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Adaptivity in Risk Communication

Exploring Differences in Risk Perception using the Cultural Cognition Approach

When informing the population about potential health hazards, cultural differences in risk perception should be taken into account and risk communication adapted to the cultural context. The present paper suggests cross-cultural, anthropological and psychological frameworks which may help explore possible differences in risk perception among the language groups in Switzerland in order to suggest effective risk communication strategies. The cultural cognition project, a combination of the psychometric paradigm and the cultural theory of risk, seems to be an adequate approach and a creative starting point for adapting information campaigns about health risks to the language regions.

Keywords: risk perception, risk communication, cross-culture, cultural cognition project.

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1. Risk Communication

Research in health communication aims at understanding people's health beliefs and health behaviour, and identifies the effects of health communication and the ways people process the information they get. Among the major challenges are individual differences in background knowledge about health, as well as the perception, understanding and processing of information among the population. Especially when it comes to communicating with a group comprised of individuals with heterogeneous cultural backgrounds, cultural differences must be taken into account. Several studies confirm a link between health outcomes and culture (Dutta 2007; Hruschka 2009; Kagawa-Singer & Kassim-Lakha 2003; Landrine & Klonoff 1992; Van Voorhees, et al. 2007). Such results provide reason for the increasing need to culturally target interventions in order to improve health (Finnegan & Viswanath 2008; Glanz et al. 2008; Hruschka 2009; Kreuter & Wray 2003; Kreuter & McClure 2004). Most of the studies supporting cultural differences in the field of health compare traditional ethnic groups like African, Hispanic and Caucasian Americans, or geographically different populations like Asians and Europeans. Adapting health communication to cultural groups is, however, an issue in Switzerland, too. In fact, empirical findings from the small country with four official languages (German, French, Italian and Romansh) suggest differences between the language regions regarding health beliefs and health behaviour (Bopp & Gutzwiller 1999; Faeh et al. 2009; Bisig & Gutzwiller 2004; Schulz et al. 2006).

The present paper will concentrate on one specific field in the area of health communication: how to inform the population about risks. The idea behind risk communication is that "increasing a person's sense that something bad can happen to them, that is, perceived risk, will motivate behavior change to either prevent or diminish the threat" (Lipkus 2008: 4420). One example in the area of health is the question of how to provide the population with scientific evidence about detrimental effects of smoking. But modern approaches of risk communication propose a wider conceptualization than just the question about how to communicate factual evidence and probabilities to the public. For Hampel (2006) for example, "risk communication is not a task where bits of information

are transported from the sender to the recipient of the communication but a process, where both sender and recipient interact in order to develop a common frame for the understanding of the problem” (Hampel 2006: 5). It is an interactive process of exchange of information and opinions among individuals, groups, and institutions concerning a risk or potential risk to human health or the environment (Lundgren & McMakin 2009). Risk communication is more likely to reach its goal when it is adapted to the public’s understanding of risk (Hampel 2006). It therefore becomes crucial to gain a deep comprehension of the population’s risk perception of the hazard before planning a risk communication strategy about the respective hazard.

This is particularly important due to one reason: there is no such thing as a “general public.” The public is not a homogeneous group, it has to be further stratified in order to improve the effects of risk communication. Indeed, in heterogeneous groups which differ, for example, by cultural background, adapting the message to the context is necessary to address arguments that the audience understands and finds acceptable. There is consistent evidence for cross-cultural differences in risk perception (Weber & Hsee 1998, 1999a, 1999b; Wang & Fischbeck 2008; Renn & Rohrman 2000). Consequently, as risk communication aims at influencing the risk perception of the population, understanding such differences can be helpful in choosing the right communication strategy adapted to different targets.

Eurobarometer studies have shown existing differences in risk perception among Mediterranean and northern countries in Europe. There is evidence that risk perception is higher in Italy than in Germany for concerns about nutritional factors (genetically modified products, pesticide residues in fruit, vegetables or cereals), for new viruses like avian influenza, and hazards related to electromagnetic fields (Eurobarometer Studies 347 [2010] and 361 [2001]).

The question arises whether risk perception of such hazards is homogeneous among the language regions in Switzerland, or whether there are systematic differences, possibly reflecting the attitude of the respective neighbor countries rather than “Switzerland as a whole.”

Furthermore it would be interesting to discover whether such possible differences are due to culture or not. The aim of the present paper is not

to answer the complex questions of how to define and measure culture. Nevertheless, comparing different language groups requires some understanding of cross-cultural research. Thus, the main goal of the paper is to combine theoretical frameworks from cross-cultural, anthropological and psychological research, which could be used to understand possible differences in risk perception among language groups in Switzerland. This would constitute a fundamental starting point for adapting future risk communication campaigns.

2. Assumptions for Cross-cultural Studies

Studies in the field of risk show that people from different countries and ethnicities differ in risk perception, concluding that these differences are due to culture (Bontempo et al. 1997; Weber & Hsee 1998, 1999a, 1999b; Wang & Fischbeck 2008; Renn & Rohrman 2000). There is one problem with such conclusions: most of the studies use proxy measures like ethnicity, country or language for culture. Consequently they must deal with ecological fallacy. The ecological fallacy consists of thinking that relationships observed for groups necessarily hold for individuals. The expected difference between effects for groups and effects for individuals is an aggregation bias (Freedman 2004). According to Matsumoto & Yoo (2006), too many studies use this procedure pretending to analyse cultural differences without justifying empirically that the discovered dissimilarities are not just aggregate differences in personalities among the investigated groups. Matsumoto and Yoo call this ecological fallacy the cultural attribution fallacy, “the inference that something ‘cultural’ about the groups being compared produced the observed differences when there is no empirical justification for this inference” (Matsumoto & Yoo 2006: 235). In an article about the history of cross-cultural research, the authors subdivide the evolution of cross-cultural research in three phases - suggesting a new, fourth phase which could help to overcome problems of ecological fallacy.

During what they define as the *first* phase of cross-cultural research, studies just compared aggregate differences among groups and concluded that the dissimilarities were due to culture (cultural attribution fallacy). In the *second* phase, researchers started to explore the concept of culture,

identifying meaningful dimensions of cultural variability. The authors of this phase developed measurement scales for culture and positioned the different countries on these scales (Hofstede 2001; Hofstede & Hofstede 2005; Triandis & Gelfand 1998; Triandis et al. 1988; Schwartz & Bilsky 1990; House et al. 2004). The following *third* phase represents what Matsumoto and Yoo call the beginning of cultural studies. Researchers started to link concepts measured on the individual level (for example risk perception) with the cultural (aggregate) dimensions of the country. Matsumoto & Yoo criticize that phase 3 cultural studies discover observed differences empirically and then identify the “potentially active cultural ingredients that supposedly produce predicted differences.” However, they often do this without measuring the cultural ingredients on an individual level; they rather rely on country scores from phase 2 studies. For this reason, Matsumoto & Yoo suggest a *fourth* and new phase of cross-cultural research methods, called linkage studies. In such studies, the observed differences among variables are empirically linked with the specific cultural sources. In order to do so, the cultural variables have to be measured directly for every individual; only in this way can inferences about culture be justified empirically (Matsumoto & Yoo 2006).

Adapting their approach to our research question about culture as explanation for differences in risk perception among language groups in Switzerland, we have to measure both the theoretical framework of risk perception and the dimensions of cultural variability on an individual level. In case of differences among the language groups, this method would allow for the testing of whether culture explains such differences, and the justification of contentions about the relationships empirically. The results would be helpful for adaptivity in risk communication: they would help to design targeted campaigns, adapting the information to the needs of the different language groups.

3. Risk Perception

In contemporary society, risk is omnipresent. “Better safe than sorry” is a common proverb, which can be traced back to the novel *Rory O'More* by the Irish writer Samuel Lover in 1837. But risk was not always a pervading category in people's thinking. Until the Middle Ages, people were used

to thinking in terms of good or bad fortune rather than of risk. Events were unpredictable and unforeseeable as they were externally attributed to “the goddess Fortuna” (Luhmann 1996). The concept of risk came into use in the 14th century, with the transition from traditional to modern society, when traders stuck together in order to manage the risk of losing their ships (Beck 1992). At this time, risk was seen from an entirely technical perspective and defined as “the probability of an event multiplied by the damage of the event” (Zinn 2008: 5). Since then, the conception of risk has continuously evolved and can be summarized in the following seven main approaches: the actuarial approach, the toxicological or epidemiological approach, the probabilistic risk analysis, economics of risk, psychology of risk, social theories of risk, and cultural theory of risk (Renn 1992). Common to all seven risk concepts is the distinction between reality and possibility (Markowitz 1991). However the concepts differ in their basic assumptions and assessment of risks. It is not the aim of the present essay to compare these risk theories (for such a work, see Krimsky & Golding 1992). Rather, this paper will concentrate on a new approach called cultural cognition (Kahan et al. 2007a, 2007b). The cultural cognition project consists of a combination of psychological and anthropological/sociological concepts and could eventually allow us to test and justify empirically whether culture explains differences in risk perception. Consequently, this article is focused on the psychometric paradigm (Slovic 2000) and the cultural theory of risk (Douglas & Wildavsky 1982), the combination of which established the concept of cultural cognition.

3.1. From Technical and Economic Risk Assessment to the Psychometric Paradigm

Regarding adaptivity in risk communication, the risk perception of individuals must be understood. Often, the public’s attitudes towards risk issues are claimed to be unpredictable, as laypersons’ judgements of risks do neither reflect technical calculations nor economic cost-benefit analyses (Krimsky & Golding 1992). However, the risk perception of laypersons is not irrational if assessed with adequate theoretical concepts. Social scientists, for example, judge the technical risk analysis (risk defined as

probability of an event multiplied by the damage of the event) as inappropriate for measuring risk perception, as it ignores values and preferences of human beings (Nowotny & Eisikovic 1990). Additionally, technical risk analyses can provide only aggregate data, while each individual may face different degrees of risk (Renn 1992).

For social scientists, the economic cost-benefit approach of Chauncey Starr (1969) is neither suitable for assessing individuals' risk perception (Renn 1992). In fact, Starr's ideas were heavily dependent on assumptions about the rational actor theory of classical economics studies; but there is evidence that people balance their risk-taking behaviour without maximizing benefits, but assuring both a satisfactory payoff and the avoidance of disasters (Tversky 1972).

The *Prospect Theory* of Tversky & Kahneman (1974) has been fundamental for theories in risk perception. In fact, they identified several systematic cognitive biases in people's ability to draw inferences from probabilistic information. Their results suggest that the risk perception of laypersons is not necessarily explicable with technical or economic calculations.

Inspired by this work, Fischhoff and colleagues showed that the public's risk perception was multidimensional and that subjective probability is only one of many factors (Fischhoff et al. 1978). They developed a psychometric model identifying multiple qualitative risk characteristics, showing that risk does not exist "out there" but that it is subjectively defined by individuals. What today is referred to as the psychometric paradigm showed that perceived risk is quantifiable and predictable (Slovic 1982a, 2000). Further, the paradigm has revealed that experts and laypersons use different definitions of risk when making their judgments. The responses of experts correlate highly with technical estimates of annual fatalities. Laypersons, as well, can assess the expected number of fatalities (and their estimates do not differ much from the experts'); however, in addition, their definition of risk incorporates several other qualitative characteristics, various aspects of risks and benefits aside from death and money. Those characteristics can be summarized in three main factors: (1) unknown risk, or the degree to which a risk is understood, (consisting of characteristics like for example "risk is unknown to those exposed," "effect delayed," "risk is unknown to science"); (2) dread of risk, or the

degree to which the risk evokes a feeling of dread (e.g., “uncontrollable,” “involuntary,” “affects me”); and (3) exposure to risk (e.g., “personal exposure”). Studies using this approach have generated a cognitive map of risk perception, identifying “personality profiles” of numerous hazards (Fischhoff et al. 1978; Slovic et al. 1982a, 1982b; Slovic 2000). Generally, laypersons see higher risk in infrequent, catastrophic and involuntary events and lower risk in frequent, familiar, and voluntary ones, and their perception of risk does not depend on relative frequencies and probabilities of adverse effects, as is the case with experts.

The psychometric paradigm in its original form was criticized for distinguishing merely among experts and laypersons. Risk characteristics were treated as inherent attributes of the hazards and not as a construct of the respondent, influenced by social, cultural and institutional processes (Rayner 1992). In fact, the statistical analysis was merely based on mean scores for whole samples, ignoring that individuals among lay populations could differ in their perceptions of risks (Marris et al. 1996). The “cognitive map” compared the mean perception of several different risks across individuals or groups, rather than the different perceptions of one risk within individuals or groups (Sjöberg 2000; Siegrist et al. 2005).

Of course, the psychometric paradigm can also provide interesting insight into differences in the estimation of the qualitative characteristics of one (or more) risks – like for example differences among countries (Keown 1989; Kleinhesselink & Rosa 1991). In this case, when interpreting the results as cultural differences, the country/ethnicity/language region is used as a proxy measure for culture, and the analyses are based on aggregate differences. But as seen before, just comparing the risk perception of two (or more) countries using the psychometric paradigm does not give empirical justification for cultural differences. There is a need for a dimension of cultural variability, which we can expect to correlate with risk perception and which would identify culture as a predictor of perception.

The idea to measure culture in risk perception studies is not new. The assumption that reactions to risks are inseparably connected with the cultural worldview of an individual comes from the cultural theory of risk (Douglas 1978), probably the most widely used anthropological approach to risk perception. It seems quite obvious to use the dimensions of cultural

variability suggested by this specific approach to measure culture. Hence, in the following paragraphs, a short introduction to this anthropological framework is given.

3.2. The Cultural Theory of Risk

Contemporarily to the psychological efforts in explaining irrational risk perception among lay persons, the anthropologist Mary Douglas (1978) developed the cultural theory of risk, also called the “grid-group cultural theory” (Mamadouh 1999). In their essay *Risk and Culture*, Douglas & Wildavsky (1982) argue that everything human beings think or do is biased by culture; hence, reactions to risks are inseparably tied to the ways in which society itself is perceived and experienced. Furthermore, the authors assume that only a limited number of “cultures” can be assessed. The cultures are understood as ways of life, which link social patterns and worldviews. Thus, the typology of cultures includes viable combinations of patterns of social relations, and respective patterns of cultural biases/worldviews (Douglas 1978; Douglas & Wildavsky 1982).

The patterns of social relations can be assessed and classified using two dimensions: grid and group. Group, the first dimension, is the degree of social integration, meaning the experience of a bounded social unit (Douglas 1970). In *Cultural Bias* (1978, reprinted as chapter of *In the Active Voice*, 1982), Douglas defines group in terms of the “claims it makes over its constituent members, the boundary it draws around them, the rights it confers on them to use its name and other protection, and the levies and constraints it applies” (ibid.: 192).

Grid, on the other hand, represents the extent to which someone accepts and respects a formal system of hierarchy and procedural rules. It is the degree of social regulation or prescription. Douglas (1978) defines it as “the cross-hatch of rules to which individuals are subject in the course of their interaction.”

Intersecting the grid and group dimensions prompts four types of social patterns. These social patterns are: individualistic, fatalistic, hierarchical or egalitarian. Every type of social pattern gives rise to a corresponding cultural bias/worldview which influences the individual’s behaviour. The combination of social patterns and cultural biases gives birth to the typol-

ogy of cultures: *Individualism* (low group/low grid), *Egalitarianism* (high group/low grid), *Hierarchy* (high group/high grid), and *Fatalism* (low group/high grid) (Mamadouh 1999). According to Douglas, all existing cultures can be assessed and identified using this classification.

Regarding the relationship between cultural ways of life and risk perceptions, the cultural theory of risk claims that individuals tend to credit risks that cohere with their cultural way of life, and to ignore risks that undermine and threaten their ways of life (Douglas & Wildavsky 1982). In summary, “types of people will ‘choose’ to be concerned with different types of hazards” (Sjöberg 2000: 5). In the following list, concerns of the four worldviews regarding risks and particularly technological and environmental harms are specified (Douglas & Wildavsky 1982; Mamadouh 1999; Kahan 2008; Sjöberg 2000):

- *Egalitarians* are especially concerned with technology and the environment, as they are generally against commerce and industry. If they want to defend (subconsciously) their egalitarian worldview, believing that certain technologies cause environmental harm is advantageous for their worldview. In fact, it implicates restrictions to the commerce and industry, and hence to the opposite, individualistic worldviews.
- *Individualists* are concerned about war and other threats to the markets. Regarding claims of environmental and technological risks, they react dismissively because they recognize, even if subconsciously, that crediting such claims would lead to restrictions on commerce and industry which is the basis of their position.
- *Hierarchists* are concerned about law and order. They are to a certain point environmental-risk sceptical, because they interpret those concerns as an implicit abuse of the competence and authority of societal elites.
- *Communitarianists* are quite indifferent about risk. They see dangers and risks unavoidable anyway and do not trust in authorities. Nevertheless, regarding environmental and technological risks they are sensitive. They believe that crediting those claims which would lead to public censure of the self-seeking individualism.

The most widely utilized approach in measuring the four worldviews was initiated by Karl Dake, who published the first empirical studies of

culture theory (Dake 1991). Dake formed separate scales to measure hierarchy, egalitarianism, individualism and fatalism. Most of the researchers working with the cultural theory of risk have followed Dake's method of using separate scales for each of the worldviews (Marris et al. 1998; Peters & Slovic 1996; Ellis & Thompson 1997).

The theoretical framework seems to be suitable for research in the field of cultural differences in risk perception. Nevertheless, the cultural theory of risk has garnered criticism. Especially the rigidity of the typology of worldviews has often been criticized, and a "mobility version" has been developed, presuming that an individual can attach to different cultural views in different spheres or over time (Rayner & Cantor 1987; Rayner 1992). Some authors claim that empirical studies using the cultural theory have performed rather poorly (Boholm 1996; Sjöberg 1997). Others conclude that the cultural theory proposes an "interesting theoretical framework, but this has not been backed up by substantive empirical studies" (Marris et al. 1996: 5). Also the OECD guidance document on risk communication for chemical risk management reports that the cultural theory of risk has been criticized on several grounds. Nevertheless, regarding adaptivity in risk communication, the report concludes saying that "most risk communicators have assured us, however, that this classification has helped them tremendously in preparing communication programmes for different audiences" (OECD 2002: 59).

3.3. The Cultural Cognition Project

There are some recent attempts to elaborate the cultural theory of risk and adapt its methods to some of the criticism. At the Yale School of Law, a group of scholars from different disciplines constitute the cultural cognition project (www.culturalcognition.net); among the researchers is also the figurehead of the psychometric paradigm, Paul Slovic. The cultural cognition project attempts to merge the psychological and the anthropological/sociological concepts, suggesting that "worldviews yield risk perceptions through a set of social and psychological processes" (Kahan 2008: 18). The idea behind the phenomenon of cultural cognition is that "cultural worldviews permeate all of the mechanisms through which individuals apprehend risk, including their emotional appraisals

of putatively dangerous activities, their comprehension and detention of empirical information, and their disposition to trust competing sources of risk information” (Kahan et al. 2006: 1072). The basic explanation for differences in risk perception is given by the worldviews of the cultural theory of risk (Douglas & Wildavsky 1982). But there are some conceptual features and practical implications of the cultural cognition project that differ from the conception of cultural theory (Kahan 2008). One difference concerns the measurement of the cultural worldviews. According to Kahan, the separate worldview measurement scales proposed by Dake (1991) face two difficulties. On the one hand, Dake did not report any measures of scale reliability, and researchers who did so found that the separate scales performed poorly. On the other hand, Kahan sees a conceptual problem in the four separate scales: in fact, “it becomes theoretically possible for a single individual to exhibit multiple, competing orientations – for example, to be simultaneously both a hierarchist and an egalitarian” (Kahan 2008: 5). For this reason, the cultural cognition project suggests the use of only two scales: one for grid, with hierarchy at one pole and egalitarianism at the other pole, and one scale for group, with individualism and communitarianism on the two opposite poles. Using a single scale for group and another one for grid, each person’s worldview is identified with a unique point. According to the cultural cognition project, these scales are highly reliable measures of the latent disposition of subjects toward those respective sets of worldviews (Kahan et al. 2007a). The reliability has been confirmed by a recent study for both the individualism ($\alpha = .88$) and the hierarchy scale ($\alpha = .89$) (Kahan et al. 2010).

A further difference between the cultural cognition project and Douglas’s conception of cultural theory is the attention that the researchers give to the psychological mechanisms that explain *why* culture shapes individuals’ beliefs about risk. The mechanisms hypothesis of the cultural cognition approach suggests that worldviews yield risk perceptions through a set of social and psychological processes. These “processes are well established; they are the heart of the psychometric paradigm or psychometric theory of risk pioneered by my collaborator Paul Slovic. What hasn’t been fully recognized until now, our research suggests, is how these social and psychological processes interact with cultural ways of life, generating

individual differences in risk perception between people who subscribe to competing worldviews” (Kahan 2008: 10). The researchers have identified several mechanisms of cultural cognition which explain why people rate the risk characteristics proposed by the psychometric paradigm differently, and hence, why their subsequent risk perception depends on the cultural worldviews (Kahan 2008; Kahan et al. 2007a). The mechanisms identified are identity-protective cognition, biased assimilation and group polarization, cultural credibility and cultural identity affirmation (Kahan 2008: 11–22). The identification of these mechanisms has, for example, contributed to the disclosure of a long lasting enigma: the tendency of white males to perceive societal risks as smaller than women and minorities, known as the “white-male-effect” (Flynn et al. 1994). Interestingly, analyses conducted by the cultural cognition project (assessing worldviews on an individual level) revealed that this racial and gender variance in risk perception is true for individuals with hierarchical worldviews, but not for individuals with an egalitarian worldview. These results can be explained with the identity-protective cognition mechanism: it seems that men, especially (powerful) individualistic and hierarchical white men, are more afraid of the threat to their identities that would occur in case of acceptance of the risk than white women or African-American (Kahan et al. 2007a; Kahan 2008).

4. Discussion

The goal of the present essay was to find an adequate risk perception approach to investigate differences in risk perception among the language regions in Switzerland and, most importantly, detect whether such differences could be attributed to culture or not. The psychometric paradigm (Slovic et al. 1982a) is certainly one of the most frequently utilized approaches in explaining risk perception, nevertheless it remains on a psychological level and does not allow for drawing conclusions about the socio-cultural background of risk perception. In fact, as stated by Matsumoto & Yoo (2006), just comparing the means of risk perception or of the different risk characteristics, no conclusions can be drawn about whether the differences are due to cultural aspects or to aggregate differences in personalities among the investigated language regions. On

the other hand, the cultural theory of risk suggested by Douglas (1978) includes the notion of culture in the concept and suggests four cultural types and respective measurement scales (Dake 1991), but the theory is criticized for being too rigid and for performing poorly in empirical research. An improved version of the cultural theory of risk is the cultural cognition project (Kahan 2008). The researchers suggest measuring both risk perception and cultural variability on an individual level, and considering psychological mechanisms for explaining the impact of culture on risk perception. Several arguments support the notion that the cultural cognition approach would be adequate to investigate risk perception in Switzerland and detect the impact of culture:

First, hazards studied in the cultural cognition project range from gun risk perception over synthetic biology to nanotechnology risk perception, and the results, so far, have supported the cultural cognition thesis (Slovic 2010: chapters 9–13); scale reliability has been confirmed (Kahan et al. 2010).

Second, the detected mechanisms provide an important tool for adaptivity in risk communication to culturally different audiences. In fact, the mechanisms behind the interaction of culture and risk perception turns the manipulation of individuals possible (Kahan 2008). Regarding the identity-protective mechanisms, for example, there is a “need for expressively sophisticated modes of risk communication, ones that avoid identity-protective resistance to public acceptance of empirically sound risk information” (Kahan et al. 2007a: 498).

And third, thanks to the improved notion of the cultural worldviews, risk communication is becoming important, or better, compatible with the theory. The rigid interpretation of cultural worldviews by Douglas & Wildavsky (1982) depicted people as having one (given) worldview and, according to it, credit or dismiss risks. This implicitly meant that there is no need for communication and no possibility of manipulation. Kahan and his group, however, adopting more flexible measurement scales, avoid this logical indeterminacy problem (Kahan 2008).

For all these reasons, cultural cognition seems to be a creative and practical framework for adaptivity in risk communication: it empirically approaches the influence of culture on risk perception, and identifies “processes of democratic decision-making by which society can resolve

culturally grounded differences in belief in a manner that is both congenial to persons of diverse cultural outlooks and consistent with sound public policymaking” (www.culturalcognition.net).

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