

5-2016

Cultural Values and Risk and Benefit Perceptions: An Examination of the Mediating Roles of Trust and Knowledge Hubris

Clayton Creed Tumblison
University of Arkansas, Fayetteville

Follow this and additional works at: <https://scholarworks.uark.edu/etd>



Part of the [Energy Policy Commons](#), [Environmental Policy Commons](#), and the [Public Policy Commons](#)

Citation

Tumblison, C. C. (2016). Cultural Values and Risk and Benefit Perceptions: An Examination of the Mediating Roles of Trust and Knowledge Hubris. *Graduate Theses and Dissertations* Retrieved from <https://scholarworks.uark.edu/etd/1541>

This Thesis is brought to you for free and open access by ScholarWorks@UARK. It has been accepted for inclusion in Graduate Theses and Dissertations by an authorized administrator of ScholarWorks@UARK. For more information, please contact scholar@uark.edu.

Cultural Values and Risk and Benefit Perceptions: An Examination of the Mediating Roles of Trust and
Knowledge Hubris

A thesis submitted in partial fulfillment
of the requirements for the degree of
Master of Arts in Political Science

by

Clayton Creed Tumblison
Arkansas State University
Bachelor of Science in Business Administration, 2010

May 2016
University of Arkansas

This thesis is approved for recommendation to the Graduate Council

Dr. Geoboo Song
Thesis Director

Dr. William Schreckhise
Committee Member

Dr. Brinck Kerr
Committee Member

Abstract

This thesis examines the process by which cultural value predispositions influence perceptions of risks and benefits of energy policies, specifically focusing on High Voltage Power Line (HVPL) installations and Hydraulic Fracturing (fracking). For HVPL installations I examine the role of (dis)trust in three groups associated with the HVPL debate – the government, environmental groups, and the energy industry – in determining risk and benefit perceptions of HVPL installation. Findings indicate that cultural value predispositions guide policy elites' perceptions of trustworthiness. Further, this trust, in turn, guides perceptions of risks and benefits of HVPL installations, partially mediating the effects of cultural value predispositions on risk and benefit perceptions. For fracking, I introduce the concept of knowledge hubris and examine the cultural value-based origins of knowledge hubris and the resulting role knowledge hubris plays in predicting risk and benefit perceptions associated with fracking. Further, I compare the role of knowledge hubris in risk and benefit assessments between a sample of the general public and local policy elites. Results indicate that the origins of knowledge hubris are similar between local policy elites and the general public. However, the influence of this knowledge hubris on risk and benefit perceptions of fracking is different between the two groups.

Acknowledgments

I would like to first express my appreciation to Dr. Geoboo Song, my advisor and committee chair, for his support, patience, and guidance throughout this process. I would also like to express my appreciation for the help, support, and guidance of the rest of my thesis committee – Dr. William Schreckhise and Dr. Brinck Kerr, and to the faculty of the Political Science department as a whole, who have consistently provided encouragement, support, and an atmosphere of learning making this process not only possible, but enjoyable. Finally, I would like to express my gratitude toward my co-researcher, Rachael Moyer, who has acted as a sounding board in addition to providing feedback and encouragement during our many discussions.

Dedication

This work is dedicated to my family, who has provided me with both the support and motivation needed to make it through this process. To my wife, Sara Tumilson, who has encouraged me and kept me focused along the way, all while accidentally learning more than she ever wanted to know about methodology and the various constructs related to my research. To my children, Rana, Hyla, and Dace, I express my gratitude for their mere presence, which motivates and inspires me to pursue success. I would like to thank my mother, Terry Tumilson, for her continued support and motherly bragging (whether it was deserved or not), and my father, Renn Tumilson, for commiserating with me on the challenges of graduate school as well as for instilling in me the desire to always want to learn more. Finally, to my sister and brother-in-law, Tamzen and Caleb Bryant, who have done an admirable job of listening to me discuss my research whilst minimizing expressions of boredom.

Table of Contents

Introduction.....	1
The Origin and Role of Trust in Local Policy Elites' Perceptions on High Voltage Power Line Installations in the State of Arkansas.....	2
References.....	24
Tables and Figures.....	29
Appendices.....	35
Knowledge Hubris and the Policy Process: A Comparison of the Origin of Inflated and Deflated Knowledge Perceptions between Policy Elites and the General Public and Their Effects on the Policy Process.....	39
References.....	58
Tables and Figures.....	63
Conclusion.....	69
Appendix.....	71

List of Published Papers

Tumlison, C., Moyer, R., Song, G., The Origin and Role of Trust in Local Policy Elites' Perceptions on High Voltage Power Line Installations in the State of Arkansas. Under Review at *Risk Analysis*

Introduction

The influence of cultural value predispositions on risk and benefit perceptions has been often researched in a plethora of domains, generally focusing on direct relationships between the two constructs. The causal process by which cultural values influence risk and benefit perceptions, however, has been relatively unexplored. Thus, the two papers in the current thesis focus on examining the causal mechanisms by which cultural value predispositions influence risk and benefit perceptions. Utilizing the context of proposed High Voltage Power Line installations in the state of Arkansas, the first paper examines how the cultural value predispositions of local policy elites shape perceptions of trustworthiness toward three groups associated with the debate – the government, environmental groups, and the energy industry – and how this (dis)trust influences risk and benefit perceptions associated with HVPL installations. Generally, I argue that an individual's cultural values lead to trusting information from sources that are perceived as congruent with their values, and distrusting information from sources whose values are perceived as incongruent, and it is this resulting (dis)trust that shapes risk and benefit perceptions.

The second paper focuses on risks and benefits associated with hydraulic fracturing, utilizing a sample of local policy elites and the general public from the states of Arkansas and Oregon. I introduce the concept of knowledge hubris – the degree to which perceived and actual knowledge are congruent – and examine its cultural values-based origins and the resulting risk and benefit perceptions associated with fracking. For this, I argue that knowledge hubris stems from identity protection desires which are oriented around an individual's cultural value predispositions. In addition to examining the mediating role knowledge hubris plays in the relationship between cultural values and risk and benefit perceptions associated with fracking, this paper examines the similarities and differences between local policy elites and the general public in terms of both the origins of knowledge hubris and its effects on risk and benefit perceptions associated with fracking.

Together, these two papers shed light on two of the mechanisms by which cultural value predispositions might shape perceptions of risks and benefits. Further, these papers focus on an often neglected group of individuals who are central to the policy-making process – local policy elites.

The Origin and Role of Trust in Local Policy Elites' Perceptions on High Voltage Power Line Installations in the State of Arkansas

By: Clayton Creed Tumblison, Rachael Moyer, Geoboo Song

ABSTRACT: The debate over installation of high voltage power lines (HVPLs) has been intense, particularly in Northwest Arkansas. Detractors claim that the installation will negatively affect both the natural environment and the local economy, which contains a large tourism component. By contrast, those in favor of installing HVPLs claim that the installation is necessary in order to reliably support the increasing demand for electric power. Using original data collected from a recent statewide Internet survey of 420 local policy elites in Arkansas, this paper focuses on two key aspects. First, we examine how local policy elites' perceptions of risks versus benefits of HVPL installation in their communities are influenced by their levels of trust toward information provided by various sources (e.g., energy industry, environmental groups, and government). Second, we utilize Cultural Theory (CT) to explain how the cultural worldviews of policy elites – specifically, egalitarianism, individualism, hierarchism, and fatalism – shape these levels of trust and HVPL benefit-risk perceptions, while controlling for other factors claimed by previous literature, including levels of knowledge on energy related issues and demographic characteristics. In general, our analysis indicates that policy elites' value-oriented formation of HVPL benefit-risk perceptions is partially due to the influence cultural values have on trust in information sources. We conclude this paper by discussing broader implications for the origin and role of trust in policy elites' decisions throughout the policymaking process.

1. INTRODUCTION

The benefit-risk perceptions of policy elites may have a direct bearing on individual level policy decisions and broader policymaking practices in society (1,2). An examination of factors that may influence the formation of such perceptions can provide valuable insight into understanding particular policy choices supported – or opposed – by various policy actors, or further afield, into proposing new approaches to policymaking, especially in an adversarial policy subsystem (3,4). This study examines the origin and the role of local policy elites’¹ trust in different information sources vis-à-vis their benefit-risk assessments of proposed High Voltage Power Line (HVPL) installations in the state of Arkansas.

The delivery of electricity in the United States depends upon a complex network of transmission lines and is regulated by various governmental agencies.² The installation of additional transmission lines increases the capacity of electric transmission and creates flexibility in the case of transmission line interruptions by allowing electricity to be rerouted, thereby reducing the risk of cascading failures and the resulting negative economic impact (5)³. Socio-political controversies related to the installations of these lines often result in delays to needed upgrades and have the potential to threaten the economy at the local, state, and national level due to the interconnectedness of the nation’s power grid.

As such, a recent controversial policy debate in Arkansas over an application to begin HVPL installation⁴ resulted in postponements of the planned installation and in the proposal of legislation aimed

¹ This research uses the conceptual definition of “local policy elites” referred to as “policy actors who hold various political resources to be utilized to exert potential influence in various phases of policy process, including agenda setting, policy analysis, policy formulation, policy implementation, and policy feedback, at the local level, as suggested by Moyer and Song (1). Policy elites of this sort may include city mayors, city council members, city clerks, city government officials, and chamber of commerce members.

² The national energy grid is overseen by the Federal Energy Regulatory Commission (FERC) and the U.S. Department of Energy and coordinated by the North American Electric Reliability Corporation (NERC).

³ Interruptions in electricity have economic implications. Severe weather poses the largest threat to reliable power (5). Economic loss due to school and businesses closings, the discontinuation of necessary services and even loss of life due to severe weather amount to between \$18 and \$33 billion every year, while more significant weather events like Hurricane Sandy (2012) are estimated to cost closer to \$52 billion (5). Because climate change is expected to increase the frequency and intensity of weather-related events in the near future, the security and reliability of the United States Energy Grid is a national priority (5). Additionally, the majority of the nation’s transmission lines are more than 25 years old, resulting in the dissipation of energy, which constrains the nation’s electric supply during periods of demand (6).

⁴ An application with the Arkansas Public Service Commission was filed for a Certificate of Environmental Compatibility and Public Need in 2013 (7). The Southwest Power Pool is the NERC’s regional entity for the southwest United States and operates over 48,000 miles of transmission lines to serve more than 15 million people in a nearly 400,000 square mile area (8). In 2008, SPP mandated the installation of a 48

at restricting the placement of future lines in the state.⁵ This offered an opportunity to investigate the risk-benefit perceptions surrounding the issue – as a critical aspect of policy decisions – particularly among those local policy elites in the affected regions. The installation of HVPLs is perceived as threatening to some who claim that the lines will degrade the natural environment, compromise human health, tarnish the natural beauty of the area and negatively impact the tourism-based local economy (9). Others see the installation as the inevitable result of a growing area population that will provide efficient, reliable electricity and strengthen the national energy grid (8).

In an effort to understand such contrasting attitudes toward HVPL installations, this paper focuses on two key aspects. First, we examine local policy elites' levels of trust toward information provided by various sources and how this influences their policy reasoning with regard to their perceptions of the benefits *versus* risks of the installation of HVPLs in their communities. Second, we further investigate the origin of policy elites' aforementioned trust (or lack thereof). For this latter inquiry in particular, we utilize Cultural Theory (CT) (10) to explain how such trust is rooted in policy elites' cultural worldviews – specifically, hierarchism, fatalism, egalitarianism, and individualism – while considering the effects of other factors claimed by previous literature, including domain specific knowledge and demographic characteristics. Broader implications for the origin and role of trust in policy elites' decisions throughout the policymaking process will also be discussed.

2. RISKS AND BENEFITS OF HIGH VOLTAGE POWER LINE INSTALLATIONS

When probing risks and benefits associated with HVPL installations, we can consider them from both a societal and an individual perspective, which is well highlighted in the related policy debate in the state of Arkansas. From a societal perspective, an updated national energy grid is important to both national security and the national economy. Smaller regional energy grid networks are responsible for providing energy to the businesses and residents of several states, affecting millions of people. However, national

mile 345 kV transmission line for northwest Arkansas, part of an \$8.1 billion planned upgrade to the grid for the 2000-2011 planning cycle (8).

⁵ Controversies concerning the installation of HVPLs are prevalent throughout the United States. Some of the most publicized include the Susquehanna-Roseland project in New Jersey, Dominion Power-James River project in Virginia, Rock Island Clean Line project in Iowa, Luzerne-Wayne project in Pennsylvania, Palo Verde-Devers project in Arizona and California, Lassen County-Santa Clara project in California, Northern Pass project in New Hampshire and Canada, and the Fredericksburg-Lampasas project in Texas.

parks and regional and local industries – particularly those that are tourism-based – may be threatened due to large-scale environmental changes necessary to accommodate new and upgraded power lines (9). Furthermore, the risks derived from pesticide use to clear vegetation surrounding power lines creates large-scale health risks, as this chemical usage may contaminate sources of groundwater and drinking water (9). From an individual perspective, a reliable energy supply is necessary to provide expected convenience and to support existing lifestyles and economic benefits. However, the resulting infrastructure can lower the property value of individuals, especially for those whose residences are adjacent to it (11,12). In addition, individuals in close proximity to HVPLs may feel that they are at risk for exposure to electromagnetic fields (EMFs) generated by HVPLs, though there have been no robust scientific grounds for such concerns (11).

The recent policy debate on the proposed HVPL installation in Arkansas reflects the various aspects of such benefits and risks. For instance, in 2013, the Southwest Power Pool claimed that benefits of HVPL installation in the Ozark Mountain area included a stable and reliable energy supply which would reduce costs associated with power loss caused by supply interruption as well as lowering costs through increased efficiency in transmission (13). They further argued that HVPL installation would provide new economic opportunities, create jobs, and connect future renewable energy sources to the national grid, as well as use land efficiently. However, there were publically expressed concerns associated with the proposed HVPL installation, including “impacts to wildlife, possible groundwater pollution if herbicides are used to keep power lines clear, visual pollution and decreased property values” as well as the degradation of the scenic beauty which supports the tourism-based economy of Northwest Arkansas and potential health risks associated with EMF exposure (9).

3. THEORIES AND HYPOTHESES

The risk perception literature provides a theoretical framework for explaining the variation in individuals’ perceived benefits and risks associated with HVPLs, which is directly applicable in the understanding of related perceptual differences among local policy elites in the state of Arkansas – a primary concern of this research. The literature has identified a multitude of factors that affect the perceptions of benefits and risks across many different domains, including psychometric characteristics of risk (14), demographic

characteristics (15), knowledge level on a risk or its source (16), trust toward relevant information sources of a risk (17), and individual values, specifically cultural predispositions (18). Following is a brief discussion on those theoretical approaches relevant to understanding the HVPL benefit-risk perceptions of local policy elites in Arkansas. We then provide theoretical postulations regarding the relationship between intrinsic value predispositions, trust in sources of information, and benefit-risk perceptions of HVPLs.

3.1. Demographics and Knowledge

Previous research has demonstrated that individuals' demographic characteristics, particularly gender and race, can influence their risk perceptions. Some studies have identified what is commonly referred to as the "white male effect" (19). These studies report that males perceive consistently lower levels of risk associated with environmental health threats than females (15), and white individuals tend to indicate lower levels of risk than non-white individuals across a variety of risk domains (19). Interestingly, this gender difference in risk perceptions is not restricted to judgment among the general public. Scientists, who are generally assumed to hold a relatively sophisticated level of scientific knowledge and expertise, have been found to exhibit similar perceptual patterns. For example, male scientists' perceived nuclear risk has been found to be substantially lower than that of female scientists (20). Kahan, Jenkins-Smith and Braman (21) argue that these findings stem from a unique value identity that is rooted on individualism and hierarchism shared among "white males" in the context of the United States, which translates into risk-taking attitudes in the assessment of potential benefits and risks of science and technology utilization, such that the evaluation reinforces their views on a resilient ecological system and the promotion of market-oriented entrepreneurship (21). Similarly, one would expect to find discernible variations based on demographic characteristics in local policy elites' personal assessments of benefits and risks relating to the installation of HVPLs in the state of Arkansas.

An individual's knowledge level regarding subtleties of the sources of risk and danger has also been offered as an explanation as to why people perceive benefits and risks differently (22). This "knowledge theory of risk perception" suggests that those who are more knowledgeable regarding potential hazards are able to make more objective and accurate evaluations as compared to those who

are less knowledgeable. This “knowledge thesis” has mainly been examined in terms of differences of risk perceptions between experts and the general population, with experts being assumed to be more knowledgeable. Empirically, results have been mixed. Some studies have found significant differences in risk assessments between the two groups across risk domains, including chemicals (23), biotechnology (24) and nanotechnology (25). However, other studies claim that, due to methodological validity issues in previous studies, there is little evidence to support the argument that the risk judgment of experts is different than that of lay people (26). While there is debate regarding the knowledge hypothesis, there is enough evidence to consider an individual's level of knowledge on state energy issues a potential contributing factor in variations in benefit-risk assessment of HVPL installations among Arkansas local policy elites.

3.2. Value Predispositions and Grid-Group Cultural Theory

Grid-group cultural theory (CT) of risk perception stems from research examining how socio-political conflict and policy debate reflect various cultural outlooks within society(27). Early work by Douglas and Wildavsky (18) suggests that perceptions of risk are developed in such a way as to sustain an individual's preferred “way of life” or “cultural worldview”. Conceptions of risks are, therefore, claimed to apply to domains and issues that would violate these dispositional preferences, resulting in debates regarding risks not necessarily confined to the technical aspects, but extended to the sociopolitical, which are oftentimes related to the more intrinsic question of how a society should be structured and function (18,28). Wildavsky & Dake (22), for instance, found CT a superior theory in predicting individual level risk perceptions across several risk domains, particularly as compared to other theoretical lenses, such as those based on differences in knowledge, personality, economic, and political views, providing early support for the theoretical claim that perspectives of risk are socially constructed.

Variations in individuals' perceptions of risk in various contexts have been examined utilizing this theoretical lens of social construction of risks (2–4,29–31). According to CT, “social relations” are the means through which “cultural biases” are shared. These biases, and the social relations stemming from them, reflect general attitudes and worldviews that are shared across socially constructed systems (32). Further, these biases help determine individual behavior, including the attention that is paid to certain

types of risk as well as risk taking preferences in different contexts (32). A typology of four primary cultural worldviews (i.e., egalitarianism, individualism, hierarchism, and fatalism) is derived based on two dimensions of social relations – “grid,” which is based on the extent to which individuals follow an “explicit set of institutionalized classifications” and “group,” which represents the extent to which individuals view themselves as bound to their social group (32).

CT suggests that each worldview is “contradistinct” to the others, and that they function together as a system, which allows an individual who holds a given worldview to rely on the distinctions from other worldviews to reinforce their own cultural biases (32). These unique worldviews create distinct risk perceptions in individuals based on perceived threats to their way of life. Long term stability is maintained by the critical system formed by this “dynamic imbalance” (18), as a system “in which ways of life are nicely balanced is less prone to being surprised and will have a wider repertoire to draw from in responding to novel situations” (32).

Egalitarians (low grid-high group) lack differentiation in their roles within the group, while being strongly bound to their social group. Equitable distribution and fairness are deemed highly valuable. Egalitarians tend to distrust authority, which reinforces group cohesion, and perceive high levels of risk, particularly in the realms of technological development and economic growth (32). Individualists (low grid-low group) are not bound by rules or social groups and generally prefer a libertarian society, seeing risk as opportunity (32). Individualists dislike external control, and thus tend to believe that society functions best when everyone, including the disadvantaged, compete, succeed, and fail as individuals. Hierarchs (high grid-high group) value both institutional and social rules, which maintain valued social order. High levels of risk are often considered acceptable, with reliance on setting the right course for society being placed on experts. Success, from a hierarch’s perspective, is attainable by obeying authority, and those who break rules should suffer severe and fast punishment. Fatalists (high grid-low group) are bound by social constructs but excluded from social groups. Fatalists view themselves as at the mercy of fate, and thus are skeptical of their own ability to seize control of situations they encounter.

The interrelationships between these different cultural worldviews form a “behind-the-scenes” economic system wherein hierarchs and individualists are focused on wealth creation, while egalitarians value equality in economic distribution (32). CT further suggests distinct ideas regarding nature held by

each worldview, with egalitarians viewing nature as fragile and easily damaged. Thus, nature must be managed carefully to avoid complete collapse, with experimentation being forbidden (32–34).

Alternatively, individualists believe the need for management of nature is minimal, as nature maintains equilibrium itself. This, in turn, allows for trial and error in regards to the environment, in pursuit of the “best possible” outcomes (32–34). Hierarchs hold somewhat similar views regarding nature, viewing it as robust and tolerant. However, as opposed to individualists, hierarchs believe that the potential for occasional events that can upset nature’s equilibrium necessitates strict regulations aimed at preventing these potential calamities. This stems from the hierarch’s desire for a certain and predictable future based on expert evaluation (32–34). True to form, fatalists view nature as simply a function of chance.

3.3 Trust

Trust is an often-utilized concept in explaining perceptions of risk (and, similarly, “acceptance”). However, trust – both how it is derived and how it affects other factors – has been conceptualized in many different ways in risk perception literature. Luhmann (35) takes a very cognitive approach, describing trust as the outcome of an active choice on the part of the trusting party derived from the weighing of benefits and risks in allowing the trustee to act on the trusting party’s behalf, with no control over the trustee’s actions. Frewer and Salter (36) suggest that trust should be categorized utilizing a three-tier system. The first tier is individualized trust, in which a party simply trusts another person or product. The second tier is system-oriented and directed toward institutions. Lastly, the third-tier is relational. In this last tier, trust is the result of personal experience and interactions between the individual and another person or group. It can be argued that both the first and third tiers are derived by some level of dyadic interactions, the third tier exclusively so. The second tier can be causally ambiguous in addition to being derived from some level of dyadic interactions. Another conceptualization of trust, similar to that of the second tier proposed by Frewer & Salter (36), is that of social trust, which is “the willingness to rely on those who have the responsibility for making decisions and taking actions related to the management of technology, the environment, medicine, or other realms of public health and safety” (17). Siegrist et al. (17) suggest that social trust is derived through salient value similarity. Salient values “consist of the individual’s sense of what the important goals (ends) and/or processes (means) are that should be followed in a particular

situation” (17). As such, the concept of salient values is contextually based, meaning that values in one situation may not be congruent in a different situation or context, thus making the origin of trust fluid and context specific.

In terms of the origins of trust in a given source of information among local policy elites, we take an approach similar to that of Siegrist et al. (17). However, we apply a Cultural Theory perspective; whereas in Siegrist et al.’s conceptualization, the origin of trust relies on the fluidity of salient values in determining trust, explicitly counter to Cultural Theory (17). Instead, we view an individual’s cultural value predispositions as providing a framework for one’s trust in an information source. More specifically, we argue that the cultural value predispositions individuals possess contribute to their motivated reasoning, and thus their willingness to trust a deliberately chosen source of information. One of the key components of motivated reasoning – “the systematic biasing of judgments in favor of one’s immediately accessible beliefs and feelings” (37)– is the idea of selective exposure, which posits that individuals choose information sources that are congruent with their currently held beliefs (30,38,39). Two other components of motivated reasoning are likely to come into play in the willingness to trust a given information source – confirmation bias and disconfirmation bias. Confirmation bias suggests that individuals tend to give greater credit to evidence that is congruent with their previous beliefs while disconfirmation bias does the inverse, in that individuals counter-argue evidence that is incongruent with prior views and beliefs (39). We thus expect that, through motivated reasoning processes, trust in an information source will arise not from the accuracy or quality of the information, but, at least in part, from the perceived congruence between the origin of the information and an individual’s deeply held cultural value predispositions.

Trust has also been examined in terms of its influence on perceptions of risks and benefits. Trust in authorities has consistently been found to exert an influence on risk perceptions across various risk domains (40–44). Further, trust has been demonstrated to influence acceptance via its effect on perceptions of risk and benefits (45,46) and is suggested to be utilized to decrease the cognitive load of an individual by allowing them to make “rational” decisions by relying on information provided by those whose opinion they deem accurate (16,47), in turn shaping perceptions of risks and benefits. Importantly, trust contains an affective component, including concerns of honesty and integrity, which can lead to greater perceptions of risk when trust is lacking (47,48). Cultural values, for example, are likely to

influence trust. In an effort to validate their worldview, individuals will categorize those who share their views as being honest and high in integrity (and conversely perceive those who do not share their worldviews to be relatively dishonest and low in integrity), reinforcing their own cultural biases (32).

While there is often an implicit assumption of the role of trust in studies utilizing cultural theory to explain risk perceptions, there is a relative dearth of studies systematically and empirically investigating these relationships. Some studies have recently begun to explicitly examine the general proposition regarding trust – particularly as related to risk perceptions and policy attitudes – being derived from value congruence between the receiver and provider of related information. In explicating perceptions of scientific consensus on the topics of climate change, nuclear waste disposal, and handgun regulation, for instance, Kahan, Jenkins-Smith, and Braman (49) conducted an experiment in which they provided subjects with information regarding an “expert’s” cultural values and found that subjects rated experts as more knowledgeable and trustworthy when the expert’s view on the risk related issues was more congruent with their own cultural value predispositions. Kahan, Slovic, Braman, Gastil, Cohen, & Kysar (50) also found that polarization of views of risks related to nanotechnology were at least partially accounted for by the congruence of the individual’s cultural worldviews and those of the “experts” advocating for – or against – further nanotechnology research. Value congruence, in this particular research, was considered a proxy for credibility, which is dependent on trust (50). Similar results were also reported in an experimental study regarding risks associated with the human papillomavirus (HPV) vaccine (51).

While informative, previous studies on the role of trust in benefit-risk perceptions lack definitive connection between implicit theoretical premises and more direct empirical tests pertaining to the question of the origin of trust. In this study, we, therefore, attempt to place more emphasis on situating the role of trust in comprehending the influence of more intrinsic dispositional values on benefit-risk perceptions while systematically examining triadic relationships between cultural values, trust, and HVPL benefit-risk perceptions using original data collected from a recent statewide survey distributed to Arkansas local policy elites. In doing so, we seek to address some of the criticisms of the CT-based

approach⁶, specifically, its low proportion of variance explained – in comparison with other factors claimed by competing theoretical approaches (e.g., affective feelings) – reported in previous empirical risk perception research (44,57) by considering the process by which cultural values might more distally exert an influence on risk and benefit perceptions through mediating factors, such as trust.

3.4 Hypotheses

The focus of this study is the examination of the origin of trust in information sources and the resulting role that trust plays in benefit-risk perceptions. As discussed, the issue of HVPL installation involves very strong proposed benefits and risks in both economic and environmental domains. As such, we expect that local policy elites with distinctive cultural orientations would exhibit substantively different perceptions of benefits and risks associated with HVPL installation.

Egalitarians perceive high levels of risk, particularly in the realms of technological development and economic growth (32) and view nature as fragile and easily damaged. Thus, we expect egalitarians to perceive greater HVPL risks (as compared to benefits). Individualists and hierarchs are both accepting of risks (32) and view nature as relatively robust. Accordingly, we anticipate that these two cultural types would perceive greater HVPL benefits (as compared to risks). Finally, fatalists view fate as chance, thus we expect them to exhibit no particular relationship with HVPL benefit-risk perceptions.

In examining trust in information sources, we explore trust in three different sources of information: the energy industry, environmental conservation groups, and government agencies. We hypothesize that strong egalitarians would (a) distrust the energy industry – viewing them as dangerous to the environment and representing a lack of fairness and equality in policy-making, and (b) trust environmental conservation groups – due to their shared view of nature and ecosystem as vulnerable.⁷ Quite contrastingly, we hypothesize that strong individualists would (a) trust the energy industry – due to its representation of market-based competition and entrepreneurship, and (b) distrust environmental

⁶ For a more in-depth discussion on the critiques of CT, see Boholm (52), Marris, Langford, & O’Riordan (53), Renn & Rohrmann (54), Rippl (55), and Sjoeborg (56).

⁷ We did not include a working hypothesis regarding strong egalitarians and trust in the government, as it can be argued that for strong egalitarians, government plays an ambiguous role in relation to equality in the policy-making process; a negative role in that policy decisions are made by just a few within the government, and a positive role in that government provides access to individuals to voice concerns and/or opinions.

conservation groups and government agencies – due to the perception that each of these impinge on individual liberties. For strong hierarchs, we expect (a) trust in the energy industry and government agencies – as they both represent experts and authority in a given field, and (b) distrust in environmental groups – as they represent deviance from institutionalized authority (in the HVPL installation context in particular). Finally, for strong fatalists, we expect no significant relationships regarding trust toward information sources – as, according to CT, they tend to be apathetic to, and detached from, any meaningful policy deliberation.

In considering the role of trust in information sources in benefit-risk perceptions, we expect several key relationships based upon our previous discussion of the debate regarding HVPL installation and its proposed benefits and consequences. We expect (a) trust in the energy industry to increase perceived levels of benefits (as compared to risks), (b) trust in environmental conservation groups to increase levels of perceived risks (as compared to benefits), and (c) trust in government agencies to increase perceived levels of benefits (as compared to risks).

In short, the analysis of our primary interest in this study is the examination of the mediating role of trust in information sources between cultural predispositions and HVPL benefit-risk perceptions among Arkansas local policy elites. In response, we postulate that, generally, the relationships between policy elites' cultural values and their HVPL benefit-risk perceptions would be mediated through trust in information sources. Furthermore, we anticipate that each of four cultural orientations (i.e., egalitarianism, individualism, hierarchism, and fatalism) would hold different mediational patterns. In other words, the four “theoretical” cultural types are expected to have differing HVPL benefit/risk perceptions, partially because their levels of (dis)trust in various information sources (i.e., the energy industry, environmental groups, and government) would be dissimilar, as specified in the previous discussion.

4. DATA, VARIABLES, AND MEASURES

4.1 Survey Data

Between March and August of 2014, a confidential Internet survey was distributed to a sample of 2,471 Arkansas local policy elites using their publicly available email addresses. These potential survey participants included city mayors, city council members, city clerks, city government officials, and

chamber of commerce members in over 51 cities⁸ in the state of Arkansas. In order to construct this elite survey sample⁹, we navigated through each of Arkansas' 51 municipal government websites and carefully evaluated which city officials' positions closely match the conceptual definition of local policy elites we provided in Footnote 1 in the introduction section of this paper. We then selected those policy elites who were likely to be concerned about HVPL issues and whose email addresses were available to the public. Among 2,471 policy elites who received our survey invitation email that contained a brief explanation of the survey and an embedded survey link, 420 took the survey¹⁰. This voluntary survey consisted of 36 substantive questions focusing on Arkansas energy policy issues regarding HVPL installations and city level sustainable energy measures. Additionally, included were questions regarding cultural worldviews, affective feelings, knowledge regarding Arkansas energy issues, trust of information sources, and demographic characteristics. The University Institutional Review Board approved this survey study, including data collection protocol.

4.2 Dependent Variable and Measures

The perceived benefits and risks that Arkansas policy elites hold regarding the installation of HVPLs is the primary dependent variable of interest in this analysis. This was operationalized utilizing specific aspects of HVPL benefits and risks which have been observed in various debates over HVPL installation (11,12) and were expressed during public comments made to the Arkansas Public Service Commission in Northwest Arkansas in 2013. As presented in Table I, a total of eleven survey items were used to measure HVPL benefit and risk perceptions. A composite HVPL benefit-risk index was developed utilizing six benefit measures (reverse-coded) and five risk measures which were averaged together to provide a single benefit-risk score. The six benefit items addressed economic, health-related, and environmental benefit dimensions, including energy supply stability and reliability, efficient energy transmission and land

⁸ Among these Arkansas cities are Little Rock, Fort Smith, Fayetteville, Springdale, Jonesboro, North Little Rock, Conway, Rodgers, Pine Bluffs, Bentonville, Hot Springs, Benton, Texarkana, Sherwood, Jacksonville, Russellville, Bella Vista, Cabot, Van Buren, Maumelle, Siloam Springs, Harrison, Magnolia, Arkadelphia, Batesville, Hope, Greenwood, Osceola, Lowell, Beebe, Morrilton, De Queen, Farmington, Alma, Berryville, Walnut Ridge, Pea Ridge, Dardanelle, Ashdown, Dumas, Cherokee village, Gentry, Tontitown, Huntsville, West Fork, Mayflower, Carlisle, Centerton, Greenland, Elkins, and Eureka Springs.

⁹ For demographic characteristics of this local policy elite sample in comparison with that of the general public in Arkansas and in the United States, see Appendix I.

¹⁰ It is noteworthy that some local policy elites may have received a personal invitation from a recognized community leader asking for their survey participation.

use, job creation, provision for renewable energy, and maintenance of necessary services during post-disaster or high energy demand periods. Similarly, the five risk items address economic, health-related, and environmental risk dimensions, including decreasing property values and threats to local industries (e.g., tourism), environmental degradation from clear cutting trees or pesticide and herbicide use, and negative health impacts due to electromagnetic field emission. All items were measured on an eleven-point scale assessing perceived level of benefit (risk), with the final benefit-risk index representing aggregate perceptions of benefits and risks where higher scores indicate greater risks and lesser benefits. These items were highly reliable, with a Cronbach's alpha score of 0.92.

(Table I about here)

4.3 Independent Variables and Mediators

The primary independent variables are individuals' cultural predispositions (i.e., egalitarianism, individualism, hierarchism, and fatalism). As presented in Table II, we utilized a previously validated scale consisting of three survey items to measure each of four value orientations for a total of twelve items (3,4,30,58,59). Survey respondents were provided twelve statements designed to measure their cultural orientations and rated their level of agreement with each statement on a seven-point scale ranging from 1 (=Strongly disagree) to 7 (=Strongly agree). Using data derived from the survey results of these twelve cultural theory items, we then conducted factor analysis and optimized the four factor solution, in which each set of three CT items was loaded onto one of four latent dimensions. These extracted dimensions conceptually matched each of the four cultural orientations suggested by CT. Based on the factor structure matrix derived from this factor analysis, factor scores for each of the four latent dimensions were calculated and used as an index for measuring each respondent's cultural orientations. Chronbach's alpha scores for each set of three CT items range from 0.67 to 0.78, indicating an acceptable range of measurement reliability within the survey items for each of the four cultural value dimensions.

(Table II about here)

In order to measure our mediation variables, Arkansas local policy elites' levels of trust toward various information sources (e.g., the energy industry, environmental groups, and government), we asked our survey respondents about their levels of perceived trustworthiness of each information source as it pertains to energy issues, including high voltage power lines, on an eleven-point scale ranging from 0

(=Not at all trustworthy) to 10 (=Completely trustworthy). Higher scores on this scale represent higher degrees of perceived trustworthiness of a particular information source, as displayed in Table III.

(Table III about here)

4.4 Control Variables and Measures

As shown in Table IV, other variables, which have been claimed by previous studies to exert influence on benefit-risk perceptions, were utilized as control variables. These include an individual's level of knowledge on energy issues and his or her demographic characteristics such as race, gender, age, education, and income. To measure respondents' knowledge levels, we asked a series of eight true/false questions relating to various energy issues in the state of Arkansas. A respondent's knowledge score was the sum of correct answers to these eight questions, with higher scores representing higher knowledge levels. For demographic characteristics we included race (coded 1 for Non-Hispanic Whites and 0 for all others), gender (coded 1 for Male and 0 for all others), age (age in years), education (a seven-point scale with higher ratings representing higher education levels), and income (a four-point rising scale).¹¹

(Table IV about here)

5. STATISTICAL ANALYSIS AND RESULTS

In order to verify our hypotheses pertaining to the triadic relationships between cultural orientations, trust in information sources, and HVPL benefit-risk perceptions among Arkansas local policy elites, we utilized mediation analysis outlined by Preacher and Hayes (60,61).¹² Using the SPSS macro MEDIATE (60, 61),

¹¹ Descriptive statistics and frequency distributions of the aforementioned variables are presented in Appendix II and Appendix III.

¹² Similar results were obtained when we utilized the mediation analysis methods suggested by Baron and Kenny,(62), which involved the following analytical steps. First, based on Ordinary Least Squares (OLS) estimation, we regressed HVPL benefit-risk perceptions on four CT measures while controlling for knowledge level and standard demographics to establish the suggested relationship between the primary independent variable (i.e., cultural orientations) and the dependent variable (i.e., HVPL benefit-risk perception). Second, holding the right side of the equation exactly the same with the regression model estimated in the first step, we ran regression while placing the trust variable in the left side of the regression equation to check if the primary independent variables (i.e., cultural orientations) are associated with the mediator variable (i.e., trust). Third, in order to precisely estimate the relationship between the mediator variable (i.e., trust) and the dependent variable (i.e., HVPL benefit-risk perceptions), we ran the regression while adding the trust variable to the right side of the regression equation used for the first step of the analysis. Finally, we follow Baron & Kenny's (62) recommendation of utilizing the Sobel test (63) for inference, which calculates a z-statistic for the estimated mediation effect in order to test a statistical hypothesis pertaining to whether there is a statistical significance in such mediation effect based upon a Gaussian distributional assumption. These analytical steps were iterated for each of the three mediating variables (i.e., trust in energy industry, trust in environmental groups, and trust in government). All variables used for these analytical steps were standardized for ease of

we estimated the effects of the four CT variables on HVPL benefit–risk perceptions through three trust-related variables while controlling for policy elites' knowledge level and standard demographics. Based on OLS regression, MEDIANTE accommodates multiple mediator variables assuming that each variable operates in parallel and there are no interaction effects between the independent variables and the mediating variables in the model (64). All measures used for this analysis were standardized for ease of interpretability of final results. Table V reports the analytical results in detail, while Figure 1 more succinctly visualizes those results¹³.

(Table V and Figure 1 about here)

5.1 Egalitarianism, Trust and HVPL Benefit-Risk Perceptions

For the relationship between egalitarianism and HVPL benefit-risk perceptions, we found that our measure of egalitarianism is positively related with our benefit-risk index ($\beta = +0.106, p < 0.05$), demonstrating that as egalitarianism scores increase, perceptions of risk in the installation of HVPLs increase as well, as presented in Figure 1. Furthermore, we found that egalitarianism is negatively related to trust in the energy industry ($\beta = -0.223, p < 0.05$), while trust in the energy industry is inversely associated with the benefit-risk index ($\beta = -0.279, p < 0.05$). From this, we can infer that egalitarianism holds positive indirect effect on perceived risk associated with HVPL installations through trust in energy industry ($\beta = +0.062, p < 0.05$), as presented in Table V.

Conversely to trust in the energy industry, egalitarianism is positively related to trust in environmental groups ($\beta = +0.326, p < 0.05$), while trust in environmental groups is positively related to the benefit-risk index ($\beta = +0.348, p < 0.05$). Accordingly, we can conclude that trust in information from environmental groups statistically significantly mediates the effect of egalitarianism on HVPL benefit-risk perceptions, while results in positive indirect effect of egalitarianism on benefit-risk perceptions ($\beta = +0.114, p < 0.05$), as presented in Table V.

interpretability of final results, and analytic results can be seen in tables and figures appearing in Appendix IV.

¹³ One anonymous reviewer suggested that it is possible that our modeling assumptions may be incorrect – specifically, that trust may be temporally precedent to cultural values. We therefore ran our analysis according to this alternative theoretical perspective while specifying cultural values and trust as the mediating variable and primary independent variable, respectively, in the model. We found that only one path was significant – that of trust in the energy industry influencing benefit-risk perceptions via egalitarianism ($\beta = -0.019, p < 0.05$). Furthermore, this effect is much smaller than the one based on our proposed model ($\beta = +0.062, p < 0.05$). This provides strong support for our original model as specified.

There was no relationship between egalitarianism and trust in the government, thus trust in the government has no mediating effect on the relationship between egalitarianism and benefit-risk perceptions of HVPL installation.

5.2 Individualism, Trust and HVPL Benefit-Risk Perceptions

For the relationship between individualism and HVPL benefit-risk perceptions, we found a statistically significant mediating effect of trust in the energy industry and distrust in environmental groups and government agencies, as presented in Table V and Figure 1.

Individualism is positively related to trust in the energy industry ($\beta = +0.122, p < 0.05$), but inversely associated with trust in environmental groups ($\beta = -0.194, p < 0.05$) and government ($\beta = -0.131, p < 0.05$), while trust in energy industry, environmental groups, and government, in turn, holds negative ($\beta = -0.279, p < 0.05$), positive ($\beta = +0.326, p < 0.05$), and negative ($\beta = -0.158, p < 0.05$) relationship with HVPL risk perceptions, respectively, as discussed earlier. As such, it can be said that a statistically significant indirect effect of individualism on HVPL risk perceptions is established via trust in energy industry ($\beta = -0.034, p < 0.05$) and distrust in environmental groups ($\beta = -0.068, p < 0.05$) and government ($\beta = +0.021, p < 0.05$), as reported in Table V.

5.3 Hierarchism, Trust and HVPL Benefit-Risk Perceptions

For the relationship between hierarchism and HVPL benefit-risk perceptions, we found a significant mediating effect of trust in the energy industry and trust in the government, as presented in Table V and Figure 1.

Hierarchism is positively related to trust in the energy industry ($\beta = +0.324, p < 0.05$), while trust in the energy industry is negatively related to the benefit-risk index ($\beta = -0.279, p < 0.05$), which allows us to infer that there is a negative indirect effect of hierarchism on perceived risk of HVPL through trust in the energy industry ($\beta = -0.090, p < 0.05$).

Additionally, Hierarchism is positively associated with trust in the government ($\beta = +0.217, p < 0.05$), while trust in the government is inversely associated with the benefit-risk index ($\beta = -0.158, p < 0.05$), indicating that trust in information from the government significantly mediates the effect of

hierarchism on benefit-risk perceptions, with an indirect effect of hierarchism on perceived HVPL risk to be statistically significantly negative ($\beta = -0.034$, $p < 0.05$), as reported in Table V. There were no other significant mediating effects of trust sources (i.e., trust in environmental groups) on benefit-risk perceptions for hierarchs.

5.4 Fatalism, Trust and HVPL Benefit-Risk Perceptions

As displayed in Table V and Figure 1, we found that trust in environmental groups and trust in government both contribute to statistically significant indirect effects of fatalism on HVPL benefit-risk perceptions. More specifically, fatalism is positively related to trust in environmental groups ($\beta = +0.159$, $p < 0.05$), which, in turn, is positively related to our benefit-risk index ($\beta = +0.348$, $p < 0.05$), yielding an indirect effect of fatalism on perceived risk of HVPL installation with a statistical significance ($\beta = +0.055$, $p < 0.05$). Similarly, fatalism is positively related to trust in government ($\beta = +0.167$, $p < 0.05$), which is negatively associated with the benefit-risk index ($\beta = -0.158$, $p < 0.05$), resulting in a statistically significant indirect effect of fatalism on benefit-risk perceptions of HVPL installation ($\beta = -0.026$, $p < 0.05$). However, trust in energy industry does not constitute any meaningful mediation effect on the relationship between fatalism and HVPL benefit-risk perceptions.

6. CONCLUSION AND DISCUSSION

Overall, this study demonstrates that the influence of cultural values on benefit-risk perceptions is partially mediated through trust – or distrust – in various groups, when considered as information sources. Specifically, in the case of HVPL installations in Arkansas, policy elites with a propensity for strong egalitarianism perceive greater risk (as compared to benefits) due to their trust in information from environmental groups and distrust in information from the energy industry, at least in part. Conversely, policy elites with strong individualism tendencies perceive greater benefits (as compared to risks) of HVPL installation due to their trust in information from the energy industry and distrust in environmental groups. These relationships are somewhat muted due to individualists' distrust in information provided by the government. Policy elites possessing a worldview of strong hierarchism perceive greater benefits (as compared to risks) in HVPL installation due to their trust in information from both the energy industry and

the government. Policy elites with a solid fatalism orientation exhibit a more complex relationship, which will be discussed in detail further below.

The results of this study provide significant implications for both theory and practice. Many previous studies have shown that cultural value predispositions influence perceptions of risk across an array of substantive domains (2,3,30). However, the causal mechanism through which this relationship occurs has been under-specified, at best. Some recent experimental works grounded on cultural cognition of risks (28,49–51) have reported that the cultural values of individuals— as information receivers – and their perceived congruence with those values held by expert information providers *interact* to influence individuals' perceptions of expert credibility (49) and, ultimately, their risk perceptions (51). In the present research, we demonstrated that cultural value predispositions do not always affect perceptions of risk directly. Furthermore, our analysis shows that there are no significant effects derived from the interaction between individuals' cultural values and their trust in information sources on risk perceptions. Instead, we found that individuals' intrinsic values appear to *lead to* different levels of trust toward information sources, ultimately influencing their judgments regarding the relative risks and benefits. One possible explanation for these disparate findings – in terms of an interactive versus causal influence – could be found in the difference in study designs. The experimental nature of previous works may have inflated the establishment of statistical relationships by creating an artificial dichotomy of cultural value fit by assigning distinctive cultural characteristics to expert information providers as part of experimental treatment. Evaluating cultural value congruence, however, may not be as clear-cut in a real world application, with individuals encountering more difficulty in inferring the intrinsic values of information providers, and thus their level of trust in the providers. This may be particularly true when multiple potential information providers are involved and the cultural values attached to these providers are ambiguous (as compared to in an experimental design in which identifiers of cultural values are manipulated as desired). Along with this line of argument, however, it is noteworthy that Brady and Sniderman (65) found that individuals are generally quite accurate in determining policy preferences of others, and thus with whom to align themselves, based on their political motivation. Likewise, attitudes toward policy issues are often attributed to individuals based upon group membership (65,66). “In-group bias” induces group members to display favoritism toward other group members (66,67) with shared

group identities being formed easily even with low levels of available information (66,68). CT suggests that cultural biases are shared through social relationships (29–32), ultimately forming culturally distinctive groups with which individuals can identify. Combining these insights, we see that a source of information (in our case the energy industry, environmental groups, and government) can be interpreted by individuals as sharing – or not sharing – cultural values and therefore as being either in-group or out-group members. This evaluation, in turn, leads to trust – or distrust – in the information provided by such sources, particularly as related to a specific policy issue, such as HVPL installations. By explicating this causal process, this study takes a step toward better understanding not only that cultural value predispositions *do* affect judgments – specifically regarding benefit-risk perceptions – but understanding *how* this is done. Considering our findings, there are at least two areas of important research to be conducted to better comprehend how cultural value predispositions shape risk perceptions and related policy decisions. First, future studies should examine whether there are other intervening variables (e.g. perceived and actual knowledge, affect, personality characteristics, etc.) – aside from trust in information sources – that mediate the relationship between cultural orientations and policy-relevant judgments (including, but not limited to, benefit-risk perceptions). Second, future research should consider other policy contexts in order to better understand not only *how*, but also *when* trust in information sources is relevant. It is likely that, given a different policy issue, the roles of various dimensions of cultural value predispositions would be weighted differently. Thus, there may be different mediating effects of these sources of trust across issues in different policy domains. Additionally, the relevant sources of information are likely to differ across issues. For example, benefit-risk perceptions associated with economic policy issues are likely to include trust in businesses and business owners, while trust in environmental groups would vary accordingly, particularly in terms of magnitude, depending on the specific economic policy proposal. Considering research in these two areas will allow for a more accurate and nuanced understanding of the role that cultural value predispositions and trust in information sources play in benefit-risk perceptions and policy-making practices.

This research also provides valuable insights to our understanding of trust, both in terms of its origin and its influence. As discussed, previous research examining the role of trust generally considers trust as a primary independent variable, neglecting considerations of where the trust originates (44,69). In

doing so, there is often an implicit (and sometimes explicit) assumption that trust is based on previous interactions between an individual and the trustee, or that the origin of a given level of trust is not important. When considering the origin of trust, previous research has considered trust to be relatively fluid in nature, derived from the context of the issue at hand (17). However, the current research provides evidence that trust in information sources may very well be relatively stable within the issue domain, as well as not derived from personal interactions between the individual and trustee. Instead, this research provides evidence for the idea that cultural value predispositions provide a strong heuristic for evaluating the trustworthiness of information based on its source.

Additionally, this study provides valuable information for cultural theory researchers in regards to treatment of fatalists. Often, fatalists are completely ignored in studies utilizing cultural theory, as, at least by theory, they are not expected to have any significant relationships with variables of interest (2–4,21,30,70). However, this study sheds some light on what may be occurring with fatalists. As discussed above, fatalism showed no direct relationship with perceptions of benefits and risks in HVPL installations, as in the cases of individualism and hierarchism in our analysis. However, there were two significant indirect effects mediated by trust in information sources (i.e., trust in environmental groups and trust in government) on perceptions of benefit and risk. Since Baron and Kenny's (62) article on mediation, many have suggested that there does not need to be a significant relationship between the independent variable and dependent variable for mediation to occur (62). In this study, we see one of the justifications for why this relationship is not necessary. Fatalism has two significant mediations associated with it – one positive and one negative. Ultimately, these competing mediations wash out any effect that fatalism has on benefit-risk perceptions. It would be beneficial for future studies to further investigate potential intervening variables related to fatalism in order to parse out exactly what may be occurring within this unique cultural group.

Finally, in regard to practical implications, this study highlights the importance of both the role and power of trust in shaping policy elites' perceptions of benefits and risks. Specifically, this study demonstrates how the source of information shapes a policy elite's benefit-risk assessments, particularly based on the trust that the policy elite has towards the provider of that information. More importantly, we found that, at least to some extent, it is not the accuracy of the information that is important to the policy

elite, but whether the source of information is perceived to be congruent with that individual's cultural value predispositions. Thus, when considering an egalitarian, for instance, providing information originating from the energy industry in an effort to persuade the policy elite to accept the installation of HVPLs would be unwise and likely counterproductive, regardless of the quality and accuracy of the information. This study provides evidence that, even for policy elites, decisions are not necessarily made solely based on "purely objective and rational" cognitive processes, but through culturally biased heuristics in regards to trust in information sources. This finding yields further insight as to how to design more effective communication strategy when risk perceptions are a major source of policy controversies.

REFERENCES

1. Moyer RM, Song G. Understanding Local Policy Elites' Perceptions on the Benefits and Risks Associated with High Voltage Power Line Installations in the State of Arkansas. Paper presented at the Midwest Political Science Association Conference; 2014.
2. Moyer RM, Song G. Understanding Local Policy Elites' Perceptions on the Benefits and Risks Associated with High Voltage Power Line Installations in the State of Arkansas. *Risk Anal.* 2016;doi: 10.1111/risa.12548.
3. Song G. Understanding Public Perceptions of Benefits and Risks of Childhood Vaccinations in the United States. *Risk Anal.* 2013;34(3):541–55. .
4. Song G, Silva CL, Jenkins-Smith HC. Cultural Worldview and Preference for Childhood Vaccination Policy. *Policy Stud J.* 2014;42(4):528–54.
5. Economic Benefits of Increasing Electric Grid Resilience to Weather Outages. President's Council of Economic Advisers and the U.S. Department of Energy's Office of Electricity Delivery and Energy Reliability and the White House Office of Science and Technology; 2013.
6. Fesmire B. Energy Efficiency in the Power Grid [Internet]. ABB Inc.; 2007. Available from: <http://www.abb.com/cawp/seitp202/64cee3203250d1b7c12572c8003b2b48.aspx>
7. Arkansas Public Service Commission Docket 13-041-U [Internet]. 2013. Available from: http://www.apscservices.info/efilings/docket_search_results.asp?casenumber=13-041-U
8. Southwest Power Pool Strategic Plan [Internet]. 2010. Available from: http://www.spp.org/publications/2010_SPP_Strategic_Plan.pdf
9. Gillette B. Documents indicate proposed power line could carry two 345 kV lines [Internet]. ES Independent. 2013 [cited 2015 Jan 27]. Available from: http://eurekaspringsindependent.com/single_story.asp?StoryID=2675
10. Thompson M, Ellis R, Wildavsky A. Cultural theory. [Internet]. Westview Press; 1990 [cited 2015 Apr 12]. Available from: <http://psycnet.apa.org/psycinfo/1990-98188-000>
11. Cain NL, Nelson HT. What drives opposition to high-voltage transmission lines? *Land Use Policy.* 2013;33:204–13.
12. Elliott P, Wadley D. The impact of transmission lines on property values: coming to terms with stigma. *Prop Manag.* 2002;20(2):137–52.
13. Transmission Planning [Internet]. Southwest Power Pool; [cited 2015 Jan 22]. Available from: <http://www.spp.org/section.asp?pageID=128>
14. Slovic P. Perception of risk. *Science.* 1987;236(4799):280–5.
15. Flynn J, Slovic P, Mertz CK. Gender, race, and perception of environmental health risks. *Risk Anal.* 1994;14(6):1101–8.
16. Siegrist M, Cvetkovich G. Perception of Hazards: The Role of Social Trust and Knowledge. *Risk Anal.* 2000;20(5):713–20.
17. Siegrist M, Cvetkovich G, Roth C. Salient Value Similarity, Social Trust, and Risk/Benefit Perception. *Risk Anal Int J.* 2000 Jun;20(3):353–62.

18. Douglas M, Wildavsky A. Risk and culture: an essay on the selection of technical and environmental dangers. Berkeley. Cal Univ Calif Press. 1982;
19. Finucane ML, Slovic P, Mertz CK, Flynn J, Satterfield TA. Gender, race, and perceived risk: the white male effect. *Health Risk Soc.* 2000;2(2):159–72.
20. Barke RP, Jenkins-Smith H, Slovic P. Risk perceptions of men and women scientists. *Soc Sci Q* [Internet]. 1997 [cited 2015 Jan 27]; Available from: <http://psycnet.apa.org/psycinfo/1997-03447-005>
21. Kahan DM, Jenkins-Smith HC, Braman D. Cultural cognition of scientific consensus. *J Risk Res.* 2010;(1):1–28.
22. Wildavsky A, Dake K. Theories of Risk Perception: Who Fears What and Why? *Daedalus.* 1990;119(4):44–60.
23. Kraus N, Malmfors T, Slovic P. Intuitive Toxicology. II. Expert and Lay Judgments of Chemical Risks in Canada. *Risk Anal.* 1992;12:215–32.
24. Savadori L, Savio S, Nicotra E, Rumiati R, Finucane M, Slovic P. Expert and Public Perception of Risk from Biotechnology. *Risk Anal Int J.* 2004 Oct;24(5):1289–99.
25. Siegrist M, Cousin M-E, Kastenholtz H, Wiek A. Public acceptance of nanotechnology foods and food packaging: The influence of affect and trust. *Appetite.* 2007 Sep;49(2):459–66.
26. Rowe G, Wright G. Differences in Expert and Lay Judgments of Risk: Myth or Reality? *Risk Anal.* 2001;21(2):341–56.
27. Douglas M. The world of goods: Towards an anthropology of consumption [Internet]. Psychology Press; 2002 [cited 2015 Jan 28]. Available from: <https://books.google.com/books?hl=en&lr=&id=goBCb-RGfU4C&oi=fnd&pg=PR7&dq=mary+douglas+2002&ots=g-IYqOrzLZ&sig=RBcOmPfOktRgOr2pAapxMKSEG08>
28. Kahan DM, Braman D, Gastil J, Slovic P, Mertz CK. Culture and identity-protective cognition: Explaining the white-male effect in risk perception. *J Empir Leg Stud.* 2007;4(3):465–505.
29. Jenkins-Smith H, Silva CL, Gupta K, Ripberger JT. Belief System Continuity and Change in Policy Advocacy Coalitions: Using Cultural Theory to Specify Belief Systems, Coalitions, and Sources of Change. *Policy Stud J.* 2014;42(4):484–508.
30. Jones MD, Song G. Making Sense of Climate Change: How Story Frames Shape Cognition. *Polit Psychol.* 2014 Aug 1;35(4):447–76.
31. Ripberger JT, Song G, Nowlin MC, Jones MD, Jenkins-Smith HC. Reconsidering the Relationship Between Cultural Theory, Political Ideology, and Political Knowledge. *Soc Sci Q.* 2012;93(3):713–31.
32. Thompson M, Ellis R, Wildavsky A. Cultural theory. [Internet]. Westview Press; 1990 [cited 2014 Mar 12]. Available from: <http://psycnet.apa.org/psycinfo/1990-98188-000>
33. Dake K. Myths of nature: Culture and the social construction of risk. *J Soc Issues.* 1992;48(4):21–37.
34. Lachapelle E, Montpetit É, Gauvin J-P. Public Perceptions of Expert Credibility on Policy Issues: The Role of Expert Framing and Political Worldviews. *Policy Stud J.* 2014;42(4):674–97.

35. Luhmann N. Familiarity, confidence, trust: Problems and alternatives. *Trust Mak Break Coop Relat.* 2000;6:94–107.
36. Frewer LJ, Salter B. Societal trust in risk analysis: Implications for the interface of risk assessment and risk management. *Trust Coop Risk Manag Uncertain Scepticism Public Mind.* 2007;143–58.
37. Lodge M, Taber C. The Rationalizing Voter - Milton Lodge, Charles S. Taber - Google Books [Internet]. 2013 [cited 2014 Feb 17]. Available from: http://books.google.com/books?hl=en&lr=&id=tqI5GxWmIU4C&oi=fnd&pg=PR11&dq=milton+lodge+rationalizing+voter&ots=YpAmNXpU1f&sig=MndT__H3ukYzMHynAOoQONcbE5I#v=onepage&q=milton%20lodge%20rationalizing%20voter&f=false
38. Kunda Z. The case for motivated reasoning. *Psychol Bull.* 1990;108(3):480.
39. Taber CS, Lodge M. Motivated skepticism in the evaluation of political beliefs. *Am J Polit Sci.* 2006;50(3):755–69.
40. Njome MS, Suh CE, Chuyong G, de Wit MJ. Volcanic risk perception in rural communities along the slopes of mount Cameroon, West-Central Africa. *J Afr Earth Sci.* 2010;58(4):608–22.
41. Heitz C, Spaeter S, Auzet A-V, Glatron S. Local stakeholders' perception of muddy flood risk and implications for management approaches: A case study in Alsace (France). *Land Use Policy.* 2009;26(2):443–51.
42. Terpstra T. Flood preparedness: thoughts, feelings and intentions of the Dutch public [Internet]. University of Twente; 2010 [cited 2016 Feb 12]. Available from: http://doc.utwente.nl/69492/1/thesis_T_Terpstra.pdf
43. Barnes PH. Approaches to community safety: risk perception and social meaning. *Aust J Emerg Manag.* 2002;1(1):15–23.
44. Viklund MJ. Trust and risk perception in western Europe: A cross-national study. *Risk Anal.* 2003;23(4):727–38.
45. Flynn J, Burns W, Mertz CK, Slovic P. Trust as a determinant of opposition to a high-level radioactive waste repository: Analysis of a structural model. *Risk Anal.* 1992;12(3):417–29.
46. Bronfman NC, Vázquez EL. A Cross-Cultural Study of Perceived Benefit Versus Risk as Mediators in the Trust-Acceptance Relationship. *Risk Anal.* 2011;31(12):1919–34.
47. Wachinger G, Renn O, Begg C, Kuhlicke C. The risk perception paradox—implications for governance and communication of natural hazards. *Risk Anal.* 2013;33(6):1049–65.
48. Espluga J, Gamero N, Prades A, Solà R. El papel de la“ confianza” en los conflictos socioambientales/The Role of“ Trust” in Socio-Environmental Conflicts. *Política Soc.* 2009;46(1/2):255.
49. Kahan DM, Jenkins-Smith H, Braman D. Cultural cognition of scientific consensus. *J Risk Res.* 2011;14(2):147–74.
50. Kahan DM, Slovic P, Braman D, Gastil J, Cohen GL, Kysar DA. Biased assimilation, polarization, and cultural credibility: An experimental study of nanotechnology risk perceptions. *Harv Law Sch Program Risk Regul Res Pap* [Internet]. 2008 [cited 2016 Feb 12];(08-25). Available from: http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1090044

51. Kahan DM, Braman D, Cohen GL, Gastil J, Slovic P. Who fears the HPV vaccine, who doesn't, and why? An experimental study of the mechanisms of cultural cognition. *Law Hum Behav*. 2010;34(6):501.
52. Boholm \AAsa. Risk perception and social anthropology: Critique of cultural theory*. *Ethnos*. 1996;61(1-2):64–84.
53. Marris C, Langford IH, O'Riordan T. A quantitative test of the cultural theory of risk perceptions: Comparison with the psychometric paradigm. *Risk Anal*. 1998;18(5):635–47.
54. Renn O, Rohrmann B. Cross-cultural risk perception: a survey of empirical studies [Internet]. Springer Science & Business Media; 2000 [cited 2016 Feb 12]. Available from: <https://books.google.com/books?hl=en&lr=&id=fuV12xahpJwC&oi=fnd&pg=PA13&dq=renn+and+rohrmann+2000&ots=8fxl9P0gcw&sig=dw4PyPOI25KJ2szd6l62BJ8REeA>
55. Rippl S. Cultural theory and risk perception: A proposal for a better measurement. *J Risk Res*. 2002;5(2):147–65.
56. Sjöberg L. Are received risk perception models alive and well? *Risk Anal*. 2002;22(4):665–9.
57. Sjöberg L. The psychometric paradigm revisited. *Royal Stat. In: Society Conference, Warwick July*. 1999. p. 12–5.
58. Ripberger JT, Gupta K, Silva CL, Jenkins-Smith HC. Cultural theory and the measurement of deep core beliefs within the advocacy coalition framework. *Policy Stud J*. 2014;42(4):509–27.
59. Herron KG, Jenkins-Smith HC. Public perspectives on nuclear security. *Risk Hazards Crisis Public Policy*. 2014;5(2):109–33.
60. Hayes AF. Introduction to mediation, moderation, and conditional process analysis: A regression-based approach [Internet]. Guilford Press; 2013 [cited 2016 Jan 7]. Available from: https://books.google.com/books?hl=en&lr=&id=iWFSpQFh-y4C&oi=fnd&pg=PP1&dq=hayes+introduction+to+mediation,+moderation,+and+conditional+process+analysis&ots=1y1_oH-KQV&sig=nkc8P12zmMrCD8WVRqsSJSE3P2s
61. Preacher KJ, Hayes AF. SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behav Res Methods Instrum Comput*. 2004;36(4):717–31.
62. Baron RM, Kenny DA. The moderator–mediator variable distinction in social psychological research: Conceptual, strategic, and statistical considerations. *J Pers Soc Psychol*. 1986;51(6):1173.
63. Sobel ME. Asymptotic confidence intervals for indirect effects in structural equation models. *Sociol Methodol*. 1982;13(1982):290–312.
64. Andrew Hayes. SPSS MEDIANTE Macro Syntax Reference [Internet]. 2014. Available from: <http://www.afhayes.com/public/mediate.pdf>
65. Brady HE, Sniderman PM. Attitude attribution: A group basis for political reasoning. *Am Polit Sci Rev*. 1985;79(04):1061–78.
66. Weber C, Johnson M, Arceneaux K. Genetics, personality, and group identity. *Soc Sci Q*. 2011;92(5):1314–37.
67. Taylor DM, Moghaddam FM. Theories of intergroup relations: International social psychological perspectives [Internet]. Greenwood Publishing Group; 1994 [cited 2016 Feb 12]. Available from:

https://books.google.com/books?hl=en&lr=&id=kBSZjkKSShMC&oi=fnd&pg=PP6&dq=moghaddam+and+taylor+1994&ots=LKjXCCqwHh&sig=ZP6WS_GxEQMmwEbJMONcn1JXTx4

68. Brewer MB. The importance of being we: human nature and intergroup relations. *Am Psychol.* 2007;62(8):728.
69. Johnson BB, Slovic P. Presenting uncertainty in health risk assessment: initial studies of its effects on risk perception and trust. *Risk Anal.* 1995;15(4):485–94.
70. Petray L, Moyer R, Song G. Understanding Public Risk Perceptions Associated with Gay and Lesbian Parenting in the United States. [cited 2015 Oct 17]; Available from: http://www.researchgate.net/profile/Liz_Petray/publication/278412652_Understanding_Public_Risk_Perceptions_Associated_with_Gay_and_Lesbian_Parenting_in_the_United_States/links/5580f12108ae607ddc3230e8.pdf

Table I. Dependent Variable and Measures

Variable	Measure
Perceived Benefit/Risk associated with HVPL	How much benefit do you think the installation of high voltage power lines in northwest Arkansas would bring to your local government and community in the forms of energy supply stability and reliability? (0=Not at all beneficial to 10= Extremely beneficial)*
	How much benefit do you think the installation of high voltage power lines in northwest Arkansas would bring to your local government and community in the form of efficient energy transmission? (0=Not at all beneficial to 10= Extremely beneficial)*
	How much benefit do you think the installation of high voltage power lines in northwest Arkansas would bring to your local government and community in the form of new economic opportunities and job creation? (0=Not at all beneficial to 10= Extremely beneficial)*
	How much benefit do you think the installation of high voltage power lines in northwest Arkansas would bring to your local government and community in the form of provision of structure for renewable energy sources? (0=Not at all beneficial to 10= Extremely beneficial)*
	How much benefit do you think the installation of high voltage power lines in northwest Arkansas would bring to your local government and community in the form of efficient land use? (0=Not at all beneficial to 10= Extremely beneficial)*
	How much benefit do you think the installation of high voltage power lines in northwest Arkansas would bring to your local government and community in the form of necessary services maintained during post-disaster or high energy demand periods? (0=Not at all beneficial to 10= Extremely beneficial)*
	How much risk do you think the installation of high voltage power lines in northwest Arkansas would pose to your local government and community in the form of environmental degradation from clear-cutting trees for power line installation? (0=No risk to 10=Extreme risk)
	How much risk do you think the installation of high voltage power lines in northwest Arkansas would pose to your local government and community in the form of pesticide/herbicide use for securing power lines? (0=No risk to 10=Extreme risk)
	How much risk do you think the installation of high voltage power lines in northwest Arkansas would pose to your local government and community in the form of decreasing property values in affected areas? (0=No risk to 10=Extreme risk)
	How much risk do you think the installation of high voltage power lines in northwest Arkansas would pose to your local government and community in the form of threats to tourism (and/or other related industries)? (0=No risk to 10=Extreme risk)
	How much risk do you think the installation of high voltage power lines in northwest Arkansas would pose to your local government and community in the form of negative health impacts due to electromagnetic field emission? (0=No risk to 10=Extreme risk)
HVPL benefit-risk index**	Index of above eleven items ($\alpha=0.92$)

* Reverse-coded

** Higher score indicates higher risk and lower benefits perceived.

Table II. Primary Independent Variables and Measures

Variable	Measure
Egalitarianism	Society works best if power is shared equally. (1=Strongly disagree to 7=Strongly agree)
	It is our responsibility to reduce differences in income between the rich and the poor. (1=Strongly disagree to 7=Strongly agree)
	What society needs is a fairness revolution to make the distribution of goods more equal. (1=Strongly disagree to 7=Strongly agree)
Egalitarianism index	Index using factor score of above three items ($\alpha=0.78$)
Individualism	We are all better off when we compete as individuals. (1=Strongly disagree to 7=Strongly agree)
	Even the disadvantaged should have to make their own way in the world. (1=Strongly disagree to 7=Strongly agree)
	Even if some people are at a disadvantage, it is best for society to let people succeed or fail on their own. (1=Strongly disagree to 7=Strongly agree)
Individualism index	Index using factor score of above three items ($\alpha=0.67$)
Hierarchism	Society is in trouble because people do not obey those in authority. (1=Strongly disagree to 7=Strongly agree)
	The best way to get ahead in life is to do what you are told to do to the best of your abilities. (1=Strongly disagree to 7=Strongly agree)
	Society would be much better off if we imposed strict and swift punishment on those who break the rules. (1=Strongly disagree to 7=Strongly agree)
Hierarchism index	Index using factor score of above three items ($\alpha=0.68$)
Fatalism	For the most part, succeeding in life is a matter of chance. (1=Strongly disagree to 7=Strongly agree)
	No matter how hard we try, the course of our lives is largely determined by forces beyond our control. (1=Strongly disagree to 7=Strongly agree)
	Most of the important things that take place in life happen by random chance. (1=Strongly disagree to 7=Strongly agree)
Fatalism index	Index using factor score of above three items ($\alpha=0.72$)

Table III. Mediator Variables and Measures

Variable	Measure
Trust in energy industry	How trustworthy is information about policy issues, such as sustainable energy and high voltage power lines, from energy industry? (0=Not at all trustworthy to 10=Completely trustworthy)
Trust in environmental groups	How trustworthy is information about policy issues, such as sustainable energy and high voltage power lines, from environmental conservation groups? (0=Not at all trustworthy to 10=Completely trustworthy)
Trust in government	How trustworthy is information about policy issues, such as sustainable energy and high voltage power lines, from government agencies? (0=Not at all trustworthy to 10=Completely trustworthy)

Table IV. Control Variables and Measures

Variable	Measure
Level of knowledge of energy issues	Most scientists and energy experts agree that the estimates for natural gas reserves in the U.S. have increased since 2001. (0=False; 1=True*)
	Coal-fired electric power plants in Arkansas supply almost three quarters of the state's electricity. (0=False*; 1=True)
	There has been a state decision on the prospective placement of high voltage power lines in Northwest Arkansas. (0=False; 1=True*)
	A state legislation has been proposed to prevent the prospective installation of high voltage power lines in either Arkansas or Missouri. (0=False; 1=True*)
	Independent power producers provide about a quarter of net electricity generation in Arkansas. (0=False; 1=True*)
	Arkansas recently ranked 17 th in the nation in terms of total energy consumed per capita. (0=False; 1=True*)
	Biomass supplied all of Arkansas' non-hydroelectric renewable energy resources for electricity generation in 2010. (0=False; 1=True*)
	Most scientists agree that electromagnetic fields from high voltage power lines can increase the risk of leukemia among those living in their proximity. (0=False*; 1=True)
Knowledge index	Index of above eight items (i.e., number of correct answers)
Race	1=Non-Hispanic White
Gender	1=Male
Age	Age in years
Education	Level of education (1=Elementary through some high school to 7=Doctorate (of any type))
Income	Total estimated annual household income (1=less than \$50,000 to 4=\$150,000 or more)

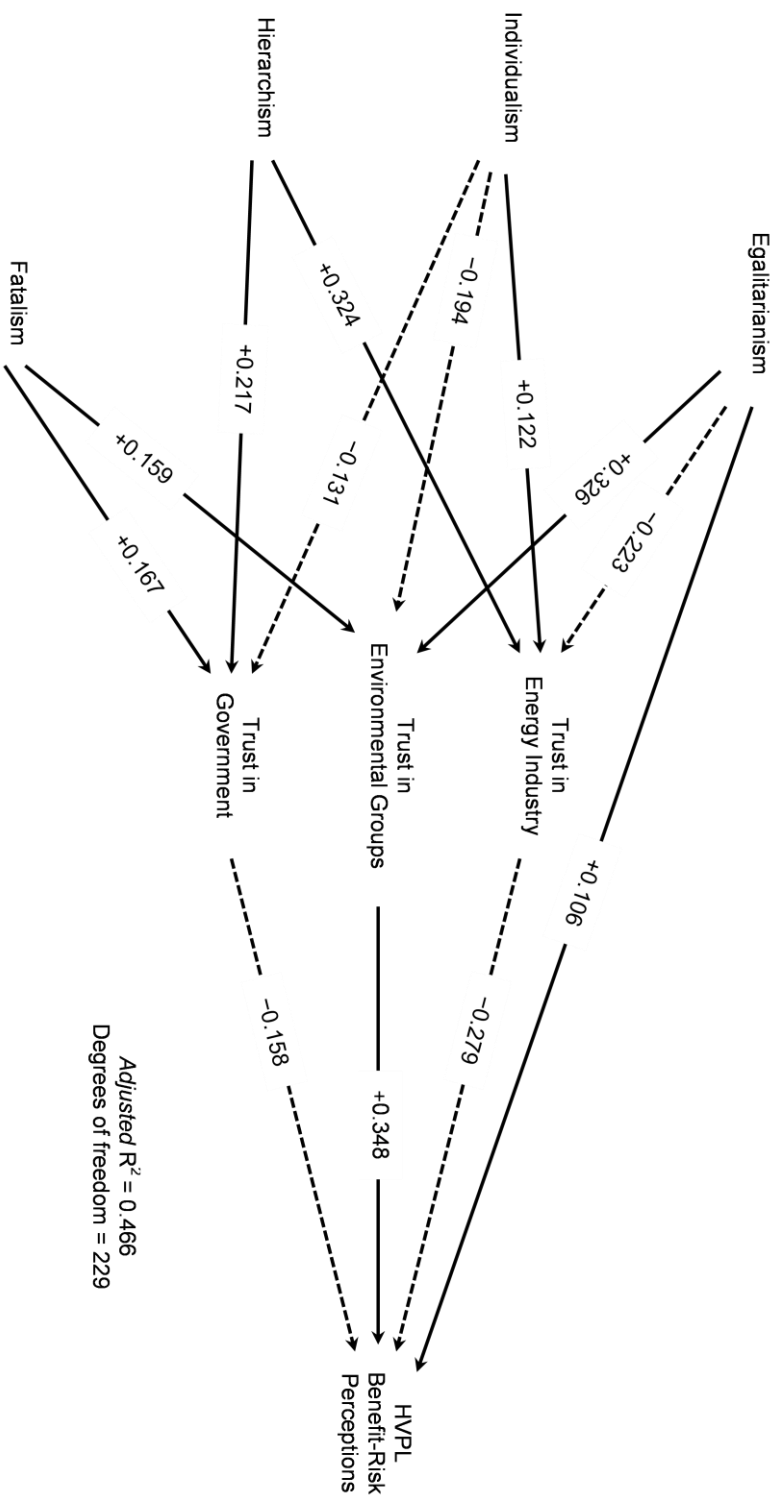
* Correct answer

Table V. Mediation Analysis Results Based On Methods Suggested By Preacher and Hayes (60, 61)

X	M	Y	c (X→Y)	a (X→M)	SE(a)	b (M→Y)	SE(b)	ab	SE(ab)
Egalitarianism	Trust in energy industry	HVP _L benefit-risk perceptions	0.106*	-0.223*	0.059	-0.279*	0.058	0.062*	0.023
Individualism			-0.047	0.122*	0.060	-0.279*	0.058	-0.034*	0.020
Hierarchy			-0.055	0.324*	0.060	-0.279*	0.058	-0.090*	0.025
Fatalism			0.046	0.104	0.058	-0.279*	0.058	-0.029	0.018
Egalitarianism	Trust in environmental groups		0.106*	0.326*	0.057	0.348*	0.057	0.114*	0.027
Individualism			-0.047	-0.194*	0.058	0.348*	0.057	-0.068*	0.021
Hierarchy			-0.055	-0.066	0.058	0.348*	0.057	-0.023	0.020
Fatalism			0.046	0.159*	0.056	0.348*	0.057	0.055*	0.021
Egalitarianism	Trust in government		0.106*	0.024	0.063	-0.158*	0.055	-0.004	0.011
Individualism			-0.047	-0.131*	0.063	-0.158*	0.055	0.021*	0.012
Hierarchy			-0.055	0.217*	0.064	-0.158*	0.055	-0.034*	0.015
Fatalism			0.046	0.167*	0.061	-0.158*	0.055	-0.026*	0.013

Note: * $p < 0.05$. In the first row of this table, X, M, and Y denote the primary independent variable, the mediator variable, and the dependent variable, respectively. The arrow represents a causal relationship between two variables. For instance, $X \rightarrow Y$ means X causes Y. Small characters c, a, and b represent standardized regression coefficients for the causal relationships presented in the adjacent parenthesis. More specifically, c ($X \rightarrow Y$), a ($X \rightarrow M$), and b ($M \rightarrow Y$) can be interpreted as the effect of X on Y, the effect of X on M, and the effect of M on Y, respectively. SE denotes the standard error of the coefficient estimation. For instance, SE(a) means standard error of a. The *indirect effect* of X on Y (mediated by M), ab, is calculated by $a \cdot b$, and its standard error, SE(ab), is calculated based upon the methods suggested by Preacher and Hayes (60, 61).

Figure 1. Triadic Relationships between Cultural Values, Trust, and HVPL Benefit-Risk Perceptions



Note: Only significant paths are shown. All paths are statistically significant at the level of $p < 0.05$. Solid lines represent positive relations while dashed lines visualize negative associations. Coefficients shown are standardized regression coefficients. Control variables (e.g., knowledge level and demographic characteristics) are not reported, but were included in the regression analysis.

Appendix I. Demographic Characteristics of Arkansas Local Policy Elite Sample Compared to General Public In Arkansas and the United States

Characteristic	Arkansas Local Policy Elites	Arkansas General Public	The U.S. General Public
Median Annual Household Income	Between \$70,000-\$80,000	Between \$40,000-\$50,000	Between \$50,000-\$60,000
Education Level (% Bachelor's degree or higher)	74%	20%	29%
Race	94% White (Non-Hispanic)	74% White (Non-Hispanic)	63% White (Non-Hispanic)
Gender	61% Male	49% Male	49% Male

Source: Moyer and Song (2016, p.15)

Appendix II. Descriptive Statistics

Variable	N	Mean	St. Dev.	Min	Max
Perceived Benefit/Risk associated with HVPL	311	5.57	2.88	0	10
Egalitarianism	306	0.00	1.00	-2.71	2.50
Individualism	306	0.00	1.00	-2.54	2.18
Hierarchism	306	0.00	1.00	-2.30	2.93
Fatalism ¹⁴	306	0.00	1.00	-1.78	2.97
Trust in energy industry	117	4.86	2.50	0	10
Trust in environmental groups	117	4.79	2.60	0	10
Trust in government	117	5.29	2.15	0	10
Knowledge ¹⁵	255	3.11	1.31	0	6
Age	420	53.91	13.45	22	87
Education	287	4.56	1.4	2	7
Income	286	2.40	0.93	1	4

¹⁴ The descriptive statistics for the four cultural worldviews are based on our factor analysis of the 12 cultural value items and are thus mean-centered at 0 with a standard deviation of 1 and are determined based on all 12 survey items. The means and standard deviations for each of the cultural values based on the three survey questions related to the particular cultural group are as follows: Egalitarianism: Mean = 3.6, SD = 1.65; Individualism: Mean = 3.95, SD = 1.4; Hierarchism: Mean = 3.6, SD = 1.45; Fatalism: Mean = 2.53, SD = 1.21.

¹⁵ One reviewer commented that the mean knowledge scores are low, particularly considering the elite sample should, theoretically, be more knowledgeable on the HVPL issue. We suspect three potential reasons for this: 1) the questions were too difficult 2) individuals in the sample were not actually concerned about the HVPL issue and 3) individuals in the sample are concerned about the HVPL issue, but have low levels of knowledge about it. However, mainly due to the design of the current study, we are unable to parse out the potential causes or outcomes that may be associated with these knowledge scores.

Appendix III. Frequency Table

Variable	<i>n</i>	Category (%)	
Race	284	Non-White (9%)	Non-Hispanic White (91%)
Gender	337	Female (35%)	Male (65%)

Appendix IV. Mediation Analysis Results Based On Methods Suggested By Baron & Kenny (1986) and Sobel (1982)

X	M	Y	c (X→Y)	a (X→M)	SE(a)	b (M→Y)	SE(b)	ab	SE(ab)	c' (X→Y)'	% Effect
Egalitarianism	Trust in energy industry	HVPL benefit-risk perception	0.278***	-0.223***	0.059	-0.375***	0.058	0.084***	0.026	0.194***	30%
Individualism			-0.128**	0.122**	0.060	-0.375***	0.058	-0.046*	0.023	-0.082	36%
Hierarchism			-0.203***	0.324***	0.060	-0.375***	0.058	-0.121***	0.029	-0.082	60%
Fatalism			0.046	0.104*	0.058	-0.375***	0.058	-0.039*	0.023	0.085	-85%
Egalitarianism	Trust in environmental groups		0.278***	0.326***	0.057	0.355***	0.061	0.116***	0.028	0.162***	42%
Individualism			-0.128**	-0.194***	0.058	0.355***	0.061	-0.069***	0.024	-0.059	54%
Hierarchism			-0.203***	-0.066	0.058	0.355***	0.061	-0.023	0.021	-0.179***	12%
Fatalism			0.046	0.159***	0.056	0.355***	0.061	0.056***	0.022	-0.010	123%
Egalitarianism	Trust in government		0.278***	0.024	0.063	-0.209***	0.058	-0.005	0.013	0.283***	-2%
Individualism			-0.128**	-0.131**	0.063	-0.209***	0.058	0.027*	0.015	-0.155***	-21%
Hierarchism			-0.203***	0.217***	0.064	-0.209***	0.058	-0.045**	0.018	-0.157***	22%
Fatalism			0.046	0.167***	0.061	-0.209***	0.058	-0.035**	0.016	0.081	-76%

Note: * $p < 0.1$; ** $p < 0.05$; *** $p < 0.01$; In the first row of this table, X, M, and Y denote the primary independent variable, the mediator variable, and the dependent variable, respectively. The arrow represents a causal relationship between two variables. For instance, $X \rightarrow Y$ means X causes Y. Small characters c, a, and b represent standardized regression coefficients for the causal relationships presented in the adjacent parenthesis. More specifically, c ($X \rightarrow Y$), a ($X \rightarrow M$), and b ($M \rightarrow Y$) can be interpreted as the effect of X on Y (without modeling M on the right hand side of the regression equation), also called the *total effect*, the effect of X on M, and the effect of M on Y, respectively. SE denotes the standard error of the coefficient estimation. For instance, SE(a) means standard error of a. The *indirect effect* of X on Y (mediated by M), ab, is calculated by $a \cdot b$, and its standard error, SE(ab), is calculated by $(b^2 \cdot (SE(a))^2 + (a^2 \cdot (SE(b)))^2)$, based upon the methods suggested by Sobel (1982). The *direct effect* of X on Y, c' ($X \rightarrow Y$), is calculated by c ($X \rightarrow Y$), the *total effect* of X on Y, minus ab, the *indirect effect* of X on Y. % Effect represents the ratio of ab, the *indirect effect* of X on Y, to c ($X \rightarrow Y$), the *total effect* of X on Y, while bold font under this column shows those that are statistically significant at the level of $p < 0.1$.

Knowledge Hubris and the Policy Process: A Comparison of the Origin of Inflated and Deflated Knowledge Perceptions between Policy Elites and the General Public and Their Effects on the Policy Process

By: Clayton Creed Tumilson and Geoboo Song

ABSTRACT: An important component of decision-making is knowledge. However, perceived knowledge is not always aligned with actual knowledge. This disparity can be significant, affecting when an individual seeks information regarding a particular policy issue. Utilizing a survey distributed to a sample of policy elites and the general public, this study examines the origins of knowledge hubris – the difference between an individual's perceived and actual knowledge regarding a policy topic. We further examine whether the origins of knowledge hubris differ between the general public and policy elites, as well as how various levels of hubris influence perceptions of risks and benefits of hydraulic fracturing. We utilize Cultural Theory (CT) to explain how hubris on a policy topic is rooted in the cultural worldviews – specifically, hierarchism, fatalism, egalitarianism, and individualism – of both policy elites and the public. We discuss the similarities and differences in the origins and levels of hubris between policy elites and the public, as well as the implications of knowledge hubris among each of these groups – together and separately – particularly focusing on the role that this hubris ultimately plays in the policymaking process.

INTRODUCTION

Hydraulic fracturing (“fracking”) is a relatively recently utilized technique for extracting from previously inaccessible reserves of oil and gas (Boudet et al., 2014) that involves a pressure injection of a mixture consisting of water, sand, and other chemicals through a previously horizontally drilled rock layer in order to facilitate the flow of oil and gas by fracturing the rock (Boudet et al., 2014; Pye, 1973). Because of these methods, increased gas and oil extraction has been enabled in previously inaccessible locations around the world (Boudet et al., 2014; Clarke, Evensen, Jacquet, & Stedman, 2012; Walser, Pursell, & others, 2007) and is expected to make the United States a net exporter of natural gas in the near future, with the share of production attributed to shale gas increasing from 23% to 49% by the year 2035 (Boudet et al., 2014).

According to supporters, fracking will lead to many positive outcomes, including increased economic growth, a more secure domestic energy supply, and a decreased reliance on electricity generation that is coal-based and carbon intensive (Boudet et al., 2014; Considine, Watson, & Blumsack, 2010; Hultman, Rebois, Scholten, & Ramig, 2011). However, the benefits proposed by fracking supporters are not without debate. While fracking is suggested to benefit local communities via expanding local business opportunities, increased job opportunities for residents, and increasing local tax revenues (Boudet et al., 2014; Kay, 2011), there may be strains placed on community infrastructures due to an influx of workers and industry into the community (Boudet et al., 2014; Jacquet, 2009). Additionally, the fracking process requires 2-10 million gallons of water per fracture (Boudet et al., 2014; Soeder & Kappel, 2009), potentially creating issues regarding water availability and access within communities. Further, the water used for the fracking process may contaminate the local water supply via chemical spills, inadequate treatment of wastewater, and aquifer contamination of methane released from the gas wells (Boudet et al., 2014; Kargbo, Wilhelm, & Campbell, 2010). As such, both federal and state agencies have issued fracking related regulations (Boudet et al., 2014; Groeger, 2012). The increased potential strains on community infrastructures due to fracking has also been suggested to lead to higher stress levels, decreased cohesion in the community, and a changing of the community character with the influx of employment-seekers to the community, increasing social problems (Boudet et al., 2014; Brasier et al., 2011; Kester et al. 2015; Heikkila et al. 2015)

With the relative newness of fracking operations in the United States, and the contradictory views regarding the benefits and risks associated with fracking practices, a better understanding of the formation of related attitudes from both the perspective of the policy elites and the general public, two important policy actors in the related policymaking process, is critical in comprehending fracking policymaking. In doing so, we underscore the role that knowledge hubris – conceptualized here as the degree of congruence between an individual's perceived and actual knowledge levels on a given topic – plays in the benefit-risk perceptions of fracking for both the general public and local policy elites. Further, we examine the origins of knowledge hubris for each of these two groups, focusing on cultural value predispositions.

We introduce this concept of knowledge hubris as, we argue, it is both a more informative and relevant construct in terms of knowledge than either perceived or actual knowledge levels. From a policymaking standpoint, we suspect that knowledge hubris provides more insight into the policy reasoning of individual actors, both in terms of policy decision outcomes and the resulting acceptance, or lack thereof, of the decisions. For example, an individual with high levels of perceived knowledge who possesses a high level of actual knowledge as well is, we suspect, more likely to make a “better” decision than another individual who has a similarly high level of perceived knowledge, but in actuality knows little about the topic at hand. Both individuals may very well vigorously attempt to assert themselves into the policy process due to their perceived expertise, but the outcomes associated with each individual's thought processes are likely to be quite divergent. Conversely, an individual who has low levels of perceived knowledge on a topic may refrain from the policymaking process. However, if this individual's actual knowledge levels are high, they are precisely the type of individual whose participation would advance the policy process.

In summary, in this paper, we attempt to examine the role of cultural value predispositions in determining levels of knowledge hubris and the resulting perceptions of risks and benefits associated with fracking operations, particularly focusing on similarities and differences between local policy elites and the general public. We first provide a theoretical discussion and literature review, leading to our conjectures. We then discuss our methodology, specifically focusing on our analysis and a discussion of the results.

We end by discussing the implications of the current research, focusing on both theoretical and practical considerations, as well as directions for future research.

THEORIES AND CONJECTURES

In the following sections we provide a theoretical discussion and literature review in order to develop our conjectures. This research is focused on three key areas of interest: examining antecedents to knowledge hubris, particularly focusing on the role cultural value predispositions play in the context of fracking policy, examining the role of knowledge hubris in determining benefit-risk perceptions of fracking, and comparing the general public with local policy elites regarding these questions. As such, we next provide a discussion on demographics, cultural value predispositions, knowledge hubris, and political sophistication in order to frame the current study.

Demographics

Demographic characteristics, particularly gender and race, have been shown to influence the risk perceptions of individuals. The so-called “white male effect” has been consistently found in studies of risk perceptions. Males consistently perceive lower risk levels than females in the domain of environmental health threats (Flynn, Slovic, & Mertz, 1994). Additionally, across a variety of risk domains, white individuals tend to perceive lower levels of risk compared to their non-white counterparts (Finucane, Slovic, Mertz, Flynn, & Satterfield, 2000). Not only are these differences in risk perceptions found amongst the general public, but have also been demonstrated to exist among scientists, who are assumed to be more rational in their decision making due to having relatively sophisticated levels of expertise and scientific knowledge. For example, in the domain of nuclear risks, male scientists have been found to exhibit significantly lower levels of perceived risk than females (Barke, Jenkins-Smith, & Slovic, 1997). It is suggested that white males (in the United States), tend to hold a unique value identity based on individualism and hierarchism. In turn, attitudes more accommodating to risk-taking, particularly in the science and technology utilization domains, are held which reinforce their worldview of both an ecological system that is resilient and market-oriented entrepreneurship (Kahan, Jenkins-Smith, &

Braman, 2011). We similarly expect such demographic-based variations in benefit-risk assessments of fracking in both the general public and local policy elites.

In terms of knowledge hubris, demographic characteristics have been found to be correlated with inflated self-estimations. Males, as compared to females, self-estimate their IQ scores as higher. Interestingly, this appears to be due not to inflated IQ estimations of males, but deflated estimations of females (Furnham & Rawles, 1999).

Cultural Theory of Risk Perception

As our primary dependent variable in this study is perceptions of benefits and risks of fracking, we utilize Cultural Theory (Swedlow, 2011; Thompson, Ellis, & Wildavsky, 1990), which suggests that the way we perceive and act in the world is shaped by the organization of our social relationships (Ney & Verweij, 2014). Perceptions of risks are, then, derived from responses to threats to the preferred 'way of life' or 'cultural worldview' of an individual, as opposed to being necessarily associated with the technical aspects of the issue. Instead, controversy regarding risks derives from an ongoing debate over the ways a society should act and function (Douglas & Wildavsky, 1982; Kahan, Braman, Gastil, Slovic, & Mertz, 2007).

Grid-group Cultural Theory (CT) suggests that cultural biases are shared through social relations, which reflect shared attitudes and worldviews across socially constructed systems (Thompson et al., 1990). An individual's behavior, particularly the attention paid to various types of risks and their risk-taking preferences in various domains, is derived from these biases (Thompson et al., 1990). A typology consisting of four primary cultural worldviews (egalitarianism, individualism, hierarchism, fatalism) stems from two dimensions – grid and group. Grid refers to the extent to which the behavior of the individual is constrained by role differentiation, wherein grid constraints are higher as roles are prescribed and lower when roles are chosen (Ney & Verweij, 2014). Group, on the other hand, refers to the extent to which individuals are bound to a certain social group (Ney & Verweij, 2014; Thompson et al., 1990). The four worldviews function together as a system, with each worldview "contradistinct" to the others. These distinctions allow for an individual's cultural biases to be reinforced via the distinctions between the other worldviews and their own (Thompson et al., 1990). These resulting interactions provide distinct

perspectives and values related to economic systems and views of nature between the various cultural groups (Thompson et al., 1990).

Egalitarians (low grid-high group) are strongly bound to their social group while lacking role differentiation. Group cohesion is reinforced by distrust in authority, and fairness and equity in distribution are highly valued (Thompson et al., 1990). Additionally, egalitarians tend to perceive higher levels of risk, especially in the areas of economic growth and technological development, as these two areas are perceived to be threatening to nature, which is viewed as easily damaged due to its fragility. As such, experimentation with nature must be avoided in an effort to manage nature carefully – a necessity from the perspective of an egalitarian (Dake, 1992; Lachapelle, Montpetit, & Gauvin, 2014; Thompson et al., 1990).

Individualists (low grid-low group) view risk as opportunity and are not bound by either rules or social groups, often preferring a libertarian society (Thompson et al., 1990). Competition among everyone, regardless of status or advantage, is believed to be what creates the best functioning society, with individuals failing or succeeding on their own merits. Therefore, individualists dislike external control, as it violates the free competition that they value. Economically, individualists are focused on wealth creation, while viewing nature as robust and able to maintain equilibrium on its own. Thus, experimentation is acceptable regarding nature, as it allows the pursuit of the “best possible” outcomes (Dake, 1992; Lachapelle et al., 2014; Thompson et al., 1990).

Hierarchs (high grid-high group) view social order as being maintained by both institutional and social rules, thus placing value on both. Risks are often acceptable, with experts viewed as central in guiding the direction of society. Similar to individualists, hierarchs place focus on wealth creation. However, obeying authority is seen as a key means toward success. As such, hierarchs believe that punishment for rule breakers should be swift and severe. Regarding nature, hierarchs are again similar to individualists, viewing it as tolerant and robust to manipulations. However, distinct from individualists, hierarchs believe that nature is subject to occasional events that can disrupt this equilibrium and thus view regulations to prevent these potential disasters as necessary due to the desire for a future that is predictable based on expert evaluation (Dake, 1992; Lachapelle et al., 2014; Thompson et al., 1990).

Fatalists (high grid-low group) lack belief in their ability to control the situations they face, being at the mercy of fate. They are excluded from social groups, but bound by social constructs. Unsurprisingly, nature is viewed by fatalists as unpredictable, with outcomes predicated on chance (Dake, 1992; Lachapelle et al., 2014; Thompson et al., 1990).

Knowledge Hubris

Decision-making is affected in various ways by both perceived and actual knowledge (e.g. Jaccard, Dodge, & Guilamo-Ramos, 2005; Rock, Ireland, & Resnick, 2003). While both actual and perceived knowledge have been often examined, there is a dearth of research regarding the discrepancy between the two. This discrepancy, we argue, is likely to serve as a more informative construct than the examination of the two individual components, potentially explaining some of the conflicting and/or inconsistent results found in the literature regarding actual and perceived knowledge and their effects on various outcomes.

There are two traditionally utilized ways to measure knowledge on an issue – assessing an individual's self-perceptions of their own knowledge and measuring an individual's knowledge level on a topic via a series of questions about the topic (Stoutenborough & Vedlitz, 2014). However, while often correlated, these two forms of measurement do not provide consistent and similar results in terms of explaining information seeking and decision making behaviors and perceived decision outcomes (Raju, Lonial, & Mangold, 1995). In the climate change arena, Stoutenborough & Vedlitz (2014) found that those with higher levels of perceived knowledge were not more likely to be concerned about climate change. However, those with higher levels of measured actual knowledge had higher concern levels regarding climate change. Perceived knowledge regarding birth control use, independent of actual knowledge, has been demonstrated to increase the likelihood of pregnancy (Jaccard et al., 2005). These two examples, one finding that actual knowledge, while not perceived knowledge, is associated with risk perspectives and the other finding that riskier behaviors are associated with higher levels of perceived knowledge, demonstrate the unexplored role of knowledge, particularly the interaction between these two types of knowledge, on outcomes.

In examining consumer decision-making, the marketing field has offered some insights into why there may be differences in outcomes associated with actual and perceived knowledge. Dodd, Laverie, Wilcox, and Duhan (2005) find that consumers making wine purchases use different sources of information based on their actual and perceived knowledge levels. Those with high levels of actual knowledge tended to use impersonal information sources, such as wine guides and reviews, to make their purchase decisions, while those who had higher levels of perceived knowledge, in addition to impersonal sources, tended to use their own preferences and discount personal sources such as friends and sales personnel. Satisfaction with the quality of purchase decisions has also been found to be attributed to higher perceived knowledge levels, but not higher actual knowledge levels (Raju et al., 1995). It is argued that perceived level of knowledge, compounded by factors in the surrounding environment, is the catalyst for information seeking behavior. The mechanism by which this occurs is an effort to participate in self-consistent behavior (Moorman, Diehl, Brinberg, & Kidwell, 2004).

The previous discussion has focused on the roles types of knowledge play in determining outcomes, as well as mechanisms by which these relationships occur. Additionally, previous work has examined antecedents relevant to our concept of knowledge hubris. Particularly, expertise and experience tend to significantly lead to an inflated sense of capabilities. This expert overconfidence is exhibited across a range of domains including estimating the number of moves that could be recalled in a game of chess, (Chi, Glaser, & Rees, 1981), card trading (List & Mason, 2011), and American football draft selection (Massey & Thaler, 2005). However, this overconfidence may not always be problematic. Johnson and Fowler (2011) argue that more complete decision rules can be outperformed by overconfident beliefs when those beliefs prove more economical, readily available, or faster. Particularly related to the current study is the finding that political elites are prone to being overconfident (Johnson & Fowler, 2011; Lin & Bier, 2008; Massey & Thaler, 2005; Tetlock, 2005), making them more likely to exhibit knowledge hubris as compared to the general public.

Political Sophistication, Local Policy Elites, and the General Public

Political sophistication – “the process of gaining and ultimately possessing expertise in one or more domains of political thinking” (Lieberman, Schreiber, & Ochsner, 2003, p. 685) is a common approach to

public opinion research and is argued to be the result of political knowledge that is highly differentiated, integrated, and organized (Campbell, 1980; Converse, 1964; Luskin, 1990). Political belief systems are argued to be more coherent as political knowledge increases in range and scope (Carpini & Keeter, 1997). Thus, when low levels of political sophistication exist, political belief systems are inconsistent, which prevents coherent and consistent policy preferences from being developed (Carpini & Keeter, 1997; Converse, 1964; Michaud, Carlisle, & Smith, 2009; Stimson, 1975; Zaller, 1992). Indeed, political sophistication has been shown to increase the relationship between political orientations and policy positions (Carpini & Keeter, 1997; Goren, 2004; Sniderman, Brody, & Tetlock, 1991; Zaller, 1992).

However, it is also argued that political sophistication is not necessary for the development of coherent policy preferences, but instead core values and beliefs that function as cognitive heuristics and allow for individuals with low levels of political sophistication to make political judgments without expending the additional costs associated with information search while still being able to hold consistent and coherent political belief systems regardless of their level of political sophistication (Goren, 2004; Popkin, 1994). Among the general public cultural value orientations have indeed been shown to represent a set of intrinsic values that, in turn, influence and predict policy preferences and political attitudes distinct from the effects of ideology. Importantly, this holds true irrespective of sophistication levels (Ripberger, Song, Nowlin, Jones, & Jenkins-Smith, 2012).

For the purposes of this paper, it is important to consider the potential distinctions between local policy elites and the general public, particularly as related to political sophistication and decision-making. We can expect that local policy elites, by their position, are relatively politically sophisticated, particularly as compared to the general population. Political elites are different from the general public demographically, tending to have higher education, more knowledge regarding politics, and higher incomes (Edinger & Searing, 1967; Griffin, 2013; Jennings, 1992; Lawless & Fox, 2005). Further, the strength and consistency of their political attitudes is also higher than that of the general public (Converse, 1964; Hetherington, 2001), supporting the argument that elites are not only distinct from the general public demographically, but likely in their levels of political sophistication, as well.

Because of their position and power, elites gain experience in the political process as compared to the general public, making them more politically sophisticated and thus likely affecting how they make

decisions (Chin, Bond, & Geva, 2000). Indeed, as compared to the general public, elites have been empirically shown to have greater levels of sophistication (Lieberman et al., 2003). Further, evidence suggests that elites differ from the general population in terms of the ways they think and make decisions. For example, Herrmann, Tetlock, and Diascro (2001) found that elites make judgments utilizing neoclassical economic reasoning, whereas the general public tended to utilize neorealist or Rawlsian lines of reasoning in their decision-making regarding international trade. Due to experience, elites also tend to be less averse to losses than the general public (Haigh & List, 2005; Plott & Zeiler, 2007). In complex situations, experts have been found to make better use of heuristics in decision-making (Feltovich, Prietula, & Ericsson, 2006; Mintz, 2004; Zimmerman & Campillo, 2003) as well as to be closer to meeting the rational actor assumption.

While research demonstrates that elites are different from the general public in terms of their decision-making process, there is debate as to why this is the case. Griffin (2013) argues that it is not a distinction in the decision-making processes of elites versus the general public, but instead a function of the roles of the two groups. Indeed, he found that when information was readily available, elected officials and the general public did not utilize different decision-making processes, supporting the contention that there is no significant difference between the two groups in terms of decision-making processes, at least under equal decision-making environments.

Another relevant consideration for the current research regarding differences between elites and the general public is associated specifically with risk perceptions. Knowledge levels of individuals regarding sources of risk and danger have been suggested to explain why risks and benefits are perceived differently across individuals (Wildavsky & Dake, 1990). According to this idea, more accurate and objective evaluations regarding potential risks can be made by those who are more knowledgeable than others. Often examined in the context of differences between experts and the general public, this “knowledge thesis” has received mixed support. Significant differences in risk perceptions between elites and the general public have been found in several domains such as biotechnology, chemicals, and nanotechnology (Kraus, Malmfors, & Slovic, 1992; Savadori et al., 2004; Siegrist, Cousin, Kastenholz, & Wiek, 2007). However, claims of issues related to methodological validity argue that legitimate support of this distinction between the two groups is minimal, at best (Rowe & Wright, 2001).

Conjectures

The focus of the current study is the examination of the origins of knowledge hubris and its role in benefit risk perceptions in the general public and in local policy elites. Because the issues surrounding fracking operations and policy are oriented around competing perceptions of risks and benefits, particularly in the environmental and economic domains, we expect that the cultural values held by an individual will significantly predict perceptions of risks and benefits associated with fracking.

Egalitarians, particularly in the technological development and economic growth domains, tend to perceive high levels of risk (Thompson et al., 1990), largely because of their view of nature as fragile and easily damaged. We therefore expect egalitarians to perceive higher levels of risks as compared to benefits. Conversely, both individualists and hierarchs view nature as relatively robust, particularly when compared to egalitarians, and are accepting of risks (Thompson et al., 1990). We therefore expect both individualists and hierarchs to perceive greater benefits as compared to risks. We expect no particular relationship with benefit-risk perceptions for fatalists, as they tend to view outcomes as matters of chance. We expect these relationships to hold for both local policy elites and the general public.

We also anticipate significant relationships between cultural value predispositions and knowledge hubris. Identity-protective cognition (Kahan et al., 2007) suggests that the well-being of a group member may be threatened via a loss of self-esteem or status-acquiring opportunities when the values of the group are challenged. This threat to group-held beliefs and values also represents a threat to the group member's identity, which is, in large part, a product of group memberships. In order to protect their identity, individuals assess information in a way that reinforces those beliefs that are associated with membership within a group (Cohen et al., 2007; Cohen, Aronson, & Steele, 2000; Kahan et al., 2007). Further, risk assessments are found to be consistent with whether the cultural value oriented beliefs of the group are threatened, including the areas of environmental risks, guns, and abortion (Kahan et al., 2007). In line with this reasoning, we suggest that perceived knowledge represents a mechanism by which an individual can attempt to protect their group-oriented identity. In the case of fracking, we expect that egalitarians will hold higher levels of knowledge hubris, as fracking operations represent a threat to the environment. For individualists, we expect a similar relationship with knowledge hubris, as fracking

operations represent a free market and competition. Thus efforts to regulate fracking represent a violation of these values. For hierarchs, we anticipate a negative relationship with knowledge hubris, as there is not a particularly group-oriented identity that appears to be violated by the topic. Additionally, hierarchs tend to prefer deferring to experts to guide decision-making, again minimizing the need to protect an identity based on knowledge.

In considering the role of knowledge hubris on benefit-risk perceptions, we expect several significant relationships. We expect knowledge hubris to partially mediate the relationship between cultural values and benefit-risk perceptions, particularly for egalitarians and individualists, who we have suggested will be engaged in a process of identity-protective cognition.

We anticipate these proposed relationships will be consistent between the sample of local policy elites and the general public. However, we do expect to find a difference in the strength of several of the relationships. A key distinction between the general public and local policy elites is that of political sophistication. As elites have been shown to have greater sophistication than the general public (Lieberman et al., 2003) which increases the relationship between political orientations and policy positions (Carpini & Keeter, 1997; Goren, 2004; Sniderman et al., 1991; Zaller, 1992) we expect the relationship between cultural value orientations and benefit-risk perceptions to be stronger for local policy elites than the general public, as the increased sophistication of the elites should make their attitudes towards policy issues stronger and more coherent than those of the general public (Lee & Chang, 2010). We similarly anticipate stronger relationships between cultural values and knowledge hubris for local policy elites as compared to the general population. As discussed above, elites have tendencies to express overconfidence, in addition to having more coherent and consistent ideological mental structures. This combination should, we suggest, lead to higher levels of knowledge hubris for local policy elites as compared to the general public. For the mediating role of knowledge hubris, however, we expect no particular difference between local policy elites and the general public.

DATA, VARIABLES, AND MEASURES

Survey Data

Between December 2015 and January 2016, we distributed a confidential survey to both local policy elites and a representative sample of the general public in the states of Arkansas and Oregon, constituting four separate statewide internet surveys. A total of 657 local policy elites in Arkansas and Oregon responded to the survey. For the general public in the two states, a total of 1,049 individuals responded.

We conceptualized policy elites as individuals who, at the local level, hold political resources and the capability to potentially hold influence throughout the policy process, including agenda setting and policy formulation, implementation, and feedback. Specifically, we focused on those individuals who are likely to be involved in the policy process related to energy policy issues. Thus, the sample frame for the policy elites consisted of city mayors, council members, clerks, and government officials, as well as chamber of commerce members in cities across each state. This data set demonstrates distinct differences between the general public and local policy elites (see Table 1), with policy elites being generally more highly educated and having higher income. Further, local policy elites are more predominately White males as compared to the sample of the general public.

(Table 1 about here)

Measuring Dependent Variable

The primary dependent variable of interest in this analysis is the perceived benefits and risks associated with fracking that are held by policy elites and the general public. This was measured by a single 7 point Likert-type question asking participants how they rated the overall balance of risks and benefits associated with fracking, anchored at 1 (risks far outweigh benefits) and 7 (benefits far outweigh risks). We utilized this single item in order to capture the heuristic evaluation of risks and benefits associated with fracking on the whole, without breaking it down into its potential component parts.

Measuring Independent Variables and Mediator

We utilize the individual's cultural value predispositions (i.e. egalitarianism, individualism, hierarchism, and fatalism) as our primary independent variables. We employed a previously validated scale (Herron & Jenkins-Smith, 2014; Jones & Song, 2014; Ripberger, Gupta, Silva, & Jenkins-Smith, 2014; Song, 2014;

Song, Silva, & Jenkins-Smith, 2014) of twelve survey items to measure cultural values (Table 2). Each of the four cultural worldviews was measured by a subset of three survey items. The survey respondents were provided with the twelve statements relating to their cultural orientations and were asked to rate their level of agreement with each of the items, which were evaluated on a seven-point scale anchored at 1 (=Strongly disagree) to 7 (=Strongly agree). We conducted a factor analysis and optimized the four factor solution from the responses to these twelve items. Each of the three subsets of items loaded onto one of the four latent dimensions. These dimensions and their loadings matched the theoretical definitions of Cultural Theory's four proposed cultural orientations. We then calculated factor scores for each dimension based on this factor analysis. These scores were used as an index measuring the cultural orientations of each respondent. Each set of three CT items exhibited acceptable reliability with Chronbach's alpha scores ranging from 0.60 to 0.79.

(Table 2 about here)

Our mediation variable, knowledge hubris, was calculated via subtracting the actual knowledge scores for each respondent from their perceived knowledge scores. Actual knowledge scores were calculated based on a set of seven "True" or "False" questions pertaining to energy and fracking issues in their respective state and then converted into a percentage correct score. Perceived knowledge was measured via two eight-point scale questions, each anchored at 0 (=Not at all informed) and 7 (=Completely informed). The first question asked respondents how well they were informed on energy policy in general, particularly regarding fracking operations, and the second asked respondents how well informed they were on issues regarding fracking operations. The responses to these two questions were added together and converted into a percentage score. The actual knowledge percentage score was then subtracted from the perceived knowledge percentage score to give us a single score indicating knowledge hubris (see Table 3).

(Table 3 about here)

Measuring Control Variables

We utilized other variables that have been claimed by previous studies to influence benefit-risk perceptions as control variables. Specifically, we included demographic characteristics such as age, gender, race, income, and education. Additionally, we included a dummy variable for the state in which

the respondent lived in order to control for any effects associated with any differences between the two states (e.g. Arkansas having fracking operations whereas Oregon does not).

STATISTICAL ANALYSIS AND RESULTS

To test our hypotheses regarding the relationships between cultural orientations, knowledge hubris, and fracking benefit-risk perceptions among local policy elites and the general public in Arkansas and Oregon, we utilized a method for mediation analysis suggested by Preacher and Hayes (A. F. Hayes, 2013; Preacher & Hayes, 2004). We estimated the effects of the cultural orientation variables on fracking benefit-risk perceptions through knowledge hubris while controlling for demographics and state of residence by utilizing the SPSS Macro MEDIATE. The MEDIATE macro is based on OLS regression and assumes no interaction between the model's independent variables and mediating variables (A. Hayes, 2014). We used MEDIATE to generate 1,000 random samples from the data to determine confidence intervals at a 95% threshold (A. F. Hayes, 2013). All variables were standardized before analysis for interpretability of results.

We calculated both the direct effects (effects of cultural orientations on fracking benefit-risk perceptions while controlling for knowledge hubris and control variables) and indirect effects (effects of cultural orientations on fracking benefit-risk perceptions carried through knowledge hubris) using SPSS MEDIATE. MEDIATE calculates indirect effects with bootstrap estimates that use 1,000 samples pulled from the data, computing the indirect effect for each of the 1,000 samples. An indirect effect of the CT variables on benefit-risk perceptions via knowledge hubris is indicated when the confidence interval does not contain zero.

Policy Elites, Cultural Values, Knowledge Hubris, and Fracking Benefit-Risk Perceptions

For the relationship between cultural value orientations and fracking benefit-risk perceptions among policy elites, we found no mediating effect of knowledge hubris, as knowledge hubris was not significantly associated with fracking benefit-risk perceptions. Our measure of egalitarianism is positively associated with knowledge hubris ($\beta = +0.132$, $p < 0.05$) and negatively associated with fracking benefit-risk perceptions ($\beta = -0.412$, $p < 0.01$), indicating that as egalitarianism scores increase, greater risks (as

opposed to benefits) of fracking are perceived. Similarly, our measure of individualism was positively associated with knowledge hubris ($\beta = +0.134$, $p < 0.01$). Opposite our measure of egalitarianism, individualism was positively associated with fracking benefit-risk perceptions ($\beta = +0.398$, $p < 0.01$), indicating that as individualism scores increase, greater benefits (as opposed to risks) of fracking are perceived. Our measures of hierarchism and fatalism were not significantly associated with knowledge hubris scores or fracking benefit-risk perceptions.

Overall, for policy elites, results indicate that, consistent with our predictions, cultural value orientations – particularly egalitarianism and individualism – significantly predict fracking benefit-risk perceptions, with egalitarians viewing fracking as being more risky, and individualists viewing fracking as providing greater benefits. While both egalitarians and individualists exhibit significant positive relationships with knowledge hubris, this knowledge hubris does not affect their judgments of fracking benefits and risks.

(Figure 1 about here)

General Public, Cultural Values, Knowledge Hubris, and Fracking Benefit-Risk Perceptions

For the relationship between cultural value orientations and fracking benefit-risk perceptions among the general public, we found significant mediating effects of knowledge hubris for egalitarians, individualists, and hierarchs. As opposed to our sample of policy elites, knowledge hubris was significantly associated with fracking benefit-risk perceptions ($\beta = +0.118$, $p < 0.01$). Our measure of egalitarianism is positively associated with knowledge hubris ($\beta = +0.089$, $p < 0.01$) and negatively associated with fracking benefit-risk perceptions ($\beta = -0.317$, $p < 0.01$). Additionally, a significant indirect effect of egalitarianism on fracking benefit-risk perceptions through knowledge hubris is indicated ($\beta = +0.011$, LLCI = 0.003, ULCI = 0.023). Our measure of individualism is positively associated with knowledge hubris ($\beta = +0.066$, $p < 0.05$) and positively associated with fracking benefit-risk perceptions ($\beta = +0.261$, $p < 0.01$). Additionally, a significant indirect effect of individualism on fracking benefit-risk perceptions through knowledge hubris is indicated ($\beta = +0.008$, LLCI = 0.001, ULCI = 0.02). Our measure of hierarchism is positively associated with knowledge hubris ($\beta = +0.082$, $p < 0.01$) and positively associated with fracking benefit-risk perceptions ($\beta = +0.156$, $p < 0.01$). Additionally, a significant indirect effect of hierarchism on fracking benefit-risk perceptions through knowledge hubris is indicated ($\beta = +0.01$, LLCI = 0.003, ULCI = 0.021).

Our measure of fatalism was not significantly associated with knowledge hubris scores or fracking benefit-risk perceptions.

Overall, for the general public, results indicate that cultural value orientations – particularly egalitarianism, individualism, and hierarchism – significantly predict fracking benefit-risk perceptions, with egalitarians viewing fracking as being more risky, whereas individualists and hierarchs view fracking as providing greater benefits. Unlike in the policy elite sample, the effects of cultural value orientations on fracking benefit-risk perceptions were partially mediated through knowledge hubris.

(Figure 2 about here)

Comparing Policy Elites and the General Public

In consideration of the inconsistent results of the previous mediation analysis, we next examine differences between our two samples – policy elites and the general public – in terms of their knowledge hubris and benefit-risk perceptions. We first conducted a Welch two sample t-test on benefit-risk perceptions between the two groups. The mean benefit-risk score for policy elites is 3.47, whereas the mean score for the general public is 3.63, indicating that the public, on average, has a higher perception of benefits as compared to risks than do elites. However, this difference is not statistically significant. We next conduct the same test for knowledge hubris. The mean knowledge hubris score for elites is 0.097, while the general public mean score is 0.06 – a statistically significant difference ($p < 0.05$), indicating that policy elites have higher levels of knowledge hubris than the general public. This finding was somewhat surprising in light of our previous findings that knowledge hubris predicted benefit-risk perceptions for the general public but not for policy elites. We therefore examined actual and perceived knowledge levels between the general public and policy elites separately. For our measure of actual knowledge the group means were significantly different ($p < 0.01$) with elites having a mean knowledge score of 0.5 and the general public having a mean knowledge score of 0.45. Similarly, our measure of perceived knowledge was significantly different between the two samples ($p < 0.01$) with policy elites having a mean perceived knowledge score of 0.6 and the general public having a mean perceived knowledge score of 0.52. The score variances between policy elites and the general public were inconsistent (see figures 3), with benefit-risk perceptions and perceived knowledge exhibiting similar degrees of variance between the two

groups, policy elites having greater variance than the general public in scores of actual knowledge, and the general public having greater variance than policy elites in knowledge hubris scores.

(Figure 3 about here)

CONCLUSIONS & DISCUSSION

Overall, this study indicates that there is a distinction between policy elites and the general public in terms of the role knowledge hubris plays in the evaluation of benefits and risks associated with fracking.

Knowledge hubris is similarly predicted by cultural value orientations between the two groups, with the relationship being stronger for local policy elites. However, this knowledge hubris, while stemming from similar sources, only affects fracking benefit-risk perceptions for the general public, not for local policy elites.

This research has significant implications for both theory and practice. While cultural value predispositions have previously been demonstrated to influence perceptions of risks and benefits across multiple domains (e.g. Jones & Song, 2014; Kahan et al., 2007; Song, 2014), there has been little, if any, research comparing this relationship between local policy elites and the general public, particularly on the same topic. Our findings indicate support for the influence of cultural values on benefit-risk perceptions for both groups. Importantly, this study demonstrates that the magnitude of the relationship is stronger for local policy elites. This finding supports research on political sophistication that suggests that those who are more sophisticated have greater coherency in their ideological views as well as more consistency in the relationships between ideological persuasions and policy opinions. The current research extends this ideology-based coherency into the realm of cultural value orientations, arguably a construct more fundamental to attitudes and beliefs than ideological identity. This result implies the need for more research on the level at which sophistication provides coherency and structure to an individual's choices and attitudes regarding various policy issues.

The finding that cultural values affect knowledge hubris regarding fracking similarly between the general public and elite in terms of the direction and significance of the relationships is not necessarily surprising. However, the magnitude of these relationships being greater for local policy elites is interesting. Experts have been found to make better use of heuristics in decision-making and to be closer to meeting the rational actor assumption (Feltovich et al., 2006; Mintz, 2004; Zimmerman & Campillo,

2003). However, in this research, those who are relative experts have higher levels of knowledge hubris - a finding seemingly at conflict with past research. However, the difference between the influence of knowledge hubris on benefit-risk perceptions of fracking between local policy elites and the general public seem to mitigate this inconsistency. Knowledge hubris shapes benefit-risk perceptions for the general public, but is not significantly associated with benefit-risk perceptions for local policy elites, indicating that the decision-making process between the two groups appears to be different – a key distinction. This difference suggests a need for further research examining both the origins and components of the distinct reasoning processes of these two groups. It is possible that the general public has similar evaluations of risk because of cues provided by policy elites and, similar to the concept of identity-protective cognition, aligning their cultural value identities with both perceived knowledge levels and benefit-risk perceptions. Future research should focus on other policy issues to examine whether the relationships found here hold across policy domains. Of particular focus should be the examination of policies at various stages of development, as it is possible that as a policy issue becomes more salient, these relationships shift in significance or strength.

REFERENCES

- Barke, R. P., Jenkins-Smith, H., & Slovic, P. (1997). Risk perceptions of men and women scientists. *Social Science Quarterly*, 167–176.
- Boudet, H., Clarke, C., Bugden, D., Maibach, E., Roser-Renouf, C., & Leiserowitz, A. (2014). “Fracking” controversy and communication: Using national survey data to understand public perceptions of hydraulic fracturing. *Energy Policy*, 65, 57–67.
- Brasier, K. J., Filteau, M. R., McLaughlin, D. K., Jacquet, J., Stedman, R. C., Kelsey, T. W., & Goetz, S. J. (2011). RESIDENTS’ PERCEPTIONS OF COMMUNITY AND ENVIRONMENTAL IMPACTS FROM DEVELOPMENT OF NATURAL GAS IN THE MARCELLUS SHALE: A COMPARISON OF PENNSYLVANIA AND NEW YORK CASES*. *Journal of Rural Social Sciences*, 26(1), 32.
- Campbell, A. (1980). *The american voter*. University of Chicago Press. Retrieved from https://books.google.com/books?hl=en&lr=&id=JeYUrs_GOCMC&oi=fnd&pg=PA18&dq=Campbell,+Angus.+1980.+The+American+Voter.+University+of+Chicago+Press.+&ots=wFFfHIVnua&sig=wDkQwf8rRLTjLP1i3tE_3wQW4Zw
- Carpini, M. X. D., & Keeter, S. (1997). *What Americans know about politics and why it matters*. Yale University Press. Retrieved from https://books.google.com/books?hl=en&lr=&id=b2ZUquOLrzoC&oi=fnd&pg=PR9&dq=carpini+and+keeter+1997&ots=ksren6ql_E&sig=WpILjMr53hwZ5FzE1v3Au38Urmc
- Chi, M. T., Glaser, R., & Rees, E. (1981). *Expertise in problem solving*. DTIC Document. Retrieved from <http://oai.dtic.mil/oai/oai?verb=getRecord&metadataPrefix=html&identifier=ADA100138>
- Chin, M. L., Bond, J. R., & Geva, N. (2000). A Foot in the Door: An Experimental Study of PAC and Constituency Effects on Access*. *Journal of Politics*, 62(2), 534–549.
- Clarke, C. E., Evensen, D. T., Jacquet, J., & Stedman, R. C. (2012). Emerging risk communication challenges associated with shale gas development. *European Journal of Risk Regulation: EJRR*, 3(3), 424.
- Cohen, G. L., Aronson, J., & Steele, C. M. (2000). When beliefs yield to evidence: Reducing biased evaluation by affirming the self. *Personality and Social Psychology Bulletin*, 26(9), 1151–1164.
- Cohen, G. L., Sherman, D. K., Bastardi, A., Hsu, L., McGoey, M., & Ross, L. (2007). Bridging the partisan divide: Self-affirmation reduces ideological closed-mindedness and inflexibility in negotiation. *Journal of Personality and Social Psychology*, 93(3), 415.
- Considine, T. J., Watson, R., & Blumsack, S. (2010). The economic impacts of the Pennsylvania Marcellus shale natural gas play: an update. *The Pennsylvania State University, Department of Energy and Mineral Engineering*.
- Converse, P. E. (1964). Ideology and discontent. Retrieved from <http://www.citeulike.org/group/582/article/369400>
- Dake, K. (1992). Myths of nature: Culture and the social construction of risk. *Journal of Social Issues*, 48(4), 21–37.
- Dodd, T. H., Laverie, D. A., Wilcox, J. F., & Duhan, D. F. (2005). Differential effects of experience, subjective knowledge, and objective knowledge on sources of information used in consumer wine purchasing. *Journal of Hospitality & Tourism Research*, 29(1), 3–19.

- Douglas, M., & Wildavsky, A. (1982). *Risk and culture: An essay on the selection of technical and environmental dangers*. Berkeley, Cal.: University of California Press.
- Edinger, L. J., & Searing, D. D. (1967). Social background in elite analysis: a methodological inquiry. *American Political Science Review*, 61(02), 428–445.
- Feltovich, P. J., Prietula, M. J., & Ericsson, K. A. (2006). Studies of Expertise from Psychological Perspectives. Retrieved from <http://psycnet.apa.org/psycinfo/2006-10094-004>
- Finucane, M. L., Slovic, P., Mertz, C. K., Flynn, J., & Satterfield, T. A. (2000). Gender, race, and perceived risk: The 'white male' effect. *Health, Risk & Society*, 2(2), 159–172.
- Flynn, J., Slovic, P., & Mertz, C. K. (1994). Gender, race, and perception of environmental health risks. *Risk Analysis*, 14(6), 1101–1108.
- Furnham, A., & Rawles, R. (1999). Correlations between self-estimated and psychometrically measured IQ. *The Journal of Social Psychology*, 139(4), 405–410.
- Goren, P. (2004). Political sophistication and policy reasoning: A reconsideration. *American Journal of Political Science*, 48(3), 462–478.
- Griffin, D. (2013). Citizens, Representatives, and the Myth of the Decision-Making Divide. *Political Behavior*, 35(2), 261–287.
- Groeger, L. (2012). *The EPA's first fracking rules—limited and delayed*. ProPublica. April 19. <http://www.propublica.org/article/the-epas-first-fracking-rules-limited-and-delayed>
- Haigh, M. S., & List, J. A. (2005). Do professional traders exhibit myopic loss aversion? An experimental analysis. *The Journal of Finance*, 60(1), 523–534.
- Hayes, A. (2014). Andrew Hayes. SPSS MEDIANTE Macro Syntax Reference [Internet]. 2014. Available from: <http://www.afhayes.com/public/mediate.pdf>. Retrieved from <http://www.afhayes.com/public/mediate.pdf>
- Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis: A regression-based approach*. Guilford Press. Retrieved from https://books.google.com/books?hl=en&lr=&id=iWFSpQFh-y4C&oi=fnd&pg=PP1&dq=Hayes+AF.+Introduction+to+mediation,+moderation,+and+conditional+process+analysis:+A+regression-based+approach+%5BInternet%5D.+Guilford+Press%3B+201&ots=1y15tA3HM_&sig=DSDpjVww_N9xVmN2dUxNhv4rxZ8
- Heikkila, T. J. Pierce, S. Gallaher, J. Kagan, D. A. Crow and C. M. Weible. (2014). Understanding a period of policy change: the case of hydraulic fracturing disclosure policy in Colorado." *Review of Policy Research*, (31)2, 65-85.
- Herrmann, R. K., Tetlock, P. E., & Diascro, M. N. (2001). How Americans think about trade: Reconciling conflicts among money, power, and principles. *International Studies Quarterly*, 45(2), 191–218.
- Herron, K. G., & Jenkins-Smith, H. C. (2014). Public perspectives on nuclear security. *Risk, Hazards & Crisis in Public Policy*, 5(2), 109–133.
- Hetherington, M. J. (2001). Resurgent mass partisanship: The role of elite polarization. In *American Political Science Association* (Vol. 95, pp. 619–631). Cambridge Univ Press. Retrieved from http://journals.cambridge.org/abstract_S0003055401003045

- Hultman, N., Rebois, D., Scholten, M., & Ramig, C. (2011). The greenhouse impact of unconventional gas for electricity generation. *Environmental Research Letters*, 6(4), 044008.
- Jaccard, J., Dodge, T., & Guilamo-Ramos, V. (2005). Metacognition, risk behavior, and risk outcomes: the role of perceived intelligence and perceived knowledge. *Health Psychology*, 24(2), 161.
- Jacquet, J. (2009). Energy boomtowns & natural gas: Implications for Marcellus Shale local governments & rural communities. *NERCRD Rural Development*.
- Jennings, M. K. (1992). Ideological thinking among mass publics and political elites. *Public Opinion Quarterly*, 56(4), 419–441.
- Johnson, D. D., & Fowler, J. H. (2011). The evolution of overconfidence. *Nature*, 477(7364), 317–320.
- Jones, M. D., & Song, G. (2014). Making sense of climate change: how story frames shape cognition. *Political Psychology*, 35(4), 447–476.
- Kahan, D. M., Braman, D., Gastil, J., Slovic, P., & Mertz, C. K. (2007). Culture and identity-protective cognition: Explaining the white-male effect in risk perception. *Journal of Empirical Legal Studies*, 4(3), 465–505.
- Kahan, D. M., Jenkins-Smith, H., & Braman, D. (2011). Cultural cognition of scientific consensus. *Journal of Risk Research*, 14(2), 147–174.
- Kargbo, D. M., Wilhelm, R. G., & Campbell, D. J. (2010). Natural gas plays in the Marcellus shale: Challenges and potential opportunities. *Environmental Science & Technology*, 44(15), 5679–5684.
- Kay, D. (2011). The Economic Impact of Marcellus Shale Gas Drilling What Have We Learned? What are the Limitations? Retrieved from <http://citeseerx.ist.psu.edu/viewdoc/summary?doi=10.1.1.364.8540>
- Kester, J., Moyer, R., & Song, G. (2015). Down the line: Assessing the trajectory of energy policy research development. *Policy Studies Journal*, 43(S1), S40-S55.
- Kraus, N., Malmfors, T., & Slovic, P. (1992). Intuitive toxicology: Expert and lay judgments of chemical risks. *Risk Analysis*, 12(2), 215–232.
- Lachapelle, E., Montpetit, É., & Gauvin, J.-P. (2014). Public Perceptions of Expert Credibility on Policy Issues: The Role of Expert Framing and Political Worldviews. *Policy Studies Journal*, 42(4), 674–697.
- Lawless, J. L., & Fox, R. L. (2005). *It takes a candidate: Why women don't run for office*. Cambridge University Press. Retrieved from [https://books.google.com/books?hl=en&lr=&id=_cWeTAHImRQC&oi=fnd&pg=PR9&dq=Fox,+R.,+%26+Lawless,+J.+\(2005\).+It+takes+a+candidate:+Why+women+don%E2%80%99t+run+for+office.+Cambridge:+Cambridge+University+Press&ots=M-5WS-yIR7&sig=727tjARYv469ste2qSQK31C6jP8](https://books.google.com/books?hl=en&lr=&id=_cWeTAHImRQC&oi=fnd&pg=PR9&dq=Fox,+R.,+%26+Lawless,+J.+(2005).+It+takes+a+candidate:+Why+women+don%E2%80%99t+run+for+office.+Cambridge:+Cambridge+University+Press&ots=M-5WS-yIR7&sig=727tjARYv469ste2qSQK31C6jP8)
- Lee, Y.-K., & Chang, C.-T. (2010). Framing public policy: The impacts of political sophistication and nature of public policy. *The Social Science Journal*, 47(1), 69–89.
- Lieberman, M. D., Schreiber, D., & Ochsner, K. N. (2003). Is political cognition like riding a bicycle? How cognitive neuroscience can inform research on political thinking. *Political Psychology*, 24(4), 681–704.
- Lin, S.-W., & Bier, V. M. (2008). A study of expert overconfidence. *Reliability Engineering & System Safety*, 93(5), 711–721.

- List, J. A., & Mason, C. F. (2011). Are CEOs expected utility maximizers? *Journal of Econometrics*, 162(1), 114–123.
- Luskin, R. C. (1990). Explaining political sophistication. *Political Behavior*, 12(4), 331–361.
- Massey, C., & Thaler, R. (2005). *Overconfidence vs. market efficiency in the National Football League*. National Bureau of Economic Research. Retrieved from <http://www.nber.org/papers/w11270>
- Michaud, K. E., Carlisle, J. E., & Smith, E. R. (2009). The relationship between cultural values and political ideology, and the role of political knowledge. *Political Psychology*, 30(1), 27–42.
- Mintz, A. (2004). Foreign Policy Decision Making in Familiar and Unfamiliar Settings An Experimental Study of High-Ranking Military Officers. *Journal of Conflict Resolution*, 48(1), 91–104.
- Moorman, C., Diehl, K., Brinberg, D., & Kidwell, B. (2004). Subjective knowledge, search locations, and consumer choice. *Journal of Consumer Research*, 31(3), 673–680.
- Ney, S., & Verweij, M. (2014). Exploring the Contributions of Cultural Theory for Improving Public Deliberation about Complex Policy Problems. *Policy Studies Journal*, 42(4), 620–643.
- Plott, C. R., & Zeiler, K. (2007). *The Willingness-to-pay/willingness-to-accept Gap, the Endowment Effect, Subject Misconceptions and Experimental Procedures for Eliciting Valuations*. *Amer. Ec. Rev.*, (in press). Working Paper (California Institute of Technology, 2003). Retrieved from <http://darkwing.uoregon.edu/~harbaugh/Readings/Rational%20choice/Plott%20Zeiler%202005%20AER%20WTP.pdf>
- Popkin, S. L. (1994). *The reasoning voter: Communication and persuasion in presidential campaigns*. University of Chicago Press. Retrieved from https://books.google.com/books?hl=en&lr=&id=fAT-IREgyQ8C&oi=fnd&pg=PR9&dq=Popkin,+Samuel+L.+1991.+The+Reasoning+Voter:+Communication+and+Persuasion+in+Presidential+Campaigns.+Univ+o&ots=6bgaBTIm79&sig=acrp7VTjuztxj0Qbgs8c_JIzndc
- Preacher, K. J., & Hayes, A. F. (2004). SPSS and SAS procedures for estimating indirect effects in simple mediation models. *Behavior Research Methods, Instruments, & Computers*, 36(4), 717–731.
- Pye, D. S. (1973). *Hydraulic fracturing process*. Retrieved from <http://www.osti.gov/scitech/biblio/5071972>
- Raju, P., Lonial, S., & Mangold, W. (1995). Differential effects of subjective knowledge. *Objective Knowledge*.
- Ripberger, J. T., Gupta, K., Silva, C. L., & Jenkins-Smith, H. C. (2014). Cultural theory and the measurement of deep core beliefs within the advocacy coalition framework. *Policy Studies Journal*, 42(4), 509–527.
- Ripberger, J. T., Song, G., Nowlin, M. C., Jones, M. D., & Jenkins-Smith, H. C. (2012). Reconsidering the relationship between cultural theory, political ideology, and political knowledge. *Social Science Quarterly*, 93(3), 713–731.
- Rock, E. M., Ireland, M., & Resnick, M. D. (2003). To know that we know what we know: perceived knowledge and adolescent sexual risk behavior. *Journal of Pediatric and Adolescent Gynecology*, 16(6), 369–376.
- Rowe, G., & Wright, G. (2001). Differences in expert and lay judgments of risk: myth or reality? *Risk Analysis*, 21(2), 341–356.

- Savadori, L., Savio, S., Nicotra, E., Rumiat, R., Finucane, M., & Slovic, P. (2004). Expert and public perception of risk from biotechnology. *Risk Analysis*, 24(5), 1289–1299.
- Siegrist, M., Cousin, M.-E., Kastenholz, H., & Wiek, A. (2007). Public acceptance of nanotechnology foods and food packaging: The influence of affect and trust. *Appetite*, 49(2), 459–466.
- Sniderman, P. M., Brody, R. A., & Tetlock, P. E. (1991). The role of heuristics in political reasoning: a theory sketch. *Reasoning and Choice: Explorations in Political Psychology*.
- Soeder, D. J., & Kappel, W. M. (2009). *Water resources and natural gas production from the Marcellus Shale*. US Department of the Interior, US Geological Survey Reston, Virginia. Retrieved from http://www.sportsmenalliance.org/PDFs/USGS_FS2009-3032.pdf
- Song, G. (2014). Understanding public perceptions of benefits and risks of childhood vaccinations in the United States. *Risk Analysis*, 34(3), 541–555.
- Song, G., Silva, C. L., & Jenkins-Smith, H. C. (2014). Cultural Worldview and Preference for Childhood Vaccination Policy. *Policy Studies Journal*, 42(4), 528–554.
- Stimson, J. A. (1975). Belief systems: Constraint, complexity, and the 1972 election. *American Journal of Political Science*, 393–417.
- Stoutenborough, J. W., & Vedlitz, A. (2014). The effect of perceived and assessed knowledge of climate change on public policy concerns: an empirical comparison. *Environmental Science & Policy*, 37, 23–33.
- Swedlow, B. (2011). A cultural theory of politics. *PS: Political Science & Politics*, 44(04), 703–710.
- Tetlock, P. (2005). *Expert political judgment: How good is it? How can we know?*. Princeton University Press. Retrieved from https://books.google.com/books?hl=en&lr=&id=QgGRar_TCjIC&oi=fnd&pg=PR3&dq=Tetlock+2005+overconfidence&ots=1dDC1_7yoE&sig=Kn6Tbkhm8sN2-j4bp9HnhFGBsFY
- Thompson, M., Ellis, R., & Wildavsky, A. (1990). *Cultural theory*. Westview Press. Retrieved from <http://psycnet.apa.org/psycinfo/1990-98188-000>
- Walser, D. W., Pursell, D. A., & others. (2007). Making mature shale gas plays commercial: Process vs. natural parameters. In *Eastern Regional Meeting*. Society of Petroleum Engineers. Retrieved from <https://www.onepetro.org/conference-paper/SPE-110127-MS>
- Wildavsky, A., & Dake, K. (1990). Theories of risk perception: Who fears what and why? *Daedalus*, 41–60.
- Zaller, J. (1992). *The nature and origins of mass opinion*. Cambridge university press. Retrieved from <https://books.google.com/books?hl=en&lr=&id=83yNzu6toisC&oi=fnd&pg=PR8&dq=The+Nature+and+Origins+of+Mass+Opinion&ots=6oEuiESwSO&sig=WYCPC8gJgfjDdBWfeaHERtffGMw>
- Zimmerman, B. J., & Campillo, M. (2003). Motivating self-regulated problem solvers. *The Psychology of Problem Solving*, 233–262.

Table 1. Demographic Characteristics

Characteristic	Arkansas/Oregon Policy Elites	Arkansas/Oregon General Public	U.S. General Public
Median annual household income	\$70,000 – \$100,000	\$40,000 – \$50,000	\$50,000 – \$60,000
Education level (% Bachelor's degree or higher)	74%	45%	29%
Race	92% White	84% White	63% White
Gender	65% Male	48% Male	49% Male

Table 2. Primary Independent Variables and Measures

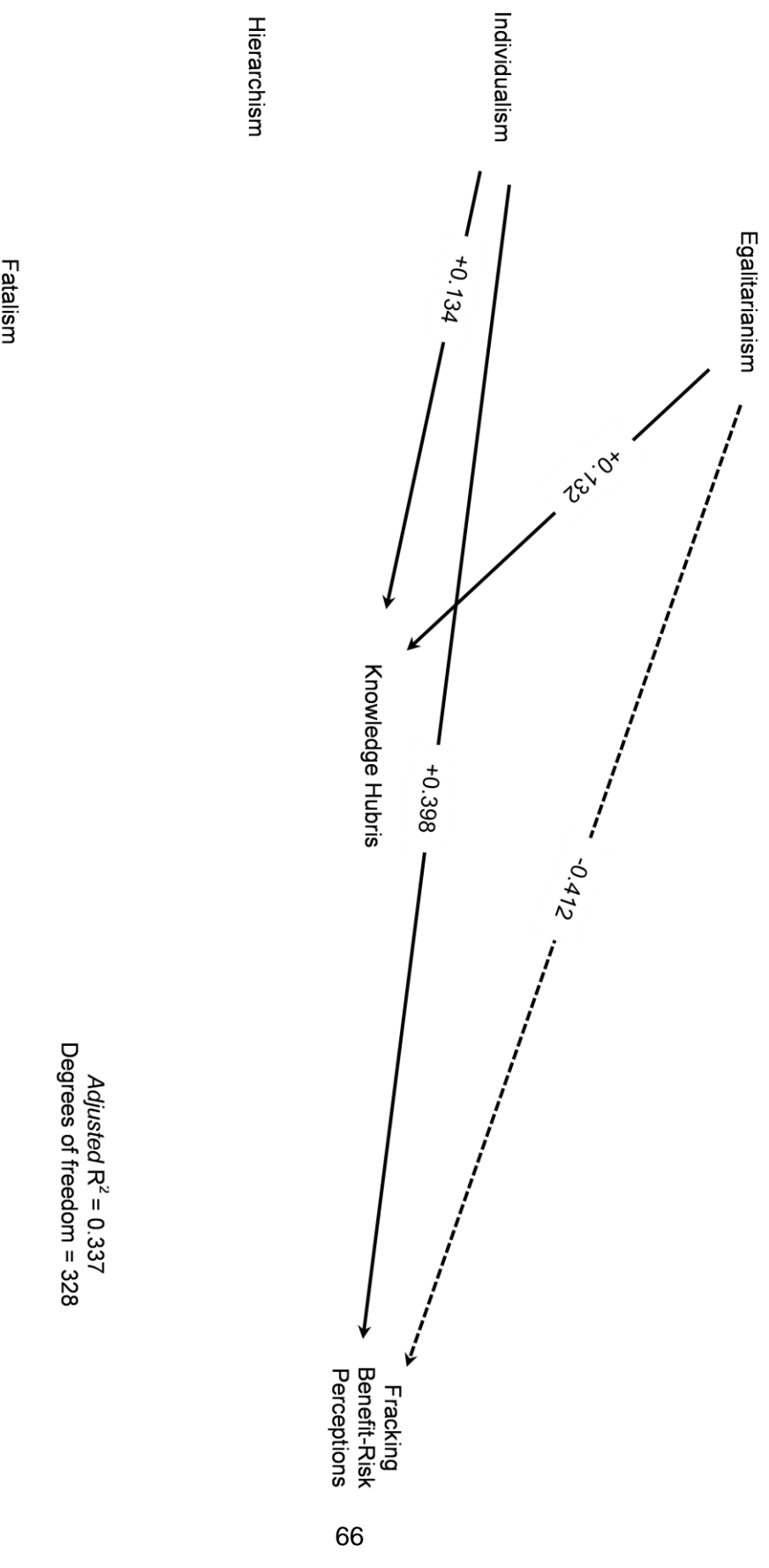
Variable	Measure
Egalitarianism	Society works best if power is shared equally. (1=Strongly disagree to 7=Strongly agree)
	It is our responsibility to reduce differences in income between the rich and the poor. (1=Strongly disagree to 7=Strongly agree)
	What society needs is a fairness revolution to make the distribution of goods more equal. (1=Strongly disagree to 7=Strongly agree)
Egalitarianism index	Index using factor score of above three items (Elites $\alpha=0.78$; Public $\alpha=0.79$)
Individualism	We are all better off when we compete as individuals. (1=Strongly disagree to 7=Strongly agree)
	Even the disadvantaged should have to make their own way in the world. (1=Strongly disagree to 7=Strongly agree)
	Even if some people are at a disadvantage, it is best for society to let people succeed or fail on their own. (1=Strongly disagree to 7=Strongly agree)
Individualism index	Index using factor score of above three items (Elites $\alpha=0.73$; Public $\alpha=0.70$)
Hierarchism	Society is in trouble because people do not obey those in authority. (1=Strongly disagree to 7=Strongly agree)
	The best way to get ahead in life is to do what you are told to do to the best of your abilities. (1=Strongly disagree to 7=Strongly agree)
	Society would be much better off if we imposed strict and swift punishment on those who break the rules. (1=Strongly disagree to 7=Strongly agree)
Hierarchism index	Index using factor score of above three items (Elites $\alpha=0.60$; Public $\alpha=0.67$)
Fatalism	For the most part, succeeding in life is a matter of chance. (1=Strongly disagree to 7=Strongly agree)
	No matter how hard we try, the course of our lives is largely determined by forces beyond our control. (1=Strongly disagree to 7=Strongly agree)
	Most of the important things that take place in life happen by random chance. (1=Strongly disagree to 7=Strongly agree)
Fatalism index	Index using factor score of above three items (Elites $\alpha=0.68$; Public $\alpha=0.76$)

Table 3. Knowledge Measures

Variable	Measure
Level of knowledge of energy policy issues (Arkansas/Oregon policy elites and the general Public 2015)	Most scientists and energy experts agree that the estimates for natural gas reserves in the U.S. have increased in the past decade. (0=False; 1=True ^{*AR *OR})
	Coal-fired electric power plants in Arkansas/Oregon supply the major source of the state's electricity. (0=False ^{*OR} ; 1=True ^{*AR})
	The Energy Policy Act of 2005 clearly states that the U.S. Environmental Protection Agency (EPA) holds comprehensive federal regulatory authorities on fracking practices. (0=False ^{*OR *AR} ; 1=True)
	Currently, there is no government-declared moratorium placed on new injection wells (for natural gas drilling) in Arkansas/Oregon. (0=False ^{*AR} ; 1=True ^{*OR})
	Currently, the majority of all U.S. natural gas production is attributed to shale gas from fracking operations. (0=False ^{*OR *AR} ; 1=True)
	Due to energy security concerns, the U.S. Department of Energy (DOE) currently enforces an absolute ban on natural gas export. (0=False ^{*OR *AR} ; 1=True)
	The first commercially successful fracking operation in the United States took place several decades ago. (0=False; 1=True ^{*AR *OR})
Knowledge index	Percentage of correct answers
Perceived Knowledge Energy	On a scale from zero to seven where zero means <i>not at all informed</i> and seven means <i>completely informed</i> , how well informed do you consider yourself to be about <i>energy policy in general</i> ?
Perceived Knowledge Fracking Operations	On a scale from zero to seven where zero means <i>not at all informed</i> and seven means <i>completely informed</i> , how well informed do you consider yourself to be about <i>fracking operations</i> ?
Perceived Knowledge Index	Sum of Perceived Knowledge items above converted to a percentage
Knowledge Hubris	Perceived Knowledge Index score minus Knowledge Index

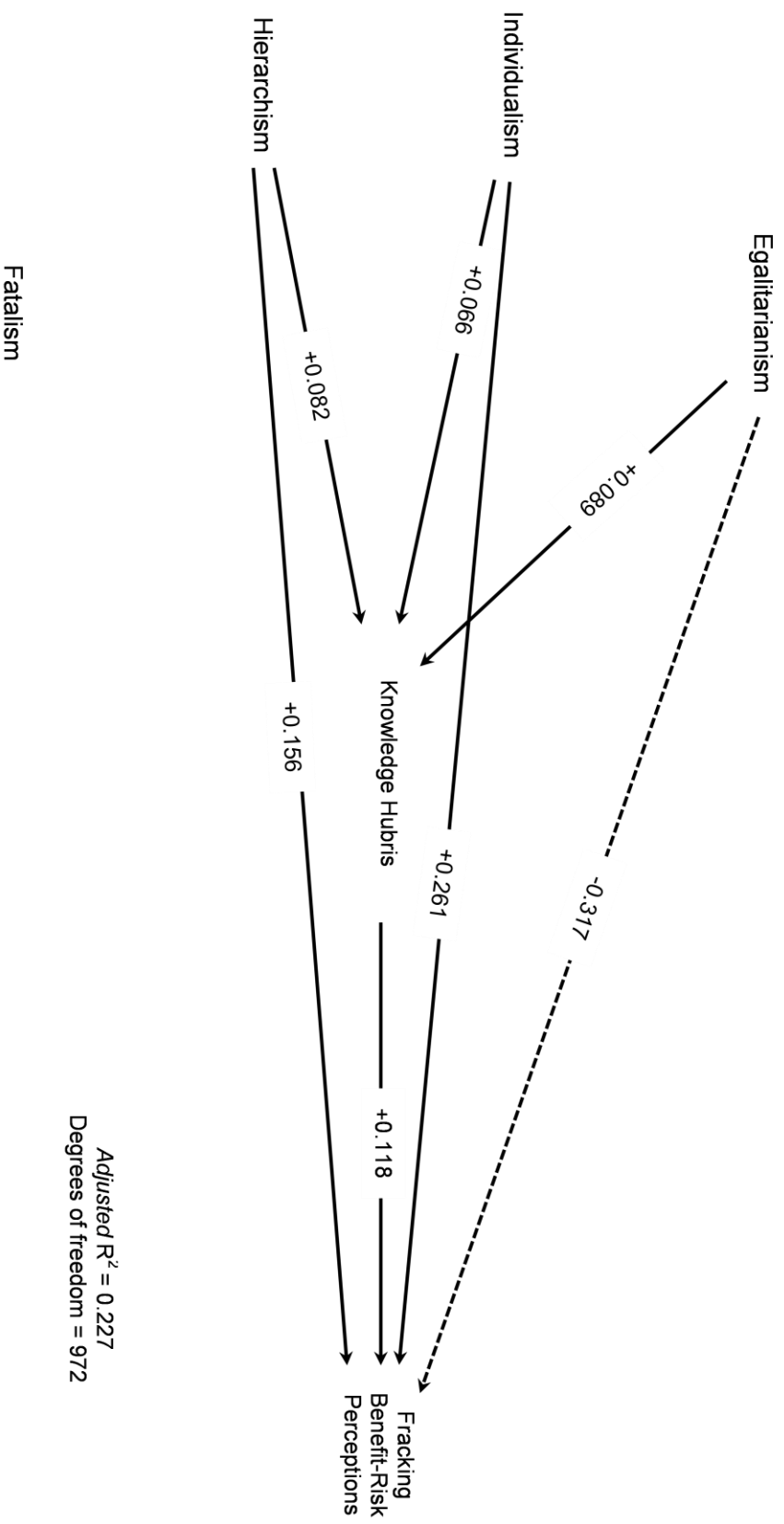
Note: * denotes correct answer (AR=Arkansas; OR=Oregon).

Figure 1. Effects of Cultural Value Orientations on Perceptions of Risks and Benefits Associated with Fracking as Mediated by Knowledge Hubris for Local Policy Elites in Arkansas and Oregon



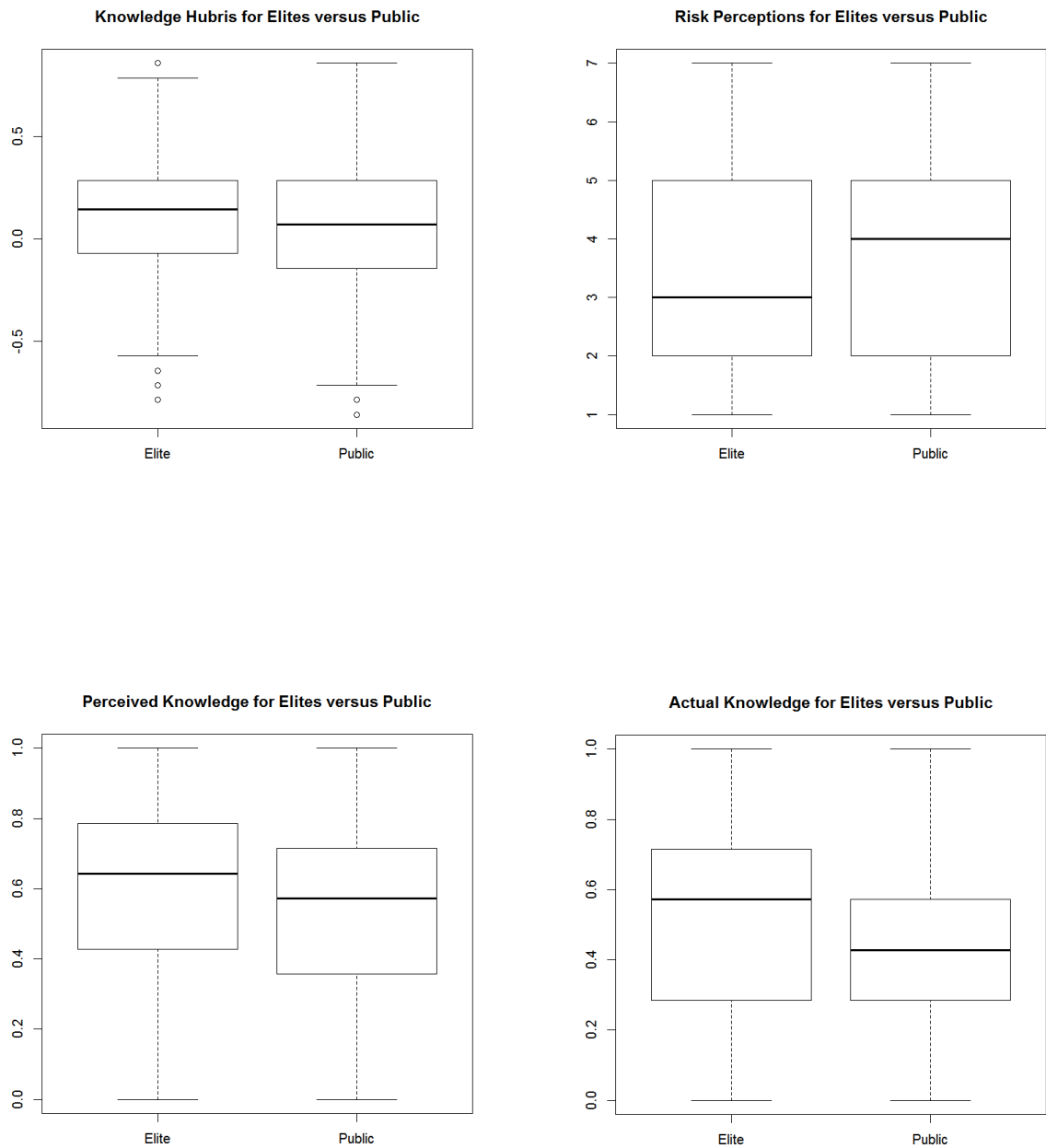
Note: Only significant paths are shown. All paths are statistically significant at the level of $p < 0.05$. Solid lines represent positive relations while dashed lines visualize negative associations. Coefficients shown are standardized regression coefficients. Control variables (e.g., knowledge level and demographic characteristics) are not reported, but were included in the regression analysis.

Figure 2. Effects of Cultural Value Orientations on Perceptions of Risks and Benefits Associated with Fracking as Mediated by Knowledge Hubris for the General Public in Arkansas and Oregon



Note: Only significant paths are shown. All paths are statistically significant at the level of $p < 0.05$. Solid lines represent positive relations while dashed lines visualize negative associations. Coefficients shown are standardized regression coefficients. Control variables (e.g., knowledge level and demographic characteristics) are not reported, but were included in the regression analysis.

Figure 3. Boxplots Comparing Local Policy Elites and General Public



Conclusion

Overall, the two papers in this thesis contribute to our understanding of the decision-making processes of local policy elites. Specifically, these papers elaborate on the relationship between cultural value predispositions and risk and benefit perceptions by examining the mechanisms by which cultural values influence policy-related perceptions of utility as measured by perceptions of risks and benefits.

The first article demonstrates that, in the context of HVPL installations in the state of Arkansas cultural value orientations influence perceptions of trustworthiness of various sources of information, which in turn influences perceptions of risks and benefits associated with HVPL installations. Specifically, egalitarians view HVPL installations as having more risks than benefits, partially due to their distrust in the energy industry and trust in environmental groups. Alternatively, individualists view HVPL installations as more beneficial than risky, partially due to their trust in the energy industry and distrust in environmental groups and the government. Similarly, hierarchs view HVPL installations as providing more benefits than risks due to their trust in the energy industry and the government. This mediating role of trust in information sources, I argue, is due perceived value congruence between the individual and the group providing information. These findings provides evidence suggesting that, for local policy elites, the content of the information may not be as important in the determination of policy support as is the source of the information.

The second paper introduces the concept of knowledge hubris and examines its cultural values-based origins, as well as its effects on risk and benefit perceptions associated with hydraulic fracturing. It further compares this process between a sample of local policy elites and the general public. Among local policy elites, knowledge hubris levels were higher, as compared to the general public. However, for local policy elites, knowledge hubris demonstrated no effects on fracking risk and benefits perceptions, whereas for the general public, knowledge hubris was found to significantly mediate the relationship between cultural values and risk and benefit perceptions for egalitarians and individualists. This distinction between the two samples suggests that, while views on fracking were similar between the general public and local policy elites, the two groups arrive at these views through distinct cognitive processes, indicating a need for future research examining the differences in the mechanisms by which

policy elites and the general public arrive at a particular viewpoint, particular when the views between the two groups are similar.

Together, these two papers provide insights into how cultural value predispositions lead to risk and benefit perceptions. Further, and more importantly, they suggest a need for future research to better explicate these processes in order to better understand perception development and the decision-making processes that are associated with policy-making and development.



Office of Research Compliance
Institutional Review Board

September 11, 2015

MEMORANDUM

TO: Geoboo Song
Rachael Moyer
Creed Tumilson

FROM: Ro Windwalker
IRB Coordinator

RE: New Protocol Approval

IRB Protocol #: 15-08-090

Protocol Title: *2015 Arkansas Energy Policy Survey*

Review Type: ☒ EXEMPT ☐ EXPEDITED ☐ FULL IRB

Approved Project Period: Start Date: 09/10/2015 Expiration Date: 09/09/2016

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (<https://vpred.uark.edu/units/rscpi/index.php>). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

This protocol has been approved for 2,000 participants. If you wish to make *any* modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 109 MLKG Building, 5-2208, or irb@uark.edu.



UNIVERSITY OF ARKANSAS

Office of Research Compliance
Institutional Review Board

February 18, 2014

MEMORANDUM

TO: Geoboo Song
John Kester III
Rachael MOyer

FROM: Ro Windwalker
IRB Coordinator

RE: New Protocol Approval

IRB Protocol #: 14-02-483

Protocol Title: 2014 Arkansas Public Policy Survey

Review Type: ☒ EXEMPT ☐ EXPEDITED ☐ FULL IRB

Approved Project Period: Start Date: 02/18/2014 Expiration Date: 02/17/2015

Your protocol has been approved by the IRB. Protocols are approved for a maximum period of one year. If you wish to continue the project past the approved project period (see above), you must submit a request, using the form *Continuing Review for IRB Approved Projects*, prior to the expiration date. This form is available from the IRB Coordinator or on the Research Compliance website (<http://vpred.uark.edu/210.php>). As a courtesy, you will be sent a reminder two months in advance of that date. However, failure to receive a reminder does not negate your obligation to make the request in sufficient time for review and approval. Federal regulations prohibit retroactive approval of continuation. Failure to receive approval to continue the project prior to the expiration date will result in Termination of the protocol approval. The IRB Coordinator can give you guidance on submission times.

This protocol has been approved for 800 participants. If you wish to make any modifications in the approved protocol, including enrolling more than this number, you must seek approval *prior to* implementing those changes. All modifications should be requested in writing (email is acceptable) and must provide sufficient detail to assess the impact of the change.

If you have questions or need any assistance from the IRB, please contact me at 210 Administration Building, 5-2208, or irb@uark.edu.