

REVIEWS

Assessing the Operationalization of Cultural Theory through Surveys Investigating the Social Aspects of Climate Change Policy Making

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ABSTRACT

Cultural theory (CT) provides a framework for understanding how social dimensions shape cultural bias and social relations of individuals, including values, view of the natural world, policy preferences, and risk perceptions. The five resulting cultural solidarities are each associated with a “myth of nature”—a concept of nature that aligns with the worldview of each solidarity. When applied to the problem of climate protection policy making, the relationships and beliefs outlined by CT can shed light on how members of the different cultural solidarities perceive their relationship to climate change and associated risk. This can be used to deduce what climate change management policies may be preferred or opposed by each group. The aim of this paper is to provide a review of how CT has been used in surveys of the social aspects of climate change policy making, to assess the construct validity of these studies, and to identify ways for climate change protection policies to leverage the views of each of the cultural solidarities to develop clumsy solutions: policies that incorporate strengths from each of the cultural solidarities’ perspectives. Surveys that include measures of at least fatalism, hierarchism, individualism, and egalitarianism and their associated myths of nature as well as measures of climate change risk perceptions and policy preferences have the highest translation and predictive validity. These studies will be useful in helping environmental managers find clumsy solutions and develop resilient policy according to C.S. Holling’s adaptive cycle.

1. Introduction

With the passing of the Paris Climate Agreement, the global community is taking steps to reduce greenhouse gas emissions. To date, 185 countries have signed on to the agreement, but given varying cultural backgrounds, resources, governments, and regulatory structures, the development of climate protection plans will be different and individually designed in each nationally determined

contribution [United Nations (UN) [Framework on Climate Change 2020](#)]. This poses a challenge for the governments and agencies developing the plans. An understanding of national, regional, and local preferences for climate protection will be necessary in implementing a successful plan.

Cultural theory (CT) provides a framework for understanding how social dimensions shape cultural bias and social relations of individuals, including values, views of the natural world, policy preferences, and risk perceptions (Swedlow et al. 2016; Thompson et al. 1990). These biases will influence how climate protection policies are formulated and received, and because CT can be applied cross-nationally (Johnson and Swedlow 2020b; Maleki and de Jong 2014; Maleki and Hendriks 2015), it is appropriate to apply it to a global problem like climate

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change. This paper provides a review of how CT has been used in quantitative surveys to understand perceptions of climate change risk and policy making and assesses these studies for construct validity. By understanding how CT can be operationalized to observe climate change risk perceptions and policy preferences, clumsy solutions that incorporate strengths from each of the perspectives of the cultural solidarities (Verweij et al. 2006) may become more attainable, and, following Holling's adaptive cycle, this type of solution is more resilient (Fath et al. 2015).

Cultural theory was developed by M. Douglas, M. Thompson, R. Ellis, A. Wildavsky, and others who have operationalized it in various ways for specific case studies (Swedlow et al. 2016). At the center of CT is Douglas's grid-group theory in which individuals' group status in combination with their grid status determines one of five solidarities with which they most identify (Thompson et al. 1990—see Fig. 1). Group status is defined by the degree to which individuals ascribe themselves as part of a social group: *high group* if they consider themselves to be strongly attached to a like-minded social community, or the opposite, *low group*. Grid status is defined by the degree to which external social structure determines one's way of life, either highly influenced by external structure, *high grid*, or independent from external structure, *low grid*. This results in four main cultural solidarities: fatalism, individualism, hierarchism, and egalitarianism. A fifth solidarity is also included in most interpretations, hermitism, which is viewed as socially absent from cultural interaction with other solidarities.

Thompson et al. (1990) connect each solidarity to a "myth of nature," first developed by Holling (1978), in which he discusses different views on the resilience of natural systems in the face of disturbance.¹ A fatalist worldview aligns with the *nature capricious* myth in which the belief is that nature is random and erratic; this passive approach considers the environment to be unreliable in terms of resources and to potentially be a threat. A hierarchist perspective sees nature as *perverse/tolerant*; it is viewed as having limits, but operation within those limits can be managed. This implies an important role for experts who can ascertain those limits and manage populations and resources accordingly. *Nature benign* is the myth aligned with the individualist worldview; stable

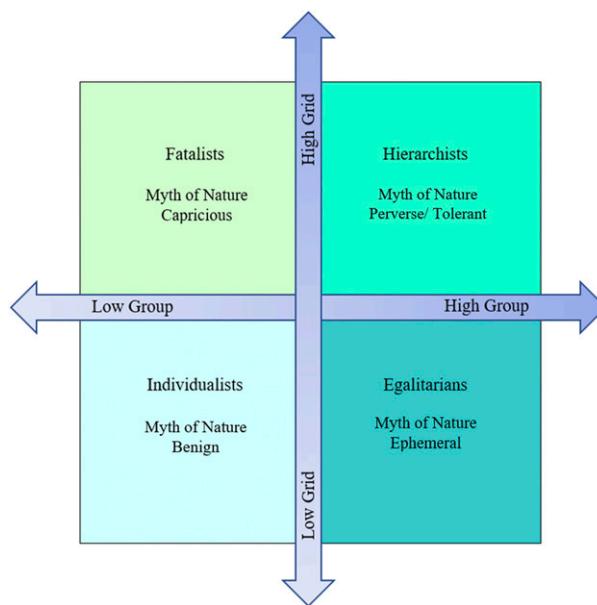


FIG. 1. The four solidarities recognized by CT, with corresponding myths of nature and placement on the grid-group scale.

nature is immune to human actions, and therefore use of natural resources can be maximized for human consumption. The myth of *nature ephemeral* corresponds with an egalitarian worldview, which believes that nature is fragile and our attempts to manage it should aim at maximum preservation to avoid complete collapse. McNeeley and Lazrus (2014) aptly point out that in this case the word "myth" does not refer to a tale or falsehood, but rather it is used to call attention to the idea that each interpretation of the resilience of nature is not 100% right or wrong but instead each can be partially true at the same time, or a "partial representation of reality" (O'Riordan and Jordan 1999; Thompson et al. 1990, p. 70).

The work of C. S. Holling (Holling 1978) is referenced throughout this text and in CT literature in three significant ways. The first is as it is mentioned above: that he is the originator of the different perspectives of nature, now known as the myths of nature, which have been incorporated into the definitions of the cultural solidarities defined by CT (Schwarz and Thompson 1990; Thompson et al. 1990). Holling also developed the *adaptive cycle*, which is applied to CT in two ways: first, as the myth of nature of the hermit (Thompson et al. 1990) and second, as a way to show how each cultural solidarity plays a role in the resiliency and sustainable management of social or natural systems (Fath et al. 2015; FASresearch 2019).

If CT can be operationalized to study the social aspects of climate change, then the solidarities and associated myths of nature can anticipate individuals' perceptions of the risks of climate change and climate protection

¹Holling's work on the myths of nature was developed separately from CT. In his 1978 paper that describes his myths of nature (regarding environmental management and assessment), he also introduced aspects of "stability and resilience of systems" that include *nature benign*, *nature ephemeral*, and *nature the practical joker* (Holling 1978, p. 9). These were used by cultural theorists to describe the outlook of each cultural solidarity group on nature aligning to individualism, egalitarianism, and hierarchism, respectively.

policy preferences (Steg and Sievers 2000). CT can also inform the development of clumsy solutions. Each of these ideas is discussed below.

a. Myths of nature and climate change risk perceptions

Cultural theory explains differences among individuals' risk perceptions as formed by culture rather than by the psychological interpretation that they are formed by personality (Johnson and Swedlow 2020a; Marris et al. 1998; McNeeley and Lazrus 2014; Thompson et al. 1990) and that one's perception of risk is derived from whether or not the specific risk is seen as a threat to one's way of life (Johnson and Swedlow 2020a; Thompson et al. 1990; Xue et al. 2014). A hypothesis tested by surveys assessed in this paper is that perception of risk associated with climate change will align with the myth of nature of the cultural solidarity group to which an individual most closely belongs. Combined with other values held by each solidarity, this can provide insight into how much people will accept climate science and support climate protection policies, which protection methods they support, or how willing they are to take personal actions to mitigate climate change.

An egalitarian perspective, following the myth of nature as ephemeral, recognizes the threat that climate change poses to the fragile natural world. In addition, because egalitarians value equality, knowing that climate change will have a greater (negative) impact on less economically prosperous groups of people, their values are at risk (McNeeley and Lazrus 2014). In stark contrast to this is the individualist view that nature is benign, and individuals with this perspective will react with much less urgency to a threat from climate change, believing that investments should be made in technology that will eventually solve climate problems as long as governmental regulation does not interfere with innovation. In this light, climate change itself is not the risk from an individualist perspective; rather, the risk and potential threat lies in measures taken to mitigate climate change (Johnson and Swedlow 2020b; Xue et al. 2014). For example, if free market opportunities will be hindered by a forced change in the use of fossil fuels, then an individualist's way of life is threatened.

The hierarchist view of nature as perverse/tolerant results in respect for the expertise of climate scientists rendering the threat of climate change as a risk warranting protective action, and the notion that carbon regulation by the powers that be will result in effective climate solutions (Verweij et al. 2006). Because people holding a fatalist worldview perceive their relationship to nature to be the luck of the draw, their reaction to a possible threat of climate change will be passive.

However, the "despair" of the fatalist may be considered by the other groups, particularly egalitarians, who value equality (McNeeley and Lazrus 2014; Thompson et al. 1990; Verweij et al. 2006). Similarly, McNeeley and Lazrus (2014) suggest engaging fatalists in climate-related resource management issues to give them a voice in decision-making, though this is challenging due to the expectation that fatalism indicates people withdraw from social engagement and it is difficult to identify fatalist perspectives in CT survey measures (Johnson et al. 2020). The perspective and role of the hermit is discussed below.

b. Climate change policy preferences and clumsy solutions

It is widely recognized that conflict arises when governments must decide on how to address the risks associated with climate change; policies will impact everyone across a spectrum of values and will likely favor some over others. Thompson et al. (1990) describe each solidarity's reaction to risk: first, either to recognize it or to ignore it. The fatalist reaction is to ignore (Thompson et al. 1990) or to find a way to cope with the risk (Johnson and Swedlow 2020a) but not to engage with it in a way that will impact them or the other cultural solidarities as the others will. Next comes how to go about mitigating the recognized risk. One will either embrace it as an opportunity (the mode of the individualist), place it in the responsible hands of experts (the mode of the hierarchist), or try to minimize it by raising awareness of the issue to everyone else (the mode of the egalitarian; Thompson et al. 1990). Egalitarians will also be more supportive of individual behavioral change to mitigate climate change, while holding skepticism of technological solutions (Verweij et al. 2006). Thus, individualists take on the risk, hierarchists and egalitarians seek to manage risks, and fatalists do not initiate engagement with risks.

One school of thought is that CT can promote "clumsy solutions" (Thompson 2003). By using CT to understand the relational patterns and cultural biases of each group, policy makers and environmental managers can incorporate the strengths of each perspective in developing climate protection policies.

Verweij et al. (2006) defined the role each solidarity could play in a clumsy solution for climate change by reflecting on the development of the Kyoto Protocol. Finding a point of compromise in the replacement of carbon-dependent energy with renewable sources like solar energy, they suggest that government (hierarchical) regulation can incentivize (individualist) businesses to invest in renewable energy, thus making the market more competitive. This, in combination with renewable energy-oriented strategies from other social institutional

(hierarchical) actors such as higher education and government tax systems, could have a ripple effect throughout society by businesses, consumers, engineers, and architects orienting themselves to accommodate and incorporate a new regime of energy capture into a more climate friendly way of life. This ripple effect, while initiated by hierarchical and individualist institutions, would go through checks and balances as it is felt by each solidarity. The role of the egalitarians, they say [as does Swedlow (2017)], is in the form of environmental groups to raise awareness about the need for climate change protection and the potential risks in technological solutions in the interest of all global citizens.

With climate change as the risk and egalitarians as the rabble rousers, individualists may see the risk as an opportunity to develop profitable technology, hierarchists will look to authorities to impose mitigation policies, and fellow egalitarians will promote personal lifestyle changes to address the problem. Fatalists will likely retreat from the issue, seeing any action they may take as fruitless while their presence in society and likelihood of being the loser in the climate crisis serves as a moral argument for climate protection by the egalitarians. The hermit will assess and act upon the risk according to their own set of rules. Here, each group plays an integral part of dealing with climate change; this is a clumsy solution.

CT also posits the idea that because each solidarity recognizes different aspects of risks, they are inadvertently helping all of the groups to solve problems associated with risks (Thompson et al. 1990). This is an extension of the nature of the grid–group origin of the solidarities: each solidarity is competing with and defined by the others and therefore dependent on the others. This dependency is also central to the hypothesis of clumsy solutions, and can also be visualized when each perspective is overlaid on Holling’s adaptive cycle, as Fath et al. have done (see Fig. 2). The adaptive cycle, interpreted this way, demonstrates the process by which social systems, based on the natural systems observed by Holling, can remain resilient through stages of growth and development (the individualist role), conservation and status quo (the hierarchist role), crisis management (the fatalist and egalitarian role), and reorganization (the hermit/autonomist role). If each solidarity occupies a space and plays a role in the cycle, then each solidarity is necessary for resilience. This is similar to how clumsy solutions necessitate the involvement of all cultural solidarities.

c. A note about the hermit

The fifth solidarity is that of the hermit, and like the others it has a corresponding myth of nature. While fatalism is often omitted from CT surveys on climate

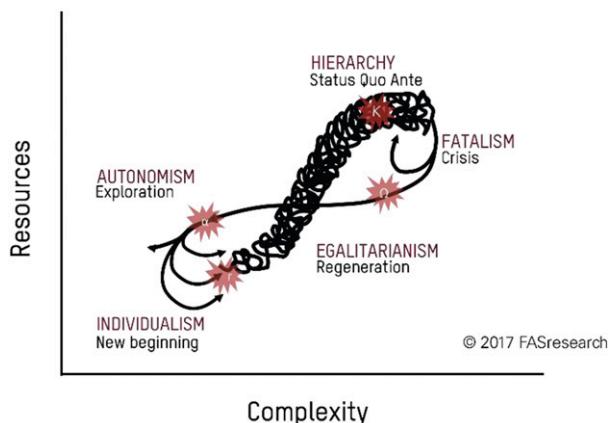


FIG. 2. The stages of the adaptive cycle as adopted by Fath et al. (2015) and FASresearch (2019). Each stage corresponds to one of the five solidarities defined by CT, as shown.

change, it is even more rare for the hermit to be included. The hermit’s myth of nature is that of nature as resilient and is an integration of the other four, which results in a “transformational cycle” (Thompson et al. 1990). Hermits create their own cultural bias by rejecting all others, including the cultural conflicts between each solidarity, the differences between their myths of nature, and the dualistic idea of humans as separate from the environment. By doing this, the hermit’s myth of nature becomes a recognition of the oneness of humans with the environment, and as either is altered, so is the other.

Thompson et al. (1990) note that the myth of nature as resilient appears to be a transcendently wise view on the interaction of humans with the environment. But, because the hermit is socially absent from the rest of society and because the hermit’s myth is functionally relevant only as a point of contemplation rather than action (it would be impossible to take action based on nature as benign and tolerant and capricious and ephemeral all at the same time), it cannot be actively employed in environmental management. However, Thompson et al. (1990) say that the mere fact that this myth exists proves that there is wisdom in it, and therefore it can be used as a point of contemplation. This is supported by the adaptive cycle as adapted by Fath et al. (2015); a theory of resilient management follows the same structure and includes the same phases as the hermit’s myth of nature.

2. Methods

a. Research methods

Mary Douglas’s first publication on CT arrived in 1970 (Douglas 1970), and the first operationalization

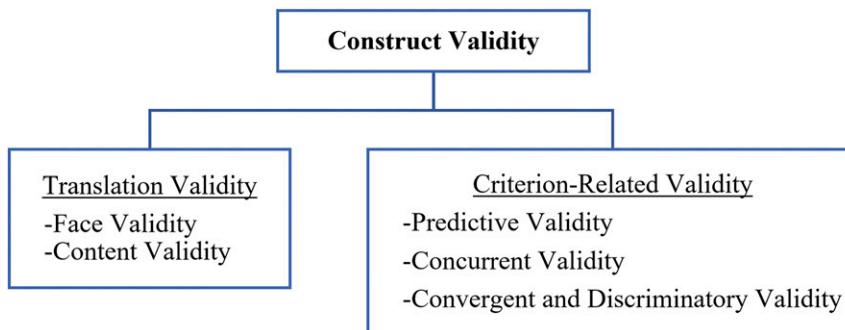


FIG. 3. Measurement validity types defined by Trochim (2006). Swedlow et al. (2016) assessed CT on translation validity (face and content) and criterion-related validity (predictive and convergent). This literature review considers the same translation validity measures of the cultural solidarities and myths of nature, and predictive validity of risk perceptions and policy preferences.

of CT was by Wildavsky and Dake (1990), but the seminal work on CT as it is commonly understood today is by Thompson et al. (1990; Swedlow et al. 2016), and this is where research for this literature review began. The terms “cultural theory” and “climate change” were used to search Google Scholar and resulted in about 11 000 results. The first few pages of results provided some insight, but it was clear that a narrower search was necessary, and the terms *risk, survey, policy, and myths*

of nature were added to *cultural theory* and *climate change* to result in 352 sources. These were scanned to identify academic papers specifically operationalizing CT using quantitative surveys to determine opinions and perceptions of climate change and climate change policy, and seven were selected for further review (see section 3, below).

As the research progressed, myths of nature, risk perceptions, and policy making/clumsy solutions were

TABLE 1. Ratings used to determine translation and predictive validity. Translation validity includes face validity, which here is assessed by if/how the survey identifies the cultural solidarities, and content validity, which here is assessed by how the survey identifies myths of nature. Predictive validity of the surveys was assessed by if/how the surveys identified risk perceptions of climate change and climate protection policy preferences of the respondents.

Rating	Translation validity		Predictive validity	
	Face validity: cultural solidarities	Content validity: myths of nature	Risk perception	Policy preferences
0	No broad worldview measures are used to determine cultural solidarities of respondents	Survey does not include measures of respondents’ views on environmental or climate change issues to identify myth of nature most closely aligned with each respondent	Survey does not include measures of respondents’ general risk perceptions	Survey does not include measures of policy preferences
1	Broad worldview measures similar to those of Wildavsky and Dake (1990) are used to determine cultural solidarities of respondents separately from measures used to determine myths of nature, and at least individualism, hierarchism, and egalitarianism are identified	Survey includes measures of only views on climate change but not on environmental issues in general to identify myth of nature most closely aligned with each respondent	Survey includes measures of general environmental risk perceptions	Survey includes measures of general (cultural) policy preferences
2	Same as above but at least fatalism, individualism, hierarchism, and egalitarianism are identified	Survey includes measures of views on general environmental issues to identify myth of nature most closely aligned with each respondent	Survey includes measures of perceptions of risk associated with climate change	Survey includes measures of climate change policy preferences

TABLE 2. Studies chosen for comparison of research questions, methods, and conclusions. Authors of each study carried out original surveys on CT, climate change, and in most cases, policy preferences. Abbreviations used in the table: *climate change* as “CC,” *fatalists*, *hierarchists*, *individualists*, and *egalitarians*, as “F, H, I, and E,” respectively. The studies are numbered in the first column, given with the author(s) of each survey. See Table 3 for assessment of validity of each survey.

Author	Year	Title	Location	About CC?	Premise of study	Study method	No. of solidarities included	n	Representative?	Questions asked about	Answer structure	Conclusions
1a and 1b: Price et al.	Published 2014; survey 2012	Measuring cultural values and beliefs about environment to identify their role in climate change responses	Australia	No	Do cultural environmental biases demonstrate the same structure as cultural biases with regard to social relations, as suggested by CT? Do cultural environmental biases demonstrate two orthogonal factors as per cultural cognition perspective; or four correlated factors of hierarchical, egalitarian, individualistic, and fatalistic dimensions?	Internet survey	4 (F, H, I, and E)	290	Yes	Myths of nature; environmental policy preferences	5-point Likert	Cultural biases about the environment do not follow the same grid-group scale as cultural biases about society; instead of four myths of nature, two result: “environment as ductile” and “environment as elastic.”
2: Jones	Published 2011; survey 2010	Leading the way to compromise? CT and CC opinion	United States	Yes	Can the dimensional structure of cultural environmental beliefs be replicated? Are cultural environmental biases related to environmental attitudes and beliefs associated with climate change? Is there a direction relationship between cultural environmental bias and carbon-relevant behavior, or is the relationship mediated through climate change beliefs? the public's position on the threat of CC and what policies are likely acceptable?	Internet survey	4 (F, H, I, and E)	5081	Yes	Nature elastic or ductile; human role in CC; attitude toward CC; Carbon-relevant behavior; environmental concern	Environmental concern: 7-point Likert; specific environmental beliefs: “ratio variable” assessment; carbon-relevant behavior: 0–2 score per action	Environmental concern: Australians are predominantly either egalitarian or fatalistic; individuals scoring high in environment as ductile and low in environment as elastic environment also showed positive carbon-relevant and proenvironment behavior
3: Pendergraft	Published 1998; survey between 1994 and 1997	Human dimensions of CC: CT and collective action	AL, CO, LA, and NV	Yes	Can statements drawn from public Mailer survey discourse on environmental issues classify individuals as one of the three politically active CT solidarities? How can this be used to approach consensus on CC solutions?	Public Mailer survey	3 (H, I, and E)	441	No	Broad environmental issues and social constructions	5-point (agree–disagree), each possible answer was weighted per solidarity	H and I alliance against E, and all groupings are “syncretic” on the individual scale; CC solutions should focus on ideological overlap between solidarities
4: McNeely and Lazrus	Published 2014	The CT of risk for CC adaptation	AK, CO, OK, and Tuvalu	Yes	How can gaining understanding of ethnographic (in-person interviews) differing cultural contexts at the institutional level provide insight to inclusive CC solutions?	Ethnographic (in-person interviews)	3 (H, I, and E); managing institutions and active civil groups instead of a representation of the population	—	—	Environment policy preferences, cultural values, and worldviews	—	Analysis of managing institutions to identify dominant solidarity corollary (CT of risk) leads to clumsy solutions

TABLE 2. (Continued)

Author	Year	Title	Location	About CC?	Premise of study	Study method	No. of solidarities included	n	Representative?	Questions asked about	Answer structure	Conclusions
5: Leiserowitz et al.	Published 2006; survey from 2002–03	CC risk perception and policy preferences: the role of affect, imagery, and values	United States	Yes	What is the relationship between worldview values and risk perceptions and policy preferences?	Mailer survey	4 in survey (F, H, I, and E); 2 (F and E) in analysis	673	Males and people over age 55 were overrepresented, but results were weighted to be representative of the U.S. population	Solidarities; CC risk perceptions; policy preferences	Affective imagery; 4-point Likert	Americans perceive moderate global CC risk and somewhat unlikely local CC risk, and they support CC mitigation policy
6: Goebbert et al.	Published 2012; surveys in 2008 (2), 2009, 2010, and 2011	Weather, climate, and worldviews: the sources and consequences of public perceptions of changes in local weather patterns	United States	Yes	What has a greater impact on perceived changes in weather, culture or actual changes in weather?	Internet survey and one phone survey in 2008	3 (H, I, and E)	7968	Yes	Weather change perceptions; cultural orientation (solidarity); political ideology	Cultural orientation and political ideology; 7-point Likert scale; weather: +1, 0, -1 rating of perceived change	Culture and political preference influences perceptions of changes in weather; perceived changes in temperature are influenced most by culture and least by actual changes in temperature
7: RIPA	2019	Roadmap to the implementation of the Paris Agreement	Austria	Yes	How can understanding the stakeholders involved in implementing the Paris Climate Agreement in Austria through CT lead to clumsy solutions?	Interviews	5 (F, H, I, E, and hermit)	134	—; interviewees selected via social network analysis	Policy Preferences (CC protection measures and who should be responsible for implementing them)	10-point Likert	The stakeholders prefer a hierarchical approach to CC protection, followed by individualistic and then an autonomous/regional approach, and least prefer an egalitarian approach

identified as important concepts common to many CT studies concerning climate change, and theoretical and review publications were included to aid in analysis. Points of analysis include: cultural solidarities, myths of nature, climate change risk perceptions, and climate change policy preferences. These were used to rate the translation and predictive validity of each survey (discussed in the next section). These points of analysis were based on a similar validity analysis by Swedlow et al. (2016) and B. Swedlow et al. (2019, unpublished manuscript). Conclusions of each study were synthesized to identify general strengths and weaknesses of the operationalization of CT in assessing the social aspects of climate change policy making.

b. Assessment methods

Swedlow et al. (2016) and B. Swedlow et al. (2019, unpublished manuscript) assessed the operationalization of CT by Wildavsky and Dake, Jenkins-Smith, and others, of similar “cultural cognition theory” by Kahan, and of grid–group measures by Ripberger et al. (Herron and Jenkins-Smith 2006; Jenkins-Smith and Smith 1994; Kahan 2012; Kahan and Braman 2006; Ripberger et al. 2011), through *construct validity*, as defined by Trochim (2006): “the degree to which inferences can legitimately be made from the operationalizations in your study to the theoretical constructs on which those operationalizations were based.” While the analysis by Swedlow et al. (2016) and B. Swedlow et al. (2019, unpublished manuscript) is of the operationalization of CT in general and not specifically related to climate change studies, it serves as a guide in analyzing other studies that apply CT to climate change.

Trochim’s construct validity consists of two measures of validity: translation validity and criterion-related validity (see Fig. 3 for validity types). Translation validity assesses whether the operationalization reflects the construct and can be further broken into an assessment of face validity and of content validity (Trochim 2006). Face validity is a general measure of how well the operationalization matches the broad intent of the construct, and content validity is assessed by comparing the operationalization against a specific set of components (Trochim 2006). These components form a checklist against which the validity of the surveys can be compared; the more boxes checked, the more valid the survey. Criterion-related validity assessed by Swedlow et al. are convergent validity, predictive validity, and discriminatory validity. Researchers B. Swedlow et al. (2019, unpublished manuscript) concluded that the operationalizations they assessed did not achieve high face validity or content validity but did achieve predictive, convergent, and divergent validity relatively well.

The use of surveys as an operationalization of CT has been debated, and Verweij et al. (2006) contend that it is best operationalized in situations where individuals can meet, argue, and defend their way of life in authentic interactions. Johnson and Swedlow (2020a) suggest the tendency of individuals to express more moderate than extreme cultural biases in surveys as a possible explanation for challenges. Johnson et al. (2020) say that surveys are common (and therefore likely to continue to be used), which warrants further research into operationalizing CT through surveys. Researchers B. Swedlow et al. (2019, unpublished manuscript) suggest that even though CT survey measures tend to have poor construct validity, they are still able to identify the cultural solidarities of the respondents and can be used to predict policy preferences.

For this paper, both of the translation validity measures of face and content validity are assessed. Here, face validity is based on whether the surveys identify the cultural solidarities of the respondents, and content validity is based on whether the surveys incorporate the myths of nature. Surveys achieved high face validity if cultural solidarities were tested by a set of worldview measures separate from other measures of CT. High content validity was achieved if there were measures of the myths of nature that were separate from the worldview measures. Including measures for fatalist, hierarchist, individualist, and egalitarian worldviews (as opposed to omitting fatalists) and myths of nature added validity. Table 1 includes the measures used to assess construct validity of the surveys.

Two of the five cultural worldviews defined by Thompson et al. (1990) are frequently omitted from the operationalization of CT in climate change studies: fatalists and hermits. This is often explained (Goebbert et al. 2012; McNeeley and Lazrus 2014; Pendergraft 1998) thus: because fatalists are withdrawn from social interaction, it is not expected that they will have an opinion or actively engage in policy formation and implementation. Hermits, by definition, operate outside of the social realm of the other four grid–group defined, mutually interdependent solidarities, and this lack of interaction excuses their inclusion in most surveys. A good translation of CT will need to attempt to survey at least hierarchy, individualism, egalitarianism, and fatalism because each solidarity is defined, in part, by its interaction and competition with the others (O’Riordan and Jordan 1999; Thompson et al. 1990; Verweij et al. 2011).

If a goal of applying CT to climate change policy making is to find clumsy solutions (Thompson 2003; Verweij et al. 2006), then an essential feature of CT is how well the cultural biases can anticipate climate change risk perceptions and policy preferences of those groups. If measures of climate change risk perceptions

TABLE 3. Construct validity analysis of each of the operationalizations of CT. A rating of 0, 1, or 2 indicates the extent to which each survey met the validity measures described in Table 1. Measures of the cultural solidarities and myths of nature demonstrate the survey's translation validity because these are two essential components of the construct of CT. Measures of risk perceptions and policy preferences demonstrate the predictive validity of CT, i.e., how well essential components of CT predict risk perceptions and policy preferences regarding climate change.

	Translation validity		Predictive validity		Total
	Face validity: cultural solidarities	Content validity: myths of nature	Risk perception	Policy preferences	
1a: Price et al. (2014)	0	2	1	1	4
1b: Price et al. (2014)	0	2	1	0	3
2: Jones (2011)	2	1	2	2	7
3: Pendergraft (1998)	1	2	1	1	5
4: McNeeley and Lazrus (2014)	1	2	1	2	6
5: Leiserowitz (2006)	1	1	2	2	6
6: Goebbert et al. (2012)	1	1	1	0	3
7: RIPA (FASresearch 2019)	2	1	0	2	5
Total	8	12	9	10	

and measures of climate protection policy preferences are both included in the surveys, then they have higher predictive validity because the actual results can be compared to the expected results.

3. Results of the literature review

Table 2 summarizes the studies selected for review using the filtering routine described in the methods. Each study has operationalized CT to identify risk perceptions of climate change, climate change policy preferences, or both, of the cultural solidarities. These measures were used to assess the predictive validity of CT. The overall construct of CT was also tested in most of the surveys by having respondents rank statements about cultural worldviews, environmental issues, and/or climate change. These measures were used to assess face and content validity. Assessment ratings are shown in Table 3. The full details on the setup, questions, and scoring of each survey (except survey 4) can be found in the tables in the online supplemental material.

a. Survey structure

All studies compared in Table 2 employed research methods of different types with a range of results. Most studies were conducted via an internet survey, or in the case of the older studies, a mail survey, with responses given on a Likert scale (all but survey 4). The number of possible responses on the Likert scale were 4, 5, 7, and 10. Survey 5 had participants respond to worldview measures on a 4-point Likert scale, but only the egalitarian and fatalist measures were rendered statistically significant enough to use in the second half of their study, indicating that a 4-point Likert scale may not be the best answer structure for a CT survey.

Cultural solidarity of the participants was determined with varying methods: surveys 4 and 7 determined cultural solidarities of institutions rather than individuals using ethnographic methods and a combination of interviews and surveys, respectively. Surveys 2, 3, 5, and 6 test solidarities based on the worldview approach (surveys 2 and 5 tested four solidarities, survey 3 tested three), but surveys 1a and 1b did not directly measure worldview and instead used a hybridized measure of “cultural environmental bias” that melded worldviews with myths of nature.

The surveys also measured environmental and/or climate change policy preferences (1a, 2, 3, 4, 5, and 7), carbon-relevant behavior (survey 1b), perceptions of risk associated with climate change (2 and 5), perceptions of risks associated with the environment in general (1a, 1b, 3, 4, 6), general environmental policy preferences (1 and 3), climate protection policy preferences (2, 4, 5, and 7), and perceptions of changes in weather (6) by responding to questions or statements through various ranking and rating methods.

Conducting in-person interviews, and/or combining surveys with interviews and observation and workshops as surveys 4 and 7 did, allows for surmisation of institutions as functional players in the social landscape of climate change policy. Observation also allows conclusions about cultural biases to be drawn while individuals are engaged in the social experiences that form their cultural biases rather than in the isolated experience of responding to a survey, which some argue is preferable (Verweij et al. 2006).

Survey 5 stands out because of how responses were collected from the participants: Leiserowitz (2006) used *affective image analysis* to determine positive or negative reactions from participants regarding risks associated with

climate change, testing the hypothesized correlations between each cultural solidarity and its expected risk perceptions and policy preferences. Affective image analysis is held as a method to garner responses efficiently from individuals while avoiding bias from the researcher (Leiserowitz 2006). Participants were asked to answer in a word or short phrase if they had positive or negative feelings about global warming, and then were asked to rate the strength of their feelings on a 5-point Likert scale. This open-ended questioning allows the participants to suggest their own conceptions of risks associated with climate change, which may be an efficient compromise between conducting in-person interviews and conducting surveys containing risks determined by the researchers. However, because of its ease of use, a Likert scale response survey of worldview measures is used most often even though it still lacks in face validity (Johnson et al. 2020).

b. Translation validity

Translation validity was assessed by considering how the cultural solidarities and myths of nature were measured in the survey. Studies that used a survey designed to determine only cultural solidarities (like the Wildavsky and Dake or Jenkins-Smith worldview measures) received a rating of 1, and if at least four instead of three solidarities (including individualist, fatalist, hierarchist, and egalitarian) were tested as Jones (2011) and the FASresearch (2019) study did, the survey received a rating of 2. Determining cultural solidarity by having questions solely about general cultural worldview allows a survey to isolate worldview from myth of nature and then look for a correlation between the two. This has stronger translation validity because it creates separate measures for different aspects of CT. All of the surveys did this except for surveys 1a and 1b, which were rated at 0 because they did not use worldview measures (they tested their “cultural environmental bias” measures.) Of the surveys assessed in this paper, only survey 7 included the hermit, defined as an “autonomous” group, and being that the hermit is defined as socially isolated from the other four groups and society in general, its inclusion or exclusion does not impact translation validity.

Myths of nature were more successfully measured by a greater number of the surveys. Surveys 1a, 1b, 3, and 4 received a rating of two by including measures solely for myths of nature that were based on general environmental issues. For translation validity, it is important to test myths of nature through measures of general environmental issues instead of climate change or other specific environmental issues because the myths, which are general attitudes toward nature, are an integral part

of the overall construct of CT and reflect content validity. Perceptions of climate change represent a more specific cultural bias of each solidarity rather than the greater construct, and therefore if a survey included measures of climate change instead of myths of nature, it received a rating of 1, which was the case for surveys 2, 5, 6, and 7.

c. Predictive validity

Swedlow et al. (2016) say that it is necessary to test the cultural solidarities separately from measures of risk perceptions, myths of nature, policy preferences, or other characteristics ascribed to the worldview of each group to isolate culture and assess for translation validity. In light of the assertion by Thompson et al. (1990) and others (Johnson and Swedlow 2020b; Verweij et al. 2011) that individuals may most identify with the worldview of one solidarity but they may also show traits of others based on the situation, when studying a specific social issue like climate change, the survey will have stronger predictive validity if respondents are able to specifically address climate change issues. This allows the survey to tap into specifics of the cultural bias that broad worldview measures are unable to do (Verweij et al. 2011).

Predictive validity for the purposes of this review is the ability of the operationalization to predict climate change risk perceptions and climate change policy preferences of each cultural solidarity, and surveys that measured perspectives and preferences about climate change rated higher than those that did not. If general environmental risk perceptions or general environmental policy preferences were tested, then the survey received a rating of 1, but if the survey measured risk perceptions or policy preferences specifically regarding climate change, it received a rating of 2. If neither of these were measured, then the survey received a rating of 0.

d. Summary of validity analysis

In survey 2, Jones (2011) centered on determining the cultural solidarities (using Jenkins-Smith worldview measures), climate change risk perceptions, and policy/mitigation preferences of those surveyed, and each of these were surveyed with separate measures, which resulted in the highest validity rating. Surveys 2, 3, 4, and 7 had the best translation validity, and surveys 2 and 5 had the highest predictive validity ratings. In general, translation validity could have been improved by including measures for fatalism, and predictive validity could have been improved by including measures specifically about climate change. It should be kept in mind that this is a brief validity analysis that focuses on whether researchers attempted to operationalize certain aspects

of CT rather than how well they did it, but the ratings are useful in illuminating main components of each study. As a whole, the studies scored highest on measures of myths of nature, followed by climate change policy preferences, then climate change risk perceptions, and last measures of the cultural solidarities. This follows similar findings by B. Swedlow et al. (2019, unpublished manuscript) that operationalizations of CT through surveys lack translation validity but are good at predicting risk perceptions and policy preferences.

4. Discussion

a. *Myths of nature*

Studies 1a and 1b by Price et al. (2014) have the lowest face validity but have high content validity and sought to answer the question of whether the myths of nature follow the same grid–group structure as the solidarities. In recognizing that the myths of nature were developed by Holling and may not be inherently cultural constructs derived from the grid–group scale, they aimed to determine whether the four myths as they are aligned with the four solidarities accurately characterize values individuals hold with regard to environmental issues and climate change. They performed two studies in Australia, 1a surveying individuals to determine with which myth of nature they most closely align based on questions about “cultural environmental biases,” and 1b to test the predictive validity of the cultural environmental biases on specific environmental issues. Their first study (1a) found only two statistically significant cultural environmental biases, suggesting that there may be only two functional myths of nature. Their second survey (1b) asked questions about climate change perceptions and preferences regarding carbon relevant behavior (personal behavior adopted to mitigate climate change), and environmental concern. The results confirmed the first study—participants formed just two groups, which the authors refer to as “nature elastic” (similar to nature perverse/tolerant) or “nature ductile” (similar to nature ephemeral). Similar to Jones (2011), they found that when asked about climate change, hierarchists and egalitarians tended to agree with one another, putting individualists and fatalists also in alignment. This, they say, demonstrates that while there is evidence to support four cultural groupings along the grid–group scale, when dealing with environmental issues, divisions only occur on the group scale, though this should be studied further.

Myths of nature ascribed to each cultural solidarity are also at the center of survey 6, which sought to determine what has a larger influence on perceptions of changes in weather, CT cultural solidarity or other

socioeconomic factors. Goebbert et al. (2012) asked Americans about their perceptions of changes in temperature, flood, and drought, and compared these perceptions with actual changes in temperature, flooding, and drought occurrences. They found that egalitarians had the highest perceptions of increases in temperature and individualists the lowest, and hierarchists did not have a statistically significant perception of changes in temperature. Differences in perceptions of flooding and droughts were not as pronounced along cultural lines. Interestingly, actual, recorded changes in temperature had the least impact on respondents’ perceptions of temperature change, far below the impact that cultural solidarity had. This finding, that culture has more of an impact on how people perceive weather than the actual weather, demonstrates the significant impact that cultural worldview has on perceptions and preferences, and Goebbert et al. (2012, p. 142) suggest that for climate protection policy to be widely supported, it will have to appease this “mix of perceived facts and value-based cognitions.”

b. *Fatalism and hermitism in survey measures*

Many surveys only measure hierarchist, individualist, and egalitarian worldviews even though the construct of CT defines each cultural solidarity in part by its relation to the others (Swedlow et al. 2016; Verweij et al. 2011). The difficult task of including fatalist worldviews in surveys poses a problem for the operationalization of CT (Johnson et al. 2020). If a person who has a fatalist worldview completes a survey without the option of identifying with the fatalist way of life, then this will force the respondent to answer questions designed to describe them as belonging to a cultural solidarity that they do not ascribe to, and the results will not be able to define an accurate cultural solidarity. The fatalist perspective is an especially challenging worldview to measure because, as Xue et al. (2014) point out, fatalists will often show traits of the other cultural worldviews through their value preferences, which again calls into question whether including fatalist measures in surveys is worthwhile. If surveys are designed also to identify fatalist perspectives, then the results may reliably cast fatalists in a cultural role to which they ascribe and potentially glean how climate change risk is perceived and what protection policy measures may be preferred.

Another reason to include measures of the fatalist view on climate change is that the myth of nature associated with fatalists is that nature is capricious. Fatalists recognize most things as beyond their control and therefore risky (Johnson and Swedlow 2020a; Johnson et al. 2020)

and may actually want nature to be managed, but surveys have thus far largely failed to identify fatalism in responses. This is supported by the [FASresearch \(2019\)](#) study, which found that the scientific community manifests as fatalist leaning even though they support climate protection policy: despite investment in the development of climate protection solutions, unity on one *best* solution has not been reached, leaving them with a feeling of despair. [Xue et al. \(2014\)](#) compared the perceived risks of natural disasters versus human-generated hazards and found that fatalists were more likely to see natural disasters as risky, meaning they may be more likely to see climate change as a risk, though this will likely be moderated by whether climate change is viewed as a purely natural hazard or one caused by humans. [Ney and Verweij \(2014\)](#) point out that research has begun to identify the role fatalism plays in public management, and climate change policy can certainly be considered in future research along these lines. If it is possible to give fatalists a voice, then their opinion can be included in policy making. This may only be the case in terms of a survey such as those included here and not in a political setting where fatalists are less likely to vote, but this could indicate an even greater need for providing a platform for fatalists to be heard in CT studies. This may seem like a moral imperative to some, but it is also necessary to define a fatalist role in clumsy solutions.

The Roadmap to the Implementation of the Paris Agreement (RIPA) study is the only one of the studies included in this paper to include the perspective of the hermit. Including the hermit (referred to in the study as the autonomist position) is controversial because if hermits are said not to engage in a measurable social way, then how can their social interactions and preferences be accounted for? The authors of the study contend that following the description of the hermit's myth of nature by [Thompson et al. \(1990\)](#) and Holling's adaptive cycle, the functional role of the hermit is as a theoretical integrator of all of the other perspectives. The institutions they say fill the role of the hermit are local and regional nongovernmental organizations (NGOs) focusing on climate protection. [McNeeley and Lazrus' \(2014\)](#) ethnographic study in the western slope of Colorado found that the NGOs involved in policy making followed an institutional egalitarian cultural bias. Holling's adaptive cycle as adapted by [Fath et al. \(2015\)](#) and [FASresearch \(2019\)](#) places the autonomous group and the egalitarian group close in proximity, both becoming most active in the aftermath of the destruction phase: egalitarians care for the victims, and the autonomous hermit helps to find new

ways of problem solving. This may also be an area in which the egalitarian and hermit perspectives overlap or form an alliance (alliances are discussed below) and, in the Colorado case, it ended in a successful policy.

c. Cultural biases of institutions and clumsy solutions

Surveys 4 and 7 look into the role that institutions play in climate change protection, and instead of determining the solidarities of individuals, determine cultural biases of these institutions. [O'Riordan and Jordan \(1999\)](#) and [McNeeley and Lazrus \(2014\)](#) pose the perspective that institutions are shaped by social factors in the same way that individuals' cultural biases are (and vice versa), which will, in turn, impact policy making as the institutions are likely to be dominant players in policy making. [O'Riordan and Jordan \(1999\)](#) say this lends itself particularly well to climate change politics because 1) both individual culture and institutional culture influence behavior causing climate change, 2) a nation's response to climate change will be shaped by its existing institutions, and 3) institutions are the product of and an influence on individual cultural bias.

In survey 4, [McNeeley and Lazrus \(2014\)](#) observed outcomes of policy making processes in Alaska, Colorado, Oklahoma, and Tuvalu. Researchers conducted ethnographic studies of stakeholder institutions involved in managing environmental risks and characterized them as market/individualistic, hierarchical bureaucratic, or egalitarian. They did the same for the populations impacted by the management policies. They found that where the managing institutions were not adequately representational of the stakeholders impacted by the policy, the policy was not well received. This was the case where egalitarian Alaskan indigenous populations found inflexibility of hierarchist hunting regulations hindered their way of life as the behavior of the moose they were hunting changed as a result of changes in the climate. In Colorado, however, where changes in precipitation have heightened the debate over water allocations, regular meetings between institutions with differing worldviews eventually led to the development of a policy that all could sign on to. [Johnson and Swedlow \(2020a\)](#) point out that there is a need for studies to test whether the hypothesis that clumsy solutions are more effective than solutions that primarily appease one cultural bias—this case study is just one example, but can be interpreted as support for this hypothesis.

Similarly, the [FASresearch \(2019\)](#) study (survey 7) identified stakeholder institutions in the field of climate change policy in Austria, and through interviews with and surveys completed by individuals representing the institutions, characterized each as one of the five cultural

solidarities defined by CT (although no responses were determined to be of the fatalist position and four positions were included: hierarchist, egalitarian, individualist, and the hermit/autonomous). Surveys from the RIPA study show that institutions prefer a hierarchical management of climate change policy, which is seen as leveling the playing field for all involved: if a business is subjected to what they perceive as a risk associated with the climate change protection plan, then all businesses are subjected to the same risk, making the policy fair. This is an interesting finding but should be considered cautiously because while this may be true in a small country like Austria, it remains to be seen if it is applicable in the United States.

Because a plurality of voices is recognized in the managing institutions in studies 4 and 7, a clumsy solution is more likely to be attained. While McNeeley and Lazrus recognized three institutional cultural biases, the RIPA study recognized five (but includes four due to no fatalist responses). McNeeley and Lazrus (2014) omit fatalist institutions according to the typical caveat that fatalists do not take part in policy making because they believe the outcome will be inconsequential for them. They do not mention the hermit. The RIPA study includes 134 institutional stakeholders from across Austria in their survey, where McNeeley and Lazrus studied small communities with only a handful of stakeholders. Also interesting is that the institutions identified as autonomous (hermits) in the RIPA study are local institutions, which are equivalent to the groups McNeeley and Lazrus studied in localized areas dealing with issues unique to those localities. If the RIPA study is a macrocosm, as it is a national study, then the McNeeley and Lazrus studies can be considered a microcosm equivalent to what is included in just the study of the hermits on the macro level of the RIPA study. This possibly adds credence to the idea that the myth of nature of the hermit as resilient is a strategy for clumsy solutions or successfully navigating the adaptive cycle.

d. Alliances

Overlapping of perspectives was found in several studies, and here they are referred to as alliances. Thompson et al. (1990) discuss alliances as an inherent part of the social relations between the cultural solidarities. The interdependent nature of the solidarities combined with the “partial truth” of each associated myth of nature means that each way of life will need to reach out to one of the others to compensate for the limitations of their way of life; in this case, to manage risks associated with climate change. “The establishment,” (Thompson et al. 1990, p. 88) is a hierarchist-individualist alliance where hierarchists support individualist business

practices and both reap economic rewards while not compromising their values. This alliance creates majority support for the hierarchist structure that supports the individualist practices and becomes a stable institution.

Note also that what appear to be alliances may also be the result of a weakness or error in the operationalization of CT, as Johnson et al. (2020) pose in their analysis of several surveys. Another explanation for what appear to be alliances could be an overlapping of temporal differences in viewpoint as explained by Johnson and Swedlow (2020b). They observe how the egalitarian view on nuclear power has shifted between negative and positive due to the change in perception of what is the biggest threat: nuclear contamination or carbon dioxide from using fossil fuels instead of nuclear energy. Because potential alliances have been identified in the studies evaluated in this review and because alliances are described by Thompson et al. (1990; Goebbert et al. 2012; Jones 2011; Leiserowitz 2006; Pendergraft 1998; Price et al. 2014) they are discussed here, but this could be an area for future research and should be considered with the above possible explanations in mind.

The most common alliances were between hierarchist and egalitarian views. This was shown in studies 1a, 1b, and 2. Surveys 1a and 1b (Price et al. 2014) found an alliance between respondents with egalitarian and hierarchist environmental bias in their views on environmental concern (high) and increased carbon-relevant behavior and an alliance between fatalists and individualists over low environmental concern and low carbon-relevant behavior. In survey 2, Jones (2011) found that hierarchists and egalitarians align on the position that the risks associated with climate change warrant action, and an antagonistic relationship was observed between egalitarians and individualists whose perspectives on nature are exact opposites of one another. Survey 6 also found egalitarians and individualists to hold opposing views, which follows the myths of nature as they are assigned by CT: egalitarians of all the groups believe nature to be the most fragile, and individualists believe it to be the most resilient.

Conversely, surveys 3 and 5 found individualists and hierarchists to be in alliance opposing the egalitarian view on climate change. Pendergraft (1998, survey 3) notes that this was unexpected, and cites other studies that support the alliances and oppositions found in surveys 1a, 1b, 2, and 6. An explanation for a hierarchist-individualist alliance posed by Xue et al. (2014) is that because hierarchism values authority, acknowledging environmental risks calls this authority into question by suggesting they have improperly managed the environment. This puts hierarchical values at risk and therefore

hierarchists, like individualists, will tend to dismiss environmental risks. Xue et al. (2014) also found a positive correlation between hierarchism and risk perceptions of natural hazards, but a negative correlation between hierarchism and risk perceptions of hazards due to human activity, which may provide insight into why hierarchists sometimes align with individualists and other times with egalitarians. This is significant in the study of climate change risk perceptions because if a person with a hierarchist worldview believes climate change to be due to natural causes, it will be perceived as more of a threat than if they believe it to be due to human activity, although this is not supported by the finding by Jones (2011) that Americans with a hierarchist worldview do believe that climate change is human caused. Jones (2011) and Verweij et al. (2006) both make the case that renewable energy is likely a point upon which the different cultural solidarities might be able to compromise. Using CT to identify alliances on climate change perceptions and policy preferences can, like clumsy solutions, be useful in developing broadly palatable climate protection policy.

5. Conclusions

This paper has aimed to review how cultural theory has been operationalized through surveys about the social aspects of climate change policy making, to assess such operationalizations for construct validity considering cultural solidarities, myths of nature, climate change risk perceptions and climate change policy preferences, and to identify ways that CT studies can help work toward clumsy solutions.

Surveys with responses on a Likert scale of at least 5 that include possibilities for respondents to identify with fatalist, hierarchical, egalitarian, or individualist ways of life and include measures specifically about climate change risk perceptions and policy preferences will have the highest translation and predictive validity and have the ability to tap into respondents' perceptions and preferences of climate change and climate protection policy. Open-ended responses like affective imagery, ethnographic, and interview methods (studies 4, 5, and 7) may avoid some of the challenges of using surveys, but the studies in this review still lack validity. In addition, because surveys are easier to conduct, a focus on improving surveys for translation validity as B. Swedlow et al. (2019, unpublished manuscript) suggest will be good for this field of research. Predictive validity of the studies was higher than translation validity, indicating that CT surveys are relatively successful in anticipating climate change risk perceptions and policy preferences, following the

same findings by B. Swedlow et al. (2019, unpublished manuscript).

Policy makers should look to the alliances over climate change risk perceptions and policy preferences illuminated by CT. Because alliances are inherent in the function of each cultural group, this is a natural way to garner majority support for policies, including climate protection measures such as renewable energy. Future CT studies on climate change should strive to include measures of fatalist and hermit perspectives because this will contribute to the overall research on how to identify these types in survey operationalization of CT, increasing face and content validity of the operationalization. This would also identify the role of the fatalist and hermit perspectives in clumsy solutions. Because formation of climate change protection policy has been so contentious and thus far largely unsuccessful, policy makers can look to the promise of clumsy solutions, and more research should be done to identify successful examples of clumsy solutions to climate policy problems.

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