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

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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 operationality 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 shout 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 Böschen, Schneider & Lerf, 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., Böschen, 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 Böschen, 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 Böschen 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 & Schuberth, 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 Böschen 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

<table>
<thead>
<tr>
<th>Grounds</th>
<th>Individual Ignorance</th>
<th>Constructed Ignorance</th>
<th>Structural Ignorance</th>
<th>Delimited Ignorance</th>
</tr>
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<tbody>
<tr>
<td>Period</td>
<td>Early 1900s</td>
<td>Early 1970s</td>
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<td>Grounds</td>
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<td>Grounds</td>
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<tr>
<td>Core Statement, Interpretation/Definition of Ignorance</td>
<td>ignorance as the individual lack/absence of knowledge</td>
<td>ignorance as an independent and constructed phenomenon</td>
<td>ignorance as a co-product of knowledge and a permanent phenomenon</td>
<td>ignorance as a general and differentiated phenomenon</td>
</tr>
<tr>
<td>Positive Impact</td>
<td>– ignorance leads to gaining knowledge through learning</td>
<td>– identifying the construction of ignorance can convert ignorance into knowledge</td>
<td>– ignorance motivates its exploration and the formulation of new processible questions</td>
<td>– ignorance makes decisions possible</td>
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<tr>
<td>Positive Impact</td>
<td>– ignorance enables and stabilises social functions</td>
<td>– ignorance enables and stabilises social functions</td>
<td>– ignorance makes decisions possible</td>
<td>– ignorance is a prerequisite for taking risks</td>
</tr>
<tr>
<td>Negative Impact</td>
<td>– ignorance can serve as a medium and a tool for manipulating and maintaining power</td>
<td>– ignorance can lead to the misperception of knowledge</td>
<td>– permanent ignorance creates constant uncertainty</td>
<td>– ignorance creates risks that can lead to misinterpretations of situations, alternative actions and consequences of actions</td>
</tr>
<tr>
<td>Examples</td>
<td>– missing, withheld or incriminating technical or technological knowledge</td>
<td>– ignorance due to use of certain methods or due to inadequate access to knowledge</td>
<td>– new questions, issues and areas which arise from new knowledge</td>
<td>– unrecognised and unknown factors and relationships, future market development</td>
</tr>
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</table>
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; Böschen, 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 Böschen, 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; Dorniok & 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


