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## **New public responsibilities for life scientists**

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### **Introduction: A say for our mouth and new tasks and responsibilities for life scientists**

“What your genes want you to eat”. This was the title of an article in the New York Times of 4 May 2003 on the ways in which the life sciences will influence food and drug choices of consumers and patients in the next decade. The author, a journalist by the name of Grierson, states that our diets and prescriptions will in the future be customized; to achieve this, consumers and patients will need continuous feedback between screening agents and food and drug consultants (such as general practitioners and dieticians) for continuous update of their gene passports or health cards and for relevant advice in response to new food products, drugs or scientific developments. The message of this journalist does not differ from those of other, less popular writers on the subject: if consumers are indeed health-driven and want to postpone death, then they must allow their genes to dominate their daily lives. That means allowing interaction between genes and lifestyles, even allowing life scientists and technologists to play a dominant role in their lives. The term ‘gene’ is indeed a metonymical expression of the whole life-science system and industry. An issue that the journalist does not address is whether consumers in future will have a say in what they put into their mouths and the related responsibility of life scientists.

To tackle these questions, I will first outline the main developments in the life sciences during the last decade, and then discuss some aspects of the traditional concept of responsibility, which stresses the causal connections between agent and outcome. I will argue that, from a pragmatic point of view, the concept of different practices can help in delineating new grey zones between conducting research, rendering advice, screening consumers and patients, consulting the public, and prescribing and selling food stuffs and drugs. Moreover, I will make it clear that professional scientists have a public responsibility; they must build new Chinese Walls to raise the level of trust between themselves and the general public.

### **New developments in the life sciences: genomics**

Although it took some time, the discovery of DNA by Watson and Crick in 1953 has significantly changed the disciplines of biology, medicine, chemistry, food science and agricultural science. Genomics is the broad label that covers the integration of these fields into the new discipline of the life sciences. Genomics describes the integrated application of biochemistry, microbiology and process technology for the purpose of turning the potential of micro-organisms and cell and

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tissue cultures to technical use. Two key components of modern biotechnology are genomics in the narrow sense (the molecular characterization of organisms) and bio-informatics (the assembly of data from genomic analysis into accessible forms). Because of its enormous potential, genomics (along with nutrigenomics) is regarded as one of the key sciences and technologies for the coming decades to improve food availability (mostly attributed to developing nations) and food quality and safety (attributed to the industrialized world). It can deliver both products and methods, for example for the analysis of food safety by delivering fingerprints of genetic activity in products and in humans.

With genomics and nutrigenomics, the sharp distinction between food and medicine falls apart, and a grey zone emerges between the two. An understanding of plant-biochemical conversion processes, along with knowledge of how humans metabolize foods, will bring prevention to the centre of medicine and food sciences, shifting the emphasis from health care to healthy living. Food acquires the characteristics of medicines and determines what kind of medication is necessary; medicines become food or influence food intake. The new grey zone where health care and nutrition meet is the battlefield where social, economic, political, juridical, educational and ethical problems are emerging, a battlefield that requires constructive social and scientific thinking, intensive public debate and corresponding technologies to come up with solutions.

As with every new science and technology, many people see benefits such as cost reduction for producers and healthier products for consumers. However, aside from cost reduction or higher prices, the new technologies may also involve both tangible and intangible costs. These costs may, for example, consist of more expensive materials, a higher level of skills needed to manage the product, or a higher risk of product failure. Genomics calls for co-operation between scientists and the general public, with successful co-operation depending to a large degree on the way citizens/consumers are able to cope with these new trade-offs in institutions (some of which are to be newly established). For food researchers, policymakers, the food industry and retailers in the genomic and nutrigenomic sector there are many uncertain factors: the knowledge claims are uncertain and different types of risk are involved. This requires risk analysis and precautionary measures. The perceptions of consumers are unclear, and the economic prospects (costs and benefits) are uncertain.

For researchers in the field of genomics and the life sciences, the customary distinctions between basic applied science and technology do not exist anymore (if they ever existed). One only has to glance through journals such as *Trends in Food Science and Technology* or *Theory in Biosciences* to see that many fundamental articles directly concern the preservation of food, the relationship between genes and obesity, or nutrient cycling and sustainability; in other words, fundamental social issues are discussed. Before the DNA revolution took place, food scientists did research into the extent to which certain ingredients were poisonous, or into the preservation of food. Nowadays, however, the life sciences are expanding into the food choices of people; they have large impact on a person's daily life, which will be increasingly organized along the networks of a gene passport or health card.

For professionals the boundaries between industry, university, and government policy are blurred. They switch easily from one sector to another. Regulations and activities that used to exist in one sector are now taken over by other sectors, like the patent system or advisory activities. For patients and consumers this makes it very unclear who is speaking, for example when consulting an expert: is he or she employed by industry or somehow connected with a government agency that has

something to gain or lose? Famous cases involve the role of scientists in the anti-smoking debate or, more recently, the role of food and health scientists in the sugar debate raised by the World Health Organization (The Guardian, 21 April 2003). Other issues that are covered in the quality press are the relationship between screening agencies and the therapeutic products that are prescribed and sold (Sciona) and the management of bio-databanks (Bulger, Heitman and Reiser 2002).

It is hardly necessary to refer to famous disasters in science and technology, such as the nuclear energy plant in Chernobyl, the Challenger and Colombia space shuttles, the marketing of GM maize by Monsanto, or the extensive use of X-rays in medicine during the 1930s, to become pro-active in the regulation of responsibility and accountability with respect to new developments. Although, historically speaking, the first reflections on responsibility refer to disastrous consequences and their punishment (John Stuart Mill, Kennett 2001), nowadays we have a more mundane conception of responsibility, which stresses the potential implications of actions and technologies and not only the negative effects (Resnik 1998). Who is responsible for the widespread implications of life-science technologies for individuals, groups and social players vis-à-vis these new developments? To establish all the links in the life-sciences network, it is necessary to assess these different factors and to establish trust between the various stakeholders and with consumers in particular. However, the various stakeholders do not put the same emphasis on these issues, their approaches in solving the issues differ widely, and so the dance of evading responsibilities continues. Companies state that they only respond to what the market and consumers want them to do; life scientists argue that they only want to conduct research and do not determine profit strategies; politicians say that they are advised by scientists and have privatized these developments at the request of citizens. I consider it better to step outside this dance, and to look beyond the parties to three impartial conceptions of responsibility and accountability: the causal theory, the role theory and the pragmatic theories of responsibility.

### **Causal theory of responsibility**

According to the causal theory of responsibility, responsibility is associated with the causal relationship between an individual person and his activities. Only when a person is in full control of the circumstances, of his agency and of the activities that he sets in motion (thus when the acting person is free), can he be held responsible. Surely, it would be unfair to make people responsible for events when they do not have control over the circumstances. According to this view, if a scientific invention is stolen from a laboratory and misused, the inventor cannot be held responsible. As a matter of fact, however, many of the acts that we perform, we do not control. There are many circumstances as well that we do not control, that we at least do not decide about and that determine our decisions.

There are several approaches to this traditional philosophical issue of freedom and determinism. On the one hand, there is the determinist approach, which denies all agency (Pereboom 2001); consequently, talking about responsibilities is superfluous. On the other hand, there is the voluntaristic view (as in the existentialism of Sartre); and thirdly, there are several approaches that stress the compatibility between freedom and determinism (compatibilism). Kant's compatibilist point of view emphasizes the agent point of view next to the deterministic view. He maintains that freedom and determinism are ways of reconstructing sequences of events. From the deterministic point of view, we organize reality according to relationships of causes (physical and

otherwise) and effects, with humans merely being effects (i.e. according to the laws of nature). From the perspective of freedom, we view moral agents acting as free causes according to moral relationships between intentions and acts (i.e. according to the laws of freedom). What this perspective does not take into account, however, is that intentions are shaped by cultural and social circumstances as well, that they are neither totally in control nor totally out of control of the agent. Actions can be caused by something beyond our control, while we can still be in control of them. This makes the perspective of freedom and responsibility more complicated. In fact, it urges us to reconstruct the distinction between freedom and determinism not as one between two different and excluding viewpoints, but as a gradual distinction: an agent can be more or less free, more or less determined.

### **Role theory of responsibility**

Linked to this complexity is the issue that the description of acts generated by human agents can vary. Suppose I intentionally open the outside door of my house, simultaneously detect a prowler waiting in the dark, hurt the kid that was just trying to open the door from outside, and alarm my partner who is sleeping upstairs (what Feinberg calls the accordion effect). The social contexts that shape actions and their interpretations are not taken into account by the causal theory of responsibility. In daily life we normally apply a more social theory of responsibility, with causality being less important. When we hold parents responsible for the actions of their children, drunken drivers for their risky behaviour and politicians for their civil servants, this has to do with our expectations of the parental role (care) and our assumptions about driving (safety) or political roles (stewardship) and not with causal responsibility or lack thereof. According to the role theory of responsibility, we allocate responsibility to individual persons depending on their social roles and the social contexts, and not only depending on the extent to which they actually cause certain events or have a conscious say about the occurrence of these events. This allocation has everything to do with the normative structure of our societies and is not a merely empirical fact. However, the social contexts do not supersede causal accounts but complement them. Intentionally, negligently or recklessly causing harm by conducting certain types of research (remember the Tuskegee Syphilis Experiment) is still covered by this concept of responsibility.

There are several issues that make role responsibility questionable. First, take the comment of the Challenger director to the engineer who warned about the poor sealings in the rocket that ultimately caused the catastrophe: “Take off your engineering hat and put on your management hat”. It is often not clear what one’s role is as a life scientist or engineer in an organization or society, and I would even argue that certain role aspects (like safety) should override other aspects (like profit or management). A second issue is that, even in situations where the practice of science and technology is well organized, there is still the issue of the goals of the organization, its research agenda, its research priorities and its research design. Scientists have a responsibility to society at large as well, one that transcends role responsibility and harbours on public responsibility. We only need to recall the appeals of Einstein and Oppenheimer to ban atomic-bomb testing, or the actions of Rachel Carson and Barry Commoner in the 1960s about the banning of DDT and in favour of biodiversity, to recognize that scientists have a certain responsibility towards the common good, a responsibility that transcends their specific role when working in a certain organization and doing their job (Shrader-Frechette 1994). A

third issue is that roles are subject to change, along with the practices that they are part of. With respect to life scientists, when their practices turn to social life as they become involved in gene passports or health cards, their social role changes accordingly. Here again there is no causal responsibility, but at least a shared responsibility for large-scale effects. But to what extent and in what measure?

## **Pragmatic theory of responsibility**

In several publications we have presented a revised version of pragmatic ethical theory, in which we first stress the three *antis* of pragmatism: against foundations of moral guidelines in metaphysical or other entities; against common dualisms like nature and culture, citizen and consumer, mind and body, science and ethics; and against fundamental doubts à la Descartes (doubting the validity of everything) or total societal critique (doubting the social system).

The first ‘anti’ means that I am sceptical of general principles such as the four justified by Beauchamp and Childress (the principles of autonomy, justice, maleficence, and beneficence). Only as heuristic guidelines can they play a role in ethical reasoning. Secondly, we stress the importance of values in a globalizing world, such as democracy and co-operation, in other words, peaceful ways of managing ethical and other normative differences. Finally, we delineate the concept of co-evolution of technology and ethics, in the sense that new technological developments are seen as intriguing challenges for common morality frameworks; they do not function a priori as impulses to draw boundary lines or erect red stop signs. Co-evolution of technology and ethics makes it clear that both change when reacting upon each other. In that sense, technology has a broad ethical component, and ethics is intrinsically connected with technology; neither can be held constant and unchanging (Keulartz et al. 2002). However, we should be wary of ethical colonialism, in the sense that ethical problems are considered to be rampant, with the consequence that scientists are overburdened with all the moral problems of the world.

In analysing urgent ethical problems (problems that hurt, not those that may arise but are rather far away or pure science fiction), I use the concept of practices, in particular their interrelationship and their relationships with public debates, consultations and decision making. This concept is useful because it clarifies how technologies are themselves part of social practices that are applied to other social practices. Embedding life sciences and their corresponding technologies in social practices means therefore to open up the social practices of science to the social practices to which they are applied and looking for positive connections between these practices and negative, controversial encounters. For example, when genetics started to use new technologies to predict and treat certain diseases such as Huntington, patient organizations, hospitals, clinics and advisory agencies changed correspondingly, as well their standards of excellence and broader norms.

In searching for compromises and new possibilities (scenarios), we pragmatics try to re-open the frozen frontiers between practices. Practices have values and goals, like standards of excellence, as well as concrete products that are measured against these values and goals. When practices change, the norms change as well, which is not only of interest for the practices involved but for society as a whole. That calls for public consultation.

Recent developments in the life sciences put them into new constellations with other practices of health care and food, in that they change these practices and require

that many traditional standards of excellence and broader norms should be made subject to revision. Because of the huge investments involved, private–public co-operation ('triple helix', Etzkowitz and Leydesdorff 2002) is growing more common. Regulations that are maintained in the private sector, such as patents, are becoming common in the public sector, including the universities. Other regulations and attitudes are moving from public sectors to semi-public sectors. Health diagnostics, health screening and health consulting, which used to be performed only in the health sector, now are also regularly performed in the food sector, even though the necessary moral and legal regulations are often lacking.

Two issues are in my view of utmost importance to be discussed by professionals, both in university and in industry settings. First, there is the topic of research priorities. If universities and their laboratories are indeed so heavily dependent on financial support by industry, who then chooses the research topics and why? Are the illnesses for which cures are sought indeed illnesses that should be urgently treated because many people suffer from them, or are they the luxury complaint of a rich minority? In the ivory-tower university environment of the early twentieth century, setting the research agenda was the privilege of peers, but nowadays this is no longer the case. Do governments decide, is it industry or the scientific community, or is it some unclear combination of the three (Nestle 2000)? Should these decisions be preceded by public debates and followed up afterwards by public scrutiny so that decision makers can be held accountable? What research topics are societal and scientifically relevant, and in what way are they linked to social goals that are thought to be relevant according to the general public? Who decides which alternatives should be chosen from the possibilities, given the present state of the art of the life sciences? What standards should be applied (Kitcher 2001)? Nowadays, these more general moral requirements of responsible scientists, like working for the public good (Shrader-Frechette 1994) are not clear, simply because it is not clear what the common good is in, say, the case of health food or food safety (how much unsafe food is acceptable?). Here only public debate and consultation can help both professionals and the public at large to find orientation. The main public responsibility of life scientists in deciding on a certain research project is therefore not that of giving information on fraud or on discrimination (although both actions are as necessary as ever), but of participating in public debates, giving both information and normative guesses about the possible benefits and detriments of new developments. This activity does not require professional codes but the skills to perform open, honest and rational debate. However, this can lead to a conflict with the second issue that ought to concern life scientists.

The second implication for life scientists in their new social constellations is that far more than in the past, they are professionally involved in consulting private persons or private companies, in advising governments and health organizations, in managing data acquired from screening tests and diagnostics, even in proposing new foods or drugs that appear to correspond with the diagnostics. The danger is even of confusing and blurring the dividing lines between these activities. It is so easy, when you get your marvellous, expensive diagnostic tool from a certain company, also to prescribe the drugs or foods that are delivered by this same company. But is it in the interest of the consumer and the science system at large? The interests of organizations never fully coincide with the common good, whatever that may be. Will the public trust a science system that naively or intentionally assumes that its particular interests coincide spontaneously with the common good? I do not think so, and the general opinion in most western societies does not assume that the interests of

a subsector coincide with societal interests. Viewed in this way, life-science professionals should set up Berlin Walls between conducting research, giving advice, doing diagnostics, public consulting, and prescribing foods or drugs. In giving advice to a consumer or patient, the professional must clearly state in advance what his potential conflicts of interests are. I am ethically pleased to see that this is already a common practice in articles in some high-ranking medical journals. In food science, however, it is still very uncommon in publications, let alone in contacts with consumers or policymakers. But this could be done much more radically, in the sense that scientists who conduct research that is financed by industry indeed refrain from giving advice to consumers and from prescribing certain foods or drugs, that they do not participate in public debates, and that all these activities are neatly, physically and personally, separated in the same way that banks and financial investment companies now separate their different activities. Such separation may be referred to as a Berlin Wall.

However, from the point of view of the urgent need for life scientists to participate in public debate and policy structures, Berlin Walls are too cumbersome, as they can prevent the necessary flow of information and communication between the various activities. So maybe Chinese Walls between conducting research, public consulting, advising and prescribing are a better solution from a pragmatic view. It is not forbidden to change sectors, but only on certain conditions, like announcing your conflicts of interest, outlining possible losses when you go along with this particular scientist, and honestly indicating alternatives. For example, in the sugar debate it should be a matter of professional honesty that, when a professional speaks out for the rules of the World Health Organization or against them, he makes his connections with industry and government clear in advance. Also, if a scientist is against regulation of sugar, he should state what alternatives there are to curb sugar intake and reduce obesity. Again, professional codes do not help here, because they mostly deal with the avoidance of harm and with honesty, and not with learning to find out where these conflicts of interest arise with the norms of other people such as various consumer groups and with other ethical skills and competencies. These kinds of skills add to the public responsibility of life scientists, which involves participation in a rational and decent way in public debates and in transparent decision making.

## **Conclusion**

In this paper I have discussed several types of responsibility for life scientists in the new constellations, where the boundaries between sciences, advising, managing information, prescribing and profits are becoming blurred. In the light of shifting commercial and political conditions and of changing relationships between medical and food practices, I have outlined new tasks and ethical issues. From the pragmatic point of view I have presented two central issues that are to be dealt with. The first issue is that of setting research priorities and their relation to the public at large. Considering that the public has an eminent interest in the new life-science developments but simultaneously does not understand them, the public responsibility of life scientists should be cultivated by training them in making rational conjectures about future possibilities of the combination of scientific development and social change. This is difficult, because scientists should refrain from publishing immature or non-validated results.

The second issue is even more complicated. Yes, we need certain Chinese Walls, not Berlin Walls, between the roles of research for universities, governments or

industries, of public consultation and of advising industry or patients/consumers. The new tasks of the life scientists require more than ever that there is total clarity in whose interest they conduct research, construct and manage data banks, prescribe foods, and so on. According to a pragmatic view of ethics, the trust of consumers in the newly establishing life-science network depends upon the question: will consumers in future have a say in what they consume? The public responsibility of life scientists should be reconstructed with that question in mind.

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