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Integrative complexity, beliefs, and attitudes: Application to prescribed fire

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ABSTRACT

This study examines integrative complexity as a moderator between basic beliefs about wildland fire management and attitudes toward prescribed fire. Integrative complexity measures an individual's level of complexity when thinking about an issue. This, in turn, illustrates the diversity of arguments people recognize about the subject. It is the capacity and willingness to acknowledge the legitimacy of competing perspectives on the same issue and forge conceptual links among these perspectives. This has significant implications for agencies in policy development and subsequent public acceptance. Households were surveyed in counties adjacent to three study areas in northern Colorado and southern Wyoming. Regression moderation analysis examined the interrelationships among basic beliefs, attitudes, and integrative complexity. Results suggest that integrative complexity moderated the relationship between basic beliefs and attitudes toward prescribed fire. We discuss how this methodology can contribute to a better understanding of public perceptions regarding proposed or subsequent strategies and policies.

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1. Introduction

Natural resource managers recognize that the social sciences can contribute to the foundation on which management decisions are made through accurate and timely information (Absher and Vaske, 2005; Allen et al., 2009). Wildland fire management has become a major public interest and policy issue, with empirically-based social science analysis informing public policy decisions (Anderson and Anderson, 2012; Kousky et al., 2012). Understanding how the general public perceives a specific management decision is critical for success in communicating and implementing management plans acceptable to the public (Burtz and Bright, 2007). As Knotek (2006) suggested, cognitive disposition influences both the decisions made by land managers and subsequent public support. A common approach to examining this disposition is through the theory of cognition called the *cognitive hierarchy*.

Viewed from a natural resource management perspective, this theory explains an individual's opposition to or support for various management strategies. It suggests that behavior reflecting this opposition or support, although directly influenced by specific perceptions related to that behavior, is connected with the attitudes, beliefs, and values people hold related to the issue (Bright and Burtz, 2006; Homer and Kahle, 1988; Manfredo, 2008). However, in addition to "what" people think about natural resource issues in terms of values, beliefs, and attitudes

(described by the cognitive hierarchy), it may also be instructive to consider "how" people think about these issues in terms of the complexity of their thoughts (Carroll and Bright, 2009, 2010; Suedfeld, 2010). One social psychological construct that explores this structure is *integrative complexity* (Tetlock, 1989). Integrative complexity is a measure of the thought complexity people exhibit when thinking about an issue and is useful for examining perceptions of dichotomous issues, for which people will either support or oppose a particular behavioral or attitudinal object (Carroll and Bright, 2009; Tetlock, 1989). The concept focuses on the structure of thoughts, or beliefs, rather than the content of those beliefs (Bright and Barro, 2000; Carroll and Bright, 2010; Tetlock, 1989). Structure refers to the conceptual rules used in thinking, deciding, and interrelating; hence how people think, not what they think (Suedfeld, 2010).

Integrative complexity has been found to be related to how people perceive a variety of issues. In a natural resource management context, Carroll and Bright (2009) suggest that people who think with more complexity about an issue should be more willing to consider a broader range of benefits of diverse management approaches, and may respond differently to management communications, than are people who think with less complexity about the same issue (Bright and Barro, 2000; Burtz and Bright, 2007). As Lavalley and Suedfeld (1997) observe, high complexity is characterized by pluralistic reasoning, in which relationships among differing perspectives or goals are explicitly considered and decisions are based on syntheses of various alternatives. This is applicable when considering wildland fire-related policy development. The wildland fire management "landscape" is extremely complex. Not only does the biophysical component have to be considered, but there are significant social, economic, and other considerations. An agency

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can greatly benefit from understanding the level of complexity with which a stakeholder group approaches a management issue.

This study utilized a two-step process to understand “what” and “how” people think about a natural resource management issue. First, we applied a portion of the cognitive hierarchy, within the context of the mountain pine beetle (MPB) infestation in the Western US, by examining the connection between broad values toward natural resource management and more specific attitudes toward prescribed fire in response to MPB infestation. We expanded on prior natural resource-focused research utilizing the cognitive hierarchy by incorporating integrative complexity in our examination of the public’s values and attitudes toward this natural resource management policy. This study applied a recently developed quantitative approach to measure integrative complexity of public perceptions about a specific management response to a natural disturbance agent (MPB). We examined whether the value–attitude relationship, hypothesized by the cognitive hierarchy, is impacted by the complexity with which people think about the issue. That is, we explored whether the relationship between values regarding the management of forests and attitudes toward prescribed fire differ for people who think with more complexity, versus less about the issue, or is there no effect of complexity at all? Considering the complexity with which people think about a natural resource management issue can contribute to a greater understanding of public perceptions regarding proposed or subsequent strategies and policies (Burtz and Bright, 2007). This contributes to social science research that can be developed and used to improve future policy development at the federal, state, and local levels (Kousky et al., 2012).

1.1. The mountain pine beetle infestation and prescribed fire

The MPB, *Dendroctonus ponderosae*, is native to the forests of western North America (Leatherman et al., 2007). Outbreaks of beetle infestations are natural ecological processes. However, there has recently been a severe and widespread MPB infestation throughout the region (Colorado State Forest Service, 2014; U.S. Forest Service [USFS], n.d.). As a disturbance agent, the extent of the infestation in Colorado and Wyoming has significant implications for fire management, recreation, and the economic use of wood products. Research continues on the relationship between beetle-killed trees, fuels, and fire behavior. Hicke et al. (2012) suggest that this question be framed around the research question asked, time since the outbreak, and the fuel or fire characteristic of interest. Regarding recreation, agencies have informed visitors about potential risks at campgrounds, picnic areas, and along trails. They also have taken actions to remove or minimize the threat (National Park Service, n.d.; USFS, 2011a,b). Economically, the infestation results in opportunities for an expanded biomass industry, dependent on a viable wood products market, as well as potential impacts on residential property valuation and mitigation costs (Colorado Forest Restoration Institute, 2010; Mahmoudi et al., 2009; Parkins and MacKendrick, 2007; Price et al., 2010).

Focusing on fire management, agency managers are developing specific management plans for fuel treatments, defined as the manipulation or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage and resistance to control; examples include chipping and burning (National Wildfire Coordinating Group [NWCG], 2014). Prescribed fire is one fuel treatment method available to managers. It is a fire intentionally ignited by management under an approved plan to meet specific objectives (NWCG, 2014). Prescribed fires can be used to accomplish management goals, such as burning off excess forest vegetation (Anderson and Anderson, 2012; Kaval et al., 2007). This decreases the likelihood of large, potentially uncontrollable forest fires. Managers are interested in assessing the public’s perceptions of prescribed fires to determine the level of agreement for its use as a response to MPB infestation. Several studies previously examined public approval of prescribed fires (Kaval et al., 2007). We expanded upon this research

by exploring thought complexity, “how” people think about prescribed fire in relation to the MPB, a natural disturbance agent.

1.2. Conceptual framework

Within the context of the MPB and prescribed fire issue, the often-used cognitive hierarchy provides the basis for this study’s conceptual framework. The complexity with which people think about MPB and prescribed fire was incorporated into this conceptual framework in order to gain a more complete understanding of the cognitive disposition people hold regarding this issue. This allows for the construction of a broader social psychological model than is possible by only including the cognitive hierarchy framework (Carroll and Bright, 2010).

1.2.1. Cognitive hierarchy

The cognitive hierarchy explores the cognitive disposition of individuals toward specific behaviors by positing that attitudes toward a behavior can be explained by understanding the basic fundamental values someone holds (Homer and Kahle, 1988; Manfredi, 2008). This effect occurs through the impact of fundamental values on basic beliefs, which impact more specific attitudes toward the behavior.

Fundamental values are not focused on specific objects or behaviors, but are the foundation of the cognitive hierarchy. They represent desirable end-states and modes of conduct (Bright and Burtz, 2006; Homer and Kahle, 1988; Schwartz and Bilsky, 1987), such as freedom and responsibility. Values are guides and determinants of social attitudes and ideologies, on the one hand, and of social behavior on the other (Rokeach, 1973). In most studies utilizing the cognitive hierarchy, fundamental values are not directly measured, but instead are operationalized through the measurement of the second level of the hierarchy, basic beliefs.

Basic beliefs are strongly value-laden, but are more representative of a specific domain of interest than fundamental values. The pattern with which an individual holds these value-laden basic beliefs is his or her *value orientation*. This represents the application of fundamental values to concrete issues, such as wildland fire management and MPB (Bright et al., 2003). One’s value orientation impacts individual behavior by guiding attitudes related to that behavior more directly than broad fundamental values (Bright and Burtz, 2006; Manfredi, 2008).

Attitudes are positive or negative evaluations of a person, object, or action (Eagly and Chaiken, 1993; Vaske, 2008). Directly influencing behavior, they have both evaluative and cognitive dimensions. The evaluative component is the positive or negative view of an object or behavior. The beliefs associated with the object or behavior make up the cognitive component. In this study, we apply the cognitive hierarchy by focusing on the orientation of one’s fundamental values toward the MPB issue and prescribed fire, and the impact of this value orientation on attitudes toward prescribed fire.

1.2.2. Integrative complexity

Integrative complexity measures the level of complexity with which people think about an issue (Burtz and Bright, 2007; Carroll and Bright, 2009; Suedfeld, 2010; Tetlock, 1989; Wallbaum, 1993). Suedfeld and Bluck (1993) characterize it as the capacity and willingness to acknowledge the legitimacy of competing perspectives on the same issue and forge conceptual links among these perspectives. The concept focuses on the structure of thoughts, or beliefs about that issue, rather than the content of those beliefs (Bright and Barro, 2000; Carroll and Bright, 2010). Much of the theory’s development came from the field of political science (Suedfeld, 2010). This included, but was not limited to, the policy process, relationships between political ideology and cognitive style, the relationship between integrative complexity and crises from the perspective of political decision making, and communication strategy (Gruenfeld et al., 1998; Suedfeld, 2010; Tetlock, 1989; Wallbaum, 1993).

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