

PIOTR STANKIEWICZ  
Nicolaus Copernicus University

## **Invisible Risk. The Social Construction of Security\***

*Abstract:* Several empirical studies of the social construction of risk have been conducted within the risk study paradigm but little attention has been paid so far to the flip side of this process, i.e., exclusion of risk from social consciousness by deliberately or involuntarily rendering it invisible, disregarding or marginalising it. This article, based on the concept of risk proposed by Ulrich Beck, Mary Douglas and Aaron Wildavsky and the findings of the sociology of scientific ignorance, introduces the “risk-concealment category.” This category applies to the mechanisms and processes underlying the social definition and construction of risk. It then presents the main functional areas of the mechanisms of risk-concealment in social practice and identifies the basic types of mechanisms which can be found at various stages of social risk definition and which lead to the social construction of the sense of security. The status of this text is projective and the possible paths of further exploration of the subject are outlined. The purpose of this article is to suggest a new research area focusing on the various aspects of risk-concealment and the underlying mechanisms, rules and action strategies. The mechanisms of risk assessment, political-economical risk definition and risk discourse are discussed.

*Keywords:* risk, uncertainty, risk evaluation, constructivism, sociology of knowledge, ignorance, security, safety.

### **Part I. Risk and Ignorance**

A four-year international study of the effects of radio waves and electromagnetic fields generated by mobile telephones was completed in 2004.<sup>1</sup> The findings were surprising. Radiation from cellular telephones can modify human DNA and destroy body cells even if it is weaker than accepted threshold values. In Poland only *Gazeta Wyborcza* (2004) and *Rzeczpospolita* (2004) mentioned these findings in brief, one-paragraph notes then went silent. Why?

There are many more similar questions concerning our ignorance of the risk of using modern technology. Why, for example, have genetically modified soy, maize and cotton been produced on a mass scale since the mid-nineties even though we have no idea what consequences the releasing of genetically modified organisms in

---

\* This article was supported by a grant from the Foundation for Polish Science and Nicolaus Copernicus University research grant no. 372-H.

<sup>1</sup> The REFLEX (Risk Evaluation of Potential Environmental Dangers from Low Frequency Electromagnetic Field Exposure Using Sensitive In Vitro Methods) study was conducted by 12 research teams in 7 EU countries. The study was co-ordinated by Professor Franz Adlkofer from the German Verum Foundation. The complete REFLEX Report and its discussion can be found on [www.verum-foundation.de](http://www.verum-foundation.de).

the environment may have? Why did we have to wait half a century to learn that Freon [CFC] destroys the ozone layer although data suggesting that this may be true were already available in the nineteen-thirties (Wehling 2004: 76)? Why did no-one notice that DDT was harmful when it was used in agriculture for more than twenty years? Why is it only now that global warming is subject to public debate, not only among ecological activists, although they have been sensitising us to this problem since the nineteen-eighties?

In 2001 the European Environment Agency published a report entitled *Late Lessons from Early Warnings: The Precautionary Principle 1896–2000* (Harremoës et al. 2001). This report discussed twelve cases of dangers relating to technological progress. Information on these dangers had been available for many years before appropriate action was taken. The oldest ones reach back to the nineteenth century when the first data on the carcinogenic effects of ultraviolet radiation and the harmfulness of asbestos were published. The purpose of this report was to draw attention to the consequences of ignoring information on the risks of applying specific technologies. But the problem is not only that decision makers ignore signals of possible danger. The flip side of this practice is the voluntary or involuntary concealment of risk from the general public.

What we are talking about here is lack of information concerning the consequences of some modern technologies which we may call “invisible risk.” Invisible risk occupies part of social unconsciousness where it has been pushed either due to the operation of specific macro- and micro-social mechanisms or due to the deliberate and intentional operations of certain actors. We feel, however, that adequate sociological analysis could help to shed some light on some aspects of this social unconsciousness. This article attempts to outline the field of investigation which includes the mechanisms whereby information on risks is repressed to the social unconscious and kept there by means of such practices as ignoring, concealing, marginalising, minimising and trivialising risk (or some of its aspects).

Many empirical studies of the social construction of various types of risk have been conducted within the risk paradigm (cf. e.g. Johnson & Covello 1987; Bajos 1997; Dake 1993; Green 1997; Stallings 1990) but very few researchers have looked at the flip side of this process, i.e., the processes and mechanisms whereby risk is made invisible and is eliminated from social consciousness and relegated to the unconscious to remain hidden, denied or ignored. A handful of studies (Böschén 2000; Proctor 1995; Shackley & Wynne 1996; Wehling 2004; H.-J. Luhmann 2001) on these issues is available but it is rather haphazard and further studies are needed to clarify the domain. This text has no ambition of filling in the gap, it is merely projective and suggests several pathways which can be taken to explore the subject more thoroughly. The purpose of this article is to present a project for a new field of research covering such topics as the concealment of risk and the underlying processes, rules and action strategies.

The framework for this project is provided by the risk concept formulated by Ulrich Beck, Mary Douglas and Aaron Wildavsky on the one hand and the sociology of scientific ignorance on the other hand.

### The Sociology of Scientific Ignorance

The sociology of scientific ignorance (SSI) sprouted from the sociology of scientific knowledge (SSK) in the early nineteen-eighties (Stocking 1998). It did not aspire to replace the existing research tradition. What it wanted to do was expand this tradition and complement it with a previously ignored dimension, the “shadow-side of knowledge” (Stocking), i.e., what science did not know. Rather than being a new sub-discipline of the sociology of knowledge, it was a redirection. Several works emerged within this new current, most of them theoretical (cf. Smithson 1985, 1989, 1993; Ravetz 1986, 1987, 1990; Funtowicz & Ravetz 1991; Stocking & Holstein 1993; Beck 1996; Michael 1996; Walton 1996; Japp 1997; Stocking 1998; Böschen 2000; Wehling 2001, 2004).<sup>2</sup>

This idea is based on the observation that ignorance has lost its natural “innocence,” both epistemological and social: ignorance is no longer a natural state, a shadow zone dissipated by scientific discovery and a mere starting point for scientific endeavour, it is now problematised as a social construct, a product of knowledge-generating processes which serves specific political functions (Wehling 2004: 36). This is how Peter Wehling describes the new approach to ignorance (2004: 36–37):

Whoever reduces ignorance to the incognisability of natural relations is also reaching for a specific figure of argumentation and placing it in either the public or the scientific debate on the reasons for the lack of scientific knowledge. And by so doing he evokes the question of the meaning of “incognisability” (fundamentally incognisable? incognisable at this particular moment? incognisable due to insufficient scientific and technological advancement?) and the factors leading to this incognisability.

The reasons for incognisability are sought not in the nature of reality itself but in the institutional and methodological barriers within science and its environment. As in the sociology of scientific knowledge, where scientific knowledge is not viewed as something which is objectively given in nature and merely discovered by scientists but as the outcome of specific social, knowledge-generating processes, so too scientific ignorance is viewed as the product of social relations. It is subject to negotiation among scientists and between scientists and other actors (sponsors, regulating and controlling institutions, consumers); as something which is moulded by specific interests and either modified and accepted or rejected. Placing ignorance on the same analytic plane as scientific knowledge meant extension of the famous symmetry principle of the so-called strong program of sociology of knowledge.

Knowledge is not just the reverse of lack of knowledge, the realm of the yet unknown, reduced by scientific progress. On the contrary, researchers have coined the term “science-based ignorance” (Ravetz 1986), conceived as the realm of relevant ignorance generated by scientific and technological advancement. “Now we face the paradox that while our knowledge continues to increase exponentially, our relevant ignorance does so even more rapidly. And this is ignorance generated by science!” (Ravetz 1986: 423, after Wehling 2004: 44). This is how Ravetz specified his concept of

---

<sup>2</sup> For a discussion of ignorance from a different research perspective see: Luhman 1992; Merton 1987; Proctor 1995; Sojak & Wicenty 2005.

ignorance generated by science: “This is an absence of necessary knowledge concerning systems and cycles that exist out there in the natural world, but exist only because of human activities. Were it not for our intervention, those things and events would not exist, and so our lamentable and dangerous ignorance of them is man-made as much as the systems themselves.” (1990: 217, after Wehling 2004: 44).

Here the sociology of scientific ignorance touches a problem which is also important for the study of risk where the focus is on the fact that, as science and technology are developing, the range of technological interventions is becoming increasingly wider; hence on the one hand, their possible consequences are becoming more and more far-reaching and on the other hand, they are becoming more and more difficult to foresee.

To summarise the most salient aspects of the sociology of scientific ignorance from the point of view of the study of invisible risk, we should draw attention to the fact that this is not sociology of ignorance in the strict sense but sociology of scientific ignorance.<sup>3</sup> This observation seems to be based on the tacit assumption that once science has described and explained a phenomenon, this phenomenon is automatically known and passes from the realm of ignorance to the realm of knowledge. Meanwhile, as far as many dangers are concerned, they remain within the domain of scientific ignorance despite the fact that they have been scientifically cognised (more on this later). In other words, they are invisible not because they continue to elude scientific cognition but because they are subject to extra-scientific processes and phenomena. These processes and phenomena must be described if we want to gain a comprehensive view of the mechanisms of risk concealment.

This aspect of the sociology of scientific ignorance goes hand in hand with its epistemological attitude: the focus here is on the nature of scientific cognisance and the reasons why certain phenomena escape it whereas the focus of the sociology of risk is on just one of the many questions concerning the development of areas of uncertainty, risk and ignorance in society.

A third major aspect of the research paradigm we are discussing here is its focus on unintended and unconscious mechanisms of ignorance generation and lack of interest in the role of specific social actors and their interests in the social construction of ignorance (Wehling 2004: 55). A pertinent illustration of this approach is Wehling’s analysis of the history of CFC and its effect on the ozone layer. In his attempt to discover how it happened that for half a century nobody noticed that CFC was destroying the ozone layer Wehling completely ignores the interests of the producers of this substance. Even when he writes about the most controversial period, lasting more than a decade (from 1974 when it was first hypothesised that CFC might be harmful to publication of the Montreal protocol in 1987), he fails to see that one of the determinants of the prolonged questioning of the detrimental effect of CFC the

---

<sup>3</sup> This is why Wehling is reluctant to identify ignorance with risk. He thinks that risk, i.e., the probability that certain consequences will take place, is situated within the cognitive horizon of science because science must first identify these possible consequences; ignorance, meanwhile, also involves lack of knowledge concerning the possible consequences of actions. Hence risk is scientifically founded and although it involves a considerable amount of uncertainty, this is not pure ignorance (Wehling 2004: 70–71).

ozone layer was the strategy adopted by Freon's main producer, DuPont concern, who consistently refused to accept this hypothesis until 1986 (cf. Smith 1998).

### Ulrich Beck and the Risk Society

Ulrich Beck, the German sociologist and a key writer on the sociological theory of risk, distinguishes three types of risk: preindustrial risks, industrial-age risks and the enormous risks of late modernity (Beck 1988: 120–121).

Preindustrial risks are not caused by technological and economic behaviours and decisions, they are extrinsic with respect to society and rooted in natural phenomena and the dealings of the gods. A typical example are natural disasters and epidemics. Little can be done to prevent them and although we can stave them off or minimise their consequences if we take sufficient pains to do so, their existence is not contingent on anything we humans do. They are usually unpredictable and incalculable (floods of the century could take place every year). However, their scope is temporally and spatially limited.

Industrial age risks are a product of social behaviour and human decisions. Unlike preindustrial risks, “we ourselves are responsible” for industrial age risks and we factor in the anticipated benefits when calculating the risk. This type of risks is individual, local, temporally and spatially limited, and predictable. Industrial age risks come closest to the classical meaning of the word “risk,” i.e., the probability of appearance of a loss of specified magnitude adopted, e.g., by insurance companies. Vehicle accidents, illness due to tobacco smoking or extreme sports are some examples.

Major dangers of the postmodern era are what Beck is most interested in (a fact which did not keep him from using the term “risk” to describe them) and they are the dialectical synthesis of preindustrial risks and industrial age risks. They resemble the former in that they are difficult to predict and control and are supra-individual. Like preindustrial risks, we do not choose them ourselves, they are inflicted on us from without. They resemble the latter in that their origins are intra-systemic, i.e., they are the product of technological progress. Ecological, chemical, nuclear and genetic dangers are examples of industrial age risks.

According to Beck, although contemporary dangers (risks) are produced by the system itself, they are the most real and obvious ones of the lot (Beck 1988: 155). This does not stop them from being the object of the social “defining relations” which take the place of power relations in risk societies. The power to define and say what is harmful and what is not, to what extent and beginning from what amounts, how to behave in the face of possible dangers, and how to control and regulate them, is one of the most fundamental political resources. This is because of the nature of the dangers themselves which are always symbolically mediated and can therefore only be cognised indirectly. As Beck wrote in *Risk Society: Towards a New Modernity* (1992: 27):

That which impairs health or destroys nature is not recognizable to one's own feeling or eye, and even where it is seemingly in plain view, qualified expert judgment is still required to determine it 'objectively.' Many of the newer risks (nuclear or chemical contaminations, pollutants in foodstuffs, diseases of civilization)

completely escape human powers of direct perception. The focus is more and more on hazards which are neither visible nor perceptible to the victims; hazards that in some cases may not even take effect within the lifespan of those affected, but instead during those of their children; hazard in any case that require the 'sensory organs' of science—*theories, experiments, measuring instruments—in order to become visible or interpretable as hazards at all.*

Therefore, what we know about dangers is symbolically mediated in science and its construction. Science is the “first filter” in their identification and description. Unnamed dangers do not exist.

Ulrich Beck pays a lot of attention in his writings to the social dimension of risk definition, the factor which determines how contemporary societies cope and deal with the typical dangers of risk society. What they decide to do about them, how they try to control them, whether or not they ignore them, depends on how they define them. Not only does this definition determine the nature of the different dangers, it also helps to determine which of them will be acknowledged and which will be ignored. Hence we may say that, according to Beck, risk construction begins with the identification of the actual, objective state of risk and is then passed through science's “perceptual organs,” interest groups (commercial, political, ideological), the media, various rationalities and world views, and risk-related conflicts, to end with a finally accepted, relatively consensual definition of the danger in question.<sup>4</sup> We will return to this later.

### Culturalist Constructivism

In their 1982 book *Risk and Culture*, the British anthropologist Mary Douglas and the American political scientist Aaron Wildavsky presented a theory of risk which they called culturalist or constructivist. Douglas and Wildavsky's theory is based on the assumption that, when confronted with a wide array of potential hazards, contemporary society must select the ones to which it will pay attention. This is caused, on the one hand, by the fact that society cannot objectively know all its threats and, on the other hand, by the nature of human cognition which—to quote Durkheim—is regulated by social categorizations. The categorizations are selective mechanisms which direct the individual perception of risk.<sup>5</sup> Each type of risk categorization and selection depends on the way the social group in which these processes take place is organized. This organization (Douglas calls it “ways of life”) includes a specific moral, religious and political order. It links risk perception to the group's values, norms and ideas.

Douglas and Wildavsky distinguish three contemporary types of organization of social groups: market, hierarchy and sect. Each type has a different approach to risk and a different social status. Market and hierarchy are modern society's central institutions whereas sects are situated at the periphery of social systems. This rather unfortunate term stands for ecological movements which are responsible for the

---

<sup>4</sup> To put it differently, we could say that risk assumes the form of a “black box” in its final stage of construction.

<sup>5</sup> Douglas and Wildavsky do not make a distinction between risks and threats.

sensitization of society to risk. Sects are in opposition to the market and the hierarchy and their ways of classifying risk. All three types of organization refer to a schema created by Mary Douglas called grid & group (for a more detailed discussion see Douglas 1970; Sojak 2004: 53–60; see also Adams 1995).

The second pillar on which Douglas and Wildavsky's theory rests is the anthropological theory of the relation between ideas of purity and danger developed by Mary Douglas (1969). According to this theory, what society decides to view as pure and impure is relative to the social order. Dirt and pollution, according to Douglas, are defined in terms of interference with the social order which constitutes a given group. Anything which is not in its proper place or violates the accepted order of things is impure. This is what the British anthropologist says in *Purity and Danger* (1969: 35):

If we can abstract pathogenicity and hygiene from our notion of dirt, we are left with the old definition of dirt as matter out of place. This is a very suggestive approach. It implies two conditions: a set of ordered relations and a contravention of that order. Dirt then, is never a unique, isolated event. Where there is dirt there is the system. Dirt is the by-product of a systematic ordering and classification of matter, in so far as ordering involves rejecting inappropriate elements.

If something does not fit into the existing classification system on which social order is founded, it is thought to be impure and polluted and therefore taboo. Douglas mentions this in the context of "taxonomic anomalies." One example of such an anomaly is perception of pork as impure meat in Jewish culture: this perception allegedly originated in the inability to classify pigs unequivocally because they have two mutually incompatible features: they belong to the *artiodactyla* family (like cattle) but do not ruminate. Anomalies such as these threaten the social order maintained by appropriate classification systems which help to organize and systematize reality and therefore the eating of pork must be forbidden (taboo).

Risk too is defined by checking whether and how it threatens the group's moral, political or religious order and whether or not it fits the accepted system of classification of reality. The group's dominant way of life and the fact that the risk threatens to jeopardise this way of life determines whether the risk will be recognised or rejected. In *Risk and Culture* (Douglas & Wildavsky 1982: 8) we read:

[T]he choice of risks to worry about depends on the social forms selected. The choice of risks and the choice of how to live are taken together. Each form of social life has its own typical risks portfolio. Common values lead to common fear (and, by implication, to a common agreement not to fear other things).

According to the culturalist approach, risk is socially constructed within each type of group even though certain objective threats are at its roots (*ibid.*: 7). Society has no direct access to them, however, except within the categories and selection filters supplied by the group: all social institutions perceive and select risk subjectively.

Douglas and Wildavsky point out that this social perception of risk has two aspects: "each social arrangement elevates some risks to a high peak and depresses others below sight" (1982: 8). Selection of certain threats and attribution of social forms to these threats is just one side of the coin; the flip side is society's tendency to ignore and marginalise potential threats. "What needs to be explained is how people agree

to ignore most of the potential dangers that surround them and interact so as to concentrate only on selected aspects" (*ibid.*: 9).

Douglas and Wildavsky point directly to the need to pursue two different lines of research on risk: its social selection and construction and its ignoring and denial. Meanwhile, as we said before, most researchers concentrate on the first aspect and remain immune to the problem of ignoring risk.

Douglas and Wildavsky's theory could serve as a good analytic instrument for such research but it also has its weaknesses. These largely flow from the anthropological nature of the theory and its focus on cultural features as the basic explanation of risk selection processes. As such, it can only embrace some of the mechanisms whereby threats are made invisible but, as we shall try to argue further on, these mechanisms go beyond the culturally determined ways of living which are typical for various social groups.

### **Risk and Threat—Between Objectivism and Constructivism?**

According to the classical, dictionary definition, risk means prediction of the probability of occurrence of certain losses and can be presented by means of the following formula:  $R = P \times S$  where  $P$  is the assumed probability and  $S$  is the anticipated magnitude of harm. In this sense, risk is a measure of danger (Bechmann 1993: 240). We may say that it is a "conceptual cover" which society uses to tame danger cognitively. Danger is translated into the universal and precise language of mathematics and the task of evaluating risk is left to the scientists.

If we refer to the "risk construction axis," reconstructed on the basis of Beck's works, which connects the factual and objective state of threat with the appropriate model of risk resulting from the social processes of risk definition, negotiation and construction, then we may assume that the concept of threat (or danger) applies to the objective, real possibility of occurrence of specific harm whereas the concept of risk applies to a conceptual construct which describes this threat. The mathematical model of risk was a popular way of coping cognitively with dangers in the industrial era.

Most writers on uncertainty in the context of technological progress admit that the concept of risk became useless in the second half of the twentieth century (cf. Bechmann 1993; Krohn & Krücken 1993; Evers & Novotny 1987; Bonß 1995). This is because the two pillars of the classical risk concept collapsed due to the acceleration of innovations in contemporary western societies: as far as contemporary hazards are concerned, we are unable to foresee the possible nature of the harm, not to mention its probability. In this sense, this resembles the extreme type of ignorance where we do not know what we do not know. Uncertainty no longer applies to the probability of occurrence of a hazard, it applies to the nature of the hazard itself.

All this has considerably broadened the field for the processes of social risk construction which are less strongly related to and limited by references to the intangible objective danger. This is attested to by the increasing number of controversies where it has not been possible to reach consensus concerning the reality and nature of the

threat in question (e.g., the connection between so-called mad cow disease (BSE) and Creutzfeld-Jacob's disease, the human contribution to global warming or the adverse consequences of bioengineering).

On the other hand, the scope of reverse processes is also broadened. Here, danger is not conceived according to the risk model in order to make it cognitively accessible. It is rendered invisible by means of various methods, beginning with science's denial of certain types of danger, through negation of certain consequences and marginalisation and exclusion from discourse and ending with concealment in the strict sense.

## **Part II. The Mechanisms Whereby Risk is Made Invisible**

In the following discussion of the mechanisms whereby risk is made invisible<sup>6</sup> we will use the terms invisible dangers and risks interchangeably. Invisible dangers are dangers unknown to scientists and are therefore a type of scientific ignorance. Risks are made invisible when knowledge concerning dangers which has already crossed the "social perception threshold," i.e., has been reported by science and is therefore accessible to the public in the form of knowledge of risk, is symbolically manipulated. Three dimensions of the said mechanisms will be discussed: the science and procedures of risk assessment, economics and politics, and discourse.

### **Risk Assessment**

Risk evaluation procedures are replete with practices whereby risk is made invisible. Not wanting to repeat the findings of the sociology of scientific ignorance, the following presentation will focus only on those mechanisms which specifically apply to risks and threats: risk naturalisation, defining border values and dependence on political and economic interests.

### **Risk Naturalisation**

One of the first steps in risk assessment is delineation of the area of occurrence of potential risk. In practice, risk is usually evaluated by representatives of natural sciences and within the frameworks of these sciences and therefore risk is usually reduced to the biological/physical dimension: possible harmfulness for the environment and human health is assessed but the social, political and economic consequences of implementation of a specific technology are not (cf. Seifert 2005). As Ulrich Beck (1992: 24) wrote:

The debate on pollutant and toxic elements in air, water and foodstuffs, as well as on the destruction of nature and the environment in general, is still being conducted exclusively or dominantly in the terms and

---

<sup>6</sup> We have decided to adopt this unfortunate term rather than the more convenient "concealment" in order to avoid focusing on conscious and intentional activities undertaken by specific actors. As Peter Wehling's classification of ignorance suggests (cf. our earlier discussion), dangers are removed from the horizon of social action and thinking by means of both intentional processes and certain spontaneous and unmanaged systemic mechanisms.

formulas of *natural* science. It remains unrecognized that a social, cultural and political meaning is inherent in such scientific ‘immerisation formulas.’

Franz Seifert (2005) shows how the “hegemony” of physical risk has shaped the debate on the acceptability of producing genetically modified plants and this in turn has influenced the course of the conflict between the United States of America and the European Union on the World Trade Organisation panel. According to Seifert, physical risk “becomes decisive in any kind of restrictive regulation, at national, supranational or international level. (...) As a consequence of physical risk hegemony scientific debates become the crucial conflict arenas” (*ibid.*: 367).

### Defining Acceptable Level of Risks

One of the crucial elements of risk assessment is the definition of maximum concentration decree. However, this practice has been so fiercely criticised in risk theory (cf. e.g., Beck 1998, 1992; Wolf 1991; Scheer 1987; Conrad 1987) that here we will only list the most important factors which may contribute to the situation where risk becomes invisible.

According to Jens Scheer (1987), the very idea that “thresholds” can be established below which a substance is harmless and above which it suddenly becomes harmful was borrowed from nuclear radiation research. In this case it has actually been confirmed that radiation in excess of a specific limit will destroy protein particles and have toxic effects on living organisms. Thresholds marking the point of qualitative change are not universal, however. The relation between substance dose and its effect on the organism is often not linear. Yet it has become accepted practice to set threshold values for many substances, just as it is done for radiation (Scheer 1987: 447).

Ignoring the process of accumulation of various substances is the next way of symbolically neutralising risk. Acceptable levels are defined for one factor only. Meanwhile, substances are deposited in the human or animal organism and their effects accumulate. Add to this the practice of a single exposure to large doses and a single measurement of their effects instead of long-term exposure to small doses, often a much better model of what actually happens in real life (Wolf 1991: 396).

Other things that have been subject to criticism are reliance on animal studies and transference of their findings to humans and the brevity of the studies which makes it impossible to identify all the effects of a substance. The latter is often forced on researchers by the logic of patent-based market competition which puts a premium on original substance discoverers only. Concerns try to shorten the interval between the discovery and its introduction to the market as far as possible.

Risk assessment is also often unable to take account of the delayed consequences of many technologies. Some of the adverse effects of nuclear radiation due to the bombing of Hiroshima and Nagasaki were not apparent until the nineteen-sixties (Sheer 1987: 449). This delayed effect is one of the reasons why some pharmaceuticals are withdrawn from the market despite previous approval. Their adverse effects sometimes do not show up until the next generations (cf. Wehling 2004: 79–82).

Some dangers are completely overlooked in risk evaluations because the number of known cases of adverse effects is too small. This could be the case, for example, with certain diseases which may be caused by in vitro fertilisation (cf. Schuh 2004).

### **Dependence on Political and Economic Interests**

Peter Weingart (2005) wrote that the changing status of science as an institution is one of the constitutive features of contemporary knowledge societies. He thinks that we are witnessing the increasing overlapping or mutual dependency of science on the one hand and politics, the economy and the media on the other hand. This is leading to the development of new phenomena and processes at the science—politics—economy—media interface which are affecting the way things are done. Making risk invisible is one of these new phenomena.

One of the major determinants of the process whereby risk is rendered invisible is the overlapping of science and big business. Science, both basic and applied, is becoming increasingly privatised and dominated by private concerns. Obviously, private economic agents who reap profit from new technologies are loathe to advertise the inherent risk. This is leading to conflict and tension between businessmen, public regulative institutions and public opinion. Scientists are the intermediaries in these conflicts. Unfortunately they are not always neutral although that is what is expected of them. Sheldon Krimsky gives many examples of the large scale of conflict of interest at the science—business—politics interface in his book *Science in the Private Interest* (2003).

Krimsky draws attention to the role which advisory committees, appointed by governmental agencies, play. In the North American legal system they have very considerable influence on legislation and decision making processes. Naturally, they should be objective, detached and, above all, not personally involved in the issues on which they are passing opinions. They should also be extremely highly qualified. In practice, however—Krimsky argues—these demands are often difficult to reconcile because highly qualified scientists usually also work for industry. Conflict of interests is therefore very common among governmental experts and advisors.

Science is not only subject to external influences (economic, political), it is also very adept at developing internal regulative mechanisms which help to make risk invisible. Jens Scheer portrays the situation in the nineteen-sixties when the consequences of nuclear bombing became evident at a time when the civil application of nuclear power was flourishing. So, its no surprise that researchers showing the “late consequences” of nuclear bombing found difficulties with spreading its data (Sheer 1987: 449).

### **Economic-Political Methods**

Once risk construction has left the field of the risk evaluation institutions in the form of specific (though not fully fashioned) knowledge about the probability of danger occurring and its possible nature, this knowledge is submitted to the further operations of economic and political actors, at which point it enters the larger field of social defining relations.

### **Risk Channelling and Appropriation**

Risk is channelled, i.e., it is reduced to a selected fragment which can be submitted to political and/or economic, preferably monopolistic, control. This method diverts attention from other threats and gives the impression that the risk in question is under control. The so-called international emission trade, advertised as a way to limit global warming, is an example. In this method, economic advantage is taken of a technological controversy so that the present technological progress can be left relatively intact while economic profit is gleaned from the situation. At the same time, public opinion receives the signal that the situation is under control and so is the risk, as attested to by the data on the development of the emission trade.

A good illustration of this mechanism can be found in the famous analysis conducted by the French sociologist, Philippe Roqueplo, who took interest in the debate on forest death in Germany and its relation to introduction of compulsory equipment of cars with catalysers which took place in the early nineteen-eighties (Roqueplo 1986). Roqueplo demonstrated that, thanks to the way the political debate in the European Union was channelled, Germany managed to enforce a beneficial interpretation of the reasons for forest death and gain economic advantage. Only private cars were “accused” and other possible causes, such as SO<sub>2</sub> emission caused by industry, electric power plants and trucks and lorries were rejected. By channelling the problem this way, Germany, the world’s leading producer of catalysers, could take advantage of the obligation to install them in cars.<sup>7</sup>

### **Withholding Information about Risk**

The next type of methods adopted to make risk invisible is withholding information in the strict sense. This is an example of conscious and deliberate action whose purpose is to prevent information about the dangers of a particular technology leaking out.

A good illustration is the court battle waged in 2004–2006 between Greenpeace, the French group CRIIGEN (Committee for Independent Research and Genetic Engineering) and the Monsanto biotechnological concern. This last organisation refused to disclose the results of research which was the basis for applying for permission to import MON863, a genetically modified variety of maize produced by this concern. Everything began when a group of *Le Monde* journalists managed to gain access to data demonstrating that rats fed with this maize, which contained a toxic insecticide, developed severe blood and organ anomalies. The German branch of Greenpeace demanded that the concern reveal its research findings but Monsanto refused on the grounds of commercial confidentiality. In 2005 the German court adjudged that the data must be disclosed, however (Greenpeace 2007).

Apparently such practices are frequent when publishing data on verified risk might threaten the actor’s economic interests. Another striking example is the history of the

---

<sup>7</sup> A similar case persisted in Poland for many years thanks to Kazimierz Grabek, the monopolist in the production of gelatin who successfully lobbied for bans on import or higher customs duty on gelatin or its components under the pretext of the risk of mad cow disease.

DuPont concern. In 2005 the Environmental Protection Agency accused DuPont of withholding information on the risk of using perfluorooctane acid (popularly called Teflon) for over 20 years. The company agreed to pay a 10 million dollar fine and allocate over 6 million dollars for environmental protection programs. This was the largest administrative fine the EPA had ever adjudged. That same year, *Business Week* magazine awarded DuPont the No. 1 of ‘the Top Green Companies’ title (DuPont, Wikipedia).

### Discourse and Risk Exclusion

The third area in which risk is made invisible is discourse which we shall now discuss. Radosław Sojak and Daniel Wicenty write in their book *Lost reality. On the social construction of ignorance* (2005: 69–84) that knowledge may be both an instrument and an object of exclusion. This is why risk marginalisation or exclusion from legitimate discourse plays a crucial role in the process of making risk invisible and the number of mechanisms which operate in this area is so large that their discussion would exceed the confines of this article. Hence we shall focus on the two most important ones.

### Discourse Framing

In her article “Biotechnology and the Politics of Truth” (2005) Sally Brookes analyses biotechnology from the perspective of various discourse frameworks which function within a given discourse formation. Discourse formation is understood as a historically originated system of discourse institutions and practices which define the discourse rules; situation within a specific fragment of the discourse formation says which cognitive perspectives, approaches and conceptualisations are acceptable and will give the ultimate meaning to specific statements and contents (Brookes 2005: 363).

Specific frames and practices are responsible for content inclusion/exclusion and framing. These frames integrate facts, theories, values and interests into cohesive structures. They say which discourse assumptions will be accepted as obvious and unquestionable. Brookes analyses the frames of the discourse on application of biotechnology in agriculture and points out their consequences for legitimisation of the GM food-based “green revolution.”

As far as making risk invisible is concerned, two frames are most crucial: the frame based on the assumption that “technology has its own trajectory” (*ibid.*: 363) and the assumption that “biotechnology is natural” (*ibid.*: 365).

The first of these two assumptions views scientific and technological development as something inadvertent which progresses according to its own intrinsic logic and also as a politically neutral phenomenon which leads to more advantages than disadvantages. This frame ignores the aforementioned contemporary links between science, politics, the economy and the media. Possible adverse effects of technological development are excluded from this frame by relegating them (as “unscientific”) to the realm of political practice.

The second frame, which declares biotechnological neutrality, habituates public opinion to the futuristic associations which bioengineering evokes by stressing that it

is “really” simply a continuation of earlier technologies (“people always manipulated genes, e.g., by crossing animals or plants in order to obtain adequate varieties”).

Maarten Hajer uses the concept of emblems to analyse ecological discourse. Emblems serve as a metaphor which helps to orient cognition and frame the problem (Hajer 1995: 19–21; cf. Lakoff & Johnson 1980). They symbolise the problem, attract most of the public opinion and concentrate discourse on themselves. Hajer gives examples of global warming and the ozone hole (the nineteen-eighties) which substituted the earlier nuclear power emblem (the nineteen-seventies) or the pesticide problem (the nineteen-sixties), the mainstays of ecological discourse in each consecutive period (Hajer 1995: 20).

It seems, therefore, that the emblem concept may be viewed as an attempt to specify the theory of discourse frames: emblems function within discourse frames according to a given discourse formation’s super-ordinate rules of discourse. By concentrating the main body of discourse on itself, it helps to divert attention from other issues. Hence the peculiar struggle to make a problem an emblem as attested to by the years-long attempts to pay more attention to the problem of global warming.

In addition to emblems, we can also find “discourse-closing categories” within discourse frames. These are incantations whose use by one of the adversaries causes discourse to reach its limits beyond which it cannot proceed any further. The aforementioned references to inadvertent or “no alternative” scientific progress, accusation of critics of certain technological solutions of the wish to “return to the caves,” or talk of the “necessary costs of progress,” all belong to this discourse-closure category. The side-effect category also serves a similar function: this category was used for a long time to tame the hazards of technological development. As long as they were viewed as potential side effects, they could be marginalised and treated as “necessary evil.”

### **Excluding People and Information**

Radosław Sojak and Daniel Wicenty think that exclusion of people who proclaim certain information is a way of excluding information from discourse (2005: 69–84). “Exclusion of a person often leads to exclusion of certain information and the perspective on which it is founded” (*ibid.*: 78). Exclusion of people and information is based on the rule that “those whose values and norms have been defined as bad have no right to participate in the game which constructs social reality” (*ibid.*: 76). Sojak and Wicenty have analysed many works on social studies of science and the history of scientific controversies in search of examples of such exclusion mechanisms (cf. also Barnes, Bloor & Henry, 1996; Collins & Pinch, 1998). But examples of this method can also be found in the sphere of risk and danger. Two examples are Zbigniew Wojtasiński’s article under the telling title “The mad ecologist disease” (2003) and Włodzimierz Zagórski’s article “The new food magic” (2006) beginning with the words: “The opponents of genetically modified food are a new tribe of savages who believe in magic rather than science.” If someone is declared a savage in the very first sentence then how can we take what he says seriously? As Sojak and Wicenty say, “to control knowledge is to control people. The use of such control excludes people

and their knowledge from the community's interpretative interplay and the process of creating social reality" (2005: 79).

### **Keeping Controversy Alive**

Another discourse strategy for the marginalisation and trivialisation of risk is to emphasise the controversial and ambiguous nature of a problem. The debate on global warming is an example of this strategy. This mechanism is particularly obvious in the United States of America where global warming is a major political issue, on both the international plane (the Kyoto Protocol) and the domestic plane (Al Gore's campaign or Arnold Schwarzenegger's "conversion" to ecologism). No wonder, therefore, that the belief that global warming has yet to be explained and the effect of human activity on global climate change has still to be proven are upheld in public debate. One of the ways in which this is done is the media's practice of quoting voices for and against global warming in equal proportions. This way, under the guise of journalist reliability and objectivity, the public is given the impression that scientists are divided in half on this issue.<sup>8</sup> Things sometimes get even worse than this as when attempts are made to count the proponents and adversaries of each theory. For example, this is what Gary S. Becker, winner of the Nobel Prize for Economics, wrote in an article tellingly entitled "Global Hypocrites" (2007: 50):

Human kind's responsibility for global warming is "very probable." That is what more than 2.5 thousand researchers, authors of the recent UN Intergovernmental Panel on Climate Change (IPCC) said. Not too few perhaps? At the same time 4 thousand other researchers signed the so-called Heidelberg Appeal protesting against the alleged connection between human activity and warming of the climate.

Sharon Begley argues that upholding controversy is a deliberate strategy adopted by PR specialists and conservative think tanks connected with the oil industry (2007).

### **Conclusion**

The foregoing analysis showed that the process we called "making risk invisible" is a multidimensional, complex social phenomenon which operates on many planes (science, the economy, politics, the media, and discourse) and involves many different social practices. These practices can be grouped into subjective and systemic, individual and structural, intentional and spontaneous, conscious and unconscious. This article quoted several empirical examples to map the contours of this new research field and to add feasibility to the hypothesis that the processes whereby risk is made invisible play an important part in the social construction (definition) of risk and hence have a direct effect on the actions which contemporary societies take (or do not take) in the face of risky technologies. Many questions still need to be answered in this

---

<sup>8</sup> One example of how this works is the "dialogue" on the causes of global warming published in the weekly *Polityka* in 2006. Two interviews were presented, one with Halina Lorenc who argued that human beings are partly responsible for global warming and one with Zygmunt Kolenda who rejected this hypothesis (*Polityka* 2006, 2006a).

context, however, but could not be fitted into the limited confines of this article. What structural conditions enable these mechanisms to function? What are the relations between the various facets of risk perception described by cognitive psychology and the mechanisms whereby risk is made invisible? And finally, should we try to reduce invisible risk or, as e.g., Niklas Luhmann claims, is invisible risk one of the constitutive factors of contemporary society?

## References

- Adams, J. 1995. *Risk*. London: University College London Press.
- Bajos, N. 1997. "Social factors and the process of risk construction in HIV sexual transmission." *AIDS Care* 9 (2): 227–238.
- Barnes, B., Bloor, D. & Henry, J. 1996. *Scientific Knowledge: A Sociological Analysis*. London: Athlone.
- Barnes, D. E. & Bero, L. A. 1998. "Why review articles on the health effects of passive smoking reach different conclusions." *Journal of the American Medical Association* 279: 1566–1570.
- Bechmann, G. 1993. "Risiko als Schlüsselkategorie der Gesellschaftstheorie." In: G. Bechmann (ed.), *Risiko und Gesellschaft. Grundlagen und Ergebnisse interdisziplinärer Risikoforschung*. Opladen: WDV.
- Beck, U. 1988. *Gegengifte. Die organisierte Unverantwortlichkeit*. Frankfurt am Main: Suhrkamp.
- Beck, U. (ed.). 1991. *Politik in der Risikogesellschaft*. Frankfurt am Main: Suhrkamp.
- Beck, U. 1996. "Wissen oder Nicht-Wissen? Zwei Perspektiven 'reflexiver Modernisierung'," in: U. Beck, A. Giddens & S. Lash (eds.), *Reflexive Modernisierung. Eine Kontroverse*. Frankfurt/Main: Suhrkamp, 289–315.
- Beck, U. 1992. *Risk society : towards a new modernity*, translated by Mark Ritter. London: Sage.
- Becker, G. S. 2007. "Globalni hipokryci" [Global Hypocrites], *Wprost* 12–19 August: 50.
- Begley, S. 2007. "Global-Warming Deniers: A Well-Funded Machine," *Newsweek* 13 August, [www.msnbc.msn.com/id/20122975/sie/newsweek/page/0/](http://www.msnbc.msn.com/id/20122975/sie/newsweek/page/0/), access 7<sup>th</sup> October 2007.
- Bonß, W. 1995. *Vom Risiko, Unsicherheit und Ungewißheit in der Moderne*. Hamburg: Hamburger Edition.
- Böschen, S. 2000. *Risikogenese. Prozesse gesellschaftlicher Gefahrenwahrnehmung: FCKW, Dioxin, DDT und Ökologische Chemie*. Opladen: Leske + Budrich.
- Breuer, S. 1986. "Ist Umweltzerstörung überhaupt vermeidbar? Niklas Luhmann über 'Ökologische Kommunikation'," *Merkur* no. 7: 681–684.
- Brookes, S. 2005. "Biotechnology and the Politics of Truth: From the Green Revolution to an Evergreen Revolution," *Sociologia Ruralis* 45 (4): 360–379.
- Brown, V. 2003. *Powody do niepokoju. Substancje chemiczne a środowisko naturalne* [Reasons to be concerned. Chemical substances and the natural environment]. WWF, [http://wwf.pl/informacje/publikacje/detox/powody\\_do\\_niepokoju.pdf](http://wwf.pl/informacje/publikacje/detox/powody_do_niepokoju.pdf), access 29.07.2007.
- Collins, H. & Pinch, T. 1998. *The Golem: What You Should Know About Science*. Cambridge: Cambridge University Press.
- Conrad, J. 1987. "Risikoforschung und Ritual. Fragen nach den Kriterien der Akzeptabilität technischer Risiken," in: Berkhart Lutz (Ed.), *Technik und Sozialer Wandel*. Frankfurt/Main: Campus, 455–463.
- Dake, K. 1993. "Myths of Nature: Culture and the Social Construction of Risk." *Journal of Social Issues* 48 (4): 21–37.
- Douglas, M. & Wildavsky, A. 1982. *Risk and Culture: an Essay on the Selection of Technical and Environmental Dangers*. Berkeley: University of California Press.
- Douglas, M. 1970. *Natural Symbols: Explorations in Cosmology*. London: Barrie & Rockliff, Cressett Press.
- Douglas, M. 1969. *Purity and Danger. An Analysis of Concepts of Pollution and Taboo*. London: Routledge&Kegan.
- DuPont, Wikipedia entry, [http://en.wikipedia.org/wiki/DuPont#Environmental\\_record](http://en.wikipedia.org/wiki/DuPont#Environmental_record), access 19.07.2007.
- Evers, A. & Nowotny, H. 1987. *Über den Umgang mit Unsicherheit. Die Entdeckung der Gestaltbarkeit von Gesellschaft*. Frankfurt am Main: Suhrkamp.
- Funtowicz, S. O. & Ravetz, J. R. 1991. "A New Scientific Methodology for Global Environmental Issues," in: R. Costanza (ed.), *Ecological Economics*, New York, NY: Columbia University Press, 137–152.

- Gazeta Wyborcza*. 2004. "Komórki niszczą komórki" [Cells are destroying cells]. 22.12.2004, p. 11.
- Green, J. 1997. *Risk and Misfortune: A Social Construction of Accidents*. London: UCL Press.
- Greenpeace. 2007. *Der Fall Gen-Mais MON863: Chronologie einer systematischen Täuschung*. [http://www.greenpeace.de/fileadmin/gpd/user\\_upload/themen/gentechnik/greenpeace\\_chronologie\\_MON863.pdf](http://www.greenpeace.de/fileadmin/gpd/user_upload/themen/gentechnik/greenpeace_chronologie_MON863.pdf), access 18.07.2007.
- Hajer, M. A. 1995. *The Politics of Environmental Discourse. Ecological Modernization and the Policy Process*. Oxford: Clarendon Press.
- Harremoës, P., Gee, D., MacGarvin, M., Stirling, A., Keys, J., Wynne, B. & Guedes Vaz, S. (eds.), 2001. *Late Lessons from Early Warnings: The Precautionary Principle 1896–2000*. Copenhagen: EEA.
- Japp, K.-P. 1997. "Die Beobachtung von Nichtwissen," *Soziale Systeme* 3: 289–312.
- Johnson, B. & Covello, V. (Eds.), 1987. *The Social and Cultural Construction of Risk: Essays on Risk Selection and Perception*. Boston: Reidel.
- Krohn, W. & Krücken, G. 1993. *Risiko als Konstruktion und Wirklichkeit. Eine Einführung in die sozialwissenschaftliche Risikoforschung*, in: W. Krohn & G. Krücken (eds.), *Risikante Technologien. Reflexion und Regulation*. Frankfurt/Main: Suhrkamp.
- Krimsky, S. 2003. *Science in the Private Interest: Has the Lure of Profits Corrupted Biomedical Research?*. Lanham, MD: Rowman & Littlefield Publishers.
- Lakoff, G. & Johnson, M. 1980. *Metaphors We Live By*. Chicago: University Of Chicago Press.
- Langdon, W. 1977. *Autonomous Technology*. Cambridge: The MIT Press.
- Loosen, W. 2004. Auf Kosten der Patienten, *Die Tageszeitung*, 30.01.2004, p. 36.
- Luhmann, H.-J. 2001. *Die Blindheit der Gesellschaft. Filter der Risikowahrnehmung*. München: Gerling Akademie Verlag.
- Luhmann, N. 1992. "Ökologie des Nichtwissens," in: N. Luhmann (ed.), *Beobachtungen der Modern*. Opladen: Westdeutscher Verlag, 149–220.
- Merton, R. K. 1987. "Three Fragments from a Sociologist's Notebook: Establishing the Phenomenon, Specified Ignorance, and Strategic Research Materials." *Annual Review of Sociology* 13: 1–28.
- Michael, M. 1996. "Ignoring Science: Discourses of Ignorance in the Public Understanding of Science," in: A. Irwin & B. Wynne (eds.), *Misunderstanding Science?* Cambridge: Cambridge University Press, 107–125.
- Moskal, W. 2005. "Agresja po Prozacu" [Aggression after Prozac]. *Gazeta Wyborcza* 07.01.2005: 12.
- Polityka*. 2006. "Na chłodno o klimacie. Rozmowa z prof. Haliną Lorenc z Instytutu Meteorologii i Gospodarki Wodnej" [Keeping Cool About the Climate. Interview with Professor Halina Lorenc, Institute of Meteorology and Water Economics]. No. 48/2006.
- Polityka*. 2006a. "Ocieplenie w polityce. Rozmowa z prof. Zygmuntem Kolendą z Akademii Górniczo-Hutniczej" [Political Warming. Interview with Professor Zygmunt Kolenda, The Academy of Mining and Metallurgy]. No. 48/2006.
- Proctor, R. N. 1995. *Cancer Wars: How Politics Shapes What We Know and Don't Know About Cancer*. New York: Basic Books.
- Ravetz, J. 1986. "Usable Knowledge, Usable Ignorance," in: W. C. Clark & T. Munn (eds.), *Sustainable Development of the Biosphere*. Cambridge: Cambridge University Press, 415–432.
- Ravetz, J. 1987. "Uncertainty, Ignorance and Policy," in: H. Brooks & C. Cooper (eds.), *Science for Public Policy*. Oxford: Pergamon Press, pp. 77–89.
- Ravetz, J. 1990. *The Merger of Knowledge with Power. Essays in Critical Science*. London/New York: Mansell.
- Roqueplo, Ph. 1986. "Der saure Regen: ein 'Unfall in Zeitlupe'," *Soziale Welt* no. 4: 402–426.
- Rzeczpospolita*. 2004. "Komórki szkodzą?" [Are Mobile Phones Harmful?] 23.12.2004.
- Scheer, J. 1987. "Grenzen der Wissenschaftlichkeit bei der Grenzwertfestlegung. Kritik der Low-Dose-Forschung," in: B. Lutz (ed.), *Technik und Sozialer Wandel*. Frankfurt/Main: Campus, 447–454.
- Schuh, H. 2004. "Roulette in der Retorte," *Die Zeit*, no. 25, 09.06.2004: 35–36.
- Seifert, F. 2005. "The Transatlantic Conflict over Biotechnology and the Hegemony of Physical Risk," in: A. Bamme, G. Getzinger & B. Wieser (eds.), *Yearbook 2005 of the Institute for Advanced Studies on Science, Technology and Society*. München, Wien: Profil.
- Shackley, S. & Wynne, B. 1996. "Representing Uncertainty in Global Climate Change Science and Policy: Boundary-Ordering Devices and Authority." *Science, Technology & Human Values* 21: 275–302.
- Smith, B. 1998. "Ethics of Du Pont's CFC strategy 1975–1995." *Journal of Business Ethics* 17: 557–568.

- Smithson, M. 1985. "Toward a Social Theory of Ignorance." *Journal for the Theory of Social Behaviour* 15: 151–172.
- Smithson, M. 1989. *Ignorance and Uncertainty. Emerging Paradigms*. New York/Berlin: Springer.
- Smithson, M. 1993. "Ignorance and Science. Dilemmas, Perspectives, and Prospects." *Knowledge: Creation, Diffusion, Utilization* 15: 133–156.
- Sojak, R. 2004. *Paradoks antropologiczny. Socjologia wiedzy jako perspektywa ogólnej teorii społeczeństwa* [The Anthropological Paradox. Sociology of Knowledge as a Perspective for a General Theory of Society]. Wrocław: Monografie Fundacji Na Rzecz Nauki Polskiej.
- Sojak, R. & Wicenty, D. 2005. *Zagubiona rzeczywistość: o społecznym konstruowaniu niewiedzy* [Lost Reality. On the Social Construction of Ignorance]. Warszawa: Oficyna Naukowa.
- Stallings, R. A. 1990. "Media Discourse and the Social Construction of Ris." *Social Problems* 37 (1): 80–95.
- Stocking, H. S. 1998. "On Drawing Attention to Ignorance." *Science Communication* 20: 165–178.
- Stocking, H. S. & Holstein, L. 1993. "Constructing and Reconstructing Scientific Ignorance: Ignorance Claims in Science and Journalism." *Knowledge: Creation, Diffusion, Utilization* 15: 186–210.
- Wadman, M. 2005. "One in Three Scientists Confesses to Having Sinned," *Nature* 6/9/2005, <http://www.nature.com/nature/journal/v435/n7043/pdf/435718b.pdf>.
- Walton, D. 1996. *Arguments from Ignorance*. University Park: Pennsylvania State University Press.
- Wehling, P. 2001. "Jenseits des Wissens? Wissenschaftliches Nichtwissen aus soziologischer Perspektive," *Zeitschrift für Soziologie* 30: 465–484.
- Wehling, P. 2004. "Weshalb weiß die Wissenschaft nicht, was sie nicht weiß?—Umriss einer Soziologie des wissenschaftlichen Nichtwissens," in: S. Bösch & P. Wehling (eds.), *Wissenschaft zwischen Folgeverantwortung und Nichtwissen. Aktuelle Perspektiven der Wissenschaftsforschung*, Wiesbaden: Verlag für Sozialwissenschaften, pp. 35–105.
- Weingart, P. 2005. *Die Stunde der Wahrheit? Zum Verhältnis der Wissenschaft zu Politik, Wirtschaft und Medien in der Wissensgesellschaft*. Weilerswist: Velbrück Wissenschaft.
- Wojtasiński, Z. 2003. "Choroba szalonych ekologów" [The Mad Ecologist Disease]. *Wprost* 37: 70–72.
- Wolf, R. 1991. "Zur Antiquiertheit des Rechts in der Risikogesellschaft," in: U. Beck (ed.), *Politik in der Risikogesellschaft*. Frankfurt am Main: Suhrkamp.
- Zagórski, W. 2006. "Nowa magia pokarmowa" [The New Food Magic]. *Gazeta Wyborcza* 9.03.2006.

*Biographical Note:* Piotr Stankiewicz is a PH.D. Candidate at the Institute of Sociology, Nicolaus Copernicus University, Toruń, Poland.

*Address:* piotrek@umk.pl