2 Questioning Evidence
Three Modes of Contestation

Eva Barlösius and Eva Ruffing

In recent years, the validity of scientific knowledge and the adequacy of scientific expertise have been increasingly contested, which is why they are considered less trustworthy.[1] Thus, societal consent on the reference to scientific knowledge and expertise as best suited for adequate problem-solving – which is typical for knowledge societies – becomes more and more fragile. By increasing the fragility of that consensus, contestation spells trouble for the authority and legitimacy of scientific evidence within the political process. We argue that such an analysis is too crude: Scientific knowledge and scientific expertise are not always disputed; in the vast majority of cases, they are accepted without causing problems in making decisions. Furthermore, it is important that scientific knowledge and scientific expertise are challenged in a variety of ways, which is why the evidence attributed to them becomes fragile in various ways.

In this chapter, we present a heuristic for distinguishing between three modes of contestation, highlighting for each the sort of difficulties it can cause for scientific knowledge and scientific expertise. These modes of contestation are the questioning of (1) the validity and reliability of scientific knowledge, (2) the extent to which the specific scientific expertise is adequate for solving the political problem at hand and (3) the scientific field's exposed position in matters of decision- and policy-making and administrative processes. All three modes of contestation cause trouble for the recognition of evidence; in the first case, because the prerequisite for evidence no longer persists; in the second case, by judging the claimed evidence as irrelevant; and in the third case, by the fundamental rejection of evidence. Whereas earlier publications of ours focused on approaches to handling these different modes of contestation,[2] we now emphasize the consequences of the contestation in terms of evidence.

Scholars in science studies, political science, sociology and other disciplines have been exploring the challenges to scientific knowledge and scientific expertise intensively for more than 15 years.[3] Our review of the vast relevant research shows that the challenges have rarely been differentiated according to what exactly is in dispute or what the contestations are driving at. To fill this gap, we have developed a heuristic that

DOI: 10.4324/9781003273509-4

intertwines perspectives from the sociology of science, political science and administrative science.[4] Our heuristic rests on the observation that research on scientific knowledge and scientific expertise in the political and administrative process usually starts (depending on the scientific perspective) either from analyzing the genesis of scientific knowledge and its transformation into scientific expertise or from examining the role of scientific expertise in the political decision-making process. The heuristic we have developed, by contrast, makes clear that the various forms of questioning are not differentiated along these lines, but rather according to what is being questioned in each case, and what the aim of the questioning is.

Striving for Evidence

Evidence has become a booming topic in science studies in the past few years. Key research areas are the requirements for scientific evidence[5] and how evidence is produced and practiced.[6] Our research is inspired by Max Weber's perspective on evidence. His conception allows us to observe the different challenges to evidence in the scientific and political fields and over the process of transformation to a knowledge society. It is not by chance that Weber began his famous work *Economy and Society* with a paragraph in which he spelt out how interpretive sociology produces scientific *evidence*, a term arguably translatable as "insight and comprehension".[7] As he puts it there, "all interpretation of meaning, like all scientific observations, strives for clarity and verifiable accuracy of insight and comprehension".[8] Clarity and verifiable accuracy can be thought of as a means of generating evidence, which to Weber is "the basis for certainty in understanding".[9] Although this phrasing shows that Weber interpreted the striving for evidence in a broad sense, including emotional, empathic, comprehensive personal convictions, values, norms or artistic ideas, he primarily had scientific evidence in mind.

Weber regarded the scientific sphere as the social field with the "greatest and most principled" grade of rationality and with the highest degree of evidence.[10] To him, rationality and scientific evidence were nearly identical, and he was convinced that this kind of evidence would dominate in modern societies. Indeed, over the past 100 years, the value that societies attach to scientific evidence has increased enormously, and this importance has spread from the scientific field into almost all other social fields. It has permeated the decision- and policy-making community through scientific policy advice, especially in the form of scientific expertise. All other forms of evidence have waned in value, as ways of arriving at and justifying political decisions that are held to be problem-adequate and legitimate are judged by their basis in scientific evidence.

With the diffusion of scientific evidence into nearly all social fields, the way it is understood has undergone great change. Within the scientific

field, Weber saw the quest for evidence as a *process*, and as the generation of reliable and valid scientific knowledge. In this process, the methodological criteria of science and the requirements for validity, reliability and transparency have to be followed to generate scientific knowledge for which scientific evidence is recognized. Thus, scientific evidence emerges from the process of generating scientific knowledge, which is why we call it *process evidence*. Scientific knowledge is always to be considered preliminary, which equally applies to scientific evidence. The political *use* of scientific knowledge casts it as a scientific outcome and conceives it as fact having the highest possible degree of veracity and authority. The consideration of scientific outcomes as fact legitimizes scientific knowledge becoming the basis for political decisions. This shift in understanding and use of scientific knowledge involves a switch from *process evidence* to *outcome evidence*, which draws its clarity and verifiable accuracy from the point that scientific outcomes are considered factual.

This switch has coincided with a decline in the political value and relevance accorded to other forms of knowledge for decision-making. Instead, the difference between scientific knowledge and scientific expertise has become very important. Scientific knowledge and scientific expertise are difficult to define. They will be more precisely described in the following sections. Here, however, we discuss how they are related to evidence. Scientific knowledge draws its reliability from the scientific process. Douglas Walton and Nanning Zhang define scientific knowledge "as something that is achieved through a process of marshalling in a scientific inquiry".[11] Scientific expertise is based on scientific knowledge but provides *Begründungswissen* (reasoning knowledge) from which political decisions are derived. Its evidence refers to its provision of adequate solutions for political problems. Scientific expertise ranks as the source of argumentation with both the highest degree of evidence and the highest degree of political authority and legitimacy. In the following, we describe the three modes of contestation of scientific knowledge and scientific expertise and analyze the consequences they have for the recognition of the evidence they produce.

A Critique of the Validity of Scientific Knowledge

The first mode of contesting scientific evidence involves doubting the validity and reliability of the scientific knowledge on which scientific evidence is based and hence its evidence. Indeed, there are mounting claims that scientific knowledge is simply wrong.[12] These challenges are convoluted; they essentially bark up the wrong tree by criticizing something to which science stakes no claim in the first place, at least no legitimate one. Scientific knowledge has no absolute validity; it is not 100 percent reliable, and there is certainly no assertion that it proclaims

the truth. Rather, scientific knowledge differs from most other forms of knowledge precisely in that its validity and reliability derive explicitly from the state of research at a particular moment, and it is, therefore, always subject to review. At most, one can say that scientific knowledge is only correct in a preliminary sense. It is to be regarded as a particularly reliable form of knowledge precisely because its validity and reliability are (ideally) constantly under question. Scientific scrutiny is not only about the tentative correctness of any scientific knowledge, but also about the existing and alleged gaps in knowledge and shortcomings in research. Additional gaps, it goes without saying, surface each time new knowledge appears, confirming the adage that research constantly raises more questions than it answers.[13]

The question of justified and unjustified claims of validity and reliability of scientific knowledge is a perennial focus of science studies. The question of scientific objectivity, for instance, was a concern of Max Weber's.[14] A similar question troubled both Karl Mannheim[15] and Ludwik Fleck[16], who asked whether it was possible to adopt a scientific standpoint that allows objective scientific observations. These authors came to more or less the same conclusion as Weber did, stating that such a scientific standpoint is difficult to access. Other studies of science have shown that the processes of generating knowledge are influenced by social, cultural, habitual and many other contextual factors, such as social structures, thinking styles, ethical and religious values, emotions and power, professional insecurity, as well as economic and legal restrictions.[17]

Alongside the limited validity and reliability of scientific knowledge, its context-bound nature has also provoked debate.[18] None of these limitations stand for "incorrectness", "inaccuracy" or "arbitrariness". In order to count as scientific knowledge, a study has to conform to accepted standards of scholarly work in the relevant field of science at the time. These standards include the expectation that knowledge's limited validity, reliability and its context-bound nature will be pointed out, as well as the concomitant knowledge gaps and research deficits.

The limited validity and reliability for which scientific knowledge is reproached in the first mode of contestation (meaning that it is only correct in a preliminary sense) are part of the "epistemological core" of the sciences and show therefore no deficiency.[19] Scholarliness constitutes the framework of this type of inquiry. The manner in which scientific knowledge is questioned within that framework is a key characteristic of science, and is inscribed in the field's nomos, that constitutes the specific nature of science itself and guarantees its continuation. This approach to questioning *is* the scientific process.[20]

Such questioning is intended to dispute the *correctness of* scientific knowledge, but the standards of the scientific endeavor are not rejected in principle. Of course, these standards, too, must be examined and

readjusted again and again. On that score, scientific evidence runs into no trouble at all in the first mode of contestation.[21] Following Weber, it can be said that it is a quest for evidence as a scientific process that includes perennial scientific contestation of the knowledge generated by the field. Consider an example to illustrate this nexus: If toxicological research finds higher residues of an environmental toxin, such as glyphosate, than previously, thanks to new detection methods, this result is a new scientific outcome, but it does not call into question the criteria for its scientific character. However, this shows that scientific knowledge, which serves as the basis for scientific expertise, has to meet particularly high requirements in terms of validity and reliability.

Researchers in science studies have proposed ways to improve the validity and reliability of identifying and characterizing scientific knowledge. Bruno Latour, for example, introduced the distinction between *science faite* (science made) and *science en train de se faire* (science in the making), the former being scientific knowledge that is solid, or cold, and the latter being new.[22] To Latour, "science in the making" represents new research results, which are too hot and risky to be taken as a basis for scientific expertise. In contrast, solid or cold scientific knowledge has been tested many times and in many different ways and has proven to be coherent and consistent with other bodies of knowledge, as in the context of meta-studies. An example for demonstrating the robustness of scientific knowledge by a meta-study is the famous research letter "Consensus on Consensus: A Synthesis of Consensus Estimates on Human-Caused Global Warming" written by 16 scientists who analyzed 2,412 papers on global warming.[23] They found a 97 percent consensus on global warming in the scientific articles, which represents a highly robust scientific outcome.

Contesting Evidence in the Context of the Decision- and Policy-Making Communities and Administrative Actors

Criticizing Problem Adequacy

The second mode of questioning evidence is to cast doubt on what is known as the problem adequacy of scientific expertise, that is, the ability and suitability of such expertise to address or solve a given problem in decision-making on political and administrative matters.[24] At stake is the way in which that expertise has been processed and used by decision makers.[25] The question here is not so much whether the expertise is based on knowledge that is right but whether the right expertise has been used, taking into account the fact that policymakers might disagree about roots and possible solutions of policy problems, and therefore also about the question of which expertise is most adequate to solve the problem at hand. To differentiate between scientific knowledge and scientific

expertise, we adopt the view taken by philosopher of science Philippe Roqueplo, to whom the essential difference is that scientific expertise is underpinned by a rationale (*connaissance de cause*) and thus aims less at explaining and understanding than scientific knowledge does.[26] To Roqueplo, what transforms "the utterance of scientific knowledge into expertise is its inscription within the dynamics of decision making".[27] Above all, scientific experts are obliged to answer questions posed by politicians and administrators.[28] We add another serious difference: In making the transition to scientific expertise, scientific knowledge becomes politically framed as well.

By political framing, we mean that in practice problems are processed in policy domains, each of which is characterized by different constellations of actors and conflicts, political models and a stock of institutional regulations that influence politico-administrative action,[29] though different policy domains and problems are also intertwined.[30] Often, separate and distinct administrative structures – a domain's own ministry and authority – are constituting elements of a policy domain.[31] However, policy fields cannot necessarily be clearly delineated, which is why political problems can, in principle, be assigned to different ones.

The framing of the particular problem determines the policy domain to which it is assigned, the department that is given responsibility for it, and the research field from which scientific knowledge is sought as expertise. Glyphosate, for example, can be politically framed as a problem of health, nature conservation or food. Depending on which understanding of glyphosate prevails, separate departments become responsible for obtaining scientific expertise from medicine, biodiversity research or nutrition science.

However, these sciences look at glyphosate from very different research perspectives, develop correspondingly different test criteria and detection methods and, when asked for scientific expertise, come to different conclusions on the hazards and risks of this substance. None of the procedures or criteria is scientifically more correct than another. Rather, they result from the different scientific approach that each field takes to the problem. Accordingly, the reports by scientific experts concentrate on different impacts, propose different permissible levels and usually do not arrive at unanimous and unambiguous overall assessments, some of which are even contradictory. The inconsistency of the results is therefore not due to an insufficient quality of scientific evidence, nor to its limited validity and reliability; the lack of uniformity by no means results from insufficient scientific evidence. Rather, different political frameworks bring different kinds of scientific expertise to bear, each of which specializes in different consequences.

The second mode of contestation takes place within a political framework involving various kinds of scientific expertise. As already pointed out, this form of questioning takes aim at the problem-solving adequacy

of that expertise and casts doubt on it. We distinguish three variants in challenging this adequacy and identify the transitions between the first and the second, in particular. In the first variant, proponents of counter-expertise accumulate knowledge other than that cited by the scientific expertise initially presented. In the second variant, the political framing is criticized as inappropriate. The point of the third variant is to contest the adequacy of scientific expertise in general to justify a specific political decision. These three possibilities for questioning scientific expertise are explained in more detail below. It is important to note, however, that none of them fundamentally questions the relevance of scientific expertise for decision makers. The second mode of contesting evidence is merely a dispute about whether the politically and administratively used scientific expertise is adequate for problem-solving – whether it is correctly framed politically. The third variant is a dispute of whether it is a political problem that should be "solved" on the basis of scientific expertise. This is where the insight and understanding offered by scientific expertise runs into trouble, not because it is said to be wrong, but rather because it is the wrong sort of expertise to solve the identified problem. The problem adequacy of the expertise is assessed in light of the policy problem's political framing. This juncture is where the aforementioned switch from process evidence to outcome evidence comes in, as the scientific results are assessed according to whether they provide an adequate basis for decision-making and administrative action.

Contestation through Counter-Expertise

A typical strategy by which to challenge scientific expertise is to establish scientific counter-knowledge and counter-expertise based on it. Opponents of one expertise advocate new research methods and topics, and often a completely different view of the problems. Transdisciplinary and socioecological research are examples of the creation of other modes of research not commonly found in the established sciences. Topics that have not been studied in the established sciences or that have been researched too little and, often, one-sidedly, include issues of gender, diversity and sustainability. Opponents of established research often help to draw attention to these gaps and shortcomings, by building grounded knowledge and expertise that runs counter to the mainstream.[32] For this purpose, they often establish their own scientific institutions, such as the Öko-Forschungsinstitute (Eco-Research Institutes) in Germany in the late 1970s.[33] It is not always the primary goal of these opponents to advance scientific research. Instead, the focus can also be to underpin their own political position scientifically.

In this variant of questioning, scientific expertise meets counter-expertise, but across these divides, there is widespread agreement that political and administrative decisions should rest on scientific

knowledge, and that they derive legitimacy on that basis. The dispute is over what kind of scientific knowledge is adequate for the problem-solving that forms the basis of political decisions and administrative action. Scholarliness and scientific expertise are not fundamentally criticized or rejected as tools of policy-making and administrative action. Even the arguments rooted in counter-knowledge and counter-expertise acknowledge that scientific knowledge and scientific expertise are the basis for objectively adequate, problem-solving, political and administrative decisions. The disagreement is about the evidence of the scientific knowledge used for the expertise, as it is said to arrive at results (outcomes) that may be scientifically correct, but not suitable for solving the identified political problem. The scientific knowledge used by policy- and decision makers and administrative actors is contrasted with other scientific expertise for which scientific evidence is also claimed, but which is said to be more adequate for problem-solving, and which therefore possesses a higher level of evidence.

Sticking with the example of glyphosate, the following example illustrates how contestation is expressed via counter-expertise. The European Food Safety Authority (EFSA) was commissioned to apply its scientific expertise to the prolongation of the authorization of glyphosate. Based on its own risk assessment, the EFSA proposed the renewal of the license for the pesticide to the European Commission (EC).[34] The International Agency for Research on Cancer (IARC), which is part of the World Health Organization (WHO), also assessed glyphosate. Its report came to the conclusion that glyphosate is "probably carcinogenic to humans".[35] The EFSA was asked to review the IARC report but came to the conclusion that there is no causal link to cancer. The different assessments have a number of reasons, and a particularly important one is that the EFSA and the IARC were looking at the same phenomenon from different scientific perspectives: The EFSA viewed glyphosate as a food risk and analyzed pesticide residues, whereas the IARC considered the pesticide as a health risk and examined whether it could potentially cause cancer in an organism.

Contestation through Problem-Shifting

Another typical strategy for questioning the objective adequacy of scientific expertise is problem-shifting – the denial that the problem has been properly framed, assigned to the appropriate policy domain and handed over to a suitable department, regardless of how the problem is comprehended. As a result, it is argued that scientific expertise that is suitable to solve the problem has not been used. This criticism aims at a political shift of the problem to a different policy domain and/or different department, a change that then justifies the recourse to other scientific expertise and, if necessary, buttresses one's own political position.[36] Shifting

the problem can mean basing scientific expertise on research knowledge from other sciences or other fields of research. These other scientific perspectives may arrive at considerations and assessments that diverge from the previous scientific presentation and evaluation. In the case of glyphosate, a very powerful contestation occurred by problem-shifting how harmful the pesticide is from agriculture and food policy to environmental policy, and by using biological expertise to prove how dangerous it is for biodiversity.

However, the questioning inherent in problem-shifting does not allege inadequacy of the knowledge being brought to bear, but rather of the problem's political framing. In other words, it criticizes the evidence by which the problem addressed was assigned to a particular policy domain, and by which scientific expertise was duly commissioned. In the political process, however, this remonstration is often argued as though it were about a lack of scientific evidence, though in fact this dispute is about inconsistencies between scientific expertise from different disciplines, which results from the diverse research perspectives. In this case, too, the reasoning is based on outcome evidence.

Contestation through Questioning the Ability to Solve a Specific Problem

A characteristic of the third variant of questioning evidence within the second mode is that a particular problem cannot be solved through scientific expertise alone. However, this feature in no way implies a fundamental rejection of the significance and importance of scientific expertise in the political process. As with the two other variants, it is acknowledged in principle that scientific expertise can contribute to adequate solutions to problems. The aim in this third variant of its critique is to keep scientific expertise from being used to decide politically contentious matters, or to cover them up scientifically. The main thrust of the argument is that conflicting interests and/or differing preferences give rise to the dissent.

In this variant of questioning, the criticism is that decision makers, policymakers and administrative actors should not use scientific evidence to bypass political dissent. In this case, too, scientific evidence runs into less trouble than do the decision-making, policy-making and administrative communities, which end up being confronted by divergent political views. The criticism is that political trouble is deliberately disguised or obfuscated with scientific evidence. For instance, the protest group called the Yellow Vests in France agreed with the scientific analyses that glyphosate is bad for biodiversity, and that the use of these pesticides should be reduced.[37] They protested against the scientific expertise exhibited by the French National Institute for Agriculture (INRA), which recommended that the farmers and winegrowers revert

to using weed hooks.[38] The protestors pointed out the collision of conflicting interests: Elite Parisians were talking about the end of the world, while the farmers and winegrowers who were in economic difficulty were talking about the end of the month.

Criticism of the Social Position of Science

The third mode of contestation arises from the transformation to a knowledge society, and the accompanying societal upheavals, especially socio-structural ones. It is thus not enough to simply state that such inquiry fundamentally questions the relevance of scientific knowledge and scientific expertise for political and administrative decision-making. At the same time, this mode of contestation is driven by discontent about the position science has acquired in society, and the authority it has been granted. This third mode of contesting scientific expertise opposes the idea that the adequacy of political and administrative decisions can be measured by whether existing scientific knowledge has been taken into account. Thus, it rests on an objection to what in modern societies is the typical coupling of science and politics as established through scientific expertise. It is a linkage intended to guarantee that "all accessible knowledge about the relevant subject area is used and taken into account" in decision-making, in order to arrive at appropriate and expedient solutions.[39]

The relationship is designed to give scientific knowledge priority over other ways of knowing and other forms of epistemological content. However, it certainly does not mean that this priority is always, or even predominantly, conferred in political and administrative practice. The third mode of contestation questions the direct coupling of scientific knowledge and political decision-making. The argument against this coupling is that scientific knowledge is assigned with authority and legitimates power in decision- and policy-making and administrative action, allegedly enabling scientific evidence to rule in those spheres.

In recent years, various labels have taken root in common parlance to characterize the way scientific knowledge is typically handled in the third mode of contesting scientific expertise. These include "post-truth",[40] misinformation and conspiracy theories. These labels make clear that something incorrect, false and erroneous is being disseminated. They characteristically delegitimize an argument before it is even formulated, always implying in advance that "the view thus designated is wrong".[41] Their counterpart in some places is "Trotzpositivismus",[42] which may be translated as "defiant positivism", the message of which is "for alternativeless facts, for scientific evidence, for truth in politics".[43] These extremes clearly reveal a typical fault line running through the knowledge society, as the more scientific expertise is used to explain and justify political and administrative action, the more it becomes the subject of social and political disputes.

With the validity and reliability of scientific knowledge, as well as the problem-solving adequacy of scientific expertise, which is always under scrutiny, and with scientific knowledge having no inherent claim to truth, the third mode of contesting scientific expertise encounters a sort of "institutional" doubt, which it escalates into a matter of principle. However, the accusation that science spreads untruth should not be misconstrued as denial of the validity and reliability of scientific knowledge. The reproach is instead aimed at the power of authorization that science has in the knowledge society.[44]

Previous studies on "Post-Truth"[45] and misinformation identify three main reasons for the success of the third mode of contesting scientific expertise. One of them is the special position of science in the knowledge society, which is the basis for the cultural, political and social supremacy of those who work in the field of science and speak for it to the outside world as experts: "Public dismissal of science, or public distrust of experts should be seen in the context of public discontent with authorities and elites that exert power over citizens' lives".[46] These disputes are less about the validity and reliability of scientific knowledge than about criticism of politics and society.

A second reason for the enormous success of the third mode of contesting scientific expertise seems to be that political decisions are often presented "without alternative" with reference to scientific expertise. The aim of circulating opposing "alternative facts", denouncing scientific findings as untruths, and spreading deliberately false statements of fact is less to lend them recognition and practical effectiveness than to bring about new rules of the game for public discussions.[47] Axel Freimuth argues similarly: "scientific results are often used to identify political [and other] decisions as having no alternative".[48] This viewpoint figures in Jan Söffner's analysis that such representations often come across as though there were a discourse of truth, accessible only to experts, which is encroaching on the field of political decision-making.[49] He argues that the opinion-formation that used to take place is now often supplanted by factual analysis only. Such a purely technocratic use of scientific expertise contributes to the emaciation of political and administrative processes. In the political science debate, representatives of the so-called agonistic theory of democracy criticize this use of scientific expertise and call for repoliticization in the sense of a stronger emphasis on conflict resolution within the framework of democratic processes.[50]

Increased social fragmentation and exclusion are the third reason for the success of contesting scientific expertise by challenging scientific expertise's exclusive ability to solve identified problems. The social groups affected by social fragmentation and exclusion will seek to make themselves heard by means of such questioning.[51] They feel powerless, fear downward mobility and perceive themselves as disadvantaged. They also feel exposed to pressures that are highly normative

socially and culturally. Consequently, both the public rejection of scientific knowledge and the publicly articulated mistrust of scientific experts must be understood in the context of real and perceived socio-structural discrimination.

If these three reasons correctly describe the core of the controversies, the third mode of contestation represents a dispute over the manner in which the relative positions of politics and science should be determined, and the extent to which scientific expertise should be a part of decision-making. Furthermore, this is apparently a socio-structural struggle against the way in which science and the decision-making, policy-making and administrative communities are entangled with social elites and the resulting power of authorization. It is a question of the relevance of scientific evidence to the decision-making, policy-making and administrative communities. The argument is that certain social groups seek to have the primacy of scientific evidence recognized, and that favoring this kind of evidence enables them to use their social positions to exercise power. Argumentation with scientific evidence and the coupling of science and politics is thus declared to be in the interest of certain socio-structural groups. It is not accepted as the best option for arriving at justified and effective political decisions. The causes underlying both the third mode of contesting scientific expertise and knowledge as a basis for guaranteeing appropriate consideration of political solutions extend far beyond the validity and reliability of scientific knowledge and scientific expertise.

Conclusion

Our chapter has presented a heuristic for systematically describing the different modes of questioning scientific knowledge and scientific expertise, by elaborating their causes, and discussing their consequences for the accepted reliability of scientific knowledge and expertise. As we have seen, the first mode starts from scientific knowledge and casts doubt on its certainty. However, this kind of doubt is inscribed in the understanding of scientific evidence as a methodologically conducted process oriented toward generating valid scientific knowledge in a transparent manner. According to its basic understanding, scientific results are always preliminary, and the validity and reliability of scientific knowledge are to be regarded as tentative.

In the second mode of contestation, politically and administratively produced and asserted evidence is the focus of criticism. The criticism derives primarily from the political and administrative framing of the problem, which is objected to as unsuitable for solving the policy problem at hand. This objection shows that the understanding of what is certain in the political and administrative process is not identical to what is taken to be certain or well-founded in the context of research. On the one hand, the argument is based mainly on outcome evidence,

which means to take scientific knowledge as fact, and to make it the basis for scientific expertise. On the other hand, framed evidence is used in the political and administrative process to establish legitimacy for solutions to certain problems.

The third mode of contestation denies that scientific evidence guarantees a high degree of validity and reliability. It thus rejects the coupling of scientific evidence and politico-administrative decisions. Reasoning on the basis of scientific evidence is not seen as a procedure for arriving at the most acceptable solutions, but rather as a typical means by which social elites exercise power. This development marks the end of societal consent to basing political and administrative decisions in a rational and problem-adequate way on expertise. Drawing on Max Weber, one can say that this mode of contestation breaks with society's typical quest for scientific evidence and rationality, resulting in broken evidence.

One could assume that the three forms of contestation clearly indicate that actors no longer trust the validity of scientific knowledge and scientific expertise. However, as argued above, the evidence of scientific knowledge and scientific expertise are hardly contested in the majority of cases. In contrast, we observe two phenomena in parallel: Trust and mistrust in scientific evidence. The COVID-19 pandemic serves as an instructive example. On the one hand, "hot" scientific knowledge on the virus was eagerly awaited, as well as the newly developed vaccines and the policies that rested on that hot knowledge, which were consequently applied in daily life. On the other hand, mistrust in this type of science-led policies grew. The existence of COVID-19 was denied, vaccines were believed to carry higher risks than the virus and the policies for controlling the pandemic were seen as harbingers of an autocratic turn. These forms of denial and the resulting clashes are a manifestation of socio-structural and political struggles and belong to the third form of contestation in our heuristic. These struggles are not about questioning the evidence of scientific knowledge, but rather a dispute about how political solutions come about.

Notes

1 This chapter builds on two previous publications (Eva Barlösius and Eva Ruffing, "Für einen vorausschauenden Umgang mit der Infragestellung wissenschaftlicher Expertise". Impulspapier, *Institutionelles Repositorium der Leibniz Universität Hannover*, (2020); Eva Barlösius and Eva Ruffing, "Die Infragestellung von wissenschaftlichem Wissen und Expertise: Eine sozialwissenschaftliche Heuristik", *Sonderband Leviathan* 38 (2021): 113–134). Here we analyzed the consequences of the three modes of contestation of scientific knowledge and expertise for political and administrative decision-making. The heuristic of the three forms of contestation was developed during our research project on "Scientific Expertise as Basis for Political Decision-Making", https://www.lcss.uni-hannover.de/de/forschung/unsere-forschungsprojekte/mwk-projekt-wiss-expertise/.

2 Barlösius and Ruffing, "Für einen vorausschauenden Umgang", Barlösius and Ruffing, "Infragestellung".
3 Alexander Bogner, *Die Epistemisierung des Politischen. Wie die Macht des Wissens die Demokratie gefährdet* (Stuttgart: Reclam, 2021); Mark B. Brown, Justus Lentsch, and Peter Weingart, "Representation, Expertise, and the German Parliament: A Comparison of Three Advisory Institutions", in *Democratization of Expertise? Exploring Novel Forms of Scientific Advice in Political Decision-Making*, eds. Sabine Maasen and Peter Weingart (Dordrecht: Springer, 2005), 81–100.
4 Barlösius and Ruffing, "Infragestellung".
5 Susan Haack, "Clues to the Puzzle of Scientific Evidence", *Principia* 5, no. 1–2 (2001): 253–281; Alfred Moore and Jack Stilgoe, "Experts and Anecdotes: The Role of 'Anecdotal Evidence' in Public Scientific Controversies", *Science, Technology, & Human Values* 43, no. 5 (2009): 654–677; Kent Staley, "Robust Evidence and Secure Evidence Claims", *Philosophy of Science 71*, (2004): 467–488; Douglas Walton and Nanning Zhang, "The Epistemology of Scientific Evidence", *Artificial Intelligence and Law* 21, no. 2 (2012): 173–219.
6 Karin Zachmann and Sarah Ehlers, eds., *Wissen und Begründen. Evidenz als umkämpfte Ressource in der Wissensgesellschaft* (Baden-Baden: Nomos, 2019).
7 Max Weber, *Economy and Society: An Outline of Interpretive Sociology* (Berkeley: Univ. of California Press, 1978).
8 Weber, *Economy and Society*, 5.
9 Weber, *Economy and Society*, 5.
10 Max Weber, *Essays in Sociology* (Oxford: Oxford Univ. Press, 1946).
11 Walton and Zhang, "The Epistemology of Scientific Evidence", 215.
12 Ralf Hohlfeld, Michael Harnischmacher, Elfi Heinke, Lea Lehner, and Michael Sengl, eds., *Fake News und Desinformation. Herausforderungen für die vernetzte Gesellschaft und die empirische Forschung* (Baden-Baden: Nomos, 2020).
13 Stefan Böschen, "Risikogenese. Metamorphosen von Wissen und Nicht-Wissen", *Soziale Welt* 53, no. 1 (2002): 67–85.
14 Max Weber, *Collected Methodological Writings* (London: Routledge, 2012).
15 Karl Mannheim, *Die Strukturanalyse der Erkenntnistheorie* (Berlin: Reuther & Reichard, 1922).
16 Ludwik Fleck, *Entstehung und Entwicklung einer wissenschaftlichen Tatsache. Einführung in die Lehre vom Denkstil und Denkkollektiv* (Basel: Benno Schwabe, 1935).
17 Miranda Fricker, *Epistemic Injustice: Power and the Ethics of Knowing* (Oxford: Oxford Univ. Press, 2009); Donna Haraway, *Primate Visions: Gender, Race and Nature in the World of Modern Society* (New York: Routledge, 1989); Sheila Jasanoff, *Science and Public Reason* (London: Routledge, 2012); Helen E. Longino, *Science as Social Knowledge: Values and Objectivity in Scientific Inquiry* (Princeton: Univ. Press, 1990).
18 Erin Leahey, "Overseeing Research Practice: The Case of Data Editing", *Science, Technology & Human Values* 33, no. 5 (2008): 605–630.
19 Helga Nowotny, Peter Scott, and Michael Gibbons, *Re-Thinking Science: Knowledge and the Public in an Age of Uncertainty* (Cambridge: Polity Press, 2001).
20 Pierre Bourdieu, *Science de la Science et Refléxivité* (Paris: Raison d'Agir, 2001).
21 See also the contribution of Daniel Füger and Elif Özmen in this volume.

22 Bruno Latour, *Le métier de chercheur: Regard d'un anthropologue* (Versailles: Editions Quae, 2001), 14.
23 John Cook, William R.L. Anderegg, Naomi Oreskes, J. Stuart Carlton, Peter T. Doran, Stephan Lewandowsky, Sarah A. Green et al., "Consensus on Consensus: A Synthesis of Consensus Estimates on Human-Caused Global Warming", *Environmental Research Letter* 11 (2016): 048002.
24 Brown, "Expertise"; Harry Collins, Robert Evans, and Martin Weinel, "STS as Science or Politics", *Social Studies of Science* 47, no. 4 (2017): 580–586; Max Krott and Michael Suda, eds., *Macht Wissenschaft Politik? Erfahrungen wissenschaftlicher Beratung im Politikfeld Wald und Umwelt* (Wiesbaden: VS Verlag für Sozialwissenschaften, 2007).
25 Renate Mayntz, "Speaking Truth to Power: Leitlinien für die Regelung wissenschaftlicher Politikberatung", *dms-der moderne Staat* 2, no. 1 (2009): 5–16; Frank Nullmeier, "Knowledge and Decision-Making", in Democratization of Expertise? Exploring Novel Forms of Scientific Advice in Political Decision-Making, eds. Sabine Maasen and Peter Weingart (Wiesbaden: Springer, 2005), 123–134; Coral Weiss, "The Many Meanings of Research Utilization", *Public Administration Review* 39, no. 5 (1979): 426–431.
26 Philippe Roqueplo, *Entre savoir et décision, l'expertise scientifique* (Paris: inra éditions, 1997).
27 Philippe Roqueplo, "Scientific Expertise Among Political Powers, Administrations and Public Opinion", *Science and Policy Studies* 22, no. 3 (1995): 175.
28 Roqueplo, *Entre savoir et décision*, 20.
29 Marian Döhler, *Die politische Steuerung der Verwaltung* (Baden-Baden: Nomos, 2007).
30 Brian Head and John Alford, "Wicked Problems: Implications for Public Policy and Management", *Administration & Society* 47, no. 6 (2015): 711–739.
31 Döhler, *Die politische Steuerung*.
32 Les Levidow, Kean Birch, and Theo Papaioannou, "Divergent Paradigms of European Agro-Food Innovation: The Knowledge-Based Bio-Economy (KBBE) as an R&D Agenda", *Science, Technology, & Human Values* 38, no. 1 (2012): 94–125.
33 See the chapter by Stefan Esselborn and Karin Zachmann in this book.
34 Irina Lock, "Debating Glyphosate: A Macro Perspective on the Role of Strategic Communication in Forming and Monitoring a Global Issue Arena Using Inductive Topic Modelling", *International Journal of Strategic Communication* 14, no. 4 (2020): 223–245.
35 IARC, "Some Organophosphate Insecticides and Herbicides", *Monographs on the Evaluation of Carcinogenic Risks to Humans Volume* 112 (2017), 30.
36 Michael Böcher, "Wissenschaftliche Politikberatung im politischen Prozess", in *Macht Wissenschaft Politik? Erfahrungen wissenschaftlicher Beratung im Politikfeld Wald und Umwelt*, eds. Michael Krott and Max Suda (Wiesbaden: VS Verlag für Sozialwissenschaften, 2007), 14–42.
37 "Glyphosate, comment s'en sortir?", France 2, December 13, 2018, https://www.france.tv/actualites-et-societe/magazines-d-actu/860147-glyphosate-comment-s-en-sortir.html.
38 "Usages et alternatives au glyphosate dans l'agriculture française", INRA, accessed February 7, 2022, https://www.actu-environnement.com/media/pdf/news-30183-rapport-inra-glyphosate.pdf.

39 Andreas Voßkuhle, "Sachverständige Beratung des Staates", in *Handbuch des Staatsrechts* (3rd ed.), eds. Joseph Isensee and Paul Kirchhof (Heidelberg: C. F. Müller, 2005), 425–476, own translation.
40 Vittorio Bufacchi, "Truth, Lies and Tweets: A Consensus Theory of Post-Truth", *Philosophy and Social Criticism* 47, no. 3 (2021): 347–361.
41 Michael Butter, *"Nichts ist, wie es scheint". Über Verschwörungstheorien* (Frankfurt am Main: Suhrkamp, 2020).
42 Alexander Bogner, "Glaubwürdigkeit und Dissens. Zur Mikropolitik ethischer Expertise", Lecture delivered at *Wissenschaft in der Verlässlichkeitsfalle? Praktiken der Konstruktion von Relevanz und Neutralität* Conference of the Leopoldina-Zentrum für Wissenschaftsforschung (April 11–12, 2019).
43 Peter Strohschneider, Über Wissenschaft in Zeiten des Populismus. www.dfg.de/download/pdf/dfg_im_profil/reden_stellungnahmen/2017/170704_rede_strohschneider_festveranstaltung.pdf, 2017, p. iv.
44 Gili S. Drori, John W. Meyer, and Hokyu Hwang, eds., *Globalization and Organization, World Society and Change* (Oxford: Oxford Univ. Press, 2006).
45 Lee McIntyre, *Post-Truth* (Cambridge: MIT Press, 2018).
46 Bart Penders, "Why Public Dismissal of Nutrition Science Makes Sense. Post-Truth, Public Accountability and Dietary Credibility", *British Food Journal* 120 (2018): 1956.
47 Silke van Dyk, "Krise der Faktizität? Über Wahrheit und Lüge in der Politik und die Aufgabe der Kritik", *PROKLA* 47, no. 188 (2017): 355.
48 Axel Freimuth, "Vertrauenswürdige Wissenschaft: Alternativlosigkeit, Impact und andere Verführungen", in *Vom Umgang mit Fakten. Antworten aus Natur-, Sozial- und Geisteswissenschaften,* eds. Günter von Blamberger, Axel Freimuth, and Peter Strohschneider (Paderborn: Wilhelm Fink, 2018), 104, own translation.
49 Jan Söffner, "Truth Politics: Warum wissenschaftliche Expertise und parlamentarische Demokratie gleichzeitig in die Krise geraten sein könnten", in *Vom Umgang mit Fakten. Antworten aus Natur-, Sozial- und Geisteswissenschaften*, eds. Günter von Blamberger, Axel Freimuth, and Peter Strohschneider (Paderborn: Wilhelm Fink, 2018), 138.
50 Chantal Mouffe, *Agonistics: Thinking the World Politically* (London: Verso, 2013).
51 Gordon Gauchat, "Politicization of Science in the Public Sphere: A Study of Public Trust in the United States, 1974 to 2010", *American Sociological Review* 77, no. 2 (2012): 167–187; Gordon Gauchat, "Public Views of Science-based Policy and Funding. The Political Context of Science in the United States: Public Acceptance of Evidence-based Policy and Science Funding", 94, no. 2 (2015): 723–746.

References

Barlösius, Eva, and Eva Ruffing. "Für einen vorausschauenden Umgang mit der Infragestellung wissenschaftlicher Expertise". Impulspapier, *Institutionelles Repositorium der Leibniz Universität Hannover*, 2020.

Barlösius, Eva, and Eva Ruffing, "Die Infragestellung von wissenschaftlichem Wissen und Expertise: Eine sozialwissenschaftliche Heuristik". *Sonderband Leviathan. Umstrittene Expertise* 38 (2021): 113–134.

Böcher, Michael. "Wissenschaftliche Politikberatung im politischen Prozess", In *Macht Wissenschaft Politik? Erfahrungen wissenschaftlicher Beratung im*

Politikfeld Wald und Umwelt, edited by Michael Krott, and Max Suda, 14–42. Wiesbaden: VS Verlag für Sozialwissenschaften, 2007.

Bogner, Alexander. "Glaubwürdigkeit und Dissens. Zur Mikropolitik ethischer Expertise", Lecture delivered at *Wissenschaft in der Verlässlichkeitsfalle? Praktiken der Konstruktion von Relevanz und Neutralität. Conference of the Leopoldina-Zentrum für Wissenschaftsforschung*, Halle, April 11–12, 2019.

Bogner, Alexander. *Die Epistemisierung des Politischen. Wie die Macht des Wissens die Demokratie gefährdet*. Stuttgart: Reclam, 2021.

Böschen, Stefan, "Risikogenese. Metamorphosen von Wissen und Nicht-Wissen". *Soziale Welt* 53, no. 1 (April 2002): 67–85.

Bourdieu, Pierre. *Science de la science et refléxivité*. Paris: Raison d'Agir, 2001.

Brown, Mark B. Justus Lentsch, and Peter Weingart. "Representation, Expertise, and the German Parliament: A Comparison of Three Advisory Institutions", In *Democratization of Expertise? Exploring Novel Forms of Scientific Advice in Political Decision-Making*, edited by Sabine Maasen, and Peter Weingart, 81–100. Dortrecht: Springer, 2005.

Brown, Mark B. "Expertise", In *Science and the Politics of Openness. Here be Monsters*, edited by Brigitte Nerlich, Sarah Hartley, Sujatha Raman, and Alexander Smith, 169–175. Manchester: University Press, 2018.

Bufacchi, Vittorio. "Truth, Lies and Tweets: A Consensus Theory of Post-Truth". *Philosophy and Social Criticism* 47, no. 3 (April 2021): 347–361.

Butter, Michael. *"Nichts ist, wie es scheint." Über Verschwörungstheorien*. Frankfurt am Main: Suhrkamp, 2020.

Collins, Harry, Robert Evans, and Martin Weinel. "STS as Science or Politics", *Social Studies of Science* 47, no. 4 (April 2017): 580–586.

Cook, John, William R.L. Anderegg, Naomi Oreskes, J. Stuart Carlton, Peter T. Doran, Stephan Lewandowsky, Sarah A. Green, et al., "Consensus on Consensus: A Synthesis of Consensus Estimates on Human-Caused Global Warming". *Environmental Research Letter* 11 (2016): 048002.

Döhler, Marian. *Die politische Steuerung der Verwaltung*. Baden-Baden: Nomos, 2007.

Drori, Gili S., John W. Meyer, and Hokyu Hwang, eds. *Globalization and Organization, World Society and Change*. Oxford: Oxford Univ. Press, 2006.

Ehlers, Sarah, and Karin Zachmann. "Wissen und Begründen. Evidenz als umkämpfte Ressource in der Wissensgesellschaft". In *Wissen und Begründen. Evidenz als umkämpfte Ressource in der Wissensgesellschaft*, edited by Karin Zachmann, and Sarah Ehlers, 9–29. Baden-Baden: Nomos, 2019.

Fleck, Ludwik. *Entstehung und Entwicklung einer wissenschaftlichen Tatsache. Einführung in die Lehre vom Denkstil und Denkkollektiv*. Basel: Benno Schwabe, 1935.

France 2, "*Envoyé spécial, soirée spéciale 'Glyphosate, comment s'en sortir?'*", December 13, 2018. Paris: 118 minutes. https://www.france.tv/actualites-et-societe/magazines-d-actu/860147-glyphosate-comment-s-en-sortir.html.

Freimuth, Axel. "Vertrauenswürdige Wissenschaft: Alternativlosigkeit, Impact und andere Verführungen", In *Vom Umgang mit Fakten. Antworten aus Natur-, Sozial- und Geisteswissenschaften*, edited by Günter von Blamberger, Axel Freimuth, and Peter Strohschneider, 99–110. Paderborn: Wilhelm Fink, 2018.

Fricker, Miranda. *Epistemic Injustice: Power and the Ethics of Knowing*. Oxford: Oxford Univ. Press, 2009.

Gauchat, Gordon. "Politicization of Science in the Public Sphere: A Study of Public Trust in the United States, 1974 to 2010". *American Sociological Review* 77, no. 2 (April 2012): 167–187.

Gauchat, Gordon. "Public Views of Science-Based Policy and Funding. The Political Context of Science in the United States: Public Acceptance of Evidence-Based Policy and Science Funding". *Social Forces* 94, no. 2 (April 2015): 723–746.

Haack, Susan, "Clues to the Puzzle of Scientific Evidence". *Principia* 5, no. 1–2 (April 2001): 253–281.

Haraway, Donna. *Primate Visions: Gender, Race and Nature in the World of Modern Society*. London: Routledge and Kegan Paul, 1989.

Head, Brian, and John Alford, "Wicked Problems: Implications for Public Policy and Management". *Administration & Society* 47, no. 6 (April 2015): 711–739.

Hohlfeld, Ralf, Michael Harnischmacher, Elfi Heinke, Lea Lehner, and Michael Sengl, eds. *Fake News und Desinformation. Herausforderungen für die vernetzte Gesellschaft und die empirische Forschung*. Baden-Baden: Nomos, 2020.

IARC, "Some Organophosphate Insecticides and Herbicides", Monographs on the Evaluation of Carcinogenic Risks to Humans *Volume* 112, 2017. https://monographs.iarc.who.int/wp-content/uploads/2018/07/mono112.pdf.

INRA. "Usages et alternatives au glyphosate dans l'agriculture française". Rapport 2017. Paris, 2017.

Jasanoff, Sheila. *Science and Public Reason*. London: Routledge, 2012.

Krott, Max, and Michael Suda, eds. *Macht Wissenschaft Politik? Erfahrungen wissenschaftlicher Beratung im Politikfeld Wald und Umwelt*. Wiesbaden: VS Verlag für Sozialwissenschaften, 2007.

Latour, Bruno. *Le métier de chercheur: Regard d'un anthropologue*. Versailles: Editions Quae, 2001.

Leahey, Erin. "Overseeing Research Practice: The Case of Data Editing". *Science, Technology & Human Values* 33, no. 5 (April 2008): 605–630.

Levidow, Les, Kean Birch, and Theo Papaioannou. "Divergent Paradigms of European Agro-Food Innovation: The Knowledge-Based Bio-Economy (KBBE) as an R&D Agenda". *Science, Technology, & Human Values* 38, no. 1 (April 2012): 94–125.

Longino, Helen E. *Science as Social Knowledge: Values and Objectivity in Scientific Inquiry*. Princeton, New Jersey: Princeton Univ. Press, 1990.

Lock, Irina. "Debating Glyphosate: A Macro Perspective on the Role of Strategic Communication in Forming and Monitoring. A Global Issue Arena Using Inductive Topic Modelling". *International Journal of Strategic Communication* 14, no. 4 (April 2020): 223–245.

Mannheim, Karl. *Die Strukturanalyse der Erkenntnistheorie*. Berlin: Reuther & Reichard, 1922.

Mayntz, Renate. "Speaking Truth to Power: Leitlinien für die Regelung wissenschaftlicher Politikberatung". *dms—der moderne Staat* 2, no. 1 (April 2009): 5–16.

McIntyre, Lee. *Post-Truth*. Cambridge: MIT Press, 2018.

Moore, Alfred, and Jack Stilgoe. "Experts and Anecdotes: The Role of 'Anecdotal Evidence' in Public Scientific Controversies". *Science, Technology, & Human Values* 43, no. 5 (April 2009): 654–677.

Mouffe, Chantal. *Agonistics: Thinking the World Politically*. London: Verso, 2013.

Nowotny, Helga, Peter Scott, and Michael Gibbons. *Re-Thinking Science: Knowledge and the Public in an Age of Uncertainty*. Cambridge: Polity Press, 2001.

Nullmeier, Frank. "Knowledge and Decision-Making", In *Democratization of Expertise? Exploring Novel Forms of Scientific Advice in Political Decision-Making*, edited by Sabine Maasen and Peter Weingart, 123–134. Wiesbaden: Springer, 2005.

Penders, Bart. "Why Public Dismissal of Nutrition Science Makes Sense. Post-Truth, Public Accountability and Dietary Credibility". *British Food Journal* 120 (2018): 1953–1964.

Roqueplo, Philippe. *Entre savoir et décision, l'expertise scientifique*. Paris: inra éditions, 1997.

Roqueplo, Philippe. "Scientific Expertise Among Political Powers, Administrations and Public Opinion". *Science and Policy Studies* 22, no. 3 (April 1995): 175–182.

Söffner, Jan. "Truth Politics: Warum wissenschaftliche Expertise und parlamentarische Demokratie gleichzeitig in die Krise geraten sein könnten", In *Vom Umgang mit Fakten. Antworten aus Natur-, Sozial- und Geisteswissenschaften*, edited by Günter von Blamberger, Axel Freimuth, and Peter Strohschneider, 131–142. Paderborn: Wilhelm Fink, 2018.

Staley, Kent. "Robust Evidence and Secure Evidence Claims". *Philosophy of Science* 71 (2004): 467–488.

Van Dyk, Silke. "Krise der Faktizität? Über Wahrheit und Lüge in der Politik und die Aufgabe der Kritik". *PROKLA* 47, no. 188 (April 2017): 347–367.

Voßkuhle, Andreas. "Sachverständige Beratung des Staates", In *Handbuch des Staatsrechts* (3rd ed.), edited by Joseph Isensee and Paul Kirchhof, 425–476. Heidelberg: C.F. Müller, 2005.

Walton, Douglas, and Nanning Zhang. "The Epistemology of Scientific Evidence". *Artificial Intelligence and Law* 21, no. 2 (April 2012): 173–219.

Weber, Max. *Collected Methodological Writings*, edited by Hans Henrik Bruun and Sam Whimster. London: Routledge, 2012 (Original work published 1904).

Weber, Max. *Essays in Sociology*, translated, edited and with an introduction by H. H. Gerth, and C. Wright Mills. Oxford: Univ. Press, 1946.

Weber, Max. *Economy and Society: An Outline of Interpretive Sociology*. Berkeley: University of California Press, 1978.

Weiss, Carol. "The Many Meanings of Research Utilization". *Public Administration Review* 39, no. 5 (April 1979): 426–431.

Zachmann, Karin, and Sarah Ehlers, eds. *Wissen und Begründen. Evidenz als umkämpfte Ressource in der Wissensgesellschaft*. Baden-Baden: Nomos, 2019.

Taylor & Francis
Taylor & Francis Group
http://taylorandfrancis.com