Article in: ALLEA Annual Report 2005 (pp. 93-104). Amsterdam: ALLEA.

Responsible Conduct in Science

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Introduction

For a long time academia had run the risk of being accused of superbia by developing an ivory tower attitude that repudiated accountability for the human and social effects of research. "Science is about how things are, not about how they should be", was an often heard defence of this position. For the past few decades, however, the issue of science and values, and their interdependence has become a major subject of discussion, certainly within medical sciences.

Attacks on the autonomy and sovereignty of science have come from different sources. First of all there was the anti-establishment movement of the 70s in which the political-scientific reflections of authors like Marcuse, Adorno, Habermas and Holzkamp became quite popular and were willingly embraced by student activists and critical staff. Their protests undoubtedly contributed to the dismantling of the misconception that freedom of science was equivalent to the negation of societal responsibility.

A second assault on free and autonomous academic science came at the end of the 80s with both governmental and industrial circles' appeal for the 'utilisation' of scientific research. Scientific goals were therefore regarded as subordinate to those of economic and technological development. Utility, applicability and economic relevance became more important criteria for research than pure scientific merit.

In recent years, the question of science's autonomous and value-free character versus the relevant and value-bound one has received ample attention, also in the world of science itself. We will briefly comment on this discussion.

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[*] Presented at the conference 'The responsible conduct of basic and clinical research', Ministry of Science, Ministry of Health, Polish Academy of Sciences, Warsaw, June 3-4, 2005.

Science: value-free or value-bound?

Granted, the issue of the relationship between values and science has become an important one during the last few decades, but opinions still diverge. On the one hand, the point of view that pure scientific knowledge is value-free, and thus has no moral connotation, is defended: Science tells us how the world is, whether we like what we hear or not, the argument goes. Basic research is driven by scientific curiosity and not by the hope that it will be put to practical use. Ethical and moral issues can only arise when science is applied and is expected to produce usable practices or objects. But then it has become technology and is no longer science. Technological objects or processes can be used for better or for worse. Science, however, produces insights, ideas, pieces of knowledge, which are in themselves neutral and can only be corrupted if mixed with political, social, economic or other non-scientific aims (see for instance, Wolpert, 1999).

On the other hand, there is a different view that does not accept the premise that science should only be concerned with producing reliable knowledge and should, consequently, be value-free. The value-bound character of science is defended with the following arguments (Drenth, 1999a):

- It is a basic obligation of all scientists and scholars to reflect on the paradigmatic presumptions and the socio-historical entrenchment of their scientific activities. This reflection is, in itself, a meta-scientific and value-embedded phenomenon. Our conceptualisations and models are always abstractions of reality, only an approximation - or 'reconstruction' - of reality can be achieved.
- The distinction between basic and applied science is less clear-cut, as is often suggested. There is a good deal of overlap between the two spheres, and it is increasingly difficult to identify parts of science that do not affect technology, or are not themselves affected by technology. Therefore, reserving the qualifications `value free autonomy' for science and 'value-bound heteronomy' for applied science and technology is no longer tenable.
- Scientists deal with a social, political or psychological reality that is continuously affected and changed by scientific findings. Health, safety, communication, privacy, mobility, welfare and economic development, and many other of humankind's worthy goals are radically influenced by the advances of modern science. But many ethical or

socio-political problems result directly from these advances. Scientists should be aware of this and should anticipate the changes such scientific advances bring about, and the problems they generate.

- Even if scientists refrain from actually making political or ethical choices, and restrict themselves to presenting probabilities and risks coupled with certain options, their reasoning is not value-free. Risks involve values and normative choices that the scientist has to face. Questions such as the following arise: Risks for whom? How far does the `right to know' go? What is the balance between the individual's right to self-determination and the interests of larger groups, or society as a whole? At what level of certainty does the scientist have to issue a warning, especially as far as irreversible developments are concerned?
- Scientists cannot avoid the meta-scientific question of whether what they pursue it is worth knowing. They have to justify - not only to themselves, but also publicly if the taxpayer or a sponsor's money is involved - why scientific issues need to be addressed. In essence, this justification implies non-scientific choices and decisions.

It is, of course, crucial for science to maintain its objectivity in the face of pressure from religious convictions, ideological movements, industrial lobbies, governmental or political and social pressure groups. On the other hand, it has become ever more difficult to separate the functions of knowledge production and making value-bound choices in extending research findings to the public or society at large. Research is, thus, embedded in the context of values, interests and political objectives. Rather than denying this, or retreating to the safety of the ivory tower, the scientists does well to realise it and to take the appropriate responsibility seriously. Many science organisations and academies have therefore sensibly placed ethical issues in science on their agendas. In the next section, we will further look into the nature of this connection between science and ethics.

External social/ethical problems in science

In an earlier publication, I made the distinction between external and internal social/ethical problems (Drenth, 2002). The former category refers to questions of the social/ethical context as well as the consequences of scientific research. Questions such as the following arise:

- What is the justification for the choice of a research topic? Is what we intend to investigate, worth knowing? This question is a matter of the researcher's personal preference and values, but, as said, in many cases also of importance to the taxpayers or sponsors.
- Is the scientific research truly independent of sponsors, employers, clients or other interested parties? We know that scientific research should be independent and free from any external pressure or influence. But all too often - and this is especially true for sponsored or contract research - there is an overriding temptation to avoid biting the hand that feeds.
- To what extent is the researcher responsible for what is done with the results? Research results can be used for better or for worse. They can turn into a blessing for individuals or society, but there are also many cases in which researchers sadly observe their research being abused by colleagues, practitioners, or the media.
- Are there cases in which ethical objections to certain implications of research, or certain consequences of new insights are becoming too strong? Sometimes scientific and technological developments' progression is faster than the reflection required on their societal and moral implications. In the medical field cloning, genetic cancer research, embryonic stem cell research, xenotransplantation and others are cases in point.

The last two points raise the interesting question of whether and where 'no go' or 'slow go' decisions could be called for because of these lagging ethical reflections. 'No go' implies that the research in question is wholly unacceptable. 'Slow go' would apply in cases where scientific or technological developments are out of step with the ethical reflection on their impact and consequences. The research could be temporarily suspended until the ethical implications have been subjected to public discussion, and reasonable consensus is reached (see McLaren, 1999).

In discussing the constraints to be imposed on science, I would like to assert that in general it would be inappropriate to refrain from doing research for fear that it might be abused or be irresponsibly applied. This would almost certainly mean the end of all research, because nearly all scientific results are, in principle, open to wilful abuse. An additional problem related to constraining research on the grounds of potentially undesirable or dangerous consequences, is that such consequences are not always easy to foresee, especially in fundamental and innovative research. After all, one of the characteristic features of

such research is that its results cannot be predicted or charted beforehand. Surprise is typical of creativity and serendipity.

It is further important to realise that any discussion of the constraints to be imposed on research is fraught with danger. History abounds with examples (Galileo, More, Spinoza, Lysenko) of science having been repressed because its research results did not find favour with the ruling ideologists, or did not serve the economic or political authorities' interests, or were opposed to the interests of (sometimes wholly respectable) movements and action groups, such as feminism, the anti-discrimination movement, environmental activists, and the freedom movement. The medical and behavioural sciences too have their victims. A few years ago, the New England Journal of Medicine described how the pharmaceutical industry lobby applied undue pressure on researchers who intended to publish data that it found unwelcome (Deyo et al, 1997). Recently, we read about the complaints of the American Union of Concerned Scientists (UCS) regarding the manipulation of the process through which science enters political decisions (*The Economist*, 10 April 2004). Although President Bush's science advisor John Marburger has tried to rebut these claims (*Nature*, 428, 8 April 2004; *Science*, 305, 30 July 2004), many of them still prevail. One of the notorious cases is that of the eminent University of California cell biologist Elizabeth Blackburn's dismissal from her position on the President's Council on Bioethics, because, she claims, of her outspoken support for research on human embryonic stem cells. I am sure all countries have similar cases.

Returning to the 'no go' decisions: are there ethical constraints to scientific research that affect such irrefutable values that all scientists and scholars would regard them incontestable? Which ethical constraints would have such a universally imperative character? In an earlier publication, I suggested that we might agree on the following principles (see also Drenth, 1999):

(1) Research is not justifiable if before, during, or after an experiment or the gathering of research data, unacceptable damage is inflicted upon the object of research, or on the environment and society (unrest, waste, pollution). This applies to all research objects, whether they be people, animals, nature or culture.

(2) A second line should be drawn when the nature and consequences of the research are in conflict with basic human values. These values always include:

- Respect for human dignity, which guarantees all individuals' autonomy and freedom of choice, informed consent prior to participation in research, and the rejection of every intent to commercialise the human body;
- Solidarity with mankind, thus guaranteeing solidarity with fellow human beings on the basis of equality; and
- Solidarity with future generations, which embodies a broader responsibility for the sustained development of the planet to be left to future generations.

Internal ethical problems

Internal ethical problems all refer to scientists' improper behaviour. This category encompasses:
- improper or imprudent behaviour with respect to subjects of experimentation, such as the insufficient protection of privacy or anonymity, neglecting to obtain informed consent, discrimination, improper treatment of experimental animals etc.
- improper dealing with the general public and the media, including too positive and too optimistic reporting of research results, which would create too much unjustified hope, especially in medical research,
- disregarding rules of 'good practice', such as undeserved authorship, improper citation, no sequence of authors according to contribution, or alphabetical order if contributions are equal, violating the rule to avoid conflict of interests (in a review task for publication or subsidy) etc.
- manipulation of data or interpretation, including fraud (fabrication or falsification of data), deceit (deliberate violation of methodological requirements (sampling, statistical techniques) so as to create a false confirmation of hypotheses, or otherwise biased results), and
- infringement of intellectual property rights, such as plagiarism, or pinching of a colleague's discovery, or a student's idea.

Of course, not all violations are equally serious. The manipulation of data is the most severe of these violations, but there is also variance within the categories. Fabrication of data is more serious than 'rounding off', or making use of a too small sample, while plagiarising substantial pieces of text is more reprehensible than pinching an idea from a conversation between colleagues.

Hard data on the occurrence of misconduct are rare and also difficult to obtain. Part of the problem is that it is not always easy to draw a clear line between unacceptable and (still somewhat) acceptable behaviour. Where lies the boundary between experimental 'proof' based on a too small sample and the illustration of an argument with 'case' data? Or between plagiarism and careless citation? Was an incorrect, but 'favourable', statistical technique truly chosen deliberately? Is it selective use of evidence, or a different methodology, or even another paradigm?

The number of reported cases in scientific and public media is, however, growing, also in medical research. To mention only a few well known cases reported in the media:

- A few years ago *Nature* and *Science* comprehensively covered the infamous case of a group of cancer researchers' fraud at the Max Delbrück Centre for Molecular Medicine in Berlin;
- At the same time (13 September 2001), *Nature* revealed a number of shocking cases of journal reviewers' theft of ideas;
- The *Times Higher* (27 April 2001) divulged that at least 19 review articles published in the highly esteemed *New England Journal of Medicine* had been written by researchers who had secret financial links to the pharmaceutical companies that had brought the examined medicines on the market;
- At a recent conference of the Office of Research Integrity (ORI), a unit within the American government's Department of Health and Human Services, a number of case studies were presented, including the dramatic case of the Research Triangle Institute in North Carolina where there had been a veritable 'epidemic of falsification'; employees had simply fabricated whole batches of data;
- Recently, Nobel Prize winner Rolf Zinkernagel's Institute of Experimental Immunology at the University of Zürich was accused of manipulating data (*Nature* 20 February 2003);
- The *New England Journal of Medicine* had to withdraw a submitted article because a number of the co-authors were unaware that "their" article had been submitted,
- Earlier this same journal had described how the pharmaceutical industry lobby placed undue pressure on researchers who were intending to publish data that it found unwelcome (Deyo et al., 1997).

The above is a selection from the generally known cases of scientific misconduct, but the fear that far more fiddling with research data

occurs unnoticed, does not, unfortunately, seem unfounded. Three years ago, an issue of *Nature* (vol.418, 8 August 2002) discussed a report that the American Institute of Medicine (IOM) had just released and that specifically dealt with scientific integrity and scientific misconduct. The IOM also noted that fully-fledged cases of scientific misconduct are rare, but that smaller lapses often go unnoticed: fudging a control here, deleting a messy data point there. But the IOM warned that what might appear to be minor violations of integrity, will have bad long-term consequences. It called for research institutions to take a more active role in creating an environment in which misconduct will not occur.

Causes of misconduct include pressure from powerful institutions or persons (governmental or church leaders), economic and financial motives (lending an ear to industrial sponsors, the risks associated with contract research), and the scientists or scholars' ambitions and vanity. Given the pressure on researchers to produce publishable output and to show (preferably spectacular) results, a present-day growth of misconduct is certainly more than likely.

As far as the prevention of misconduct is concerned, one may consider corrective measures (punitive measures, sanctions), or preventive measures (procedures, regulations, precepts, whistleblowers, ombudspersons), but most important is the development and fostering of a scientific conscience, and a proper sense of values and standards.

What role do Academies play

What role could academies of sciences and humanities and umbrella academy organisations, such as the All European Academies, play in this matter? After all, academies have an important advisory role. Moreover, the ethical issues in general, and most certainly the problems concerning scientific misconduct, are of real concern to the academies.

At ALLEA's General Assembly in Prague in 2000, I reported on a modest survey of ALLEA members that addressed these problems. Four questions were asked: Is scientific misconduct a serious and growing problem in your country? Is there a formal procedure or protocol to deal with these problems in your country (the role of the Academy?)? Is there a need for a prescriptive code of ethical conduct,

or good manners in science? What role could ALLEA play in these matters?

The reactions varied, but in general scientific misconduct was seen as a growing concern. Often there was no official procedure or protocol, and the leadership of the relevant institute handled the matter. Sometimes academies were involved in an advisory or evaluative capacity. The general reaction to the question on the need for a code of conduct was affirmative; in certain cases such a code was already available. Almost all ALLEA members (with the exception of one or two who only acknowledge the problem as a country-specific matter and not a universal one) welcomed the idea of ALLEA taking some initiative or role in the further development or promotion of a 'code for good manners in science' in Europe.

Many academies have already developed such a prescriptive set of rules, a code of conduct and/or a procedure for handling reported cases of misconduct. The NAS publication On being a scientist (1995, sec. ed.) is both well known and well written. In 1998, the *Deutsche Forschungs-Gemeinschaft* issued Proposals for safeguarding good scientific practice as a reaction to a disturbing case of collective fraud. In December 2000, the European Science Foundation issued a policy briefing on this issue under the title Good scientific practice in research and scholarship in which, among others, it was recommended that:
- National academies should draw up national codes of good scientific practice in research and scholarship where these do not yet exist; and
- National academies should initiate discussions on the most appropriate national approach to procedures for investigating allegations of scientific misconduct, whether by means of an independent national body, formal procedures at each university and research institution, or by other means.

It should be clear that this does not only concern purely national problems, although culture and traditions, as well as legislation may have an influence on the way these problems are handled in practice. The issues in question are, however, generic and universal, and also need an international approach. This is why I have urged (intermediate) international Associations of Academies, such as ALLEA, USNAS, the Federation of Asian Scientific Academies of Science, the African Academy of Science and others to become actively involved in the co-ordination of the various approaches undertaken nationally in co-

operation with world-wide organisations such as IAP, ICSU, TWAS and UNESCO. In fact, they can play a role by specifically:
- placing the issue of misconduct on the agenda,
- providing individual national academies with information and advice,
- co-ordinating national activities internationally with a view to alignment around common principles (although not disregarding differences of opinions and legal traditions between states), and
- dealing with misconduct in international research projects.

In this vein, ALLEA has tried to take up responsibility for the co-ordination at a European level, without this implying that uniform rules and procedures need to be developed for all European countries. ALLEA adapted a recommendation by the Royal Netherlands Academy of Arts and Sciences (*Notitie wetenschappelijke integriteit,* KNAW, 2001), translated it into English and has offered this 'Memorandum on Scientific Integrity' for the perusal of all ALLEA's member academies (ALLEA et al., 2003). This Memorandum urges the founding of a National Committee for Scientific Integrity (NCSI) that can serve as an advisory board, or a science court of appeal when the (primarily responsible) institute or university's settlement in respect of the violation of scientific integrity is found to be unacceptable to one of the relevant parties. In The Netherlands, such a body (LOWI) has been founded by the Royal Academy in close consultation with the National Science Foundation (NWO) and the Association of Universities (VSNU). It is not ALLEA's intention to have other European countries copy this formula exactly, but by offering this model, it aims to stimulate the discussion on the most desirable approach and to point out the potential helpful role that Academies of Science could play. Furthermore, it aims, if possible, to co-ordinate a European approach to the phenomenon of scientific misconduct that can be so detrimental to science.

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