

Between Positivism and Relativism

In her seminal work *Risk and Rationality* (1991), Shrader-Frechette introduced the terms *naïve positivism* and *cultural relativism*¹ for setting the scene for the risk debate: ‘In the debate over what methodological norms, if any, guarantee the rationality of risk evaluation, analysts are arrayed on a spectrum extending from the relativists to the naïve positivists (Shrader-Frechette 1991, p. 8)’. Shrader-Frechette described the two antithetic poles as follows:

At the left end of the spectrum are the cultural relativists, such as anthropologist Mary Douglas and political scientist Aaron Wildavsky. They believe that ‘risks are social constructs,’ that ‘any form of life can be justified.... no one is to say that any one is better or worse,’ that there is ‘no correct description of the right behavior [regarding risk],’ and therefore that the third stage of risk assessment, risk evaluation, is wholly relative. At the other, naïve-positivists, end of the spectrum are engineers such as Chauncey Starr and Christopher Whipple. They maintain that risk evaluation is objective in the sense that *different* risks may be evaluated according to the *same* rule – for example, a rule stipulating that risks below a certain level of probability are insignificant. They also claim that risk assessment, at least at the stage of calculating probabilities associated with harms and estimating their effects, is completely objective, neutral, and value free. (Shrader-Frechette 1991, p. 8)

Naïve positivist, Shrader-Frechette explained, only trust in facts and empirical confirmability. They believe that facts, and only facts, are neutral and objective. The trust in facts, in turn, makes naïve positivist believe that

the factual stages of risk assessment, i.e. hazard identification and risk estimation, ‘can be wholly objective and value free’. The overemphasis of facts over value judgements makes naïve positivists believe ‘that risk estimates can completely exclude normative (ethical and methodological) components’ (Shrader-Frechette 1991, p. 39). Shrader-Frechette termed the naïve positivists’ belief in objective and allegedly ‘neutral’ facts as the ‘principle of complete neutrality’ (Shrader-Frechette 1991, p. 39). As the root of naïve positivists’ obsession with facts and neutrality, Shrader-Frechette identified the fact–value dichotomy:

Perhaps many risk assessors and scientists have erroneously believed that it is possible to make value-free, confirmed judgments, about either risks or science, because they subscribe to an extreme form of the fact-value dichotomy, a famous tenet of naïve positivism. This is the belief that facts and values are completely separable, and that there are facts that include no value judgments. Applied to hazard assessment, this claim is that risk analysis ought to consist of *factual* and neutral risk estimates, although the policy decision made as a consequence of them may be *evaluative*. (Shrader-Frechette 1991, p. 43)

Albeit questioning whether complete objectivity is achievable, Shrader-Frechette admitted that ‘the traditional positivist motivation behind belief in the fact–value dichotomy is a noble and important one’ (Shrader-Frechette 1991, p. 43). Shrader-Frechette acknowledged that value-free observations, ‘if they existed, would guarantee the objectivity of one’s research (Shrader-Frechette 1991, p. 44)’.² The problem of the naïve positivists’ approach, however, is that risk assessments are typically applied in situations where factual information is either incomplete or under conditions of scientific uncertainty: in cases where all possible outcomes of an activity, as well as the probability of each outcome would be known, obviously there would be no need for risk estimates. With a view on the problem of insufficient scientific information and ‘probabilistic uncertainty’, Shrader-Frechette noted:

As witness of this uncertainty, the current technological landscape is littered with the bodies of victims of various hazards. From Chernobyl to Bhopal, there are victims of risks that experts allegedly measured objectively, catastrophes that were not supposed to happen. (Shrader-Frechette 1991, p. 30)³

Turning to the other end of the epistemological spectrum, Shrader-Frechette observed that cultural relativism, in contrast to naïve positivism,

tends to overemphasise value judgements.⁴ With regard to risk assessment, these observations translated into the finding that positivists overemphasise the ‘objective’ first two steps of risk assessment, i.e. hazard identification and hazard estimation, whereas relativists overemphasise the following, ‘subjective’ step of risk assessment, i.e. risk evaluation.⁵

The starting point of the critique of cultural relativists is what Shrader-Frechette called ‘an astute (although not original) insight (Shrader-Frechette 1991, p. 31)’. The relativists’ insight consisted of recognising the impossibility to achieve wholly objective, i.e. value-free risk evaluations. As a consequence, relativists criticised ‘[risk] assessors for their repeated error in assuming that lay estimates of risk are mere “perceptions” whereas expert analyses are “objective” (Shrader-Frechette 1991, p. 31)’. And Shrader-Frechette conceded that ‘the cultural relativists are correct in affirming that engineers and housewives both employ value judgments, especially in evaluating risk acceptability’ (Shrader-Frechette 1991, p. 31).⁶ From that insight, cultural relativists conclude that ‘any judgement of risk evaluation is merely a social construct (Shrader-Frechette 1991, p. 31)’.

Shrader-Frechette’s review⁷ of considerations developed and employed by various risk relativists provided a set of five main relativist arguments. Following Shrader-Frechette, these five main arguments put forward by risk relativist are the following [Shrader-Frechette 1991, pp. 31–32, start citation]:

1. Increased knowledge and additional reasoning about risks do not make people more rational about hazards.
2. Risk assessments are like judgments in aesthetics.
3. “Any form of life,” including risk behavior and attitudes, “can be justified,” since all people—including experts who disagree about hazard analysis—are biased in their perceptions of danger.
4. Modern persons are no different from “primitives” (Douglas and Wildavsky’s term) in that social structures dictate their views on, and responses to, alleged hazards.
5. More specifically, environmentalists’ views on risk are a result of their “sectarian problems” [citation end].

Albeit environmental issues, as addressed in Point 5 above, were a major point in Shrader-Frechette’s *Risk and Rationality*,⁸ they are factored out in the following, thus providing room for an analysis of relativist arguments in general. Bare from contemporary political context, the four remaining

arguments of relativists are considered as general expressions of relativism and not only targeted on laypersons in the USA. For generalising the four remaining relativist arguments properly, they are rewritten and commented as follows:

1. Increased knowledge and additional reasoning about risks do not make people more rational about hazards.
 - In other words, people are unreceptive to scientific explanation. This means that relativists consider the knowledge gap between scientific experts and the public as unbridgeable (public–expert divide).
2. Risk assessments are like judgments in aesthetics.
 - In other words, risk assessment is rather an art than science. Argument (2) is an expression of epistemological subjectivity.
3. ‘Any form of life’, including risk behaviour and attitudes, ‘can be justified’, since all people—including experts who disagree with hazard analysis—are biased in their perceptions of danger.
 - In other words, there is neither right or wrong, nor correct or incorrect, in risk assessment. Argument (3) expresses the notion of epistemological relativism.
4. Modern persons are no different from ‘primitives’ (Douglas and Wildavsky’s term) in that social structures dictate their views on, and responses to, alleged hazards.
 - Douglas and Wildavsky argue that the views on hazards of ‘modern persons’ and ‘primitives’ alike are shaped by respective social structures. It has to be noted that Douglas and Wildavsky have equated ‘modern persons’ with ‘primitives’ only in the way their views on hazards are shaped. Because the observation of Douglas and Wildavsky only makes sense under the assumption that these social structures are different, i.e. not equal, argument (4) can be termed culturalist. Furthermore, because social structures are embedded in particular contexts, e.g. linguistic and geographic contexts, argument (4) is also an expression of contextualism.

Hence, the relativist approach to risk and risk assessment, as observed by Shrader-Frechette, can be summarised as follows: consent over risk and risk assessment is impossible because knowledge gaps between experts and the

public are unbridgeable (argument 1) and the assessment of risk is inevitably subjective and relative to the assessor and contingent upon social and cultural context (arguments 2–4).

In today's post-ideological times, the antagonism between positivism and relativism is barely made explicit. More likely, the gap between the two world views is expressed as an inclination or affiliation to a more 'realist' or 'rationalist' approach, on the one hand, or to a more 'sociologist' or 'historical' approach, on the other hand. Before proceeding to the specific questions about epistemological problems with respect to risk, it may be helpful to shed some light on expressions of the positivism–relativism distinction commonly used today.

In this perspective, Philip Kitcher discerned between a 'realist-rationalist cluster', on the one hand, and a 'socio-historical cluster', on the other hand. According to Kitcher, the 'realist-rationalist cluster' is characterised by the following features (Kitcher 1998, pp. 34–35, start citation):

1. In the most prominent areas of science, the research is progressive, and this progressive character is manifest in increased powers of prediction and intervention.
2. Those increased powers of prediction and intervention give it the right to claim that the kinds of entities described in scientific research exist independently of our theorizing about them and that many of our descriptions are approximately correct.
3. Nonetheless, our claims are vulnerable to future refutation. We have the right to claim that our representations of nature are roughly correct while acknowledging that we may have to revise them tomorrow.
4. Typically our views in the most prominent areas of science rest upon evidence, and disputes are settled by appeal to canons of reason and evidence.
5. Those canons of reason and evidence also progress with time as we discover not only more about the world but also more about how to learn about the world [citation end].

On the other hand, the 'socio-historical cluster' was characterised by Kitcher by outlining the following points (Kitcher 1998, p. 36, start citation):

1. Science is done by human beings, that is, by cognitively limited beings who live in social groups with complicated structures and long histories.
2. No scientist ever comes to a laboratory or the field without categories and preconceptions that have been shaped by the prior history of the group to which he or she belongs.
3. The social structures present within science affect the way in which research is transmitted and received, and this can have an impact on intratheoretical debates.
4. The social structures in which science is embedded affect the kinds of questions that are taken to be most significant and, sometimes, the answers that are proposed and accepted [citation end].

However, regardless of respective labels, divisions between ‘realist’ and ‘rationalist’ approaches, on the one hand, and ‘sociologist’ or ‘historical’ approaches, on the other hand, are the result of a more fundamental schism. In essence, the conflict revolved around the question what should follow in the footsteps of religious explanations of human life; science or philosophy, positivism or historicism? As long as religious, *i.e.* metaphysical explanations prevailed, inconsistencies between scientific evidence and religious beliefs could be bridged.⁹ However, as soon as science began to emancipate from religion, new approaches to the old question about the meaning of life were required. Muhsin Mahdi described the challenged represented by new scientific disciplines as ‘the difficulty that emerged in the study of man and society as a result of the emancipation of philosophically neutral physics and chemistry (Mahdi 1996, p. 1038)’.

Challenged by the emancipation of science, one approach consisted in refraining from explanation and interpretation. Hence, that approach resulted in a separation of scientific activities from corresponding interpretation and valuation. Such attempts are usually subsumed under the generic term of ‘positivism.’ Muhsin Mahdi explained:

Positivism resolves this difficulty [i.e. the emancipation of science] by means of a science of man and society that is philosophically neutral regarding values or judgements of value, the things about which people have disagreed and will continue to disagree. Facts, on the other hand, are thought to be things about which people could agree regardless of their judgments of value. (Mahdi 1996, p. 1038)

The other approach for answering fundamental question was to integrate new scientific discoveries into respective actual context. The generic term for such attempts is historicism, contextualism, or relativism. Muhsin Mahdi described historicism as an approach realising that ‘the hope for agreement regarding facts is illusory: one needs a science that recognizes the fact of unresolvable disagreement regarding facts as well (Mahdi 1996, p. 1039)’. As its name indicates, the scientific method selected by historicism is the science of history. With regard to the historical scientific method, Muhsin Mahdi noted the following:

As regards judgements of value, this science [i.e. history] will overcome disagreements regarding them not by asserting that they cannot be understood as judgments of value but by a peculiar understanding of these judgments of value: by understanding them as relative to comprehensive views and by understanding that these comprehensive views change and differ from one period to another or one culture to another. (Mahdi 1996, p. 1039)

With a view on the focus of the study at hand, the crucial difference between positivism and historicism is the respective approach towards facts and values: whereas the hallmark of positivism is the distinction between facts and values, historicism rejects that distinction:

... [H]istoricism rejects the distinction between facts and values because it believes that both depend on a comprehensive view or a world view (a *Weltanschauung*) that changes from one society to another and from one period to another. By limiting itself to the study of facts and relations between facts, positivism sticks to part of the surface, as it were, and is not able to penetrate to the origin of these manifestations, which can be properly understood only as manifestations of the comprehensive view that underlies them. These manifestations include values, what people think or believe to be good or true or beautiful, and the articulation of these thoughts in science and art. (Mahdi 1996, p. 1038)¹⁰

Turning to risk as an epistemological phenomenon specifically, the antagonism between positivist and relativist concepts may take various forms, terms and expressions. Although applying different terms, several authors have depicted the phenomenon of risk from an antithetic perspective. Ulrich Beck, for example, used the terms *realism* and *constructivism* for referring to the epistemological debate (Beck 2005, pp. 23–26).

Ulrich Beck traced the epistemological realism–constructivism dichotomy back to two distinguished types of science. Beck observed:

In this context it is useful to distinguish two types of science which are beginning to diverge in the civilization of threat. On the one hand, there is the old, flourishing laboratory science, which penetrates and opens up the world mathematically and technically but devoid of experience and encapsulated in a myth of precision; on the other, there is a public discursivity of experience which brings objectives and means, constraints and methods, controversially into view. Both types have their particular perspective, shortcomings, constraints and methods. Laboratory science is systematically more or less blind to the consequences which accompany and threaten its successes. The public discussion – and illustration – of threats, on the other hand, is related to everyday life, drenched with experience and plays with cultural symbols. It is also media-dependent, manipulable, sometimes hysterical and in any case devoid of a laboratory, dependent in that sense upon research and argumentation, so that it needs an accompanying science (classical task of the universities). It is thus based more on a kind of science of questions than on one of answers. It can also subject objectives and norms to a public test in the purgatory of oppositional opinion, and in just this way it can stir up repressed doubts, which are chronically excluded in standard science, with its blindness to threats and consequences. (Beck 1994, pp. 30–31)

On these grounds, Beck doubted whether experts—torn between the positivism of their professional background and the relativism of societies’ expectations—are able to deliver unbiased outcomes. Beck explained, taking into account societal interdependencies: ‘In risk issues, no one is an expert, or everyone is an expert, because the experts presume what they are supposed to make possible and produce: cultural acceptance [of risk] (Beck 1994, p. 9)’.

The perception of two types of science goes back to the Greek distinction between *techné* or *epistémē*, on the one hand, and *phronesis*, on the other hand. Whereas the former is said to be ‘represented by the laboratory science’, the latter is said to be ‘based on common sense-based science befitting the “real world where people live and work and die” (Cho 2010)’.¹¹ Hence, the distinction between abstract laboratory sciences and contextualised common-sense approaches has a long tradition. In this respect, Sungjoon Cho observed:

In everyday lives, scientific inquiries, particularly those related to health risks, tend to connote a certain “truth” claim: for example, “hormone-treated beef

is unsafe to consume,” or in a more radicalized form “we may get cancer if we eat a hormone-treated beef.” As discussed above, the conventional (mainstream) science tackles these inquiries through a sophisticated set of “methodologies” which positivistic scientific knowledge produces after rigorous scientific investigation. Therefore, according to this conventional standpoint being scientific means being “objective” and “universal.” Under this rubric, what science means in the United States should be the same as in Europe. (Cho 2010)

Having related positivist scientific approaches to *techné* or *epistémè*, Sungjoon Cho associated contextualising and historicizing approaches such as Gadamer’s hermeneutics with *phronesis*:

However, philosophers have long challenged this positivistic lab scientism. Edmund Husserl famously criticized this version of modern science as a “mathematization of nature” which is arguably detached from our real life, that is to say, “lifeworld” (*Lebenswelt*). Following Husserl’s tradition, Hans-Georg Gadamer objected to the conventional premise that an exhaustible scientific “method” is an exclusive avenue to a truth claim. According to Gadamer, this version of science is nothing more than the “paradigmatic expression of the condition that gave rise to epistemology” or even the “naïveté of an ontology of the world based on the objectivism of mathematical natural science.” According to Gadamer, the lifeworld is an “intuitively given world” amid ever streaming horizons and has a “finite, structure-relative” arrangement yet with “indeterminate open horizons.” In contrast, the world of science holds the “symbolic givenness of a logical substruction that can no more be given by itself than infinite series of numbers.” While “objective science may be a factor in our own lifeworld,” it can only be understood by “historical exploration of its origin and its limits of validity”. (Cho 2010)

The concept of ‘lifeworld’ (*Lebenswelt*) and Gadamer’s hermeneutics may help to shed light on a crucial divide within risk assessment concepts. On the one hand, there are approaches aiming at separating facts from values in risk assessment, basing on the premise that science can be neutral, context-free and carried out without any prejudice. On the other hand, opposing voices argue that any kind of human knowledge is inevitably embedded in the human ‘lifeworld’:

In sum, Gadamer’s hermeneutics accuse scientific positivism, the pedigree of which might be traced back to August Comte, of a self-fulfilling prophesy

gravely detached from the lifeworld. According to Gadamer, those presuppositions or prejudices, which constitute our lifeworld or tradition (history), are in fact necessary for us to unearth the truth, including the scientific truth, from those texts or phenomena before us. They never distract or prevent us from getting to the truth. (Cho 2010)

From a legal perspective, antagonistic world views can be found, for instance, in different theories of administrative constitutionalism. In this respect, Elizabeth Fisher contrasted a rational-instrumental with a deliberative-constitutive paradigm of administrative constitutionalism. The rational-instrumental paradigm of administrative constitutionalism, on the one hand, is based on a rather instrumental or functional understanding of public administration. In particular, Fisher observed that the rational-instrumental paradigm of administrative constitutionalism

... construes public administration to be an 'instrument' of the legislature – a 'robot' or 'transmission belt' whose task is strictly to obey the preordained democratic will (as expressed in legislation) and to act effectively and efficiently. Its discretion is to be constrained as much as possible, and ideally by an analytical methodology (such as risk assessment or cost/benefit analysis) which ensures that administration applies the facts to the legislative mandate in as accurate a way as possible. (Fisher 2006, p. 335)

Hence, the rational-instrumental paradigm of administrative constitutionalism addresses risk as 'objective and quantifiable and the problems of complexity, uncertainty and socio-political ambiguity as largely manageable (Fisher 2006, p. 337)'.

On the other hand, the deliberative-constitutive paradigm of administrative constitutionalism promotes

... a model of public administration that is designed to address the complexities of risk problems by understanding public administration as being constituted by the legislature so as to wield substantial and continuing problem-solving discretion in relation to particular issues. This exercise of discretion is wide ranging and the nature and exercise of this discretion will vary depending on the specific problem. Tools such as risk assessment may have a role to play, but their legitimacy is not guaranteed, and, in every circumstance, the quality and veracity of scientific knowledge must be assessed. Likewise, a significant role is recognised for deliberation, in that the process of considering the different factors involved in a decision will

produce a result which is greater than the sum of these factors. (Fisher 2006, pp. 335–336)

Thus, the deliberative-constitutive paradigm of administrative constitutionalism considers risks as inherently ‘complex socio-political disputes in which complexity, uncertainty and socio-political ambiguity dominate’ (Fisher 2006, p. 337).

Tomas Hellström applied the terms *objectivism* and *constructivism/contextualism* for describing antagonistic approaches towards risk (Hellström 1998, pp. 4–6). In the scope of the study at hand, the terms objectivism and constructivism/contextualism are used tantamount to the terms introduced by Shrader-Frechette, i.e. positivism and relativism.

A basic distinction between the two concepts of risks relates to the dimensions against which risks are assessed. Objectivist concepts of risk, which encompass technical risk analysis in general and food safety risk analysis in particular, are typically assessing risks against only one dimension. Hellström pointed at the following examples of risk dimensions: (i) risk may be presented as the probability of harm (‘risk of exposure’); or (ii) risk may be presented as a consequence (‘the risk from smoking’); or (iii) risk may be presented as describing a dangerous situation (‘a hazardous waste plant creates a risk’). Hellström noted that ‘[a] statement of risk based on only one of these aspects (e.g. probability of occurrence) has been referred to as a one-dimensional concept of risk’. Hellström contrasted such one-dimensional concepts of risk to multidimensional approaches which are typically found in environmental risk assessment (Hellström 1998, p. 7). Whereas one-dimensional risk concepts were related to objectivist approaches, including technical and toxicological risk analysis, Hellström seemed to connoted multidimensional concepts of risk to constructivist and contextualist approaches.

Objectivists presume that there is a ‘true and real risk’ which can be expressed in one single number and to which, finally, everybody must agree by virtue of rational arguments.¹² The perception of scientifically ascertainable risks as generally acknowledged facts introduces a notion of universalism into the objectivist risk concept. A proponent of scientific universalism and the belief in the universal validity of scientific principles was Robert Merton. Merton’s emphasis on universalism as a determining ‘norm’ of science is based on a distinction between internal and external factors. Whereas internal factors have to follow certain methodological standards, external factors should be kept out of the realm of scientific

activity.¹³ Particularly scholars with an interest in the history and philosophy of science, such as Toulmin, Duhem and von Helmholtz, have criticised Merton's distinction between internal and external factors.¹⁴ From a broader perspective, Tracey Epps summarised criticism on Merton's concept as follows:

Merton's ideas are useful in summarizing familiar characteristics of science. Nevertheless, they have been subject to much criticism and the perception of science as objective and neutral is far from being universally accepted. Instead, it is subject to challenge both in academia, and in the wider world. The academic challenge focuses on whether objective knowledge is possible and the extent to which science is socially constructed. In the wider world, the challenge focuses more on the actual use of science in different contexts, including in regulatory decision-making. (Epps 2008, p. 148)

Volker Böhnigk (1999) explained that Merton's insistence of science as an 'aseptic' endeavour is based on an understanding of science as a purely rational endeavour and scientists as *rationalistic* machines. In a rationalistic mindset, Böhnigk argued, science is perceived as an authoritative set of norms and criteria, such as universal validity, neutrality and the idea of the unity of all sciences. For a perception of science as a discipline based on an authoritative canon of abstract norms, Böhnigk (1999, p. 16) used the term *objectivism*.¹⁵

With regard to risk theory, in particular, Hellström referred to the 'objectivist orientation' as 'those practices within risk research that treat risk as a measurable physical attribute (Hellström 1998, p. 11)'. Hellström further discerned between approaches focusing on one measurable attribute and others taking into account varieties of factors. Examples for the former are financial, actuarial and health risk analyses, focusing on the probability of occurrence of a loss or a health risk. Objectivist approaches focusing on one single aspect (e.g. probability of occurrence) are called *one-dimensional* risk concepts (Hellström 1998, p. 7). On the other hand, there are *multidimensional* concepts of risk, in particular, environmental risk assessments. Albeit multidimensional risk concepts are integrating a variety of factors, objectivist approaches to environmental risk assessments are inclined to physical attributes amenable to probability calculations.

The objectivist approach towards risk was deconstructed by the school of the constructivists, or contextualists. The constructivists pointed at the fact that risk, by definition of the objectivists themselves, is not real, but the

product of a probability prediction in relation to the severity of the issue at stake.¹⁶ However, predictions of future events and the idea of probability itself are, by definition, not a matter of universal truth or ‘reality’, but the product of human presumptions. Instead, the constructivists perceived risk as a social construct, emphasising its social context.¹⁷ The constructivists observe that risk, as a function of probability considerations, is contingent upon the perspective of the person and its social context; risk is never an absolute number, but relative to the circumstances and the people involved.¹⁸

Hellström also noted some common features with approaches putting forward a so-called objective–perceived risk dichotomy. Particularly popular among technocrats criticising ‘subjective biases of laypersons’, the objective–perceived risk dichotomy is based on the assumption that ‘irrational emotional factors enormously multiply public judgments of the scale of some objective risks, such as nuclear power, while reducing the scale of others, such as car accidents’.¹⁹

Hellström pointed out three categories of objectivist approaches to risk: (a) technical approaches, (b) economic approaches and (c) psychometric approaches. Technical approaches towards risk are intended to measure and forecast probabilities of system failure and accidents. Under the term technical approaches, Hellström subsumed (i) actuarial analysis, (ii) toxicological/epidemiological analysis and (iii) probabilistic risk assessments (Hellström 1998, p. 12). Hence, toxicological and food safety risk analysis belongs to the cluster of technical approaches.

The focus of toxicological and epidemiological risk analysis is on the causality between hazards and risks. Hellström explained: ‘Through toxicological (e.g. animal experimentation) and epidemiological (e.g. quasi-experimental comparison between exposed and non-exposed populations) causal agents are isolated from intervening variables to produce a risk characterization (Hellström 1998, p. 12)’.

Hellström (1998, p. 10) provided the following overview over the objectivist/constructivist divide (Table 1):

Shrader-Frechette (1991, pp. 8 and 9) herself adopted some sort of ‘middle position’ between the cultural relativists and the naïve positivists which she called ‘scientific proceduralism’.²⁰ Her aim was to show ‘how risk evaluation (the third stage of [risk] assessment) can be rational and objective, even though there are not completely value-free rules applicable to every risk-evaluation situation’. To this purpose, Shrader-Frechette

Table 1 Objectivism-Constructivism

	<i>Objectivism</i>	<i>Constructivism-contextualism</i>
View of science	Instrumentalist, essentially truthseeking, natural science oriented, experimental, demarcationist, analytical reduction in defining the research object	Critical function, socially contingent, socially responsible, anti-reductionist in its attempt to expand a research problem outwards and upwards rather than narrowing them down
View of reality	Realist, essentialist, focus on the explanatory properties of representation of the causal structure of the world. Causalist, mechanistic	Images of reality are viewed as essentially contingent on social and cultural factors. Organismic types of explanatory factors are sought in human actions as derived from imageries and social perceptions
Ethos	Strives to emancipate humans from nature. Ethos is procedural scientific and instrumentalist	Strives to emancipate humans from social and political control, in some cases predicated on the assumption that the human condition is essentially one divorced from nature

articulated in ‘why and how both the cultural relativists and the naive positivists err in their general accounts of risk evaluation’.²¹

NOTES

1. It has to be noted that terms may vary. Ian Holland and Aynsley Kellow, for instance, are using the terms ‘Reductionism’ and ‘Constructivism’ for describing similar epistemological variances (see Ian Holland and Aynsley Kellow, ‘Trade and risk management: exploring the issues’, in David Robertson and Aynsley Kellow, *Globalization and the Environment. Risk Assessment and the WTO* (Edward Elgar 2001), pp. 235–239).
2. In contrast to naïve positivists, however, Shrader-Frechette was of the view that both facts and values are forming human perception of reality. In particular, Shrader-Frechette considered that values are indispensable components for the development of scientific theory: ‘A great many philosophers of science (myself included) maintain that both our values and the action of the external world on our senses are responsible for our perceptions, observations, and facts. Even though facts are value laden, we still may have a sufficient reason for accepting one theory over another. Conceptual and logical reasons also ground theory choice and hence objectivity. One theory may have more explanatory or predictive power, or unify more facts, for example (Shrader-Frechette 1991, p. 44)’.

3. Shrader-Frechette discerned between *risk* and (*probabilistic*) *uncertainty*. In situations of risk, probabilities of given outcomes are known, whereas in situations of uncertainty, probabilities of given outcomes are unknown.
4. Considering arguments of cultural relativists, Shrader-Frechette extensively referred to the groundbreaking work of Mary Douglas and Aaron Wildavsky, *Risk and Culture* (University of California Press, 1982).
5. Shrader-Frechette applied a three-step model of risk assessment, consisting of the three steps: (1) hazard identification, (2) risk estimation and (3) risk evaluation (Shrader-Frechette 1991, p. 5).
6. However, Shrader-Frechette observed that '[s]ome of these relativists reserve their harshest criticism for the U.S. public', i.e. the mentioned 'housewives', while sparing the "engineers". Thus, Shrader-Frechette pointed at an obvious inconsistency in the line of arguments of 'some of these relativists'. On the one hand, cultural relativists base their major argument, namely that risk evaluation is wholly relative and a social construct, on the observation that risk evaluation unavoidably comes along with value judgements. On the other hand, however, the same relativists 'single out U.S. environmentalist or sectarian laypersons (as opposed to technical experts) as having particularly biased constructs'. Therefore, Shrader-Frechette concluded that 'cultural relativism contributes to a *proindustry bias* towards risk, a bias that disenfranchises the lay public and supports the status quo' (Shrader-Frechette 1991, p. 31, emphasis added). Such findings may have motivated Shrader-Frechette to focus particularly on cultural relativism. Her attempt for rehabilitating environmental concerns and laypersons' judgement, as expressed in *Risk and Rationality* (1991), may be better understood in context. In context of the USA of the 1980s, *Risk and Rationality* may also be read as a defence of environmental movements concerned with, and federal agencies in charge of environmental protection and public health. In the wake of the Presidency of Ronald Reagan, environmental and public health concerns came under pressure:

The Reagan administration in the early 1980s was hostile towards the environmental movement, attempting a strategy of active exclusion. Attempts were made to demonise and exclude environmentalists from government. The regulatory basis of environmental administration was wound back, in keeping with market liberalism and individualist values. (...) In keeping with its ideological commitment to reducing the burden of regulation on business, the Reagan administration immediately began to dismantle the institutional capacity of the state to manage and regulate environmental affairs (John S. Dryzek, David Downes, Hans-Kristian Hernes,

Christian Hunold, David Schlosberg, *Green States and Social Movements. Environmentalism in the United States, United Kingdom, Germany, and Norway*. (Oxford University Press, 2003), pp. 34 and 136)

Political headwinds against environmental concerns did not leave academia unaffected. As Shrader-Frechette observed, relativists such as Douglas and Wildavsky questioned the ability of laypersons for making rational risk decisions. On the other hand, segments of Congress, unhappy with regulatory activities in the field of environment and public health, initiated evaluations of risk assessment procedures applied by federal agencies, in particular the EPA and the Food and Drug Administration (FDA). One of these evaluations was the famous report *Risk Assessment in the Federal Government: Managing the Process*, published in 1983 by the National Research Council (NRC) and known as the *Red Book*. With its emphasis on a conceptual separation between science and policy, *i.e.* risk assessment and risk management, the *Red Book* may be considered as a positivist attempt to contain regulatory activities of federal agencies in the USA.

7. Shrader-Frechette's review comprised, among many others, relativists such as Mary Douglas and Aaron Wildavsky (*Risk and Culture*), Melville Herskovits (*Cultural Anthropology*) and William Graham Sumner (*Folkways*).
8. A major point of Shrader-Frechette in *Risk and Rationality* was her refutation of claims that laypeople are irrational environmentalists and sectarians. In particular, Shrader-Frechette disproved arguments of a vocal segment of 'antipopulist' social scientists asserting that laypersons 'are dominated by "superstitions" about environmental risks and by fundamentalist desires for unrealistic environmental "purity" (Shrader-Frechette 1991, pp. 15–17)'.
9. A contemporary example for attempts to reconcile scientific evidence with religious faith is creationism. In short, creationism rejects the scientific theory of evolution and explains life on earth by referring to a metaphysical 'creator'.
10. However, besides these obvious differences, Mahdi pointed at important—and frequently overlooked—similarities between positivism and historicism: 'Positivism and historicism have many things in common. Both are essentially modern, the stepchildren of the distinction between philosophy and the peculiarly modern view of science, and the offspring of the belief in progress and the absolute superiority of modern science and scientific history over all earlier thought' (Mahdi 1996, p. 1041). Mahdi's observation highlights the fact that both approaches, *i.e.* positivism as well as historicism, were similarly ambitious endeavours initially. Original positivism, as conceived by Auguste Comte, was inspired by the vision that

agreements regarding scientifically established facts are attainable and thus universally valid. Historicism, in turn, was carried by the belief ‘that values and philosophies and comprehensive views can be known, and can be known scientifically’ (Mahdi 1996, pp. 1038–1039). Hence, whereas positivism was based on the presumption that natural sciences provide value-free outcomes, historicism basically claimed similar philosophically neutrality for its historical method.

11. The initial Greek distinction established by Aristotle in the *Nicomachean Ethics* was, however, that between *phronesis*, on the one hand, and *sophia* on the other hand. In an earlier draft version of the paper, dated July 31, 2009 and entitled ‘Science, Hermeneutics and International Law: Rethinking the *Hormones* Dispute’ presented at the ESIL-ASIL research forum in Helsinki, October 2–3, 2009, Cho himself suggested the opposite *episteme*—*phronesis* for discerning between opposite approaches towards science, i.e. positivist and constructivist approaches respectively.
12. The notion that risk can be quantified in a number which then reflects a universal ‘reality’ shows the vicinity of the objectivist approach to the philosophical school of Positivism and the interchangeability of both terms.
13. Böhnigk 1999, p. 44.
14. Böhnigk 1999, pp. 44–45, referring to Stephen E. Toulmin, Pierre Duhem and Hermann v. Helmholtz.
15. The term *objectivism* is used in various contexts. For instance, Gottlob Frege used the term *objectivism* as an opposing philosophical concept to Immanuel Kant’s *rationalism*; and a particular notion of *objectivism* was developed by Ayn Rand and her *objectivist movement*.
16. Technically, risk (R) is commonly defined as the product of the magnitude of negative consequences (C) as a result of a certain event, and the probability (P) of occurrence of that event, providing the formula $R = P \times C$.
17. Hence, the synonymous term *contextualists*.
18. The fact that risk is relative to its observer was illustrated by Kaplan and Garrick (1981) and the example of the rattlesnake in the mailbox. Kaplan and Garrick recalled: ‘We had a case in Los Angeles recently that illustrates this idea. Some people put a rattlesnake in a man’s mailbox. Now if you had asked that man: “Is it a risk to put your hand in your mailbox?” He would have said, “Of course not.” We, however, knowing about the snake, would say it is very risky indeed’. For Kaplan and Garrick, the allegory of the rattlesnake in the mailbox demonstrates that risk ‘is a subjective thing—it depends who is looking’. As Kaplan and Garrick noted, some scholars refer to the fact that risk is relative by using the phrase ‘perceived risk’. However, Kaplan and Garrick worried that the phrase ‘perceived risk’ suggests the existence of another kind of risk which is not only perceived, that is to say, the existence of an ‘absolute risk’. The problem of Kaplan and Garrick was

- that notions of absolute and perceived risk ‘brings us in touch with some fairly deep philosophical matters, which incidentally are reminiscent of those raised in Einstein’s theory of the relativity of space and time’.
19. See, for example, Brian Wynne, “Risk Perception, Decision Analysis, and the Public Acceptance Problem”. Published in Brian Wynne (ed.), *Risk Management and Hazardous Waste. Implementation and the Dialectics of Credibility* (Berlin: Springer-Verlag, 1987), 357.
 20. Shrader-Frechette defended her ‘middle position’, that is, *scientific proceduralism*, ‘by means of arguments drawn from analogous debates over *naturalism* in contemporary philosophy of science’. Following the analogy drew by Shrader-Frechette, for philosophers of science as well as for risk evaluators holding some sort of middle position, the challenges are rather similar. Naturalistic philosophers such as Dudley Shapere, Larry Laudan and Roland Giere, holding a middle position between the relativists and the logical empiricists, are challenged ‘to show precisely how theory choice or theory evaluation can be rational, even though there are no universal, absolute rules of scientific method that apply to every situation’. Risk evaluators in pursuit of some middle position between the cultural relativists and the naïve positivists are challenged ‘to show how risk evaluation (the third stage of [risk] assessment) can be rational and objective, even though there are no completely value-free rules applicable to every risk-evaluation situation’.
 21. Shrader-Frechette summarised her attempt as follows: ‘My purpose in this volume [i.e., *Risk and Rationality*] is (1) to articulate why and how both the cultural relativists and the naïve positivists err in their general accounts of risk evaluation; (2) to explain the misconceptions in a number of specific risk-evaluation strategies allegedly deemed “rational”; and (3) to argue for a “middle position” on the methodological spectrum of views about how to guarantee the rationality of risk evaluation’.

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