Practical guidelines on Scientific Integrity

The range of ethical issues in research is very wide, ranging from a minor deviation in following proper protocols to full-blown fraud, from unintended but nevertheless selective reporting to manipulation of results to please the funding organization or contractor, from being inspired by someone's ideas to stealing or scooping.

Rule one for all people involved is in all cases: **address any potential ethical issue as soon as it is encountered**. In known cases of severe misconduct, it became apparent afterwards that there were observations and even suspicions by at least some people, which was not communicated or picked up by the responsible authorities. The examples below discuss a number of issues and suggest best practices and actions to take. The focus is on <u>scientific</u> issues and not general ethical aspects (such as stealing or intimidation) or student-related issues (exam fraud, etc.). This is a concise and almost anecdotal overview, not meant to be a comprehensive account, as more thorough documents can be found elsewhere. The University of Amsterdam adheres to the *The Netherlands Code of Conduct for Scientific Practice*, published by the Association of Universities of the Netherlands (VSNU) as well as the publication by the European Academies of Science (ALLEA): *A European Code of Conduct for Research Integrity*. The American Academies (NAP) published a similar document: *On Being a Scientist: A Guide to Responsible Conduct in Research*.

It is highly recommended that ethical issues are openly discussed, in particular with new employees and (guest) co-workers, and this text can help to open and guide discussions. In addition to these guidelines, there are a number of actions implemented or planned by the faculty or by research schools, some information can be found elsewhere:

- Training/awareness on ethics – courses are offered for PhD students by national graduate schools (see websites of EPS, PE&RC, SENSE).
- Data policies: Cloud services for storage are being developed by SURFsara. Currently researchers are responsible for storing their own data.
- Internal/external audits: this is being considered.

As a general rule, any potential ethical issue encountered requires action: looking away is not an option. A first step could be to check with colleagues to see if your views or observations are shared or not, but either way, the organisation should know about any potential issue. This can start with talking to your own superiors, and if needed can be escalated to a complaint issued to the University Ethics Committee.

The following escalation ladder is suggested as a guideline for actions:

1. Contact your superior, discuss the issue and decide on which further action to take.
2. If the outcome is not satisfactory (for instance the problem is down-played), or if this is too problematic (for instance because he/she is involved), contact the director of the research department.

3. If this is not satisfactory, or too problematic, or if you prefer absolute confidentiality, contact one of the university "Vertrouwenspersonen" (Confidential Advisors) to discuss the issue. Although they are not specifically appointed to deal with integrity issues, they can advise you on a course of action. They treat cases confidentially, and action is taken after mutual agreement.

4. You can submit a formal complaint to the University Ethics Committee, through its chairperson, or alternatively to the Board of the University.

University of Amsterdam Ethics Committee (AIEC):

Mw. prof. dr. J.C.J.M. (Hanneke) de Haes (chair)
E: J.C.J.M.deHaes@uva.nl
Mw. mr. S. (Sarah) Benschop (secretariate)
E: Sarah.Benschop@uva.nl

Academic Affairs
University of Amsterdam
Spui 21
1012 WX Amsterdam
T: 020 525 3382

Vertrouwenspersonen:
"Vertrouwenspersonen" (Confidential Advisors, also for issues of stealing, intimidation, etc.) working at the Faculty of Science (note that you are free to contact someone working at another faculty also - see http://medewerker.uva.nl/extranet/az/content/vertrouwenspersoon/ for the complete list.

For employees:
Dhr. dr. A.J.P. (André) Heck
T: 020 525 8486
E: A.J.P.Heck@uva.nl

Dhr. dr. M. (Martijn) Rep
T: 020 525 7764
E: M.Rep@uva.nl

Mw. drs. Y. (Yocklang) Chong
T: 020 525 5790
E: Y.Chong@uva.nl

For students:
Mw. Iris Hettelingh
T: 020 525 5864
E: I.Hettelingh@uva.nl

Experts that may be consulted for specific matters for advice:

Faculty legal expert:
Mw. mr. Y.C. (Yvonne) Scheepers
Academic Affairs Faculty of Science
T: 020 525 7826
E: Y.C.Scheepers@uva.nl

Technology Transfer Office expert (e.g. on consortium agreements):
Mw. mr. M. (Marion) Leenen
T: 020 525 2759
E: M.C.L.Leenen@uva.nl

Medical ethical issues:
Mw dr. Y.E. Donselaar
AMC
T: 020 566 7389
E: mecamc@amc.nl

Animal testing expert:
Mw. dr. M. (Miriam) van der Meer
SILS
E: M.vanderMeer@uva.nl

1. Ethical aspects of research topics or its methodologies

1.1 Potential unintended use or misuse of results
Scientific research can sometimes deliver knowledge that can be used for unintended purposes, even for illegal activities (e.g., bioterrorism), or societal/ethically disputable applications.

Best practices: The issue is discussed during the conversations preceding and following appointments of personnel.
Open discussions in research team to raise awareness, and reported transparently in project communication (for instance at the project website). Reporting potential misconduct within a team is vital: suspicious behaviour concerning misuse must be reported.

1.2 Use of individuals as subjects in medical experiments.
(Bio-)medical research often necessitates the use of individual subjects, for instance in clinical trials. This is strictly regulated (Wet medisch-wetenschappelijk onderzoek met mensen, WMO). Only a brief summary is presented here, as this will be rare for IBED. But note that it also may apply to the use of students in lab practicals.

Best practices: Planning: Permission is needed from the relevant authorities at all times, see www.ccmo.nl for details. There is special contact person of the AMC ethical committee for dealing with this for the UvA, who can advise on proper procedures needed to get the required permissions from the authorized ethical committee. Control: researchers must adhere to the approved, strict protocols and log all performed experiments.
Potential cases of misconduct or deviations from the planning must be reported immediately, for instance to the assigned medical testing officer.

1.3 Use of animals in experiments
Biological and (bio)medical research often involves working with animals and (especially for vertebrates) there are strict regulations ("Wet op Dierproeven") on who are allowed to handle animals and what a treatment may and may not involve, the number of animals used, etc.

Best practices: The VSNU has published a Code of Conduct for dealing with animals (in Dutch, see http://www.vsnu.nl/gedragscodes).
Planning: Permission is needed from the relevant authorities. There is certified employee at the FNWI ("dierproefdeskundige", animal testing expert) for dealing with this who should be informed at all times, and needs to be involved to adhere to proper procedures and get permission. Control: Researchers must follow strict protocols and log all performed experiments.
Potential cases of misconduct or deviations from the planning must be reported immediately, preferably to the animal testing expert.

1.4   Observing humans
Research in human behaviour can be direct (observations) or indirect (data logs), on individuals or on aggregations of individuals, and is used for a wide range of topics, including behavioural and psychological research. This raises issues on anonymity and privacy that must be properly addressed.

Best practices: The VSNU has published a Code of Conduct for dealing with data (in Dutch, see www.vsnu.nl/gedragscodes) that can be traced back to individuals.

In general, one should obtain written permission of the subject before the data are used or disclosed. The permission must state the scope of the research, the extent of the use of the information (where it will be used for), the way/length of time that the data will be stored and maintained, and the responsible authority for curating the data. Data on individuals that are stored in a database must adhere to relevant legislation ("Wet Bescherming Persoonsgegegevens").

Anonymity, data that cannot be traced back to individuals: a protocol must be described that ensures anonymity. This involves describing the way that the data are anonymized and the storage and (future) destruction of the primary data. This protocol must be freely available.

Accidental discoveries: it is conceivable that observations lead to discoveries completely outside the specified scope of the actual research question. The research team is bound to ignore any such findings. Only If the discovery points at potential criminal activities this must be reported to the relevant authorities. Best contact person for legal issues is the faculty legal expert.

2.   Ethical aspects of collaboration in research

2.1   Co-authorship of papers
Practices on (co-)authorship differ in the various disciplines, but is a topic frequently causes major discussions at the stage of publication that are preferably to be prevented.

Best practices: Authorship in collaborative work is discussed at the start of a project. This not necessarily entails who will be lead author and who co-author(s), but concerns the criteria that will be used to determine if a co-authorship is warranted or not, and what the procedure will be to decide on the order of the authors (habits vary a lot among disciplines in the importance of being first or last author). Consider asking a binding judgement from a respected scientist in such cases. The International Committee of Medical Journal Editors (ICMJE) provides a detailed account in their *[Recommendations for the Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals](#)*. Authorship should be based on the following: (a) substantial contribution to conception and design, or acquisition of data, or analysis and interpretation of data; (b) drafting the article or revising it critically for important intellectual content; and (c) final approval of the version to be published: and (d) 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. It is advisable to specify the contribution of all authors to a published work and make this available upon request, also for journals that do not require this information as part of their standard policy.

2.2   **'Ownership' of ideas, originality**

Scientific discussion is essential for research and takes place at the work floor, at meetings, e-mail interchanges etc. It is sometimes difficult to trace back the origins of an idea, and the lines between a fruitful open exchange of ideas, scooping results or stealing ideas is not always clear.

Best practices: Openness and reciprocity is the ideal (but also idealistic or sometimes naive) way to operate. This can entail informing discussion partners in advance about your plans (at least globally), and asking if they foresee any overlap with their own plans, or if they wish to collaborate. In cases where research (topics, experiments, techniques) is highly competitive and scooping or stealing ideas is a real issue, there should be written agreements with all (including temporary) people working on the project, specifying the accepted rules of conduct for disclosure of information. This may include a clause on what is allowed when people leave an institution.
Contact the faculty legal officer for advice, or for setting up an agreement among co-workers. The legal expert at the Technology Transfer Office can assist in setting up a consortium agreement for projects with partners. This may also include clauses on how Intellectual Property is dealt with and the potential beneficiaries of valorisation of results.

2.3   **Hierarchical relationships among researchers, e.g. professor and PhD student, and peer pressure**

In an ideal scientific world all scientists are independent and each other's peers: the scientific input is what counts, not rank, seniority or prestige of a researcher. However, hierarchical relationships and group processes may create situations in which the independence or equality is under pressure.

Best practices: A supervisor must leave ample room for dissenting scientific opinions of people under his/her supervision. Despite a hierarchical relationship, a junior researcher is responsible for his/her own activities at all times, and must not bend due to perceived pressure, for instance in representing the results in a way the junior researchers is not comfortable with. This can be a delicate problem, and should preferably be discussed openly, for instance with an independent colleague as mediator. If this is too problematic or does not solve the issue one of the "Vertrouwenspersonen" can be contacted.

3.   Ethical aspects of reporting results, fraud and plagiarism

3.1   **Independence of reporting from provider of funding**

Research is paid by public funding, but increasingly also contracted by private or semi-private organisations. In some cases, organisations may only want to hear their preferred outcome, and may exert pressure to present the results in a particular way, or omit certain aspects. Conversely, a researcher might want to give in to please a money provider, in order not to risk future funding. Clearly the integrity of scientific work needs to ensure independent reporting and accountability for all results. Research is almost always team-

work, in which the responsibilities are shared. This is a great asset, as checks and balances can be implemented to ensure accountability for the entire chain.

Best practices: In contracts, the principle of independent reporting must be clearly specified and, while the funding organisation can request clarification of the results, pressure to modify any findings is never permissible. Similarly, agreements on the (delay in) timing of publications can be part of a contract (so always in advance), however, prevention of publication is not acceptable. Requests from a contractor to modify reports, as well as other influences on conducting the research should always be communicated to the research team, not only to the principal author or investigator, so that they can be openly discussed in the team. For bigger contracts it is recommended to install an independent advisory committee, with its tasks specified in the contract.

3.2   Authenticity of (primary) data

Key to all scientific work is proper reporting, to ensure accountability for all results. Some of the most extreme cases of fraud in science involved the fabrication of data, with huge implications. Research is almost always team-work, in which the responsibilities are shared, which reduces the risks, and ensures that checks and balances can be implemented to guarantee accountability for the entire chain that may involve many people recording data, operating equipment, writing logs, etc.

Best practices: For all experiments and observational studies, a scientist must be assigned with the responsibility for maintaining an accurate logbook and securing the safe and un-manipulated storage of the raw, primary data. This is done adhering to commonly accepted protocols for the discipline, and with an amount of detail that allows reconstruction of the followed methods to obtain the data. This scientist can delegate part of the work to others (for instance a lab technician), in which case the scientist should regularly inspect logbooks and ascertain the correctness and completeness of the data. Likewise, the project leader or supervisor of the assigned scientist regularly checks the accuracy of reporting and storage of un-manipulated results: "*Can you show me the logbook and the raw data?*". Colleagues (for instance working in the same lab) should aware that they should report if they have doubts on the way data are collected by a co-worker or colleague, difficult as this might be.

3.3   Transparency of workflows for data mining and data processing

Raw data often need to be processed to get publishable results, which may include procedures to remove outliers, transformations and aggregation of data, and combining with data from other sources. Any such action is prone to unintentional human mistakes, as well as malicious manipulation in extreme cases.

Best practices: This step is as important as maintaining logbooks and storing primary data. For all projects that involve experiments, observations or modelling, a scientist must be assigned with the responsibility for maintaining accurate log of workflow from primary to processed data, based on procedures that can be repeated later and by others, so with sufficient detail (e.g. version of the program used for each step of a work flow, parameter settings, input/output/log files). This scientist can delegate part of the work to others (for instance a lab technician), in which case the scientist

should regularly inspect the correct implementation of workflows.

Working with data from experiments is sometimes a process executed by a single person behind his/her computer, and unintentional mistakes or fraudulent manipulation is probably not easily picked up by colleagues other than the direct co-workers/supervisor. The project leader or supervisor of the scientist should therefore regularly check the followed procedures ("*Can you show me exactly how you obtained this table/graph?*").

If intentional manipulation is suspected it should be reported immediately.

3.4   Storage of data, statistical analyses and workflows, audits

For scientific research, it is essential that results can be checked (by colleagues, co-authors, audits), and therefore the raw data, workflows, input/output files, programs (versions) used need to be archived in a suitable form for later inspection.

Best practices: Whereas the scientist is responsible for the accuracy of the archive, the organisational unit of the scientist is responsible for enabling the safe storage of this information, as well as making it available for regular audits to see if the policies are properly implemented.

In case the primary data are too unwieldy to store ("Big Data"), appropriate procedures are implemented, for instance, by describing exactly the flow from raw to archived data, storage of a subset of raw data plus the work flow, to be able to reconstruct the correctness later.

3.5   Duplicated reporting in abstracts, symposium talks, peer-reviewed papers

Science is continuous work-in-progress, and preliminary results might be published in a symposium abstract, or results from contract research might become available first in the form of a report, and later as a peer-reviewed publication. How often can the same materials be presented before 'self-plagiarism' applies?

Best practices: Results submitted to peer-reviewed journals should be original and new, unless clearly labelled as a review, or with an explicit reference of some parts to earlier work ('copied from source x", or "adapted from x").

If the results are already published as a report ('grey' literature) this should also be mentioned, and provided (as copy, or as link) at the time of submission, with an explanation to the editor, so that he/she can decide to accept the submission or not.

Referencing partial findings of earlier work of yourself and with (partly) the same authors should adhere to the normal rules for proper citations of any work, see next paragraph.

Publication of preliminary results and 'work in progress' (e.g. as a symposium abstract, poster or talk) requires permission of all authors working on the project that are planning to publish the results later on.

Computer programs can be used for automated comparison of texts with already published materials (see [Wikipedia](#) for software).

3.6   Proper citations

Proper citations are part of a rigorous scientific method, showing how new results relate to older findings. The definition of what 'proper citations' are is not so easy though, for

instance, it is not always possible to reconstruct the origins of an idea, so that the proper persons receive appropriate credits. Moreover, not citing certain colleagues (intentional or not) can create feuds that might be harmful to science as well as (young!) careers. Likewise for citations that are put in the wrong context.

Best practices: Although it is hard to define strict guidelines, and journals have their own policies, there are some general principles that may help:

Verbatim text from other sources should always be presented in quotes (or italics), with the exact reference. At least two (co-)authors should explicitly check the correctness and appropriateness of citations in a paper. Indiscriminate self-citations should be avoided.

Senior scientists can help when junior scientists are in doubt about the origins of an idea and what is normally done in the field (no need to cite Darwin or Watson and Crick in every paper).

If there are certain competing 'schools' of thought in a particular area, in particular young scientists should be made aware of the background and the sensitivities that may arise. Having said that – scientific discussion of dissenting opinions is key to progress (but selective citing is not the way to achieve this).

4. Ethical aspects and conflicts of interest in research evaluations

4.1 Reviewing papers

Independent peer review of papers before publication is considered to be one of the cornerstones of rigorous scientific practices in almost all disciplines. In many cases this is done anonymously to the authors, which is both a virtue (only the strength of the arguments counts) and a danger (unfounded criticism can be voiced without the reviewer being held accountable). Rejecting a good paper but using the information or ideas for your own benefit is clearly considered highly unethical.

Best practices: Usually this concerns individual activities, but you can consult a trusted colleague when in doubt, explaining the case and your doubts, without giving details that would breach confidentiality.

As (associate) editor of a journal, check its policies regarding reviewing before accepting the job. Select reviewers carefully, be aware of heated debates and potential mud-throwing.

If authors suggest to exclude certain people as reviewers, grant this request or inform the authors that honouring such requests is not part of the policy of the journal, in which case the authors could decide to withdraw the submission.

If your role is reviewer, objectivity and confidentiality is essential. This holds in particular when the topic of a study overlaps with your own interest. Consider not accepting invitations to review papers that you expect to be so close to your own plans that treating the information confidentially is impossible. Of course, reviewing the work of a close colleague or friend should be avoided as well. Repeated reviewing work by the same people and/or the same results should also be avoided: let others also decide on the fate of a publication, and inform the editor of your considerations.

As author, if you suspect that a very opinionated reviewer has scorched your submission, you can

politely inform the deciding editor of your thoughts. Requests to reconsider the submission with another reviewer are rarely honoured, but at least the editor will know about the issue.

4.2   Reviewing research proposals
Peer review of proposals is a key step to obtain funding for research, and can make or break careers. Given the extreme competition, it is very easy for a reviewer to kill a proposal, by giving it a low mark (anything below 'excellent' in fact). Likewise, panels members can have conflicting interests, leading to unfair outcomes.

Best practices: Many of the same principles of independence and objectivity as for reviewing papers apply to reviewing research proposals. As reviewer, decline to review if you are in doubt and suspect that conflicts of interests may arise. Make sure that your verbal review corresponds to your final mark.
Only accept membership of a panel in which a common opinion has to be reached if you feel the panel as a whole has the expertise, independence and reputation to do this well.
If you have your own interests in a particular proposal (or for instance a close colleague) make this explicitly clear and do not partake in the discussion of this proposal (e.g. leave the room).

4.3   Quality assessments of institutes / programs
In the constant quest for excellence of all research institutions, peer review of research is a big responsibility (as well as a huge task), as the future of people and entire research groups may depend on the outcome of the review.

Best practices: Many of the same principles of independence and objectivity as in the previous sections apply here. Again, this is a group process, which helps to reach a balanced judgement. In addition, some principles for reviewing: If you are in a panel, ensure that you are aware of how your judgement will be used by the organisation. Ask for the Terms of Reference.
If you feel that some panel members have too much influence and too big an impact on the outcome, address the issue openly in the group. Likewise, listen to others and attempt to reach consensus, but claim a dissenting opinion if you have sufficient grounds not to accept a certain conclusion.

References

The University has a page with its rules and regulations in Dutch:
> http://www.uva.nl/over-de-uva/uva-profiel/regelingen-en-reglementen/onderzoek/onderzoek.html
> This also includes links to the information of the federation of universities (VSNU) on the general code of conduct on integrity issues, as well as specific codes for animal testing and the use of personal data.

Some information is translated to English at:
> www.uva.nl/en/about-the-uva/uva-profile/rules-and-regulations/research/research.html

Legislation:

See www.overheid.nl for all Dutch laws and bylaws. In general it is better to seek assistance from (university) legal experts than attempt to study the regulations yourself.