

Culture, Environmental Risk Perception and Behavior

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Defining our scope. What do we know about risk perceptions across cultures? We'll begin by explaining what we mean by culture and what we mean by risk. By culture we mean the set of ideas, including values, norms, and beliefs, carried by a group (Dietz & Burns, 1992; Richerson & Boyd, 2005). As a short hand we will call the aggregate set of values, norms, beliefs, etc. cognitions. The idea of culture is mostly deployed in discussing differences across groups. We know that gender, ethnicity, political ideology, class, religion and their intersections account for some of differences in risk perception and other environmentally significant cognitions. For example, in the U.S. it is well known that politically conservative white males see far less environmental risk and are less concerned about environmental problems than other groups (McCright, Marquart-Pyatt, Shwom, Brechin, & Allen, 2016; McCright & Xiao, 2014; Slovic, 1999). At a larger scale we can ask about differences across nations and language groups. Culture is a very useful concept as long as we are clear what we mean, and in particular what groups we are comparing, in any given analysis.

By risk we mean people's perceptions of uncertainty about changes they consider consequential. There is some interesting literature debating how best to define risk (Jaeger, Renn, Rosa, & Webler, 2001; Rosa, Renn, & McCright, 2013) but this simple definition will suffice for our purposes. A key point to note is that while uncertainty might be a part of reality, risk is about perceptions of uncertainty and thus a part of culture. As Slovic and Weber explain:

“It (risk) does not exist “out there,” independent of our minds and cultures, waiting to be measured. Instead, risk is seen as a concept that human beings have invented to help them understand and cope with the dangers and uncertainties of life. Although these dangers are real, there is no such thing as “real risk” or “objective risk.” The nuclear engineer’s probabilistic risk estimate for a nuclear accident or the toxicologist’s quantitative estimate of a chemical’s carcinogenic risk are both based on theoretical models, whose structure is subjective and assumption-laden, and whose inputs are dependent on judgment. Nonscientists have their own models, assumptions, and subjective assessment techniques (intuitive risk assessments), which are sometimes very different from the scientists’ models and then those subjective perceptions then guide behavior.” (Slovic & Weber, 2002:4)

Why do cultural differences in cognitions about risk matter? Because differences in thinking about risk lead to different decisions, and those decisions have consequences for the

environment and sustainability, e.g. decisions about energy consumption within the household account for 38% of overall U.S. greenhouse gas emissions (Dietz, Gardner, Gilligan, Stern, & Vandenberg, 2009). People make many different kinds of environmentally consequential decisions and occupy many different roles in doing so. We are consumers, we may engage in politics as citizens or as activists or as professionals in the policy system, we may work in an organization that takes environmentally consequential actions, some of us manage resources, ranging from lawns to landscapes. Different roles in turn may invoke different values, norms, beliefs, and risk cognitions. Indeed, it would be appropriate to describe subcultures defined by roles as well as by membership in social groups. Again, it is important to keep concepts straight when we are talking across disciplines and domains of action. What may matter in consumer decision making of one sort may differ not only from actions taken in politics but also from other kinds of consumer decisions. And even within a role there are many different kinds of decisions. For example, household energy consumption is driven by habits that require decisions to change, by daily actions such as turning off appliances or setting shower temperature, by “fix it and forget it” actions such as setting water heater temperature, and by decisions that have implications for years to decades or even longer including major equipment purchases, residential location and childbearing (Stern, 2014; Stern et al., 2016).

How does risk factor into decisions? In examining how cultural differences may influence risk perceptions and thus environmentally consequential decisions, it is useful to think of three large body of literature that address environmental decision making and risk. Roughly speaking we can group research into work inspired by the rational actor model, work that has been labeled “heuristics and biases” , and work in environmental social psychology that examines, among other things, values, norms, beliefs and trust. Like any evolutionary taxonomy, the distinctions between these groupings is not absolute. Some work crosses boundaries and we need more synthetic work to develop a more robust understanding. But each of these three traditions has its own way of engaging with risk and thus in turn identifies things that may vary across cultures in ways consequential for environmental decision making.

Rational actor model (RAM). The RAM notes that in making decisions under uncertainty, people have to take into account the probability that various outcomes will occur. So people may differ in their beliefs about the risks of various outcomes, see below. They may also differ in the degree to which they are comfortable with risk or are risk averse. We can conjecture that those who are most vulnerable will likely be most risk averse since a bad outcome could be catastrophic. That in turn could become embedded in a culture over time, leading, for example, African American farmers to use a somewhat different risk calculus than white farmers (Rivers & Arvai, 2007). Time preferences for future costs and benefits and discount rates applied to future outcomes are closely related to risk aversion. One reason for discounting the future (but not the only reason) is uncertainty. It should be noted that most people discount the future in a complicated way with the immediate future discounted more than the longer term future (hyperbolic discounting) and that some people appear not to discount the future at all. There is some evidence that discount rates vary not only across individuals but also across nations and cultures (Wang, Rieger, & Hens, 2016). Finally, we should note that the RAM was developed to describe market interactions in Western capitalist societies. There is a very long standing debate

about the degree to which it applies cross-culturally. A central theme in this debate is the degree to which people make decisions based on the narrow self-interest posited by the RAM versus taking account of the interests of others. Self-interest and altruism is a central theme in the values-beliefs-norms literature discussed below. Contemporary microeconomic theory makes extensive use of game theory to treat the classical rational actor model as a special case. There is a growing body of research to examine cross-cultural differences in how people make decisions in situations in which there may be benefits to altruism (Henrich et al., 2005; Henrich et al., 2010; Ostrom, 2000).

Heuristics and biases. A body of research labeled variously heuristics and biases, examines how decision making, the processing of information and in particular the handling of uncertainty by humans differ from what is posited by the simple rational actor model (Cialdini, 2007 [1984]; Fischhoff & Kadvany, 2011; Kahneman, 2011; Kahneman, Slovic, & Tversky, 1982). This approach is the basis of the field of behavioral economics. Contrasting this mode of decision making with the RAM acknowledges that we have at least two different modalities for making decisions, with the distinction labeled System I and II thinking, fast and slow thinking, or affective and deliberative decision making. The heuristic and biases focuses on experiments and does not have a grand overarching theory so it can be difficult to summarize. Briefly, it appears that we make decisions and in particular deal with uncertainty using cognitive shortcuts, i.e. heuristics and biases. These allow us to assess information quickly and make decisions without too much effort. These shortcuts often serve us well in routine decisions. But they can also lead us astray and allow us to be manipulated. Note that nearly everyone has difficulty handling probabilities—even highly educated professionals. One of the major findings in this body of work is that when we make assessments of risks, we take into account not just the probability of an occurrence but also features of the risk such as the degree to which we see it as voluntary or involuntary, familiar or unfamiliar and the degree to which an outcome is dread. This leads our assessments of risk to differ from an actuarial calculation. The heuristics and biases literature also notes that most people are asymmetric in their treatment of gains and losses; we place a higher value on something lost than on the same thing gained, which contradicts at least the simplest versions of the RAM (Kahneman & Tversky, 1979a, 1979b).

Overall, this literature suggests that there are many influences on risk perception, including characteristics of the risk that are distinct from the probability of occurrence and the magnitude of the harm. As Renn and Rohrman emphasize, risk perceptions are highly influenced by multiple layers of contexts, including contexts that we would normally define as cultures or sub-cultures (Renn & Rohrman, 2000). Rosa and colleagues have done some thoughtful cross-cultural comparisons of risk perceptions in the US and Japan that demonstrate the importance of careful thinking about culture and risk. They note that the two nations are similar in technology and affluence but substantially different in cultural history so make for a useful comparison (Kleinhesselink & Rosa, 1991, 1994; Rosa & Matsuda, 2005; Rosa, Matsuda, & Kleinhesselink, 2000). The literature looking at perceptions of risk across cultures (usually defined in terms of nations or linguistic groups) is substantial (Renn & Rhormann, 2013).

Values, Beliefs, Norms and Trust. There are many social psychological theories that have been applied to risk perception and environmental decision making. Of these, values-beliefs-norms (VBN) theory was designed to encourage cross-cultural comparisons (Dietz, 2015; Dietz, Fitzgerald, & Shwom, 2005; Steg, 2016; Steg & de Groot, 2012). The influence of values, and in particular of self-interest versus altruism links this approach to the RAM. And like the heuristics and biases literature, this literature examines processes variously called motivated reasoning or biased assimilation that make it easier to take on new information that is consistent with values and prior beliefs and more difficult to take on information that is dissonant. We note that values are closely related to identity and thus are probably a key element of culture (Van der Werff, Steg, & Keizer, 2013a, 2013b, 2014). Most work in this tradition uses the well-developed and widely deployed Schwartz approach to measuring values (S. H. Schwartz, 2015). There is an extensive literature looking across nations, religions and other groups using this approach and some fairly strong evidence about what is consistent across most groups and what varies (S. Schwartz, Lilach Sagiv, 1995; S. H. Schwartz, 2014a, 2014b; S. H. Schwartz & Bardi, 2001). Values, beliefs and norms have been found to influence risk perceptions in several studies (Bidwell, 2013; Dietz, Dan, & Shwom, 2007; Slimak & Dietz, 2006; Whitfield, Rosa, Dietz, & Dan, 2009). However, trust is also very important in risk perceptions and acceptability of various risks. Trust is itself a sort of risk assessment—trust implies that the behavior of others can be predicted (Fehr, 2009; Henry & Dietz, 2011). An interesting opportunity for further work lies in integrating the work on multiple forms of altruism in VBN theory with “construal level” theory that examines perceived social distance to other groups and the effect that perceived distance has on altruism and empathy (Zwicker & Wilson, 2013).

Challenges in studying the influence of culture and especially of religion on risk cognitions.

One obvious challenge is to specify exactly what aspect of risk cognition will be examined. Table 1 provides a terse summary of the aspects of risk cognition that might be influenced by culture that we have mentioned. The list is certainly not exhaustive. Different factors may influence different elements of this list. And each element may play a unique role in influencing decisions that involve risk. Further, as we noted, there are many different types of decisions, each with its own set of drivers.

Table 1. Aspects of risk cognition and environmental decision making might be influenced by cultural differences and key literature reviews

Aspect of Risk Cognition that vary by culture	Key Citations
Assessment of the certainty of future events	
Risk tolerance	(Fischhoff, Slovic, Lichtenstein, Read, & Combs, 1978)
Discount rates/ time preferences for costs and benefits, including non-linearities in discount rates and discount rates of zero	(Wang et al., 2016)
Heuristics and biases used as shortcuts in decision making	(Kahneman et al., 1982)
Asymmetry in preferences for gains versus losses	(Thaler, Tversky, Kahneman, & Schwartz, 1997)
Values	(Dietz, 2015; Dietz et al., 2005; Steg, 2016; Steg & de Groot, 2012)
Beliefs	(Dietz, 2015; Dietz et al., 2005; Steg, 2016; Steg & de Groot, 2012)
Norms	(Ostrom, 2000; Schultz, Nolan, Cialdini, Goldstein, & Griskevicius, 2007)
Trust	(Fehr, 2009; Henry & Dietz, 2011; Siegrist, Earle, & Gutscher, 2007; Slovic, 1999)

We also have to distinguish whether what we conjecture to be a key element of culture, such as religious affiliation, is a causal factor or an indicator of membership in a subculture. White's classic paper, in addition to eliciting thorough criticisms regarding its historical analysis, led to a small literature trying to examine the influence of religious affiliation on environmental concern using individual level data from the U.S. (Eckberg & Blocker, 1989, 1996; Hand & Van Liere, 1984; Kanagy & Willits, 1993; Shaiko, 1987; L. White, Jr., 1973; L. J. White, 1967). In this literature, Christian fundamentalism proved the strongest predictor among the various ways religion was examined. Fundamentalism was often measured not only by denomination but also by agreement with survey items indicating a belief that "the Bible is the literal word of God." But a question arises. Is the effect here causal in the sense that White argued: the Bible's admonitions, if internalized, lead to a lack of concern with the environment and low perceptions of risk? Or is fundamentalism, as operationalized in these studies, an indicator for membership in a subculture? If the latter then there will be a correlation between religion and environmentalism, but the effect of religion per se is not causal. It might be interpreted as spurious in that another set of cognitions present in that subculture is causal. Or it might be that the whole complex of cognition is necessary to produce differences in environmentalism or risk perception.

It may be possible to distinguish across the ways in which religion works: as causal per se, as an indicator of a subculture that acts as a whole or as an indicator of a subculture other aspects of which influence environmentalism and risk perception. For example, we might compare white, Republican fundamentalists with African American, Democratic fundamentalists to distinguish the effects of religious beliefs and political ideology (although if race and political party affiliation are strongly correlated the problem of which of those is causal remains). Our larger point is that it is important to define what we mean by culture and the other concepts we use and have a theoretical model of how they act if we are to understand how culture influences risk cognition and environmental decision making.

We also note that we might think of culture in network terms. Rather than drawing sharp and a priori boundaries between cultures and subcultures, we might think of cultures and subcultures as networks (Hoffman, Lubell, & Hillis, 2014). In some networks groups (and thus cultures) are tightly connected internally and relatively isolated from others. In others there may be strong links between relatively isolated groups. In still others, the structure is diffuse, with strong connections ubiquitous.

Finally, our charge included the term behavior. There is a tendency to be cynical about the influence of values, beliefs, norms, trust, risk cognitions and other aspects of culture on behavior. We believe this cynicism is misplaced. There are many studies that demonstrate casual effects. The problem is that the causal effects are moderate. There are several reason for this. First, most environmentally consequential behaviors are heavily constrained by wealth and other circumstances and we can't expect to overcome them with the simple changes we can make in our research. Second, the elements of culture that are most important in the long run are hard to change in the short run. Much social change comes from cohort succession. Third, individual behavior is influenced by so many factors that we cannot expect high predictability; in the regression jargon individual level regressions will seldom have high R^2 s. But if one aggregates to a larger geopolitical unit, those individual level predictions form the basis for quite accurate prediction at larger scales. Or put differently, while it is hard to predict who will respond to an intervention, well designed interventions can often have substantial overall effect. So the enterprise of understanding how various aspects of culture influence risk cognitions and environmental decision making is likely to make important contributions to both basic understanding and to finding practical strategies for environmental protection and sustainability.

Literature cited

- Bidwell, D. (2013). The role of values in public beliefs and attitudes towards commercial wind energy. *Energy Policy*, 58, 189-199.
- Cialdini, R. B. (2007 [1984]). *Influence: The Psychology of Persuasion* (Revised Edition ed.). New York: HarperCollins.
- Dietz, T. (2015). Environmental Values. In T. Brosch & D. Sander (Eds.), *Oxford Handbook of Values* (pp. 329-349). Oxford: Oxford University Press.
- Dietz, T., & Burns, T. R. (1992). Human Agency and the Evolutionary Dynamics of Culture. *Acta Sociologica*, 35, 187-200.

- Dietz, T., Dan, A., & Shwom, R. (2007). Support for Climate Change Policy: Social Psychological and Social Structural Influences. *Rural Sociology*, 72(2), 185-214.
- Dietz, T., Fitzgerald, A., & Shwom, R. (2005). Environmental Values. *Annual Review of Environment and Resources*, 30, 335-372.
- Dietz, T., Gardner, G. T., Gilligan, J., Stern, P. C., & Vandenberg, M. P. (2009). Household Actions Can Provide a Behavioral Wedge to Rapidly Reduce U.S. Carbon Emissions. *Proceedings of the National Academy of Sciences*, 106, 18452-18456.
- Eckberg, D. L., & Blocker, T. J. (1989). Varieties of Religious Involvement and Environmental Concerns: Testing the Lynn White Thesis. *Journal for the Scientific Study of Religion*, 28, 509-517.
- Eckberg, D. L., & Blocker, T. J. (1996). Christianity, Environmentalism, and the Theoretical Problem of Fundamentalism. *Journal for the Scientific Study of Religion*, 35, 343-355.
- Fehr, E. (2009). On the Economics and Biology of Trust. *Journal of the European Economic Association*, 7(2-3), 235-266.
- Fischhoff, B., & Kadavy, J. (2011). *Risk: A Very Short Introduction*. Oxford: Oxford University Press.
- Fischhoff, B., Slovic, P., Lichtenstein, S., Read, S., & Combs, B. (1978). How safe is safe enough? A psychometric study of attitudes towards technological risks and benefits. *Policy Sciences*, 9(2), 127-152.
- Hand, C. M., & Van Liere, K. D. (1984). Religion, Mastery-Over-Nature, and Environmental Concern. *Social Forces*, 63, 555-570.
- Henrich, J., Boyd, R., Bowles, S., Camerer, C., Fehr, E., Gintis, H., . . . Tracer, D. (2005). "Economic man" in cross-cultural perspective: Behavioral experiments in 15 small scale societies. *Behavioral and Brain Sciences*, 28, 795-855.
- Henrich, J., Ensminger, J., McElreath, R., Barr, A., Barrett, C., Bolyanatz, A., . . . Ziker, J. (2010). Markets, Religion, Community Size, and the Evolution of Fairness and Punishment. *Science*, 327(5972), 1480-1484.
- Henry, A. D., & Dietz, T. (2011). Information, networks, and the complexity of trust in commons governance. *International Journal of the Commons*, 5(2), 188-212.
- Hoffman, M., Lubell, M., & Hillis, V. (2014). Linking knowledge and action through mental models of sustainable agriculture. *Proceedings of the National Academy of Sciences*, 111(36), 13016-13021.
- Jaeger, C., Renn, O., Rosa, E. A., & Webler, T. (2001). *Risk, Uncertainty and Rational Action*. London: Earthscan.
- Kahneman, D. (2011). *Thinking Fast and Slow*. New York: Farrar, Straus & Giroux.
- Kahneman, D., Slovic, P., & Tversky, A. (Eds.). (1982). *Judgement Under Uncertainty: Heuristics and Biases*. Cambridge, England: Cambridge University Press.
- Kahneman, D., & Tversky, A. (1979a). Prospect Theory: An Analysis of Decision Making under Risk. *Econometrica*, 47, 263-291.
- Kahneman, D., & Tversky, A. (1979b). Prospect theory: An analysis of decision under risk. *Econometrica: Journal of the Econometric Society*, 263-291.
- Kanagy, C. L., & Willits, F. K. (1993). A 'Greening' of Religion? Some Evidence from a Pennsylvania Sample. *Social Science Quarterly*, 74, 674-683.
- Kleinesselink, R. R., & Rosa, E. A. (1991). Cognitive Representation of Risk Perceptions: A Comparison of Japan and The United States. *Journal of Cross-Cultural Psychology*, 22, 11-28.
- Kleinesselink, R. R., & Rosa, E. A. (1994). Nuclear Trees in a Forest of Hazards: A Comparison of Risk Perceptions Between American and Japanese University Students. In G. W. Hinman, S. Kondo, T. C. Lowinger, & K. Matsui (Eds.), *Nuclear Power at the Crossroads* (pp. 109-119). Boulder, Colorado: International Research Center for Energy and Economic Development.

- McCright, A. M., Marquart-Pyatt, S. T., Shwom, R. L., Brechin, S. R., & Allen, S. (2016). Ideology, Capitalism, and Climate: Explaining Public Views about Climate Change in the United States. *Energy Research & Social Science, 21*, 180-189. doi:doi:10.1016/j.erss.2016.08.003.
- McCright, A. M., & Xiao, C. (2014). Gender and Environmental Concern: Insights from Recent Work and for Future Research. *Society & Natural Resources, 27*(10), 1109-1113.
- Ostrom, E. (2000). Collective Actions and the Evolution of Norms. *Journal of Economic Perspectives, 14*(3), 137-158.
- Renn, O., & Rhormann, B. (Eds.). (2013). *Cross-Cultural Risk Perception: A Survey of Empirical Studies*: Springer Science and Business Media.
- Renn, O., & Rohrmann, B. (2000). Cross-cultural risk perception: State and challenges *Cross-Cultural Risk Perception* (pp. 211-233): Springer.
- Richerson, P. J., & Boyd, R. (2005). *Not by Genes Alone: How Culture Transformed Human Evolution*. Chicago, Illinois: University of Chicago Press.
- Rivers, L. I., & Arvai, J. (2007). Win Some, Lose Some: The Effect of Chronic Losses on Decision Making Under Risk. *Journal of Risk Research, 10*(8), 1085-1099.
- Rosa, E. A., & Matsuda, N. (2005). Risk Perceptions in the Risk Society: The Cognitive Architecture of Risk Between Americans and Japanese. In Y. Murakami, N. Kawamura, & S. Chiba (Eds.), *Peace, Security, and Kyosei* (pp. 113-130). Pullman, Washington: Washington State University Press.
- Rosa, E. A., Matsuda, N., & Kleinhesselink, R. R. (2000). The Cognitive Architecture of Risk: Pancultural Unity or Cultural Shaping? In O. Renn & B. Rohrmann (Eds.), *Comparative Risk Perception*. Dordrecht, The Netherlands: Kluwer.
- Rosa, E. A., Renn, O., & McCright, A. M. (2013). *The Risk Society Revisited: Social Theory and Governance*. Philadelphia: Temple University Press.
- Schultz, P. W., Nolan, J. M., Cialdini, R. B., Goldstein, N. J., & Griskevicius, V. (2007). The Constructive, Destructive, and Reconstructive Power of Social Norms. *Psychological Science, 18*, 429-434.
- Schwartz, S., Lilach Sagiv. (1995). Identifying Culture-Specifics in the Context and Structure of Values. *Journal of Cross-Cultural Psychology, 26*(1), 92-116.
- Schwartz, S. H. (2014a). Rethinking the concept and measurement of societal culture in light of empirical findings. *Journal of Cross-Cultural Psychology, 45*(1), 5-13.
- Schwartz, S. H. (2014b). Societal value culture: Latent and dynamic. *Journal of Cross-Cultural Psychology, 45*(1), 42-46.
- Schwartz, S. H. (2015). Basic individual values: sources and consequences. In T. Brosch & D. Sander (Eds.), *Oxford Handbook of Values* (pp. 63-84). Oxford: Oxford University Press.
- Schwartz, S. H., & Bardi, A. (2001). Value Hierarchies Across Cultures: Taking a Similarities Perspective. *Journal of Cross-Cultural Psychology, 32*(3), 268-290.
- Shaiko, R. G. (1987). Religion, Politics and Environmental Concern: A Powerful Mix of Passions. *Social Science Quarterly, 68*, 244-262.
- Siegrist, M., Earle, T. C., & Gutscher, H. (Eds.). (2007). *Trust in Cooperative Risk Management: Uncertainty and Skepticism in the Public Mind*. London: Earthscan.
- Slimak, M. W., & Dietz, T. (2006). Personal Values, Beliefs and Ecological Risk Perception. *Risk Analysis, 26*(6), 1689-1705.
- Slovic, P. (1999). Trust, Emotion, Sex, Politics, and Science: Surveying the Risk-Assessment Battlefield. *Risk Analysis, 19*, 689-701.
- Slovic, P., & Weber, E. U. (2002). Perception of risk posed by extreme events.
- Steg, L. (2016). Values, Norms, and Intrinsic Motivation to Act Pro-Environmentally. *Annual Review of Environment and Resources, 41*(1).
- Steg, L., & de Groot, J. I. M. (2012). Environmental values. In S. Clayton (Ed.), *The Oxford Handbook of Environmental and Conservation Psychology* (pp. 81-92). New York: Oxford University Press.

- Stern, P. C. (2014). Individual and household interactions with energy systems: Toward integrated understanding. *Energy Research & Social Science, 1*, 41-48.
- Stern, P. C., Janda, K. B., Brown, M. A., Steg, L., Vine, E. L., & Lutzenhiser, L. (2016). Opportunities and insights for reducing fossil fuel consumption by households and organizations. *Nature Energy, 1*, 16043.
- Thaler, R. H., Tversky, A., Kahneman, D., & Schwartz, A. (1997). The effect of myopia and loss aversion on risk taking: An experimental test. *The quarterly journal of economics, 647-661*.
- Van der Werff, E., Steg, L., & Keizer, K. (2013a). I Am What I Am, by Looking Past the Present: The Influence of Biospheric Values and Past Behavior on Environmental Self-Identity. *Environment and Behavior, in press*.
- Van der Werff, E., Steg, L., & Keizer, K. (2013b). The value of environmental self-identity: The relationship between biospheric values, environmental self-identity and environmental preferences, intentions and behaviour. *Journal of Environmental Psychology, 34*, 55-63.
- Van der Werff, E., Steg, L., & Keizer, K. (2014). I am what I am, by looking past the present the influence of biospheric values and past behavior on environmental self-identity. *Environment and Behavior, 46*(5), 626-657.
- Wang, M., Rieger, M. O., & Hens, T. (2016). How time preferences differ: Evidence from 53 countries. *Journal of Economic Psychology, 52*, 115-135.
- White, L., Jr. (1973). Continuing the Conversation. In I. G. Barbour (Ed.), *Western Man and Environmental Ethics* (pp. 55-65). Reading, Massachusetts: Addison-Wesley.
- White, L. J. (1967). The Historical Roots of Our Ecological Crisis. *Science, 155*, 1203-1207.
- Whitfield, S., Rosa, E. A., Dietz, T., & Dan, A. (2009). The Future of Nuclear Power: Value Orientations and Risk Perceptions. *Risk Analysis, 29*(3), 425-437.
- Zwickle, A., & Wilson, R. S. (2013). Construing risk. *Effective Risk Communication, 190-203*.