

What is Ignorance?
A Chronological Overview of the Discourse on Ignorance in a Historical Context

Daniel Dorniok

Dr. Daniel Dorniok
Carl von Ossietzky Universität Oldenburg
FAKULTÄT II - Informatik, Wirtschafts- und Rechtswissenschaften
Institut für Betriebswirtschaftslehre und Wirtschaftspädagogik
Fachgebiet Produktion und Umwelt
D-26111 Oldenburg
<http://www.uni-oldenburg.de/produktion/>
daniel.dorniok@uni-oldenburg.de

Auf die Thematik bezogene Veröffentlichungen:

Dorniok, D. (2013): Die Funktionalität eines Rechts auf Nichtwissen. Untersuchung wider die Transparenzierung der Gesellschaft, zur Konstitution eines allgemeinen Rechts auf Nichtwissen und eines umfassenden Datenschutzes im Arbeitskontext. BIS-Verlag der Carl von Ossietzky Universität Oldenburg.

Dorniok, D. (2012): Zum Einfluss des Beratungsansatzes auf die Wahrnehmung und Bedeutung von Wissen und Nichtwissen bei Beratern. In Zeitschrift für Arbeitswissenschaft, 01/2012, 66 Jahrgang, S. 24-37.

Dorniok, D. (2012): Die Einschätzung der Differenz von Wissen und Nichtwissen bei Unternehmensberatern – Ergebnisse eines universellen Strukturgleichungsmodells. In: Schmalenbachs Zeitschrift für betriebswirtschaftliche Forschung (zfbf), Mai 2012, S. 308-340.

Dorniok, D.; Mohe, M. (2011): Nichtwissen als vernachlässigte Variable im Verhältnis von Organisation und Umwelt. In: Conrad, P. ; Sydow, J. (Hrsg.): Managementforschung, Band 21, Organisation und Umwelt, S. 91-132.

Keyword

Knowledge

Ignorance

Historical Context

Consequences

Introduction

Knowledge and the intensive use of knowledge are usually assigned positive attributes in science and practice and are considered instruments that can open up possibilities and guarantee economic and social success. Knowledge has been the object of extensive research for a very long time, whereas the absence of knowledge, which is commonly understood as ignorance, has so far been largely neglected and therefore hardly explored and discussed. The relationship of knowledge and ignorance in modern society is perceived to be a paradoxical one, in the sense that the increase of knowledge means an increase in what is unknown (e.g., Smithson, 1989; Willke, 1996 p. 27f). Thus, the 'knowledge society' becomes a 'knowledge-and-ignorance society' (cf. e.g., Smithson, 1989). This paradoxical condition seems to make it necessary to also study ignorance and the circumstances under which it comes into existence.

A analysis of available literature in social science, suggests that the topic remains unclear and leads to even more confusion and new questions, rather than to satisfying answers. This paper will present an overview of existing research on ignorance (international social science literature, identified with diverse Databases (EBSCO, EconBiz, IngentaConnect, Informaworld, BNET, Economics-ejournals, WISO, ISI, ScienceDirect, Social Science Research Network) and searched for terms (in german and english) like ignorance, non-knowledge, nonknowledge, lack of knowledge, Unknown, Nichtwissen, Nicht-Wissen, Wissenslücken, Fehlen von Wissen, Ungewissheit) by analysing systematically (like analysis of content, see specially Mayring 2010) the relevant literature and by presenting chronologically different concepts, forms and effects of ignorance to reveal the meaning of ignorance and suggest ways of approaching it. In doing so, it will highlight the significance of this research on ignorance, which has been hitherto underestimated, although many existing works link ignorance to diverse positive and negative consequences on individuals, groups, social processes, organisations and the society as a whole.

A more differentiated understanding of the term arises from the chronological analysis of the existing literature that will be presented in this paper. The overview of existing approaches to ignorance will demonstrate the universal nature of the social processes associated with ignorance; in all areas where actions or decisions are made on the basis of knowledge, ignorance is important and should be discussed accordingly.

We begin by asking how the term ignorance is generally understood (in current literature). ‘Ignorance’ describes the general absence of knowledge, which can occur in various forms: e.g. inevitable ignorance, not-yet-knowledge, non-knowledge-ability or conscious non-know-intention (cf. Beck, 1996; Wehling, 2006). As Congleton has put it, ‘the existence of ignorance generally implies a complete lack of knowledge about a variety of real or imagined possibilities’ (2001 p. 394).

Investigating ignorance involves differentiating it from related terms and phenomena, such as uncertainty, mistakes, negative knowledge, liminal knowledge, tacit knowledge and intuition. There are different concepts on the relationship between ignorance, risk and uncertainty (e.g., Collingridge, 1980; Faber and Proops, 1993; Smets, 1991; Smithson, 1989). While Smithson (1989 p. 5f) as well as Smets (1991) use ignorance as a generic term, which includes e.g. ‘uncertainty’, Kahneman and Tversky (1982) understand ignorance as a subform of uncertainty. This paper follows the argumentation of Wehling (2006 p. 110) and assumes ‘that *uncertainty* is generally treated as a form of however limited, hypothetical and uncertain *knowledge*, while ignorance describes the lack and absence of knowledge’ (Wehling, 2006 p. 110, my translation). Thus, a mistake is to be distinguished from ignorance, as a mistake is also based on knowledge, albeit on alleged knowledge (cf. Luhmann, 1990 p. 172; Mayntz, 1999 p. 35; Wehling, 2006 p. 114).

Concerning negative and liminal knowledge, their differentiation from and relation to knowledge is already indicated in the terms that refer to ‘knowledge of the limits of knowledge’ (Knorr-Cetina, 2000: 165, my translation). Tacit knowledge is also a form of knowledge that is only implicitly known and used but cannot be explicitly described (cf. Collins, 2001). Such knowledge cannot be communicated and might be interpreted as ignorance by observers. Concerning intuition, while in philosophy, like tacit knowledge, it is regarded as a form of ignorance, psychology understands it as a ‘compressed’ form of knowledge (Zeuch, 2009 describes it as ‘a very strong and highly compressed form of knowledge’ p. 162, my translation).

This article is structured as follows: first, the research field of ‘ignorance’ is investigated through a chronological presentation (to show systematically the change of the term ignorance) and analysis of the conceptual understanding of ignorance and its effects by the current literature. From the chronological presentation of research on ignorance it can be seen

that studies of ignorance have developed from ignorance on the individual level to the construction of ignorance, the distinction between different forms of ignorance, the special importance of structural and unknown ignorance, to the potential social consequences, risks and threats of ignorance. Consequently, ignorance is no longer regarded only as a lack of knowledge that can be converted into knowledge, but as a partly durable and not removable phenomenon that arises in parallel with knowledge and can have various consequences on society. Overall, this realisation established that, in general, ignorance is basically unavoidable and in certain forms is always reproduced. This is mainly, because ignorance arises with and through knowledge. Thus, the production of new knowledge is always accompanied by the danger, or the chance, to create new ignorance. However, ignorance cannot always be identified clearly as it cannot be scientifically ascertained what constitutes 'correct' and 'complete' knowledge

A general and comprehensive definition is still missing. As a result, in several publications it is not always clear whether the authors discuss the same object of study. This suggests that there is still a lack of clarity or serious differences in how ignorance is understood.. Subsequently, the results and gaps in current research are critically analysed as well as concrete implications for practice (e.g., individual and organisational decisions, scientific research and communication) and further scientific investigation are identified. Implications for research arise primarily from the lack of knowledge about *how* and *where exactly which* forms of ignorance emerge, *which* factors are responsible for their emergence and stabilisation, *what kind of* consequences each form has, *which* actors are involved, on *which* levels and *in what way* these consequences can be seen, *how* these consequences can be modified by *which* targeted interventions.

Overview of Research in Ignorance

The analysis of previous research on the subject of ignorance shows that different perspectives have developed over time (from the early 20th century till 2010), which highlight different interpretations, forms and effects of ignorance in the social context.

Individual Ignorance

In the early 20th century, ignorance was discussed in the context of social relationships (see e.g., Fleck, 1935; Merton, 1936; Moore & Tumin, 1949; Simmel, 1908; Weber, 1919). In those early works ignorance is understood as an absence or lack of knowledge. Simmel (1908) understands ignorance as deliberately held back knowledge, a ‘secret’ that is accessible through knowledge. This individual lack of knowledge can be used functionally and, because it allows one to hide things from other people, it is a necessary condition of social relationships (Simmel, 1908). Thus, withholding systematically certain private knowledge protects, according to Simmel, from social ‘chaos’; similarly, a disclosed secret can lead to changes in social relations. Under certain circumstances the disclosure of a secret could also lead to a sudden change in the prevailing social order, with negative consequences, such as social dislocation and conflict.

Merton argues that ignorance can have positive effects. In his opinion, one can use ‘specified ignorance’ (cf. Merton, 1936) to acquire knowledge through learning, and profit from the acquisition of knowledge by solving problems. Moore and Tumin (1949), Schneider (1962), and later Popitz in particular (1967) follow Simmel’s concept and view ignorance as a basic condition of sociality. As far back as 1949, Moore and Tumblin described ignorance as a driver of social change. In addition, the presence of ignorance facilitates certain social relations and practices, i.e., the ignorance of others may allow an actor to carry out concrete activities. However, ignorance can also have a stabilising effect, for example in cases where certain knowledge that would have led to negative social changes is deliberately held back (cf. Davis, 1960; Moore & Tumblin, 1949; Popitz, 1968, Schneider, 1962; Simmel, 1908). A more concrete example is the concealment of violations of standards, which in turn leads to the stabilization of those standards (cf. Popitz, 1968). Negative effects has individual ignorance if it is prevailing in information pathologies (Wilensky, 1967) or when it is used against other individuals as a tactical instrument, a medium and tool for manipulating and maintaining power (cf. Schneider, 1962). In view of this, in the works mentioned in this

subsection ignorance is understood as a knowledge gap or as complete lack of knowledge (see Knight, who takes a contrasting position). In this view, it is possible to cure ignorance with knowledge, i.e. ignorance is seen as something that can be eliminated. However, as we will argue further down, this point of view represents a reductionist approach to ignorance and the issues that arise from this subject.

Constructed Ignorance

In constructivist approaches, which first developed in the 1970s (see e.g., Foerster, 1990; Glasersfeld, 1987; Maturana, 1974; Varela, 1981), ignorance is no longer seen merely as the opposite of knowledge but as a separate construct (cf. Schütz & Luckmann, 1979; Weinstein & Weinstein, 1978), complex and differentiated, and a research object in itself. It is perceived to be formed through various social ‘construction’ and definition processes (cf. Smithson 1985) and to have a varied social distribution (Schütz & Luckmann, 1979). Ignorance as a construct may have also been created deliberately by an individual; this is described as ‘cultivated ignorance’ (Rapp, 1972 p. 159).

Weinstein and Weinstein (1978) proclaimed as a counterpart to the sociology of knowledge, even the sociology of ignorance, in which the impacts and operability of ignorance should be investigated. However, even in such approaches, ignorance is often described and simplified as ‘individual ignorance’, shaped by the environment of an individual (e.g., experiences – see Schütz & Luckmann, 1979 p. 203f), or as ‘misinterpretation’ and ‘inattention’ (Weinstein & Weinstein, 1978 p. 155f); in other words as socially present knowledge that is not fully realised or is incorrectly realised. According to Schütz and Luckmann (1979), ignorance may be eliminated through knowledge, i.e. knowledge about who knows what or about what one does not know but wishes to know, and through the acquisition of such knowledge. According to Weinstein and Weinstein, ignorance can also be converted into knowledge, more specifically into knowledge that is accepted as ‘correct’ by the society. Ignorance can be identified if an observer notices or suspects selective and hypothetical ignorance, if ‘in other words, there is an explicit or implicit judgment by an observer that a subject should have cognized that which he did not’ (Weinstein & Weinstein, 1978 p. 469). This approach, however, requires a vantage point from which a scientific observer can distinguish deviations from ‘correct’ knowledge and can provide strategies for the ‘improvement’ of knowledge.

The potential impact of such ignorance is similar to the potential impact of a personal lack of knowledge except that the constructed nature of ignorance and the use of such ignorance to generate power (e.g., power to control access to knowledge) is more strongly emphasised. The deconstruction of the conditions of ignorance or the principles according to which it is constructed, such as determination and awareness strategies or restrictions on access to knowledge because of economic or political interests, can lead to the transformation of ignorance into knowledge. Loasby (1976) and Shackle (1968, 1979) mention productivity as an important element on which ignorance can have a positive impact. According to Loasby (1976 p. 162) the impact of ignorance on productivity is expressed in the stimulation of decisions, which may, however, also be blocked through ignorance, while Shackle (1979) regards ignorance of the future as the most important condition which makes decisions possible: ‘choice is an exploitation of unknowledge’ (1979 p. IX).

Structural Ignorance

Since the 1980s, ignorance has been increasingly treated as an independent object of study, particularly in disciplines such as sociology, philosophy of science and history of science (see particularly: Douglas & Wildavsky, 1982; Luhmann, 1992; Merton, 1987; Ravetz, 1990; Smithson, 1985). Such studies investigate ignorance and its consequences on various areas, such as individual and scientific processes. Moreover, the term ‘ignorance’ has become gradually more sharply defined by being distinguished from other related concepts: for instance, Collingridge (1980) described ignorance as a state characterised by the complete lack of knowledge, while in situations of risk and uncertainty specific knowledge (e.g., knowledge of probabilities, uncertain knowledge) is present.

Furthermore, these studies have led to the realisation that an increase in knowledge means an increase in ignorance. For example, knowledge creates ignorance in the form of problems, like radioactive waste from nuclear technology (see Ravetz, 1986). This finding fundamentally changed the perspective on ignorance.

In such studies, ignorance is no longer seen as just an individual lack of knowledge, or as the product of ‘information pathologies’ (Scholl, 1992) or of positive illusions (Taylor, 1989), but as a phenomenon that may arise from any scientific process. In this light, ignorance is seen as a permanent structural phenomenon that arises in parallel with targeted learning and the generation of knowledge (cf. Douglas & Wildavsky, 1982; Luhmann, 1992; Ravetz, 1990).

Whereas according to Merton's concept of 'specified ignorance' (1987) ignorance provided a starting point for gaining knowledge and solving problems, this is no longer the case in Ravetz's concept of 'usable ignorance' (1986). Ravetz assumes that structural ignorance as 'usable ignorance' (Ravetz, 1986) primarily motivates the formulation of new processible questions and the initiation of efforts to investigate, and eventually displace ignorance.

As several scientific fields (ecology, economy, technology, etc.) are confronted with new forms of socially constructed ignorance, the awareness of its role, as described above, has a special significance for science. Through the attempts to record 'usable ignorance' and to process it scientifically, different forms of 'construction and reconstruction of scientific ignorance' emerge (Stocking & Holstein, 1993, my translation). In the light of this, the responsibility of actors such as science, society, etc., is to identify the construction of ignorance, to use it productively and to transform it into solvable issues. It can be assumed that in the process of doing so, it is not possible to identify and scientifically operationalise all questions and every instance of ignorance. Accordingly, Ravetz sees a possibly permanent ignorance (Beck, 1996) that actors are permanently confronted with and permanently have to deal with (Ravetz, 1990 p. 274f; also Douglas & Wildavsky, 1982; Faber, Manstetten, Proops, 1990; Smithson, 1989). To deal with this topic, Ravetz and Funtowicz propose the following subdivisions: applied science is characterised by a low degree of 'system uncertainties' and decision stakes and certain forms of uncertainty. 'Technical or professional consultancy' is characterised by moderate degrees of the above. When the degree of uncertainty and the decision stakes are high, a 'total environmental assessment' is necessary, in which also non-scientific actors (affected by certain decisions) are included (Funtowicz & Ravetz, 1991, 1993, 2001; Ravetz, 1986).

In addition to concepts of the (social) construction of knowledge (e.g., Berger & Luckmann, 1969) and the recognition of the construction of ignorance (Schütz & Luckmann, 1979; Weinstein & Weinstein, 1978), the comparable concept of the social and anthropogenic constructive production of ignorance, and the assumption that ignorance, like knowledge, is socially constructed and negotiated (Smithson, 1985 p. 151), are central to several works. These works tend to highlight the structural component of ignorance that arises from the co-production of ignorance by knowledge. Ravetz (1990) for example, speaks of 'science-based ignorance' (Ravetz, 1990 p.1) and of 'man-made ignorance' (Ravetz, 1990 p. 217).

This ignorance is no longer just an individual lack of available society knowledge, but a product of scientific processes: ‘More research brings more ignorance to the light of day’ (Douglas & Wildavsky, 1982 p. 64). This statement underlines the general insuperability of ignorance. Ignorance is seen as a permanent structural phenomenon that is produced in parallel with knowledge and therefore cannot be avoided or permanently eliminated. The awareness that co-produced ignorance increases faster than the knowledge is an important point that this approach emphasises: ‘Now we face the paradox that while our knowledge continues to increase exponentially, our relevant ignorance does so, even more rapidly’ (Ravetz, 1986 p. 423).

Knowledge and science are not sufficient to eliminate the kind of ignorance described above. ‘Learning’ and the generation of new knowledge are not effective as measures for dealing with all types of ignorance but only with known ignorance, i.e. in the presence of knowledge about the absence of certain knowledge and of the ability to obtain this knowledge. They are also ineffective in cases of ‘not-yet-knowledge’ or a ‘specified ignorance’ (Merton, 1987). First, unknown ignorance, which has not been distinguished and identified, and which we therefore do not know that it exists and where it exists, cannot be eliminated through ‘learning’ or the creation of new knowledge. Second, new ignorance emerges through the creation of new knowledge (cf. Douglas & Wildavsky, 1982; Japp, 1997; Luhmann, 1995; Luhmann, 2000; Ravetz, 1990). For that reason, knowledge and the generation of new knowledge only dislocate ignorance. Actors are permanently confronted with structural ignorance that cannot be eliminated and develops into “non-knowledge-ability” (Beck, 1996) that has to be ‘tolerated’ (cf. Douglas & Wildavsky, 1982; Ravetz, 1990; Smithson, 1989).

Alternative cognitive and institutional methods are therefore required to remove structural ignorance (Ravetz, 1990 p. 274f). As Smithson pointed out as far back as 1989: ‘Not long ago, the dominant methods of coping with ignorance were to try to eliminating it or absorbing it. The emerging frameworks now seem to have jettisoned the assumption, that ignorance is ultimately reducible, and the new style is “managerial” in the sense of attempting to understand, tolerate, and even utilize certain kinds of ignorance’ (Smithson, 1989 p. viii). Luhmann (1992) extended Smithson’s idea (1989) conceptually and sociologically. Focusing on systems, Luhmann explains persuasively and in detail how ignorance arises in parallel with knowledge. In Luhmann’s systems theory ignorance is also treated as a construct that is formally derived and underpinned. Ignorance is perceived as the ‘other side’ of knowledge

(cf. Luhmann, 1992, 1995 p. 159, 2000, 2002), that is, not merely as a lack of knowledge and absence of construction, but as a part of knowledge. Ignorance is co-produced together with knowledge without the observer necessarily noticing or intending this.

Luhmann sees ignorance as inherent in systems, i.e. ignorance does not arise from unknown environmental variables or from the problems associated with the processing of information, but from the operation of systems themselves. More precisely, it arises from using a particular form of knowledge/ignorance. Because of this conception ‘the accumulation of knowledge [...] can only lead to a progressive reproduction of ignorance, but not to a gradual transformation from ignorance to knowledge’ (Luhmann, 1995 p. 177, my translation). Ignorance may subsequently be ‘produced and reduced’ through knowledge (Luhmann, 2000 p. 186), but it cannot be reduced completely through knowledge (Luhmann, 2000 p. 186). New observations may, if they prevail in communications, create new knowledge and thus displace ignorance; based on this knowledge, they simultaneously create again new ignorance. Therefore, they cannot reduce ignorance. Even scientific knowledge and the sciences themselves may create more uncertainty and risk (see also Giddens, 1990 p. 34f; Luhmann, 1991). Thus, systems theory emphasises the structural and unavoidable nature of ignorance (see also Japp, 1997; Willke, 2002). Japp (1997) presents ignorance as a structural lack of transparency, which is an inevitable consequence of the self-referential strategy of social systems, while Willke (2002) describes ignorance as ‘a basically not clearable uncertainty of possible events’ (my translation). Like Shackle (1968), Luhmann also recognises the usefulness of ignorance – especially ignorance of the future – as the most important condition of decisions (Luhmann, 2000 p. 183f). Thus, ignorance is not a dysfunctional state. On the contrary, the uncertainty that is permanently generated by ignorance becomes an important resource for the reproduction of social systems and thus also for organisations.

Other authors have proposed different views on the origin of ignorance. According to Walton, ignorance arises simply as ‘absence, or negation of knowledge’ (Walton, 1996 p. 139); the view is also shared by Michael (1996) and Turner and Michael (1996), who examine the social meaning and effect of ignorance in particular. However, ignorance can also result from the fact that certain things have not yet been explored. Proctor offers some reasons why certain things are not explored and the ‘social construction of ignorance’ is maintained (Proctor, 1995 p. 8). ‘Ignorance is socially constructed by censorship (admittedly rare) by failures to fund, by the absence or neglect of interested parties, and by efforts to jam the

scientific airwaves with noise. Science, public policy, and public opinion are all affected' (Proctor, 1995 p. 13). The construction of ignorance Proctor describes may include adjusting research to e.g. the interests of certain actors and groups (concerning the tobacco industry see Proctor, 1995) but also to reward structures (Proctor, 1995, S. 267).

Delimited Ignorance

The distinction of ignorance into ‘general’ and ‘permanent’ has brought into focus various topics with respect to ignorance (e.g. ecological problems – see Beck, 2007, Luhmann, 1992; Wehling, 2006). Recent debates have dealt with the possibilities, problems, risks and threats of societal decisions with relation to ignorance. In this context, ignorance is increasingly differentiated and delimited. Research has identified the tendency of the knowledge-based society to develop into an ignorance-based society (Beck, 2007 p. 211) and of the knowledge-economy to develop into an economy of ignorance (Piel, 2003). Beck (2007), for example, views ignorance as something relevant to the entire society, as e.g. in the case of the large-scale risks that ignorance about the side effects of particular technological developments entails.

Ignorance in the area of science is of particular importance, as science is held responsible for the risks it creates (Krohn, 2003; Wehling, 2003). In more recent contributions ignorance is investigated in various fields and scientific branches. So far, ignorance has been explored in relation to the military (Brennan, 1992), economics (Katzner, 1992), finance (Koppl, 1996), information asymmetries (Kessler, 1998), use of machinery (Kremer & Bienzeisler, 2005), customers, consumers and product quality (Crean, 2007; Ehrich, & Irwin, 2005; Hippner, 2005), elections (Kitahara & Sekiguchi, 2008), education (Brüsemeister & Eubel, 2008; Kraus, 2008; Langer, 2008; Schimank, 2008; Stross, 2009), the social distribution of ignorance (Joffe & Farr, 1996; Ungar, 2008), philosophy (Rott, 2009) and psychology (Frosch, Beaman & McCloy, 2007).

These contributions discuss the potential negative effects of ignorance and differentiate ignorance further: for example, ignorance is described as a blind spot of perception (Foerster, 2003; Zeuch, 2007), as what surrounds knowledge (Brodbeck, 2007) or as forgetting (Geisenhanslüke & Rott, 2008; Mecke, 2008). The differentiation of the term into its various possible forms enhances the theoretical foundation of research on ignorance (see especially Bösch, Schneider & Lurf, 2004). A very complex model of ignorance is presented by Wehling (2004, 2006). He suggests a heuristic model for distinguishing dimensions of ignorance, derived from the observation of social discourse and conflicts. He distinguishes three dimensions: first, the knowledge of ignorance (known vs. completely unknown ignorance), second, ‘intentionality’ (deliberately willed ignorance vs.

unintentional/unavoidable ignorance), and third, ‘temporal stability’ (not-yet-knowledge vs. non-knowledge-ability) (Wehling, 2004 p. 71f). This concept allows a more sophisticated detection and specification of each of these forms of ignorance.

Moreover, the particularly precarious form of unknown ignorance that has been termed the ‘unknown unknowns’ (e.g., Bösch, Schneider, Lerf, 2004; Grove-White, 2001) and its implications have been extensively discussed. The important thing about this type of ignorance is that there is no inkling of what is not known and therefore the risks and threats that may occur, and which become apparent only with hindsight, are entirely unknown (on the example of CFCs see Bösch, 2000; Wehling, 2002). In these cases, knowledge could only be generated through the damage that resulted from the impact of past actions and events. Previously, the ignorance of those consequences had not been recognised.

As decisions and actions are always planned and implemented on the basis of specific knowledge, and thus also of a known or unknown ignorance, these risks concern all actions and decisions. The risks can quickly escalate into threats: Schneider (2006) mentions misperceptions of situations, alternative actions, and the consequences of actions attributed to ignorance. Ignorance can also incur costs and problems on companies, related to e.g. sales, personnel management, quality management and in interdisciplinary collaboration, as Zeuch found out in a recent empirical study (2007 p. 107f; on problems in genetics, see also Bösch et al., 2006).

However, some recent studies have found that ignorance also has positive effects. Strulik (2004, 2009) goes along with the perspectives of Shackle (1968) and Luhmann (2000), and confirms ignorance as ‘the most important condition to make profitable decisions possible’, because in his opinion it is a ‘prerequisite for entering risks as well as an engine for the knowledge-based development of future uncertainty’ (Strulik, 2004 p. 18, my translation). Even Zeuch (2007) concludes that ignorance can be a resource. His results demonstrate that even personal ignorance may have a positive effect as it can serve as feedback and contribute to the self-protection and self-esteem of the staff. Ignorance on the part of other actors (e.g., customers) may prove beneficial to customer loyalty, to building a network and enhancing the reputation of managers (Zeuch, 2007 p. 111f).

Ignorance can also be used to protect from an overload of information and knowledge (Dorniok & Mohe, 2010) and to promote one's interests; in the context of consulting, for example, it is possible to generate follow-up orders by producing deliberately ignorance in clients (Dorniok & Mohe, 2009). Especially in this context, ignorance has also a political dimension. It is recognised that ignorance includes a tactical component and can be selectively used to control social processes. With relation to the politicisation of ignorance (Stocking and Holstein, 1993; Wehling, 2009) the question arises why specific types of ignorance are produced and by whom. This raises the question why ignorance is deliberately created e.g. through secrecy, concealment or selective information transfer (Wehling, 2009). Proctor (1995, 2008) studied this in the context of 'agnotology' – a term he coined – using the example of the cigarette industry.

The scientific analysis of risk and the production of knowledge has expanded beyond the topic of prevailing knowledge and its relation to the question of what is not known. Accordingly, the question arises whether (and if so how) it is possible to adequately deal with something unrecognised, unexpected and not known. All attempts to answer this question implicitly assume that ignorance and its negative consequences can be prevented through knowledge, for example through recursive learning (Groß et al., 2005; Krohn, 2003), self-reflection within science (Lerf & Schubert, 2004), having ignorance defined consensually only by experts (van den Daele, 1993), or managing ignorance through changes in decision processes (e.g., through institutional innovation – see Bösch et al. 2004), through individual and organisational redirection (Kreibe, 2004; Seitlinger, 2004), through actions under administrative law (Dose, 2004), ignorance management (Gray, 2004) or preventive reduction of ignorance by liability rules (Hapke & Japp, 2001; Japp, 1997; WBGU, 1999).

Most of the authors mentioned above have identified a culture of ignorance characterised by control and complexity, acknowledging the complexity of reality.

Table 1: Overview of Ignorance and its Effects

	Individual Ignorance	Constructed Ignorance	Structural Ignorance	Delimited Ignorance
Period	Early 1900s	Early 1970s	Early 1980s	Early 1990s
Main Proponents (chronologically arranged)	Simmel (1908) Weber (1919) Merton (1936) Popitz (1967)	Weinstein & Weinstein (1978) Schütz & Luckmann (1979) Smithson (1985)	Douglas & Wildavsky (1982) Ravetz (1990) Luhmann (1992) Japp (1997)	Beck (1991) Luhmann (2000) Wehling (2002) Böschen et al. (2004)
Grounds	individual (++)	individual (++) society(+)	individual (+) society (++)	individual (+) society (++)
Core Statement, Interpretation/Definition of Ignorance	ignorance as the individual lack/absence of knowledge	ignorance as an independent and constructed phenomenon	ignorance as a co-product of knowledge and a permanent phenomenon	ignorance as a general and differentiated phenomenon
Positive Impact	<ul style="list-style-type: none"> – ignorance leads to gaining knowledge through learning – ignorance enables and stabilises social functions 	<ul style="list-style-type: none"> – identifying the construction of ignorance can convert ignorance into knowledge – ignorance enables and stabilises social functions 	<ul style="list-style-type: none"> – ignorance motivates its exploration and the formulation of new processible questions 	<ul style="list-style-type: none"> – ignorance makes decisions possible – ignorance is a prerequisite for taking risks
Negative Impact	<ul style="list-style-type: none"> – ignorance can serve as a medium and a tool for manipulating and maintaining power 	<ul style="list-style-type: none"> – ignorance can lead to the misperception of knowledge – ignorance can control power 	<ul style="list-style-type: none"> – permanent ignorance creates constant uncertainty 	<ul style="list-style-type: none"> – ignorance creates risks that can lead to misinterpretations of situations, alternative actions and consequences of actions
Examples	<ul style="list-style-type: none"> – missing, withheld or incriminating technical or technological knowledge 	<ul style="list-style-type: none"> – ignorance due to use of certain methods or due to inadequate access to knowledge 	<ul style="list-style-type: none"> – new questions, issues and areas which arise from new knowledge 	<ul style="list-style-type: none"> – unrecognised and unknown factors and relationships, future market development

Discussion

The overview of the literature shows that there are actually a lot of scientific contributions in relation to ignorance from various faculties and related to various topics. In some disciplines ignorance is intensively studied, especially those that are strongly affected by ignorance, and where their effects of actions and decisions are relevant to and affect society as a whole. Thus, a special emphasis is placed on (scientific) ignorance in risk sociology, science theory, sociology of knowledge, sociology of science and the sociology of history of science (see e.g., Beck, 1996; Bösch, 2002b; Japp, 1997; Luhmann, 1992; Merton, 1987; Proctor, 1995; Smithson, 1989; Wehling, 2002; Wynne, 2002).

This is particularly true in the case of sociology, where scholars have identified a ‘sociology of scientific ignorance’ (Stocking, 1998; Wehling, 2004). In other areas ignorance has so far been mostly ignored. This is evident in the fact that in certain fields, few publications examine ignorance and that little research is related to ignorance. In business studies, for example, there are only a few contributions focusing on ignorance, although there are some exceptions, such as the theoretical investigation of ignorance in relation to organisations (Dorniok & Mohe, 2010; Seidl, 2007), empirical surveys of ignorance in enterprises (Zeuch, 2007) and in knowledge-intensive service providers (Dorniok & Mohe, 2009).

The overview of existing approaches to ignorance has demonstrated the universal nature of the social processes associated with ignorance; in all areas where actions or decisions are made on the basis of knowledge, ignorance is important and should be discussed accordingly. New scientific and technological developments in particular (e.g., due to the unpredictability of certain consequences, risks, latent effects, effects in other, more remote areas etc.), not to mention the positive and negative effects of ignorance, suggest that it is necessary to pay more attention to the subject of ignorance. However, ignorance is seen rather as a threat because of the risks it entails, which is why there is demand for studies that examine how ignorance can be prevented. Ignoring ignorance can have extremely negative consequences (e.g., damage to the ozone layer by CFCs, see Bösch, 2000; BSE, Dressel, 2002; Wehling, 2002).

From the chronological presentation of research on ignorance it can be seen that studies of ignorance have developed from ignorance on the individual level to the construction of

ignorance, the distinction between different forms of ignorance, the special importance of structural and unknown ignorance, to the potential social consequences, risks and threats of ignorance. Consequently, ignorance is no longer regarded only as a lack of knowledge (cf. Merton, 1987 p. 7) that can be converted into knowledge, but as a partly durable and not removable phenomenon that arises in parallel with knowledge (see Douglas & Wildavsky, 1982; Luhmann, 1992; Ravetz, 1990) and can have various consequences on society. Overall, this realisation established that, in general, ignorance is basically unavoidable and in certain forms is always reproduced. This is mainly, because ignorance arises with and through knowledge. Thus, the production of new knowledge is always accompanied by the danger, or the chance, to create new ignorance. However, ignorance cannot always be identified clearly as it cannot be scientifically ascertained what constitutes 'correct' and 'complete' knowledge.

In the chronological presentation of the different phases of research on ignorance it is important to consider that the concepts partly overlap and the present discussion has included both early and later concepts of ignorance. Researchers who seek to operationalise ignorance face several difficulties and problems. There are various, often different or even contrasting views on ignorance, as in the case of the concepts of Luhmann and Wehling. While Wehling (e.g., 2006) bases his ideas on the concept of science and ignorance that is characterised by a realistic position and focuses on potential consequences of ignorance, Luhmann (especially 1992) examines the concept of science and ignorance from a constructivist point of view and focuses on the construction of ignorance in social contexts. A general and comprehensive definition is still missing. As a result, in several publications it is not always clear whether the authors discuss the same object of study. This suggests that there is still a lack of clarity or serious differences in how ignorance is understood. Importantly, this affects how its meaning is evaluated, which consequences it has and what strategies and measures can be developed in response to it. While ignorance as 'absence of knowledge' can be compensated relatively easily by knowledge, constructed ignorance can be eliminated only if the underlying structures are recognised, considered and deconstructed and new forms of monitoring are put in place. This approach can sometimes mean that axioms and processes of knowledge generation (which can always only produce knowledge that they are able to create and therefore ignore what they are not able to create) and their structures (i.e., the use of certain theories and methods) need to be modified to be able to produce new knowledge.

Existing works on the subject are largely theoretical or conceptual, with only very few empirical studies. Only recently has a trend towards empirical (case) studies begun (e.g., Böschen, 2000; Böschen et al., 2008; Dorniook & Mohe, 2009, 2010; Japp, 1997; Ungar, 2000; 2008; Wehling, 2003; Zeuch, 2007). However, there are many and varied ideas on methods of coping with ignorance, especially scientific ignorance. However, these methods tend to focus on dealing with knowledge rather than dealing with ignorance. Accordingly, they still primarily aim at reducing ignorance by means of knowledge. In these approaches, it is still assumed that the negative effects of ignorance and ignorance itself could be reduced, if *more* and *better* knowledge could be produced, although this has been disputed by several authors (e.g., Luhmann, 1995, 2000; Douglas & Wildavsky, 1982). The methods presented in this overview have emerged to some extent from the cultural conditions of the respective scientific areas and disciplines and seem more realistic.

Implications for research arise primarily from the lack of knowledge about

- *how* and *where exactly* (in theory and practice) *which* forms of ignorance (and also which forms of understanding) emerge,
- *which* factors (e.g., interests, conscious strategic use of ignorance, complexity, limitations of methods, cognitive and institutional limitations of the cognitive ability of human beings, etc.) are responsible for their emergence and stabilisation,
- *what kind of* consequences each form has,
- *which* actors are involved,
- on *which* levels and *in what way* these consequences can be seen,
- *how* these consequences can be modified by *which* targeted interventions.

These research questions aim at specifying the conditions underlying the formation, impact, and interrelation of the consequences of ignorance, and appropriate responses to these consequences.

As already mentioned, the increase in knowledge means that there is an increase in ignorance. Also, ignorance is especially important in the light of global economic relations and new scientific and technological developments (e.g., unforeseen consequences, risks, latent effects, effects in other more remote areas and times). Overall, it can be expected that the discussion on ignorance especially in social processes (e.g., individual and organisational decisions, scientific research and communication) will be intensified in the future. This will help shed more light on relatively unknown areas, fill knowledge gaps, solve problems that result from

such gaps, and emphasise the significance of knowledge and science in the context of society. Furthermore, potential knowledge can only be assessed when its limit – or its “other side” – is also considered, which is ignorance and the realisation that knowledge is also often only ignorance.

Literature

Abbott, J. (2005): Understanding and Managing the Unknown: The Nature of Uncertainty in Planning. In: *Journal of Planning Education and Research* 24, S. 237-251.

Anderson, H./Goolishian, H. (1992): Der Klient ist Experte: Ein therapeutischer Ansatz des Nicht-Wissens. In: *Zeitschrift für Systemische Therapie*. 10 (3), S. 176-189.

Beck, U. (1988): *Gegengifte. Die organisierte Unverantwortlichkeit*. Frankfurt a.M.

Beck, U. (1991): *Politik in der Risikogesellschaft*. Frankfurt a.M.

Beck, U. (1996): Wissen oder Nicht-Wissen? Zwei Perspektiven „reflexiver Modernisierung“. In U. Beck, A. Giddens, S. Lash (Hrsg.), *Reflexive Modernisierung. Eine Kontroverse* (S. 289-315). Frankfurt a.M.: Suhrkamp.

Beck, U. (2007): *Weltrisikogesellschaft. Auf der Suche nach der verlorenen Sicherheit*. Frankfurt a.M.: Suhrkamp.

Bleicher, A./Bittens, M./Groß, M. (2009): Keiner weiß genau was da unten ist – Vom erfolgreichen Umgang mit Nichtwissen in Sanierungsprojekten. In: *Altlasten spektrum* 3, S. 136-141.

Bösch, S. (2000): *Risikogenese. Prozesse gesellschaftlicher Gefahrenwahrnehmung: FCKW, Dioxin, DDT und Ökologische Chemie*. Opladen: Leske Budrich.

Bösch, S. (2002): *Risikogenese. Metamorphosen von Wissen und Nichtwissen*. In: *Soziale Welt* 53, S. 67-86.

Bösch, S./Schneider, M./Lerf, A. (Hrsg.) (2004): *Handeln trotz Nichtwissen. Vom Umgang mit Chaos und Risiko in Politik, Industrie und Wissenschaft*, Frankfurt a.M.

Bösch, S./Kastenhofer, K./Marschal, L./Rust, I./Soentgen, J./Wehling, P. (2006): *Scientific Cultures of Non-Knowledge in the Controversy over Genetically Modified Organisms (GMO) The Cases of Molecular Biology and Ecology*. In: *GAIA* 15/4, S. 294-301.

Braden, J./Shaw, S. (2009): *Intervention Validity of Cognitive Assessment Knowns, Unknowables, and Unknowns*. In: *Assessment for Effective Intervention*. 34(2), S. 106-115.

Brennan, T.J. (1992): *Rational Ignorance: The Strategic Economics of Military Censorship*. In: *Southern Economic Journal*. 58(4), S. 966-974.

Brodbeck, K.-H. (2007): *Die Differenz zwischen Wissen und Nichtwissen*. In: Zeuch, A. (Hrsg.) (2007) *Management von Nichtwissen in Unternehmen*. Heidelberg: Carl-Auer.

Brüsemeister, T./Eubel, K.-D., (2008): *Evaluationsbasierte Steuerung, Wissen und Nichtwissen – Einführung in die Thematik*. In: Brüsemeister, T./Eubel, K.-D. (Hrsg.) *Evaluation, Wissen und Nichtwissen*. Wiesbaden: Verlag für Sozialwissenschaften, S. 233-274.

- Caplan, B. (2001): Rational Ignorance versus Rational Irrationality. In: *Kyklos* 54(1), S. 3-26.
- Carrillo, J./ Mariotti, T. (2000): Strategic Ignorance as a Self-Disciplining Device. In: *The Review of Economic Studies* 67(3), S. 529-544.
- Cohen, M. (1993): The Unknown and the Unknowable-Managing Sustained Uncertainty. In: *Western Journal of Nursing Research* 15, S. 77-96.
- Collingridge, D. (1980): *The Social Control of Technology*. New York: St. Martins Press.
- Collins, H. M. (1993): The structure of knowledge; in: *Social Research*, 60 (1), 95-116.
- Congleton, R.D. (2001) In Defense of Ignorance: On the Significance of a Neglected Form of Incomplete Information. In: *Eastern Economic Journal*, Eastern Economic Association 27(4), S. 391-407.
- Creane, A. (2007): A note on welfare-improving ignorance about quality. In: *Economic Theory* 34(3), S. 585-590.
- Daase, C./Kessler, O. (2007): Knowns and Unknowns in the 'War on Terror': Uncertainty and the Political Construction of Danger. In: *Security Dialogue* 38(4), S. 411-436.
- Daele, W. van den (1993). Zwanzig Jahre politische Kritik an den Experten. Wissenschaftliche Experten in der Regulierung technischer Risiken: die aktuelle Erfahrung. In: J. Huber & G. Thurn (Hrsg.), *Wissenschaftsmilieus. Wissenschaftskontroversen und sozio-kulturelle Konflikte*, S. 173-194. Berlin.
- Davis, F. (1960): Uncertainty in Medical Prognosis, Technical and Funktional. In: *American Journal of Sociology* 66, S. 41-47.
- Dorniok, D./Mohe, M. (2009). Nichtwissen in wissensintensiven Dienstleistungsunternehmen: Ergebnisse einer Delphi-Studie. In: *Zeitschrift für Unternehmensberatung* 9, S. 259-264.
- Dorniok, D. /Mohe, M. (2010a): Funktionen und Leistungen von Beratern für den organisationalen Umgang mit Nichtwissen. In: *Gruppendynamik & Organisationsberatung* 01.
- Dose, N. (2004): Politisch-administrativer Umgang mit Nichtwissen. In: Bösch, S./ Schneider, M./Lerf, A. (Hrsg.): *Handeln trotz Nichtwissen. Vom Umgang mit Chaos und Risiko in Politik, Industrie und Wissenschaft*. Frankfurt a.M., S. 121-138.
- Douglas, M. /Wildavsky, A. (1982): *Risk and Culture. An Essay on the Selection of Technical and Environmental Dangers*. Berkley.
- Dressel, K. (2002): *BSE – The new dimension of uncertainty. The cultural politics of science and decision-making*. Berlin. Edition sigma.
- Drucker, P. (1993): *Die postkapitalistische Gesellschaft*. Düsseldorf: Econ.
- Ehrich, K. /Irwin, J. (2005): Willful Ignorance in the Request for Product Attribute Information. In: *Journal of Marketing Research* 42(3), S. 266-277.

- Ewald, F. (1998): Die Rückkehr des genius malignus: Entwurf einer Philosophie der Vorbeugung. In: Soziale Welt 49, S. 5-24.
- Faber, M./Manstetten, R./Proops, J. (1990): Humankind and the world: An anatomy of surprise and ignorance. Heidelberg.
- Faber, M./Proops, J. (1993): Evolution, Time, Production and the Environment. 2., rev. and enl. ed. Berlin etc.
- Feenan, D. (2007): Understanding Disadvantage Partly Through an Epistemology of Ignorance. In: Social Legal Studies 16(509), S. 509 - 531.
- Fleck, L. (1935): Entstehung und Entwicklung einer wissenschaftlichen Tatsache. Einführung in die Lehre vom Denkstil und Denkkollektiv. Frankfurt/Main.
- Foerster, H. v. (2003): Entdecken oder Erfinden. Wie läßt sich Verstehen verstehen? In: Gumin, H./Meier, H. (Hrsg.): Einführung in den Konstruktivismus. München, S. 41-88.
- Frosch, C.A. /Beaman, C.P. /McCloy, R. (2007): A little learning is a dangerous thing: An experimental demonstration of ignorance-driven inference. In: The Quarterly Journal of Experimental Psychology 60(10), S. 1329–1336.
- Geisenhanslüke, A. /Rott, H. (2008): Vorwort Ignoranz. In: Geisenhanslüke, A. /Rott, H. (Hrsg.): Ignoranz. Nichtwissen, Vergessen und Missverstehen in Prozessen kultureller Transformation. Bielefeld, S. 7-15.
- Giddens, A. (1990): The consequences of modernity. Cambridge. Stanford University Press
- Glaserfeld, E. von (1987): Wissen, Sprache und Wirklichkeit. Arbeiten zum Radikalen Konstruktivismus. Braunschweig. Vieweg+Teubner
- Gray, D. (2004): Gesucht: Chief ignorance officer. In: Harvard Manager 26, S. 18-19.
- Greene, J. (1995): Term Limits: A Measure of Our Ignorance. In: Social Science Quarterly 76, S. 718-719.
- Grove-White, R. (2001): New wine, old bottles. Personal reflections on the new biotechnologycommissions. In: Political Quarterly 72, S. 466-472.
- Gruen, D. (1997): Ignorance and Ricardian Equivalence. In: The Economic Record. 73(220), S. 35-44.
- Ghirardato, P. (2001): Coping with ignorance: unforeseen contingencies and non-additive uncertainty. In: Economic Theory 17, S. 247–276.
- Gross, M. (2007): The Unknown in Process: Dynamic Connections of Ignorance, Non-Knowledge and Related Concepts. In: Current Sociology 55, S. 742-759.
- Groß, M./Hoffmann-Riem, H./Krohn, W. (2005): Realexperimente: Ökologische Gestaltungsprozesse in der Wissensgesellschaft. Bielefeld. Transcript

- Hapke, U./Japp, K.-P. (2001): Prävention und Umwelthaftung. Zur Soziologie einer modernen Haftungsform. Wiesbaden. Deutscher Universitäts-Verlag
- Hogarth, R.M./Kunreuther, H. (1995): Decision making under ignorance: arguing with yourself. In: Insurance: Mathematics and Economics 16(3), S. 281-281.
- Hippner, H. (2005): Die (R)Evolution des Customer Relationship Management. In: Marketing – Zeitschrift für Forschung und Praxis 27 (2), S. 115-134.
- Holzer, B./Mai, S. (2005): Herrschaft kraft Nichtwissen. Politische und rechtliche Folgenprobleme der Regulierung neuer Risiken. In: Soziale Welt 56, S. 317-335.
- Hossfeldler, M. (2009): Irrtum als wissen? In: Erwägen Wissen Ethik 20/1, S. 128-129.
- Jaeger, J./Scheringer, M. (2009): Von Begriffsbestimmungen des Nichtwissens zur Umsetzung des Vorsorgeprinzips. In: Erwägen Wissen Ethik 20/1 S. 129-132.
- Japp, K. (1997): Die Bedeutung von Nichtwissen. In: Soziale Systeme 2, S. 289-312.
- Joffe, H./ Farr, R. (1996): Self-proclaimed ignorance about public affairs. In: Social Science Information 35(69), S. 69-92.
- Kade, J./ Seitter, W. (2009): Umgang mit Wissen/Nichtwissen als Antwort auf die wachsende Bedeutung von Nichtwissen in der Wissensgesellschaft. In: Erwägen Wissen Ethik 20/1, S. 132-135.
- Kahneman, D./Tversky, A. (1982): Variants of uncertainty. In: Cognition 11, S. 143-157.
- Katz, J. (1979): Concerted Ignorance: The Social Construction of Cover-Up. In: Journal of Contemporary Ethnography 8, S. 295-316.
- Katzner, D.W. (1992): Operationality in the Shackle-Vickers approach to decision making in ignorance. In: Journal of Post Keynesian Economics 15(2), S. 229-254.
- Keiner, E. (2005): Stichwort: Unsicherheit – Ungewissheit – Entscheidungen. In: Zeitschrift für Erziehungswissenschaft 8(2), S. 155-172.
- Kelsey, D./Quiggin, J. (1992): Theories of Choice under Ignorance and Uncertainty. In: Journal of Economic Surveys 6(2), S. 133-153.
- Kerwin, A. (1993): None too solid. Medical ignorance. In: Knowledge: Creation, Diffusion, Utilization 15 (2), S. 166-185.
- Kessler, A. S. (1998): The value of ignorance. In: RAND Journal of Economics 29(2), S. 339-354.
- Keßler, O. (2005): Nichtwissen und die Etablierung von Governance-Regimen. In: WeltTrends 46, S. 71-82.
- Kieser, A. (2005): Wissenschaft und Beratung. Universitätsverlag Winter:Heidelberg.

- Kitahara, M/Sekiguchi, Y (2008): Condorcet Jury Theorem Or Rational Ignorance. In: Journal of Public Economic Theory 10 (2), S. 281–300.
- Kozlov-Davis, J. (2001): A Hybrid Approach to the Use of Deliberate Ignorance in Conspiracy Cases. In: Michigan Law Review 100(2), S. 473-501.
- Knight, F. (1964): Risk, Uncertainty and Profit. New York: Augustus Keller.
- Kelsey, David & Quiggin, John, 1992. " Theories of Choice under Ignorance and Uncertainty," Journal of Economic Surveys, Wiley Blackwell, vol. 6(2), pages 133-53.
- Knorr-Cetina, K. (2000): Die Wissensgesellschaft. In: Pongs, A. (Hrsg.): In welcher Gesellschaft leben wir eigentlich? Bd. 2. München: Dilemma, S. 149-169.
- Koppl, R.G. (1996): It is high time we take our ignorance more seriously. In: International Review of Financial Analysis 5(3), S. 259-272.
- Kraus, J. (2008): Die Ideologie des Nicht-wissens. Novo Argumente 97, S. 21-23.
- Krause, D. (2005): Luhmann-Lexikon. Stuttgart: UTB.
- Kreibe, S. (2004): Vom Umgang mit Nichtwissen aus Sicht der industriellen Praxis. In: Bösch, S./Schneider, M./Lerf, A. (Hrsg.): Handeln trotz Nichtwissen. Vom Umgang mit Chaos und Risiko in Politik, Industrie und Wissenschaft. Frankfurt a.M., S. 189-206.
- Kremer, D./Bienzeisler, B. (2005): Optimierung des Wissens- und Informationsaustauschs in Projekt- und Entwicklungsteams. Das KITT-Training zur Unterstützung der Wissensprozesse in interdisziplinären Teams. In: Industrie Management 3, S. 63-66.
- Krohn, W. (2009): Symmetrie von Wissen und Nichtwissen? In: Erwägen Wissen Ethik 20/1, S. 138-140.
- Langer, R. (2008): Nicht Wissen hilft – Evaluation in der Konkurrenz von Symbolisierungen. In: Brüsemeister, T. /Eubel K.-D. (Hrsg.) Evaluation, Wissen und Nichtwissen, Wiesbaden: Verlag für Sozialwissenschaften, S. 233-274.
- Lerf, A./Schuberth, E. (2004): Komplexe Systeme: Wo das Wissen der Naturwissenschaften an Grenzen stößt. In: Bösch, S./Schneider, M./Lerf, A. (Hrsg.): Handeln trotz Nichtwissen. Vom Umgang mit Chaos und Risiko in Politik, Industrie und Wissenschaft. Frankfurt a.M., S. 211-236.
- Liberatore, A./Funtowicz, S. (2003): Democratising expertise, expertising democracy: What does this mean, and why bother? In: Science and Public Policy 30, S. 146-150.
- Loasby, B. (1976): Choice, complexity and ignorance. An enquiry into economics theory and the practise of decision-making. Cambridge University Press
- Luhmann, N. (1990): Die Wissenschaft der Gesellschaft. Suhrkamp. Frankfurt a.M
- Luhmann, N. (1991): Soziologie des Risikos. Berlin. Walter de Gruyter.

Luhmann, N. (1992): Ökologie des Nichtwissens. In: Ders., Beobachtungen der Moderne. Opladen, S. 149-220.

Luhmann, N. (1993): Die Paradoxie des Entscheidens. In: Verwaltungsarchiv 84, S.287-310.

Luhmann, N. (1995): Gesellschaftsstruktur und Semantik. Studien zur Wissenssoziologie der modernen Gesellschaft, Bd. 4. Frankfurt a.M.

Luhmann, N. (2006): Organisation und Entscheidung. Opladen.

Luhmann, N. (2002): Die Politik der Gesellschaft. Frankfurt a.M.

Martinelli, C. (2007): Rational ignorance and voting behavior. In: International Journal of Game Theory 35(3), S. 315–335.

Maturana, H. R. (1974): Autopoiesis. The organization of living systems, its characterization and a model. In: Bio-systems 5, S. 187-196.

Mayntz, R. (1999): Wissenschaft, Politik und die politischen Folgen kognitiver Ungewissheit. In: Gerhards, J./Hitzler, R. (Hrsg): Eigenwilligkeit und Rationalität sozialer Prozesse. Opladen, S. 30-45.

Mayring, Philipp (2000). Qualitative Inhaltsanalyse. Forum Qualitative Sozialforschung / Forum: Qualitative Social Research [Online Journal], 1(2). <http://www.qualitative-research.net/fqs-texte/2-00/2-00mayring-d.htm> (22.08.2011).

Mecke, J. (2008): Erinnerungen an das Vergessen. In: Geisenhanslüke, A./Rott, H. (Hrsg.): Ignoranz. Nichtwissen, Vergessen und Missverstehen in Prozessen kultureller Transformation. Bielefeld, S. 121-152.

Meddin, W. (2001): What Is Complexity Science? Toward an “Ecology of Ignorance”. In: Emergence 3(1), S. 43–60.

Merton, R (1987): Three fragments from a sociologist’s notebook: Establishing the phenomenon, specified ignorance, and strategic research materials. In: Annual Review of Sociology 13, S. 1-28.

Morgan, J. (1978): Multiple Motives, Group Decisions, Uncertainty, Ignorance, and Confusion: A Realistic Economics of the Consumer Requires Some Psychology. In: Psychology and Economics 68(2), S. 58-63.

Mecke, J. (2008): Erinnerungen an das Vergessen. In: Geisenhanslüke, A. & Rott, H. (Hrsg.): Ignoranz. Nichtwissen, Vergessen und Missverstehen in Prozessen kultureller Transformation. Bielefeld, S. 121-152.

Merton, R. K. (1936): The Unanticipated Consequences of Purposive Social Action. In: American Sociological Review 1, S. 894-904.

- Merton, R (1987): Three fragments from a sociologist's notebook: Establishing the phenomenon, specified ignorance, and strategic research materials. In: *Annual Review of Sociology* 13, S. 1-28.
- Michael, M. (1996): Ignorance science: Discourses of ignorance in the public understanding of science. In: Irwin, A./Wynne, B. (Hrsg.): *Misunderstanding science?* Cambridge, S. 107-125.
- Moore, W./Tumin, M. (1949): Some social functions of ignorance. In: *American Sociological Review* 14, S. 787-796.
- North, K. (2005): *Wissensorientierte Unternehmensführung: Wertschöpfung durch Wissen.* Gabler.
- Pazner, E./Schmeidler, D. (1975): Competitive Analysis under Complete Ignorance. In: *International Economic Review* 16(1), S. 246- 257.
- Petersen, T./Faber, M. (2004): Verantwortung, Kuppelproduktion, Wissen und die Bedeutung von Nichtwissen. In: Held, M./Kubon-Gilke, G./Sturn, R. (Hrsg.): *Normative institutionelle Grundfragen der Ökonomik: Jahrbuch 3. Ökonomik des Wissens.* Marburg, S. 173-200.
- Piel, K. (2003): *Ökonomie des Nichtwissens. Aktienhype und Vertrauenskrise im Neuen Markt.* Frankfurt a.M.
- Popitz, H. (1968): *Über die Präventivwirkung des Nichtwissens. Dunkelziffer, Norm und Strafe.* Tübingen.
- Proctor, R. N. (1995): *Cancer War. How Politics Shapes What We Know and Don't Know About Cancer.* New York.
- Proctor, R.N. (2008): Agnotology. A Missing Term to Describe the Cultural Production of Ignorance (and Its Study). In: Proctor R.N./Schiebinger, L. (eds.): *Agnotology: The Making and Unmaking of Ignorance.* Stanford: Stanford University Press. S. 1-33.
- Probst, G./Raub, S./ Romhardt, K. (2006): *Wissen managen: Wie Unternehmen ihre wertvollste Ressource optimal nutzen.* Gabler.
- Rapp, H. R. (1972): *Wohin mit der Information. Die kultivierte Ignoranz.* Göttingen.
- Ravetz, J. (2004): The post-normal science of precaution. In: *Futures* 36, S. 347-357.
- Rott, H. (2009): Der Negationsbegriff des Nichtwissens, in *Erwägen Wissen Ethik* 20/1, S. 147-148.
- Scheringer, M. (2002): Persistence and Spatial Range of Environmental Chemicals. Wiley-VCH, Weinheim. In: Jaeger, J. (1998): *Exposition und Konfiguration als Bewertungsebenen für Umweltgefährdungen. – Zeitschrift für angewandte Umweltforschung* 11 (3/4), S. 444-466.

Schimank, U. (2008): Nichtwissen und funktionaler Antagonismus: Nachtgedanken eines nachdenklichen Schulpolitikers. In: Brüsemeister, T./Eubel, K.-D. (Hrsg.) Evaluation, Wissen und Nichtwissen, S. 295-312.

Schneider, L. (1962): The role of the category of ignorance in sociological theory: an explanatory statement. In: American Sociological Review 27, S. 492-508.

Schneider, U. (2006): Das Management der Ignoranz: Nichtwissen als Erfolgsfaktor. Wiesbaden. Deutscher Universitätsverlag.

Schimank, U. (2008): Nichtwissen und funktionaler Antagonismus: Nachtgedanken eines nachdenklichen Schulpolitikers. In: Brüsemeister, T./Eubel, K.-D. (Hrsg.): Evaluation, Wissen und Nichtwissen. Wiesbaden, S. 295-312.

Scholl, W. (1992): Informationspathologien. In: Frese, E. (1992): Handwörterbuch der Organisation. 2. Aufl. Stuttgart, S. 900-912.

Schütz, A. & Luckmann, B. (1979): Strukturen der Lebenswelt, Band 1. Frankfurt/Main: 1979.

Scitovsky, T. (1950): Ignorance as a source of oligopoly power. In: The American Economic Review 40(2). Papers and Proceedings of the Sixty-second Annual Meeting of the American Economic Association, S. 48-53.

Seidl, D. (2007): The Dark Side of Knowledge. In: Emergence: Complexity & Organisation 9, S. 13-26.

Seitlinger, M. (2004): Der Beitrag der Religion zu nachhaltigen und attraktiven Lebensstilen. In: Böschen, S./Schneider, M./Lerf, A. (Hrsg.): Handeln trotz Nichtwissen. Vom Umgang mit Chaos und Risiko in Politik, Industrie und Wissenschaft. Frankfurt a.M., S. 263-280.

Shackle, G. (1968): Uncertainty in economics. And other reflections. Cambridge.

Shubik, M. (1954): Information, Risk, Ignorance and Indeterminacy. In: The Quarterly Journal of Economics 68(4), S. 629-640.

Simmel, G. (1908): Soziologie. Untersuchungen über die Formen der Vergesellschaftung. Berlin.

Smets, Ph. (1991): Varieties of Ignorance and the Need for Well-founded Theories. Information Sciences 57/58, S. 135-144.

Smithson, M. (1985), Toward a Social Theory of Ignorance, in: Journal for the Theory of Social Behavior, No. 15, S. 151-172.

Smithson, M. (1989), Ignorance and uncertainty. Emerging paradigms, New York.

Smithson, M. J. (2008): Social Theories of Ignorance. In: R.N. Proctor & L. Schiebinger (Hrsg.): Agnotology: The Making and Unmaking of Ignorance. Stanford University Press, S. 209-229.

Stocking, S.H./Holstein, L. (1993): Constructing and reconstructing scientific ignorance: Ignorance claims in science and journalism. In: Knowledge, Creation, Diffusion, Utilization 15, S. 186-210.

Stocking, S. H. /Holstein, L. (1993): Constructing and reconstructing scientific ignorance: Ignorance claims in science and journalism. In: Knowledge, Creation, Diffusion, Utilization 15, S. 186-210.

Stross, A.M. (2009): Nichtwissen – Anmerkungen zu einem soziologischen Konstrukt aus bildungstheoretischer Perspektive. In: Erwägen Wissen Ethik 20(1), S. 153-156.

Strulik, T. (2009): Nichtwissen als gesellschaftliche Ressource. In: Erwägen Wissen Ethik 20(1), S. 156-158.

Taylor, S.E. (1989): Positive Illusions. Creative Self-Deception and the Healthy Mind. New York: Basic Books.

Townley, C. (2006): Toward a Revaluation of Ignorance. In: Hypatia 21(3), S. 37-55.

Turner, J./Michael, M. (1996): What do we know about „don't know“? Or, contexts of “ignorance”. In: Social Science Information 35, S. 15-37.

Ungar, S. (2008): Ignorance as an underidentified social problem. British Journal of Sociology 59, S. 301-326.

Varela, F.J. (1981): Autopoiesis: A theory of living organization. New York.

Vickers, D. (1986): Time, ignorance, surprise, and economic decisions: a comment on Williams and Findlay's "Risk and the Role of Failed Expectations in an Uncertain World". In: Journal of Post Keynesian Economics 9(1), S. 48-57.

Vopel, O. (2001): Wissensarbeit im Investmentbanking. In Willke, H. (Hrsg.): Systemisches Wissensmanagement, S. 162-236.

Wagner, J. (1993): Ignorance in Educational Research Or, How Can You Not Know That? In: Educational Researcher 22(5), S. 15-23.

Walton, D. (1996): Arguments from ignorance. Pennsylvania.

WBGU (Wissenschaftlicher Beirat der Bundesregierung Globale Umweltveränderungen) (1999): Welt im Wandel: Strategien zur Bewältigung globaler Umweltrisiken. Jahresgutachten 1998. Berlin.

Weber, M. (1919): Gesammelte Aufsätze zur Wissenschaftslehre. Tübingen.

Wehling, P. (2001): Jenseits des Wissens? Wissenschaftliches Nichtwissen aus soziologischer Perspektive. In: Zeitschrift für Soziologie 30, S. 465-484.

Wehling, P. (2009): Wie halten wir es mit dem Nichtwissen? Eine ebenso kontroverse wie notwendige Debatte. In: Erwägen Wissen Ethik 20/1, S. 163-175.

Weinstein, D. & Weinstein, M. (1978): The Sociology of Nonknowledge: A Paradigm, in: Jones, R. A. (Hrsg.): Research in the Sociology of Knowledge, Science and Art, Band 1. New York: 1978, S. 151-166.

Weizäcker, C. von und E.U. von (2008): Fehlerfreundlichkeit: Eigenschaft alles Lebendigen, Technikkriterium, Zivilisationsleistung. In: Erwägen Wissen Ethik 19(3), S. 291-299.

Wilensky, H. L. (1967): Organizational Intelligence, Knowledge and Policy in Government and Industry. New York.

Willke, H. (1996): Systemtheorie I: Grundlagen. Stuttgart.

Willke, H. (2002): Dystopia. Studien zur Krisis des Wissens in der modernen Gesellschaft. Frankfurt a.M.

Witte, C.L./Kerwin, A./Witte, .H. (1991): On the Importance of Ignorance in Medical Practise and Education. In: Interdisciplinary Science Review 16, S. 295-298.

Wynne, B. (2002): Risk and environment as legitimacy discourses of technology: Reflexivity inside or out? In: Current Sociology 50, S. 459-477.

Zeuch, A. (2007): Management von Nichtwissen in Unternehmen. Heidelberg: Carl-Auer.

Zeuch, A. (2009): Nichtwissen mit den Augen eines Nicht-Soziologen. Kritische Ergänzung zu Wehlings „Nichtwissen-Bestimmungen, Abgrenzungen, Bewertungen. In Erwägen Wissen Ethik 20/1, S. 161-163.