2.1. Peer Review of Research Papers
   1.2.2. Peer Review of Research Grant Applications
   1.3. Role and Responsibilities of the Reviewer

1.4. Challenges in Peer Review
2. Guiding Younger Generations
2.1. Teaching Responsibilities as Mentors
2.2. Guiding Doctoral Students and Reviewing Their Dissertations Responsibly
3. Ways to Prevent Research Misconduct
3.1. Roles of Policies, Guidelines, etc.
3.2. Roles of Academic and Professional Associations
3.3. Roles of Research Institutions
4. Importance of Ethics Education in Research
4.1. Professional and Occupational Ethics
4.2. Ethics Education in Research on the Rise
5. Prevention of Research Misconduct and Whistleblowing
5.1. Importance of Reporting Misconduct
5.2. Protection of Whistleblowers

Section VIII: For the Progress of Society (omitted)

1. Role of Scientists
2. Dialogue between Scientists and Society
3. Scientists and Professionalism