Risk under construction:

The German discourse on the ban of MON810

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1. Setting the Scene

Food crises ranging from BSE to EHEC have time and again demonstrated that uncertain risks in the area of food safety constitute one of the main societal challenges we are currently facing. Their nature as "possible, new, imaginable hazards, with which society has no or limited experience" (van Asselt and Vos, 2008) leads to situations in which traditional means of science prove to be inadequate for drawing suitable conclusions informing how the uncertain risk is to be handled. This challenge is particularly visible in the regulation of genetically modified organisms (GMOs): they have been characterized as an uncertain risk and pose questions related to socio- political, economic and cultural considerations (Ansell and Vogel, 2006; van Asselt and Vos, 2008).

How GMOs are regulated is a question with national as well as international implications. National rules interact with EU law and are embedded in the multilateral WTO/GATT framework. In this paper we will take a closer look at the implications of the EU model after its institutional re-organisation. This re-organisation was necessitated by several food scares and crises which highlighted the inadequacies of the ad-hoc approach to food safety regulation and a focus on economic rationality of the former system (Chalmers, 2003; Vos, 2004; Vos and Wendler, 2006). The most influential novelty of the EU approach to risk regulation was the institutional separation between risk assessment and risk management. This bi-institutional model was supposed to provide "independent" risk assessment in order to restore public trust into the system of food regulation (Dreyer & Renn 2010, p. 4). Accordingly, science should "no longer be seen to be policy making" and therefore be deprived of its exclusive influence on risk management (Löfstedt, 2005, p.xx). This institutional rationale can be said to reflect the ideas of post-normal science (PNS) (Ravetz, 2006). The paradigm is associated with the recognition that science is not and cannot be value-free - even less so in situations of scientific uncertainty. Instead of treating science as a realm *above* society, it should be understood as a product of social context. PNS provides us with a valuable lens to understand the changing role of science within governance and society at large (cf. De Marchi and Ravetz, 1999; Wesselink and Hoppe, 2010).

Within this new framework, the European Food Safety Authority's (EFSA) GMO panel is entrusted with the role of risk assessor. It assesses and evaluates the risks posed by GMOs and GM product and forwards its opinion to the risk manager. The function of risk management is attributed to the European Commission and the Member States. Other important actors involve the risk producer and risk protesters. They provide input to the regulatory process, but do not have an instutionalised role in the process (van Asselt & Vos, 2008; Ravetz, 2001).

Notwithstanding the removal of science from the decision-making core and the institutionalised recognition thereof, risk managers still expose a tendency to justify decisions exclusively on the basis of scientific findings. This has been the case with regard to the ban of GM maize MON810 in Germany, which was announced in 2009. This GM variant is a Bt-insect- resistance trait. The German authorities presented the measure as a scientific imperative and made no reference to the social, economic and cultural dimensions that influenced the decision. In this way, the impression has been created that the decision was based on certainty with regards to the potential consequences of MON810. This is noteworthy, since the expert assessment of MON810 was marked by uncertainty concerning potential hazards. This apparent contradiction hints at the fact that a perceived risk is irreducible to its scientific evaluation, but rather emerges in wider social processes of communication about the risk (Kasperson et al., 1988; Johnson, 2008). In order to be able to properly assess a risk decision we should look beyond the technical analysis and take into account the impact of relevant social actors on characterizing the risk. This is a challenging task in the case of the German ban of MON810, since multiple actors were involved in the respective public debate, ranging from risk producer to the media, risk contesters and risk managers.

In an environment in which science is no longer the ultimate benchmark, the Social Amplification of Risk Framework (SARF) constitutes a helpful tool to account for the collective effect of multiple actors on *risk construction*. The process of risk communication is conceived as the transfer of signals between information sources (e.g. the risk assessors) transmitters (e.g. the media, interest groups) and receivers (e.g. industry) (Renn, 2008, p. 376; Kasperson et al, 1988). In this way, it is able to yield explanations of why the social characterisation often deviated strongly from the scientific assessment of risk. Accordingly, technical assessments are restricted to the dimensions of probability and magnitude, while society has a more comprehensive concept of risk that incorporates social, economic and cultural values. When technical assessments come to interact with these values, risks are therefore either amplified or attenuated. The proponents of SARF, however, regard this as a positive effect as it leads to a fuller determination of the risk (Kasperson et al, 1988). A cluster of meaningful signals pertaining to the same topic is called a message. By comparing the properties of messages about a risk, then, one can learn how actors selectively interpret facts and anticipate consequences (Renn, 2008, p. 376).

Although SARF has been criticized for being too mechanistic in terms of separation between messenger and message (Renn, 2008), it can be countered that the two are not understood as distinct from each other, since each message is shaped according to specific values and norms of the actor in question. Consequently, the framework allows

us to scrutinize the influence of collective dynamics on the definition of social risk and simultaneously to identify the effect of singular actors on this process.

However, we would like to modify the traditional SARF approach for our analysis as it privileges the technical assessment of risk over the social assessment when talking about risk amplification and attenuation respectively. In areas of certain risks, for example the danger inherent in smoking, the prioritization of science over the opinion of the tobacco lobby might be adequate. Yet, in areas of *uncertain* risks, there is no reason to prioritize scientific definitions over social ones, therefore, we deem it more appropriate to speak of *risk construction,* rather than amplification and attenuation. This change of terms enables us to understand risk construction as a continuous process in which scientific and social actors participate on equal footing.

On the basis of this conceptual understanding, we will analyze the discursive process of risk construction which informed the German ban of MON810. Although this special GM-maize variant is authorized on EU level,[1] its cultivation has been banned by several Member States by invoking the safeguard clause laid down in EU law. In comparison to other Member States,[2] Germany has a rather inconsistent anti-GMO policy. This can be said, since the ban of MON810[3] marks a contrast with the authorization of genetically modified sugar beet, potatoes, spring wheat and other variants of maize in 2011.[4] Because of this inconsistency and the controversies involved, we consider the German case a particularly interesting example.

The ban of MON810 in Germany followed a debate which involved multiple actors with conflicting risk representations. While the risk producer, Monsanto, claims that the product is safe, the responsible German Minister of Consumer Protection justified the ban by indicating that MON810 poses a risk to the environment. Furthermore, the involved risk protesters stressed that scientific experts established uncertainty about the safety of the MON810. Although arriving at contradictory risk representations, all actors based their accounts on scientific insights. Consequently, the situation is marked by the uncertainty paradox: although MON810 poses an uncertain risk – which implies that certainty cannot be established through scientific assessment – the different actors turn to science in the search for conclusive answers (van Asselt and Vos, 2006, 2008).

In order to be able to assess the implications of the ban, we will analyze the discursive process of risk construction in relation to MON810 in order to reveal shortcomings of the current model and practicalities of risk regulation. Our understanding of SARF will help us to identify discursive patterns and their implications for risk construction. Moreover, it can guide us in discovering problems and possible improvements of risk communication in the area of EU food safety.

After introducing the EU's legal framework in which GMOs in general and MON810 in particular are regulated, we present a critical discourse analysis in which we follow the discourse- historical approach. The first step will be to conduct a first-order critique in order to unravel rhetoric and discursive patterns of the different actors which will reveal the influence of the different actors on risk construction. This will be followed by a second-order critique in which our findings will be evaluated in the light of current debates on risk governance. After providing some recommendations based on ongoing scholarly debates, the last part of the paper will provide summarizing remarks.

2. GMO Regulation

This section will commence with a brief overview of the current EU regulation of GMOs within the framework of food safety regulation before examining how MON810 is governed on the EU level. Following, it will be explained how the German ban is situated in the legal framework.

The current EU framework for food regulation is laid down in Regulation 178/2002 (hereinafter General Food Law or GFL) and is guided by two main principles: the promotion of the internal market and the protection of public health and safety.[5] The system set out by the GFL incorporates the separation between risk management and risk assessment as explained above.

The Commission and the Member States are responsible for risk management while EFSA provides scientific risk assessments.[6] This separation of tasks is aimed at insulating science from value-laden discussions about how to regulate risks. "Scientific knowledge is authoritative, but not exclusively so" (Skogstad, 2001, p.490), because managers may also take other 'legitimate' factors such as social considerations, the precautionary principle and/or international standards into account when judging the acceptability or tolerability of risks.[7]

In the case of GMOs, Directive 90/220 used to regulate the authorization procedure, but was later amended by Directive 2001/18 and Regulation 1829/2003.[8] The current framework provides for authorization by the Commission based on a risk assessment made by EFSA. Authorizations are granted for specified time periods and can be renewed upon request by the producer. The Member States also play an important role in this process, as applications for authorization are submitted to competent national authorities first and Member States are consulted[9] on the application and can eventually invoke a safeguard clause to ban a GMO or GM product.[10] We can therefore observe that the EU's institutional framework concerning GMO regulation places science *within* and not *above* society and thereby removed science from the decision-making core.

3. Regulating MON810

When Monsanto applied for authorization of MON810 at the competent French authority in 1995, Directive 90/220 still applied and determined the regulatory procedure for GMO cultivation. The French authority therefore examined whether Monsanto's application complied with Directive 90/220 and then forwarded its favorable opinion to the Commission. The Commission drafted its consent and informed the other Member States' authorities. However, objections were raised and the Commission had to refer the case to a standing committee - the Scientific Committee for Plants (SCP, which can be regarded as the predecessor of EFSA) in order to obtain a scientific opinion. The SCP was composed of Member State representatives and chaired by the Commission, so in this case which took place before the institutional reform of the EU's food safety regime, political decision-making and science were not separated from each other. In February 1998, the SCP came to the conclusion that there was no reason to believe that placing MON810 on the market would entail any adverse effects on human health or the environment. Following this opinion, the Commission adopted its Decision 98/294 which envisaged the authorization of MON810. On the basis of this decision, the French Agricultural Ministry granted the authorization for the deliberate release of MON810 into the environment in 1998.[11]

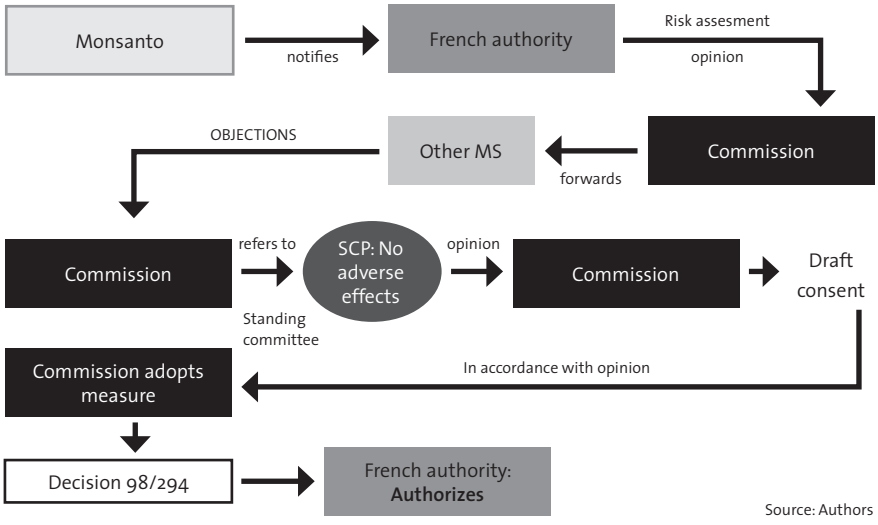


Figure 1 Procedure according to Directive 90/220 - MON810; 1998

Following the revision of the EU's regulatory framework for GMOs in 2001 and 2003, MON810 and the products originating from or containing it were notified as already existing products[12] and are therefore now authorized in the EU under Regulation 1829/2003. Monsanto duly filed for renewal of the authorization in 2004. This procedure is still ongoing which means that, in principle, MON810 may be cultivated in the EU.

However, several Member States[13] have installed safeguard measures which limit or ban the maize variant. They were able to do so due to safeguard measures which were provided in the old as well as the new GMO regime. The safeguard measures may be applied if a Member State has justifiable scientific reasons to consider that an already authorized GMO poses a risk to human health or the environment.[14] Germany is one of the countries which have such a measure in place.

In principle, the authorization of MON810 which was granted by the French authority in 1998 is effective in Germany[15] and the GMO may therefore be cultivated and placed on the market until the process of re-authorization is completed. However, in August 2007, Germany invoked the EU law safeguard clause for the first time and temporarily suspended the authorization of MON810 as it ordered Monsanto to enact and comply with a monitoring plan. The German authorities argued that their decision was aimed at ensuring a high level of precaution until a decision about the re-authorization was reached. This suspension was lifted again in autumn 2007 when Monsanto presented a monitoring plan which was in accordance with EU law (BVL, n.d.). In April 2009, Germany invoked the safeguard provisions[16] again, claiming that scientific studies provided conclusive evidence of negative effects of MON810. This time, it enacted a *ban on the cultivation* of MON810, which has the effect that the 1998 authorization is suspended until either Commission or Council repeal the safeguard measure or when the re-authorization becomes definite. Monsanto challenged the ban in front of two courts. The lower Court (Verwaltungsgericht Lüneburg) decided that the ban was in conformity with the German law on GMOs and the higher Court (Oberverwaltungsgericht Braunschweig) also held that it was justified. However, the case is not fully decided yet as the proceedings were suspended in order to give Monsanto and the German authority the possibility to reach an agreement concerning the ban and its consequences outside the court room (VG Braunschweig, 2009; Redaktion Beck- Aktuell, 2009). If the parties cannot find an agreement themselves, the Verwaltungsgericht Lüneburg will have the final say and it is, given the two previous judgments, likely that it is ready to uphold the ban.

This section provided a short overview of how GMOs in general, and MON810 specifically, are regulated at the EU level and in Germany. It already pointed towards the fact that there is much debate around the risk MON810 poses to the environment

and human health. The German authorities invoked a safeguard clause on the basis of scientific findings, which was contested by Monsanto. The following section will provide more insights into this debate by examining how different actors communicated their point of view on MON810. It will be examined how and to what extent MON810 was constructed as a risk.

4. Critical Discourse Analysis

As earlier parts of this paper have demonstrated, communication is of vital importance in the portrayal of risks. It can serve to construct a risk by attaching values to purely technical features. In order to understand how this is done by various actors, the following section sets forth to analyse the discourse of various actors involved in the German ban of MON810. We chose to follow the discourse-historical approach to critical discourse analysis (CDA) in order to uncover patterns visible in messages transmitted by Monsanto – the risk producer – criticizing the ban, German politicians justifying the ban, the media, who transmit information to the public and risk contesters active in Germany. It should be noted that the relationship between discourse and socio-political practice is a dialectical one, which means that what is said influences what is done and the other way around. When analyzing discursive activities, these should not be understood only as the product of individual deliberations but also informed by social values and meanings. Individual authoritative actors can, thus, to a certain extent, control the discourse, but should be conceived as subjects rather than masters of the discourse (Jäger, 2001, p. 37). SARF allows for an understanding of risk construction as a matter of discourse, where individual actors – sources, transmitters and recipients – produce a risk message which is simultaneously informed by social norms and values. Hence, it enables us to deconstruct the process in which a social definition of risk emerges which deviates strongly from scientific assessment. Risk construction should therefore not be understood as a process only driven by individual intentions, but is also informed by its wider social context.

The first step of our analysis is a 'first order critique' which wil help us to uncover textual story lines, inconsistencies and silences or non-expressions (Meyer 2001, p. 26; Jäger 2001, p. 34; Wodak 2001, p. 65). Secondly, we will subject the findings from the first section to a 'second order critique' in which we wil contextualize the discursive patterns in their wider socio- political context. This section will be rather interpretive and relate our findings to the conceptual and theoretical debate on uncertain risks.

The purpose of this analysis is to show how the actors' use of science influenced the social construction of risk. In order to account for the multi-actor situation, we will analyse

the influence of the most important communicators on risk construction surrounding MON810. Monsanto as the risk producer and GMO proponent will be taken into account. Since politicians have to justify their regulatory decisions, their discourse activities also need to be included in this analysis. It is mostly the media which take on the role of the transmitter between politicians/decision-makers and the public. Thus, scrutinizing the display of MON810 in a selection of online versions of mainstream newspapers adds this dimension to our case study. Lastly, risk protesters, such as environmental NGOs, play an important role in the dialogue on GMOs.

4.1 First-Order Critique

Within the discourse surrounding MON810, we can observe three closely connected logics which influenced the way in which the different actors approached science in the construction of their arguments. This process of argument construction is neither linear nor is there a necessary causal relationship between the observed patterns. The first logic is that actors expect 'plausibility proofs', meaning that they assume science to provide definite and conclusive answers to closed questions. An interlinked pattern is the representation of science as a superior authority. A third related pattern is that the actors remain silent on uncertainty. We regard these patterns as constitutive elements of the social process of risk construction.

a. Plausibility Proofs

In a press release, the Federal Minister of Consumer Protection emphasized that any policy approach must ensure that "any use of argrobiotechnology . . . is completely safe" (Aigner, 2009). Equally displaying the expectation that science can provide certainty, the Bavarian Minister President called on experts to clarify "all open questions" (Focus, 2009a).[17] Interestingly, this line of thought is present independently of party lines. The then Environmental Minister pertaining to a different party, for example, claimed that "first al doubts on the environmental effects of MON 810 should be erased"[18] before the commercial cultivation of MON 810 could be reconsidered (Focus, 2009a). The media exposed the same logic, for instance by posing simplistic and closed questions such as "how dangerous are such manipulations for the environment, humans and animals? Can these artificial interferences with genetic materials cause unimagined harm to humans or the environment?"[19] (Hamburger Abendblatt, 2009). Another example for this can be found in the newspaper *Frankfurter Allgemeine Zeitung* (FAZ) which asked "how threatened is the environment in reality?"[20] (2009). The omnipresent expectation of plausibility proofs indicates that science is seen to provide 'truth'. Thereby, it is arguably elevated above all

other sources of knowledge. The depiction of science as providing superior authority is another recurring discursive pattern.

b. Science as Providing Ultima te Authority

In order to discredit the German ban, Monsanto first highlighted the procedural requirement of the safeguard clause which states that a ban has to be motivated by new scientific evidence. According to the risk producer, the safety of its product is confirmed by "an overwhelming body of evidence" which has been "repeatedly confirmed" by "competent authorities" (Monsanto, 2009a, b). The authority of this argument is further reinstated by drawing a dividing line between Monsanto's science and the science used by the German authorities in order to justify the ban. Monsanto stated that this ban was not "supported by any *convincing* scientific evidence" (2009a). When talking about the court case, Monsanto hopes that "there is room for scientific argumentation within this framework",[21] and thus implies that this has not been possible in the debate before (Sueddeutsche Zeitung, 2009). Moreover, Monsanto's managing director for Northern Europe makes it clear that she regards the decision to ban MON810 in Germany as a politically motivated one, in sharp contrast to a scientifically justified one: "the political environment has radically changed . . . I think she [the Minister for Consumer protection] acted in the clear intention of [party comrades] . . . [and] the arbitrary ban is not substantiated through convincing scientific proofs" (Monsanto, 2009c).[22] Furthermore, Monsanto presents itself as a victim of a "breakout of true hostility towards technology in Germany" which prefers precaution over anything else (Sueddeutsche Zeitung, 2009).[23] It implies that Monsanto does not stand any chance - despite scientific evidence indicating the safety of its product- against the regulator. Thereby, the company presents itself as a rational actor confronting the value-driven and emotional sentiments transmitted by German politicians. Consequently, Monsanto depicts scientific arguments as the only valid ones.

The German risk manager exhibited a similar depiction of science. The Minister for Consumer Protection insisted that "contrary to other assertions, my decision is not political. It is a technical decision and is moreover required to be so for legal reasons" (Aigner, 2009). In this case the use of the word 'technical' implies superiority of scientific rationales over political ones. Moreover, it seems to be regarded as providing justification to a degree where no further elaboration on the nature of the respective scientific evidence is required: the Minister emphasized that there were "justifiable grounds" for the ban of MON810 without explaining the precise grounds (Aigner, 2009). Similarly, a party comrade called the ban "a very important, technically founded decision"[24] (Der Spiegel, 2009a) and emphasized that "we . . . do not want [MON 810] given the current *state of science*"

(Die Welt, 2009, emphasis added).[25] Taken together, all these statements exemplify that justifications are easily made with reference to science as the latter is seen as a superior source of authority.

The media also follows this logic of regarding science as providing ultimate authority. They depict science as factual and therefore superior to 'politics' or 'ideology'. Monsanto's studies were called into question by the German newspaper, *Hamburger Abendblatt*, which emphasized that "while the producers point at *their own* risk studies, the opponents collect evidence from the *most diverse* scientific institutions" (2009, emphasize added).[26] The company's assessment and monitoring were label ed as "questionable" and it is highlighted that a scientific institute made it explicit that Monsanto's data interpretation is flawed (Tagesspiegel, 2009).[27] The notion of the scientific invalidity of the ban is strengthened by label ing it a "purely political decision" (Taz, 2009)[28], which was taken due to "inner party pressure" (Tagesspiegel, 2009).[29] The scientific justification is seen as a superficial argument trying to conceal the underlying political pressure by party comrades and GMO-opponents (Die Zeit, 2009a,b; Focus, 2009a,b; Der Spiegel, 2009a).[30] Moreover, the position of the GMO opponents is contrasted to that of 'science' by label ing it a "quasi-religious movement" which plants "seeds of fear" about the "devil's maize [MON810]" (Die Zeit, 2009a,b).[31] The media argues that "politics surrendered to ideology" and "used populist sentiments of GMO-opponents" in order to justify their ban, despite scientific evidence pointing to the safety and usefulness of MON810 (Die Zeit, 2009a,b).[32] Here, the opposing view is presented as a value-driven, irrational one, denying the facts produced by scientists. By repeatedly drawing a value-fact distinction, the media presents science as a superior source of knowledge.

Another significant actor in the debate surrounding MON810 were non-governmental organizations. A Greenpeace spokeswoman underlines her support for the ban by claiming that "numerous scientific studies have shown that the genetically modified maize presents a danger for the environment".[33] Neither the content nor the source of the scientific studies in question are mentioned, instead 'scientific studies' are positioned as an unquestionable source of truth. Moreover, a big part of the conducted research is claimed to "be controlled by the companies through patents or the declaration of results as company secrets" (Greenpeace, 2009).[34]

In this debate in which science is regarded as providing 'truth', it was commonly utilized to legitimise points of view and discredit others. With reference to science, actors presented their arguments as factual and thereby rhetorically elevated them above other claims. The acknowledgment of uncertainty is incompatible with these claims as it would exhibit the limits of science in providing 'truth'. Another pattern we could observe

accordingly was that the different actors avoided or crowded out uncertainty in their speech acts.

c. Uncertainty as a Non-Expression

In line with the authority claims and plausibility proofs, uncertainty, whether in explicit or implicit terms, is avoided by the risk producer in its communications about MON810. The term uncertainty itself cannot be found in any of the press releases or statements made by Monsanto and neither does the company refer to it implicitly. Hence, science is presented as a uniform block that can only express one, 'true,' solution which, in the case of MON810, is that the maize form is safe. Nowhere in its press releases or statements does Monsanto acknowledge the possibility of value-judgements being inherent to science or the possibility that science may not always be able to produce conclusive evidence. Quite to the contrary, the terms 'safety' and 'safe' are omnipresent and suggest that they can indeed be provided by the 'superior authority' of science.

As the risk manager emphasised, the decision to ban MON810 was a "technical one" and had to be so "for legal reasons" (Aigner, 2009). For the German decision-makers it was thus of similar importance to uphold the image of science as a provider of truths and facts and therefore avoid uncertainty in the discourse. There are no statements which admit, neither implicitly nor explicitly, that scientific uncertainty about risks posed by MON810 remain, although the risk managers were surely aware of the scientific pluralism.[35]

The risk protesters also remain silent on uncertainty by presenting MON810 as "entailing too high risks for the environment" (BUND, 2009).[36] Greenpeace stresses the danger of the GMO without indicating attached uncertainties: "MON810 inherits dangers for the environment, because it produces a toxic, which is not just deadly to the vermin European corn borer" (Greenpeace, n.d, p.1).[37]

We have repeatedly identified an equation of uncertainty with risk - an observation in line with findings by i.a. van Asselt and Vos (2008). Through this equation, the nature of *uncertain* risks is ignored since possibility is confused with certainty. Risk managers, the media and risk protesters expose this pattern. The Minister for Consumer Protection justifies her ban on the basis of "new evidence [that MON810] endangers the environment" (Der Spiegel, 2009b).[38] On the part of the media, the *Hamburger Abendblatt*, for instance, states that "the risk for the butterflies cannot be assessed conclusively . . . is a reason why the maize . . . may no longer be cultivated in Germany (2009).[39] In similar vein, a Greenpeace and Friend of the Earth Report concluded that uncertainty necessitates a recommendation for non-cultivation (2009, p.3).

4.2 Second-Order Critique

The preceding section has analysed the construction of risk associated with the GM maize MON810 in Germany. More specifically, by focusing on the use of language, it has shown how an uncertain risk, as technically defined, has been socially constructed as a known risk. We have identified that the risk producer and certain media representations regard the product as safe while the risk managers and protesters view it as a danger. In spite of their diverging definitions, the different actors exposed common patterns of risk construction. First, by demanding plausibility proofs, all actors approached science as if it was able to provide certainty. If science is seen as providing truth, it follows that it is superior to all other sources of knowledge. The representation of science as the ultimate benchmark of political decisions therefore constituted a second omnipresent pattern. As the former two findings suggest, there could be no recognition of uncertainty in the discourse surrounding MON810. A third dominant pattern therefore consisted in the crowding out of uncertainty. These patterns exhibit the uncertainty paradox as defined by van Asselt and Vos (2006, 2008). In the following we will contextualize these patterns in the light of current practical and normative debates on EU risk governance.

The first two patterns – plausibility proofs and science as a superior authority – can be understood as boundary work. According to Gieryn (1983, 1999), the notion of boundary work relates to the drawing of distinctions between different realms, such as science versus non-science or versus politics or ideology. Through this contrast, self-evident justifications are created and maintained and, at the same time, help to construct superiority of claims. We argue that this can be done explicitly as well as implicitly. In the case of MON810, the expectations of plausibility proofs established science as a source capable of providing 'truth' which implies that science is *above* all other sources of knowledge. This constitutes an implicit boundary between sources of evidence and establishes a hierarchy between them. Accordingly, science, as a producer of 'truth' is the self-evident choice for actors demanding answers and warranting claims. Our first-order critique revealed that regulators turned to science to clarify "al open questions" (Focus, 2009a). This stands in stark contrast to the rationale of the new participatory model and PNS which contend that science is an insufficient base for decision-making and should be supplemented by non-scientific considerations. Interrelated, explicit boundary work is manifest in statements suggesting that science can provide superior authority to their claims. The actors involved in the discourse surrounding MON810, articulated boundaries between science and politics and between science and ideology. This tendency is exemplified by media reports that depicted GM opponents as a "quasi-religious movement"[40] (Die Zeit, 2009a,b) as opposed to 'sober' science. In contrasting these realms, they constructed a superiority of rational scientific facts over political or ideological considerations.

The third pattern – avoidance or crowding out of uncertainty- can be understood as an expression of uncertainty intolerance on the part of the different actors. This relates to situations in which scientific uncertainty is "not acknowledged deemed irrelevant or . . . simply evaded" (van Asselt and Vos, 2008). The logic that uncertainty equals risk and the presentation of uncertainty as a monolithic block manifest this intolerance (cf. Van Asselt and Vos, 2008). Uncertainty intolerant speech acts crowd out uncertainty from the discourse and thereby help to construct a risk that is perceived to be certain or known by the wider society.

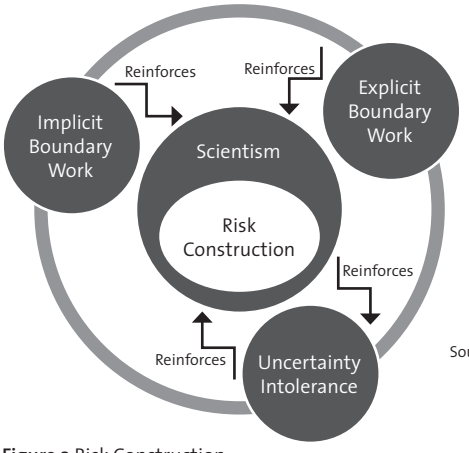
We thus observe a strong discursive tendency to prioritise scientific findings over all other statements. This notion that "facts and values are distinct entities and that facts, unlike values, are beyond dispute" has been termed 'scientism' (Kleinman and Kinchy, 2003, p. 585). Scientism includes three main assumptions: the superiority of facts over values, the neutrality of science and the idea that science is the best basis for decision-making. Within this scientism discourse, actors were able to instrumentalise science for the justification of political arguments. The central example for this is the official statement of the German authority that the decision to ban MON810 was a "purely technical decision" (Aigner, 2009). As our first-order critique has shown, the other actors similarly used science to give their arguments a factual disguise.

The discursive tendencies which we have identified arguably reflect and reinforce some of the most pressing problems of the new participatory model of EU risk governance. The institutional separation of risk assessment and risk management and the opening up of both processes to public deliberation entailed that now a myriad of scientific and social perspectives have to be accounted for in decision making. As our case study has exemplified, social actors now can access relevant information at an early stage and mobilise their 'own' science in order to construct versions of risk which justify their political arguments. This arguably engenders a pluralism of science in which it is difficult for lay people to differentiate between scientific sources according to quality (De Marchi and Ravetz, 1999; Löfstedt et al., 2011). In turn, regulators are able to pick and choose the scientific claims which best fit their arguments. This may lead to suboptimal policy outcomes because neither scientific nor social rationales are adequately incorporated into decision-making (Renn, 2001; Löfstedt, 2005). At the same time a discourse like the one on MON810 in Germany in which every actor presents his science as the only true one in spite of uncertainty, the confusion and uncertainty resulting from this pluralism is arguably amplified. This undermines the rationale of the new participatory model which had been designed to promote transparency and trust. By allowing for the instrumentalisation of science and the exclusion of uncertainty in communication, the model rather gave

way to the erosion of transparency and a polarisation of the debate. Hence, in line with Renn (2001), we argue that, given the current conditions, it is increasingly difficult to find consensual risk choices that are acceptable for society at large. We would like to term such a situation in which pluralism without a hierarchy and the consequent possibility that science is instrumentalised in combination with an erosion of transparency one of *uncertainty amplification*. In this context we understand uncertainty in its rather plain word meaning of denoting confusion and a lack of clarity.

Furthermore, it can be argued that the erosion of transparency, fuelled by a scientism discourse, is problematic from the angle of normative democracy. This is because it helps to avoid accountability of decision-makers. By enabling regulators to 'arbitrarily' draw on scientific sources to justify their claims, it shields the underlying political rationale from public scrutiny. In summary, the quality of the decision may be compromised as neither social nor scientific standards are sufficiently accounted for. This is in line with Renn's contention that the quality of political solutions can only be ensured if the "best expert knowledge about potential consequences of each decision option" as wel as a "reflection and processing of all relevant opinions and evaluations put forward by stakeholders and affected citizens" are included (2001, p. 429).

We argue that the process of risk construction has been strongly influenced by a scientism discourse. Scientism has been reinforced by implicit as well as explicit boundary work. In addition, there is a mutually reinforcing relationship between uncertainty intolerance and scientism. While the conventional conception of science fuels uncertainty intolerance and allows for authority claims, the crowding out of uncertainty reinforces the image of authoritative science.



Source: Authors

Figure 2 Risk Construction

This, in turn, highlights several chal enges. First of al , 'supermarket thinking' (Renn, 2001) reflects the tendency of different actors to 'pick and choose' scientific evidence in order to buttress their political intentions. In similar vein, a value-inclusive debate was avoided. Both mechanisms potentially lead to suboptimal policy outcomes. Moreover, there is a general confusion about whose science is to be trusted and can be relied upon as, for example, an integrating rationale for science is missing (Renn, 2001). At the same time, decision-makers may be able to avoid accountability. Arguably, we are thus presented with practical and normative deficits. By introducing scientific pluralism, the new participatory model therefore presents us with these deficits as long as uncertainty is not incorporated within public and political discourses.

In our view, the problems caused by a scientism discourse can only be adequately dealt with if there is a wider acknowledgment of scientific pluralism and uncertainty which characterize the era of post-normal science. It is clear that uncertainty *tolerance* is conditioned by an acknowledgment of uncertainty. Moreover, regulators will only be held accountable for their scientific rationales, if the wider public is aware of scientific pluralism, i.e. of the presence of alternative scientific arguments. This requires a changed understanding and representation of science which enables the accommodation of uncertainty in the discourse. In the next section, we would like to point at some potential trajectories to include uncertainty into risk governance identified by several scholars in order to balance scientific and social dimensions.

5. Recommendations

As risks are the "bel wethers" of decision-making (Kasperson et al., 1988), their construction is crucial to policy outcomes. It has been demonstrated that uncertainty intolerance and scientism have helped to construct an uncertain risk as a known risk and an inherently political decision could therefore be presented as a self-evident technicality. It is, however, desirable that decisions are value informed. Risk communication should therefore be uncertainty *tolerant*. If uncertainty is acknowledged by a wider array of social actors, it is more likely that value considerations will supplement scientific rationality. Our main trajectory is consequently to improve communication throughout the whole process of risk governance in order to sensitize all actors with respect to the limits of science. This would comply with the underlying rationale of the separation of risk assessment from risk management. Following the institutional separation, science no longer carries direct implications for decision making and thereby, at least in theory, creates room for non-scientific considerations.

Our recommendations hint at possible ways in which communication between risk assessors, managers and the wider public takes could be improved at different intersections. It should be noted, however, that risk governance is not a linear three-stage process, but that dynamic interactions between realms of assessment, management and communication are needed (van Asselt and Renn, 2011). Due to the potentially infinite number of intersections, our recommendations cannot be exhaustive, but nevertheless might provide further input for the development of guidelines.

In general, it has been widely acknowledged that traditional top-down risk communication aimed at bringing public perceptions in line with expert opinion is no longer viable (Renn, 2006; Löfstedt, 2005). Rather, effective risk communication should be based on a two-way exchange of views and mutual learning. This means that a professional community should take into account alternative positions and risk management practices as well as existing public perceptions. In doing so, problems with processing scientific information should be identified and accounted for in conveying risk information. Moreover, attached social values and interests should be identified prior to assessment and management so that expert opinion and policies actually address the concerns of society. In this way, tailor-made risk communication strategies can be developed that effectuate a profound understanding of the uncertainties involved. In order to realize this, interaction between risk assessors and the public at an early stage is of vital importance (Renn, 2006, p.54; Renn and Walker, 2008, p.xxv; Johnson 2008). The ultimate goal of risk communication should thus not be to educate citizens, but to assist them "in understanding the rationale of risk assessment results and risk management decisions, and to help them arrive at a balanced judgement that reflects the factual evidence . . . in relation to their own interests and values" (Renn, 2006, p.54-55). Based on the awareness of uncertainty, both, those who are central to the risk management process and society at large should thus make their value- informed judgements which are then to feed back on decision making.

More specifically, we suggest two means which conform to the underlying rationale of risk communication as outlined above. In our view, the establishment of an overall framework for risk communication could be enhanced by the introduction of a uniform language 'code'. This could be modelled on the Intergovernmental Panel on Climate Change (IPCC) reports which provides for a format according to which likelihood and confidences are to be expressed. The general idea was to develop a scheme on which uncertainty information could be expressed in uniform terms (Risbey & Kandlikar, 2007, pp.19-21). As a result, the uncertainty information could be transmitted in a clearer and more understandable way which could counteract the erosion of transparency and

improve the overall process of risk communication. Confusions between uncertainty and risk could be avoided.

With the help of a uniform language surrounding scientific uncertainty, actors involved in risk governance could, from 'framing' onwards, define the problem surrounding the uncertain risk in unambiguous terms. According to Dreyer and Renn (2009, 2010) so-called interface stages could provide further assistance in this process. The stage of framing is very important as it could tackle the problems associated with uncertainty intolerance and scientism by the roots through expressly taking societal values into account. It should therefore involve society and scientists in order to ensure that science answers the 'right' questions, i.e. those society deems the most pressing. A second stage proposed by the two authors consists of an evaluation after risk assessment. At this stage, both, scientific and societal arguments should be taken into account when judging the acceptability of the risk. In this way an open dialogue involving science and society is created without falling back into the old technocratic model (2010, pp. 19-20).

Moreover, we would like to argue in line with Löfstedt et al's (2011) account of improved official risk communication. Official risk assessment bodies like EFSA should improve their public profile and engage in more proactive and audible risk communication. This is necessary, since official bodies like EFSA increasingly lose their influence on public risk definition vis-à-vis other stakeholders due to their inferior communication skills (Löfstedt et al, 2011). Against this background, the authors propose a number of strategies to improve official risk communication. Firstly, they argue that regulators are often too slow to communicate in comparison to other actors. The reason for this lies in the vast bureaucratic machineries that make up most government departments. It would therefore be useful to reduce the bureaucratic barriers to efficient communication. Moreover, they suggest that officials should be "encouraged to attend risk communication courses" in order to improve their capabilities (p. 421). Secondly, official bodies like EFSA should promote an understanding of their high scientific standards, since in media discourses scientists are often pitted against each other, regardless of their scientific credentials (p. 422). Thirdly, in order to ensure that the risk assessment of official assessors is of the highest quality - and is therefore less likely to be undermined by stakeholders and special interest groups - it would be advisable to subject all scientific results relevant to decision making to strict scientific peer review (p. 423).

In our view the underlying problem is how science is understood and used by the different actors involved in risk governance. The preceding proposals could arguably help to sensitise the institutional process as well as the public discourse for uncertainty. In combination, these might help to foster a broader acknowledgement of the limits

of science and the related importance of social rationales to decision-making. Taken together, we envisage a discourse that helps to forge consensual decisions and thereby to prevent societal ruptures. In line with Renn (2001), such a discourse should aim to create common knowledge informing common reflections. These reflections should, in turn, clarify relevant preferences and values and ultimately generate consensual regulatory solutions. Given such a discourse pressure on regulators would arguably rise to disclose the political motivations of their decisions and prohibit them to (mis-)use science as a universal and self-evident justification.

6. Concluding Remarks

Uncertain risks increasingly confront decision makers with the task of forging adequate regulations on new technologies, products or developments. Since under conditions of uncertainty, science is unable to yield conclusive evidence, the academic debate has increasingly acknowledged that in the era of pots-normal science regulations on uncertain risks must be informed by social, economic and cultural values and interests. The risks which are to form the basis of decision making thus need to be defined in terms of scientific *and* social considerations. The new participatory model of risk governance as applied in the area of EU food safety incorporates this insight by building on an institutional separation of risk assessment and risk management. In this way, the technical dimensions of probability and magnitude are to be supplemented by societal choices on acceptability. By drawing on SARF we have developed an understanding of risk construction as a discursive process in which technical and social views interact to produce definitions of risk.

Our study examined the process of risk construction in the case of the German ban on MON810. It was highlighted that an originally uncertain risks has been constructed as a know risk. We have argued that the process of risk construction has been strongly influenced by a scientism discourse and the mutually reinforcing relationship between uncertainty intolerance and scientism. While the conventional conception of science fuelled uncertainty intolerance and allows for authority claims, the crowding out of uncertainty reinforced the image of authoritative science. In this way, reference to science was used to display a political decision as a technical one. Our modified understanding of SARF enabled us to discern this instrumentalisation of science and uncertainty, a process usually overlooked in the traditional understanding of SARF. This instrumentalisation may, in fact, inhibit a fuller determination of risk as it discursively delimits the factors taken into account. The

supplementation of technical properties of a risk with social dimensions which is envisaged as a positive trait of social risk construction by SARF, may thus be hampered.

We think that uncertainty intolerance and the present displays of science are due to an 'outdated' conceptualisation of science which neglects the possibility of value-judgments within science and the fact that uncertain risks have to be regulated according to their *social* acceptability. Before uncertainty *tolerance* can exist and be communicated effectively, these qualities of uncertain risks have to be incorporated within the regulatory framework. Post-normal science as a sensitizing concept might prove to be helpful in this respect.

Overal , the case of Germany's ban on MON810 revealed that the current risk governance process is still not fit to adequately deal with the challenges posed by uncertain risks. We emphasized several challenges which resulted from the way in which MON810 has been constructed as a known risk. 'Supermarket thinking' and the exclusions of values from the debate potentially lead to suboptimal policy outcomes and decision-makers may, at the same time, be able to avoid accountability. In addition, the lack of an integrating rationale for science may lead to situations of uncertainty amplification, polarise debates and even lead to ruptures in society. In order to counteract these practical as well as normative deficits, we suggested general and specific trajectories aimed at improving communication on and understanding of uncertain risks. Ultimately, we envisage that the institutional process and the public discourse are sensitised for uncertainty in order to improve decision-making and accountability. This is to provide for risk choices which represent the interests and values of the largest possible number, thus avoiding societal ruptures and ensuring the democratic quality of EU risk governance.

Endnotes

1. Please see Section 2 for more details on the authorization process.
2. E.g. Austria banned MON810 as early as 1999 (European Commission, n.d.).
3. Germany invoked the safeguard clause provided by Article 23 of Directive 2001/18 and Article 34 of Regulation 1829/2003 in order to enact the ban.
4. An overview of the different variants, a map of where they are cultivated or released and information for previous years can be found via the BVL website (BVL, 2011).
5. See Recitals (1) and (2) of the GFL.
6. The separation is contained in Art. 6, the definitions of what the EU understands as 'risk analysis', 'assessment' and 'management' in Art. 3 (10), (11) and (12) of the GFL.
7. See Recital (19), Art. 3(12), Art. 6(3), Art. 7 of the GFL.

8. It is supplemented by Regulation 1830/2003 which stipulates rules for the traceability and labeling of GM products placed on the market.
9. In addition, in the case of GMO authorization for cultivation, Member States are responsible for the initial environmental risk assessment.
10. Art. 23 of Directive 2001/18, which requires new scientific evidence indicating that a GMO constitutes a risk to human health or the environment, and Article 34 of Regulation 1829/2003, which presupposes that a GM product constitutes a serious risk to human or animal health or the environment.
11. Moreover, products originating or containing MON810 (i.e. MON810 in the form of derivatives for human consumption) are authorized pursuant to Regulation 258/97. The use of food additives made fr om MON810 is allowed under Directive 89/107. Since the German ban concerns cultivation only, the other areas will not be explored further in this paper.
12. Authorized under Directive 90/220 or Regulation 258/97 respectively.
13. Austria, Hungary, Luxembourg, France, Greece and Germany (European Commission, n.d.).
14. The Commission tried several times to repeal the national safeguard measures, but the Council upheld them by QMV (European Commission, n.d.,a).
15. This is in accordance with §14 Abs 5 Gentechnikgesetz which provides that GMO authorizations granted by competent EU Member State authorities have the same effect in Germany as authorizations granted by the competent German authority. "Der Genehmigung des Inverkehrbringens durch die zuständige Bundesoberbehörde stehen Genehmigungen gleich, die von Behörden anderer Mitgliedstaaten der Europäischen Union oder anderer Vertragsstaaten des Abkommens über den Europäischen Wirtschaftsraum nach deren Vorschriften zur Umsetzung der Richtlinie 2001/18/EG erteilt worden sind."
16. Art. 23 of Directive 2001/18 and Art. 34 of Directive 1829/2003.
17. "Bayerns Ministerpräsident Horst Seehofer (CSU) sagte: Neue Studien zwingen uns dazu, die offenen Fragen erst einmal zu klären" (FOCUS, 2009a).
18. "Bundesumweltminister Sigmar Gabriel (SPD) sagte, zunächst sollten alle Zweifel über die Umweltverträglichkeit von MON 810 ausgeräumt werden . . ." (FOCUS, 2009a).
19. "Doch wie gefährlich sind solche Manipulationen für Umwelt, Menschen und Tiere? Können die künstlichen Eingriffe ins Erbgut . . . ungeahnte Schäden an Menschen oder an der Umwelt anrichten?" (Hamburger Abendblatt, 2009).
20. "Doch wie gefährdet ist die Umwelt wirklich?" (FAZ 2009).
21. "Wir hoffen, dass in dessen Rahmen auch wissenschaftlich argumentiert werden kann" Ursula Lüttmer - Ouzane in an interview with the Süddeutsche Zeitung. (Sueddeutsche Zeitung, 2009).
22. "Das politische Umfeld hat sich in den vergangenen Jahren radikal geändert. Noch vor kurzem erlebten wir eine CSU, die stark hinter der grünen Gentechnik stand. Aber das hat sich zuletzt leider komplett gedreht. Man sieht doch, wie ein Herr Seehofer gestrickt ist. Er schaut auf die Stimmung im Volk. So kam es, dass Partner, die uns früher unterstützt haben, jetzt eine absolute Kehrtwende gemacht haben. Ich denke, sie [the Minister for Consumerprotection] hat in der klaren Intention der Herren Söder und Seehofer

gehandelt." Ibid; "Das willkürliche Verbot von MON 810 durch Bundeslandwirtschaftsministerin Ilse Aigner ist nicht durch überzeugende wissenschaftliche Beweise untermauert, die eine solche Maßnahme rechtfertigen würden." Monsanto Press Release from 5 may 2009. (Monsato, 2009c).

23. "In Deutschland ist in der letzten Zeit vielmehr eine wahre Technologiefeindlichkeit ausgebrochen. Immer heißt es: Lieber tun wir etwas nicht, bevor wir nicht wissen, was es in letzter Instanz bedeutet." (Sueddeutsche Zeitung, 2009).
24. "… eine ganz wichtige, fachlich begründete Leitentscheidung" (Der Spiegel, 2009a)
25. "Wir in Bayern wollen das bei dem derzeitigen Forschungsstand nicht", sagte Seehofer (Die Welt, 2009b).
26. "Während die Hersteller auf eigene Risikostudien verweisen, sammeln die Gegner Indizien aus verschiedensten Forschungsinstitutionen" (Hamburger Abendblatt, 2009).
27. "Fragwürdig is aber auch, wie Monsanto den … Monitoring Bericht … zusammengetragen hat … Das Hemholtz-Zentrum for Umweltforschung, das gemeinsam mit der Gesellschaft für Schmetterlingssc hutz und der Internetplattform Science 4 you die jährliche Falterzählung betreut, weist jedoch ausdrücklich darauf hin, dass eine solche Interpretation aus den Daten … nicht abzuleiten sei" (Tagesspiegel, 2009).
28. "Das war eine rein politische Entscheidung" (Taz, 2009).
29. "Entsprechend wird Aigner aus ihrer Partei unter Druck gesetzt, den Anbau zu verbieten" (Tagesspiegel, 2009).
30. "Hintergründig wird Ilse Aigner [the Minister for Consumer Protection] nämlich von der heimischen CSU in München unter Druck gesetzt" (Die Zeit, 2009a). "Und die deutsche Politik tut heute ihr Bestes, um es den Gentechnik-Kritikern so weit wie möglich recht zu machen" (Die Zeit, 2009b). "Der Druck aus der CSU, den Genmais zu verbieten, war in den vergangenen Wochen größer geworden" (Focus, 2009a). "Als treue Vollstreckerin ihres übermächtigen Parteichefs Horst Seehofers … legte die junge Bundesministerin [Aigner] die Argumentation dar… Die Mimik zeigte: Der Druck muss enorm gewesen sein" (Focus, 2009b). "Eigene [Aigners] Überzeugung sieht wohl anders aus" (Der Spiegel, 2009a).
31. "Teufelsmais" (Heading, Die Zeit, 2009a)." "Einiges spricht dafür, dass es sich bei der Anti-Gentechnik-Lobby um eine quasireligiöse Bewegung handelt." "Die Saat der Angst ging auf" (Die Zeit, 2009b).
32. "Mit dem Anbauverbot für MON810 erliegt die Politik der Ideologie." "Die Politik macht sich hier in populistischer Absich die Stimmungsmache der Gentechnikgegner zunutze" (Die Zeit, 2009a).
33. "Zahlreiche wissenschaftliche Studien belegen, dass der Genmais eine Gefahr für die Umwelt darstelle" (Der Spiegel, 2009b).
34. "Letztlich kontrollieren die Konzerne große Teile der Forschung über Patente oder darüber, dass sie Forschungsergebnisse für Betriebsgeheimnisse erklären." (Greenpeace, 2009)
35. While the German authorities justified the ban on the basis of two studies, EFSA came to the conclusion that MON810 was as safe as conventional maize (EFSA, 2009). Several other studies, for example Ricroch 2009 and an opinion provided by the German agency for biological safety (ZKBS 2009), came to the conclusion that a ban could not be justified on the basis of current scientific findings.
36. "In Deutschland wurde der Anbau im April 2009 verboten – wegen zu großer Risiken für die Umwelt." (BUND, 2009).

37. "MON810 birgt Gefahren für die Umwelt, da er ein Gift produziert, das nicht nur tödlich auf den Schädling Maiszünsler wirkt." (Greenpeace, n.d., p.1).
38. "Sie [Aigner] habe berechtigten Grund zu der Annahme, dass . . . MON810,eine Gefahr für die Umwelt darstellt"(Der Spiegel, 2009b).
39. "Das Risiko für die Schmetterlinge lässt sich also nicht abschließend beurteilen; dies ist einer der Gründe, dass der Mais . . . nicht mehr wachsen darf" (Hamburger Abendblatt, 2009).
40. "Teufelsmais" (Heading, Die Zeit, 2009a). "Einiges spricht dafür, dass es sich bei der Anti-Gentechnik-Lobby um eine quasireligiöse Bewegung handelt." "Die Saat der Angst ging auf" (Die Zeit, 2009b).

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