Freedom and responsibility in science: reconcilable objectives?

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Introduction

Science and scientists operate in a field of tension with two poles: freedom and responsibility. On the one hand science cannot exist and grow without freedom. Scientific practice is inconceivable without the freedom to think, to speak, to carry out and to communicate about research. Only facts, and all the available facts, should speak; only the logical, analytical norm should rule. Science should be unfettered and free from external pressures, be it from tradition, ideology, religion, or political or financial interests. If science is unable to retain its independent and impartial nature, it will sooner or later become irrelevant and useless.

On the other hand there is the – and in recent years increasing - need for public accountability. Scientists are nowadays confronted with a variety of ethical, social and political questions which cannot be pushed aside with the argument that they are normative and not scientific. Ethical and socio-political questions arise with respect to the choice of research areas and topics, to the nature of experimentation and gathering data, and to the question of what will be done (and by whom) with the research results afterwards.

In this paper we will argue that the scientist's freedom to investigate, to define and to follow his/her own rules and criteria on the one hand, and the scientist's duty to acknowledge the danger of irresponsible complacency and to shield science from the insulation from its ethical and political consequences on the other, are important prerequisites for the value and the

contribution of science. Although at first sight the objectives freedom and responsibility may seem to contradict and therefore exclude each other, we will maintain that they can be reconciled and can both be pursued at the same time.

The evolution of the issue

In ancient days a good deal of the power to be derived from knowledge rested in the hands of an omniscient God, and the way that power was exercised was not always liked, but never distrusted. Later, science has appropriated much of the knowledge and has placed this source of power in the hands of scientists and scholars, who in their enthusiast search for knowledge, have opened wide horizons and surprising perspectives.

But there came also critique. Not everyone is convinced that these scientists and scholars can handle their power and deal with it in a responsible manner. Critics hesitate over their awareness of the ethical ramifications of knowledge and the moral implications of scientific discoveries.

For quite some time positive scientists have incurred risks of accusations of *superbia,* by developing an ivory tower attitude, in which any accountability for human and social effects of scientific research is repudiated: "Science is about how things are, not about they should be". Since a few decades, however, the question of science and values has once again been high on the agenda. Attacks on the autonomy and sovereignty of science have come from various sources:

First of all there was the anti-establishment movement of the 70's, in which the political-scientific reflections of authors like Marcuse, Adorno, Habermas, and Holzkamp became popular and were notably embraced by the critical student activists and (often junior) staff. Their criticism contributed to the dismantling of the arrogant misconception that freedom of science is equivalent to a negation of societal responsibility.

A second attack resulted from the economic recession in many Western countries in the 80's, which led to reduced public and private funding for research. Quantity and quality of research became important criteria for survival in the often serious cutbacks in research personnel. This resulted in the dissolvement of another miscomprehension of scientific freedom, as the license to freely think, meditate, and explore without caring much about output or quality.

A third assail on the scientific and academic freedom came from the cry for 'utilization' of science at the end of the 80's and the 90's, to be heard both in governmental and industrial circles. It was argued that scientific goals should be made subordinate to those of economic and technological development, and that criteria such as utility, applicability and economic relevance should be given priority over pure scientific standards. Considerations of societal and technological relevance for funding research even penetrated the policy of many national and international research councils, the long term defenders of pure and fundamental research. It is ironic to see that basically the principles of the Neo-Marxist movement of the 70's and those of the industrial utility orientation of the 90's coincide: les extremes se touchent!

In the fourth place it has to be said that in recent years also within science itself the question as to whether science is autonomous and value-free or value-bound has received ample attention. We will present a more detailed discussion of this issue in the next section, relying a good deal on an earlier exposé I presented in Drenth (1999a).

Science: value-free or value-bound?

The question phrased in the heading of this section has become an important issue during the last few decades, although the opinions still diverge. As I observed at a conference of ALLEA (the European Federation of National Academies of Sciences and Humanities) on the subject *European Science and Scientists between Freedom and Responsibility* (Drenth et al, 1999): On the one hand it was defended that scientific knowledge is value-free and has no moral or ethical connotation. Science tells us how the world is, whether we like the story or not. Basic research is driven by academic curiosity and not by the hope or probability that it will be put to practical use. Ethical and moral issues can only rise

when science is applied and it produces usable objects. But the latter is technology. Technological objects or processes can be used for better or for worse. Science produces insights, ideas, knowledge. These are in themselves neutral and can only be corrupted if mixed with political, social or economic or other non-scientific aims.

On the other hand, there is a different view that does not accept the assumption that science should only be concerned with producing reliable knowledge thus making it value-free. The following grounds and arguments for this position can be brought forward:

- It is a elemental obligation of all scientists and scholars to reflect on the paradigmatic presumptions and the socio-historical entrenchment of their scientific endeavor. This reflection is, in itself, a meta-scientific and value-embedded phenomenon. We must realize that our conceptualizations and models are always abstractions of reality, and that only an approximation – or 'reconstruction' – of reality can be achieved.
- Recently the distinction between fundamental science on the one hand and applied science and technology on the other has become less clear-cut. There is a good deal of overlap between the two spheres, and it is increasingly difficult to identify a part of science that does not affect or is not affected by technology. In this light reserving 'value free autonomy' for science and 'value bound dependence' for applied science and technology is no longer tenable.
- Increasingly scientists deal with a social, political or psychological reality that is fundamentally affected and changed by the scientific findings: health, safety, communication, environment, privacy, peace, mobility, economic development, and many other social objectives of great value are radically influenced by modern science, and many ethical or socio-political problems result directly from the advances of scientific research. Scientists should be aware of this and should anticipate the changes they work, and the problems they induce.
- Even if scientists refrain from actually suggesting political or ethical choices, and restrict themselves to presenting probabilities and risks connected with certain options, this is not value-free. Risks involve values and normative choices, and these have to be faced by the scientist. One may think of the modern medical research (genetically determined diseases) or environmental research (climate and global change). Risks for whom? How far does the right to know go? What is the balance between self-determination and the interests of larger groups or the society as a whole? How certain does the scientist have to be before warning, especially in the case of irreversible developments?
- Scientists cannot avoid the meta-scientific question whether or not it is worth knowing what they pursue. It has to be justified - if only for him or her personally, but often, since taxpayer's or sponsor's money is involved, also publically – why scientific issues need to be addressed. This justification implies, in essence, non-scientific choices and decisions.

It seems fair to conclude that in scientific research on the one hand objectivity has to be maintained in spite of the pressure from ideological movements, industrial lobbies, governmental strain or political pressure groups. On the other hand it has become increasingly difficult to separate the functions of producing knowledge and making value–bound choices in extending research findings to the public. In this respect it may be useful to draw a distinction between science as a *product*, the accumulated body of knowledge, and science as the *process of knowledge accumulation*. The former, knowledge as such, which was refereed to by the Swiss philosopher Bochenski (at the Engelberg Forum, 1990) as "*Wissenschaft als Inhalt"* is morally neutral and solely subject to methodologoical-scientific norms. However, this does not apply to the latter, which Bochenski referred to as "*Wissenschaft als Tätigkeit"*. This is subject to ethical and political norms, which have bearing upon the choice of hypotheses to be researched, the manner in which data is gathered and experiments are conducted, and accountability for what is ultimately done with research data (Drenth, 1993).

Our conclusion is that research is 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 realize this and to take the appropriate responsibility seriously.

The impairment of freedom

In the previous section it was shown that for *Wissenschaft als Inhalt* the freedom to formulate and adhere to its own laws and criteria is absolute essential for its *raison d'être.* Without this freedom science will sooner or later become irrelevant and useless. Let us have a look at the factors that spark and fuel the impairment of this freedom.

In the first place the pressure of powerful individuals or institutions, which are ill-disposed towards or even strongly opposed to the possible outcomes of the research. This is probably the most dangerous and far-reaching form of influence. Opponents try to prejudice the researcher and to influence the results, or, if that is impossible, to obstruct a proper analysis or due publication, or even or to prohibit the research all together. Historic examples range from the Roman Catholic pressure on Gallileo to review his heliocentric cosmology to the fundamental Christian and Islamic resistance against the theory of evolution, and from Stalin's pressure on the biologist Lysenko to distort biological facts in order to comply with Communist Party agricultural policies to the opposition of the 'nurture' lobby in psychology to the analysis of genetic determinants of human behavior in the 70's.

Secondly economic and financial interests. Competition and marketing interests in the pharmaceutical research, or in technical studies which may lead to lucrative patents can have a strong influence. Economic interests undoubtedly played a role in the premature marketing of the drug thalidomide with disastrous consequences for a number of pregnant mothers and unborn babies. Fear for losing financial support moved NASA to send a space shuttle into orbit without sufficiently checking possible computer deficiencies and with the well known tragic outcome. Both military importance and financial constraints have led to insufficient and inadequate safety studies in Chernobyl-type nuclear power plants, leading to the largest non-military nuclear disaster ever. In a recent upsetting report Deyo et al. (1997) reveal how the pharmaceutical lobby has assailed medical researchers who were critical of research that supported the quality of a number of drugs, turning these researchers into defendants, intimidating them and discouraging others from taking up similar lines of investigation. Similar assertory attempts are known on the part of the tobacco-industry vis-à-vis researchers demonstrating the disastrous health effects of smoking.

In this connection a warning against the almost unlimited growth of contract research within universities is in place. More and more universities and research institutes tend to (have to) rely on assistance from private, external funding for the financing of their research. Of course, contract research does not necessarily imply an encroachment on the scientific freedom and autonomy. In principle contract research can be independent, unbiased and can follow perfectly the scientific rules. But it cannot be denied that it may suffer from the overriding temptation to avoid biting the hand that feeds you. In a recent publication Köbben and Tromp (1999) have given ample demonstration of the inclination of contract researchers (under real or putative pressure) to produce 'favorable' results.

A third potential corrupting force is the own ambition of the scientist, enforced by vanity, desire for fame and recognition, chances of personal profits and career opportunities or other personal motives. In itself there is nothing wrong with scientific ambition, or tenacious belief in own ideas or hypotheses. Without these drives probably no ground-breaking discoveries would be made, nor Nobel prizes rewarded. However, there are too many tragic examples throughout history of science indicating that the craving for scientific honor and fame can push the scientist beyond the ethical borders and can lead to fraud and faking of data.

Socio-ethical constraints

It has become clear that freedom of research is a sine qua non for proper and integer scientific practice. But, as has been indicated as well, science can also be seen as *Tätigkeit,* and in this perspective freedom cannot be defended at all costs. Scientists should also realize their ethical and

societal responsibility. Let us now discuss some of the constraints on science that follow from this responsibility (see also Drenth, 1999b).
Point of discussion is whether there are social or ethical constraints to be imposed on science; in other words whether there is a need for 'no-go' or 'slow-go' decisions on the ground of social and ethical objections. 'No-go' means that the research in question is wholly unacceptable. Examples may be attempts to make human-ape hybrids, applications of germline genetic manipulation to enhance intelligence, and human cloning for procreation. 'Slow-go' would apply in instances where results should be temporarily suspended until the ethical implications have been subjected to public discussion, and, preferably, reasonable consensus has been reached. This area may include cases in which we have insufficient knowledge to appreciate and, thus, control the consequences of our research (see Mc Laren, 1999).

It should be realized that any discussion of the constraints to be imposed on research is fraught with danger. Throughout history we find too many examples of scientists having been repressed and their research having been stifled because the results were not consonant with the ruling ideologists, did not favor with powerful authorities, or were opposed to the interest of influential movements and action groups. Even if these movements have fully respectable objectives, such as equal rights for women, environmental protection, anti-discrimination, and peace, infringement of the right to investigate because of political unacceptability of outcomes to external groups is utterly dangerous.

We further like to assert that it would be wrong to refrain from doing research into a given problem in case it might possibly be abused or be applied irresponsibly. This would definitely mean the end of all research, since nearly all scientific results are in principle open to willful abuse. An additional problem of constraining research on the grounds of potentially undesirable or dangerous consequences is that such consequences are not always manifest on beforehand. Particularly outcomes of fundamental and innovative research are often surprising and hard to predict. So it is difficult to derive the constraints directly from the nature of the results.

It follows from the foregoing that is not easy to identify the ethical constraints that would be incontestable for scientists and the general public. They should refer to basic and peremptory values that would be imperative for scientists and responsible citizens alike. At the above mentioned conference of ALLEA the following principles have been discussed and accepted:

(1) Research is not justifiable if, before, during or after the experiment or the gathering of data unacceptable damage is inflicted upon the object of research or its wider environment (social environment, society, nature). This applies to all objects of research, whether they be people, animals, nature or culture.
(2) Research is not justifiable in cases where the nature or the consequences of the research are in conflict with basic human values. These values include in any case:
    a) respect for human dignity, which guarantees the autonomy and freedom of choice of all individuals, informed consent prior to participation in research, and the rejection of every intent to commercialize the human body;
    b) solidarity with mankind, which guarantees regard and acceptance of fellow human beings on the basis of equality;
    c) solidarity with posterity, which embodies the broader responsibility for sustained development of a planet that is to be left to future generations.

Limits to responsibility

May I finally pose a similar caveat as I expressed at the recent opening ceremony of the European Academies' Science Advisory Council in Stockholm (June 11, 2001), arguing that there is also a limit to the moral obligations of scientists. They should adhere to their scientific trade, and should not take over the responsibility of politicians, employers, doctors and educators, nor become another pressure group in the political arena. They can present careful analyses of problems at hand, they can indicate probabilities and risks of certain outcomes, they can denounce biases and prejudices, they can show that there is no statistical justification for certain

fears or hopes….., but they should not take over the responsibility from the actual decision makers. It is not up to the physicist to decide whether or not nuclear energy should be exploited. It is not up to the virologist to determine immigration restrictions for possible carriers of infectious diseases. It is not up to the behavioral scientist to decide whether euthanasian termination of life should be allowed to deeply depressed, incurable patients. If we would not recognize these limits we would ask too much responsibility of scientists, and as Lewis Wolpert once said (Wolpert, 1989), it would give too much power to a group who are neither trained nor competent to exert it.

Conclusion

In this paper I hope to have demonstrated that in science freedom and responsibility are not irreconcilable, and can and must be pursued at the same time. The challenge, therefore, is not simply to make a choice between the two, but to look for a balance, that sufficiently permits the realization of both incontestable objectives.

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