

INTEGRATIVE COMPLEXITY OF WILDFIRE MANAGEMENT: DEVELOPMENT OF A SCALE

Joshua Carroll
University of New Hampshire
Department of Recreation Management and Policy
195 Hewitt Hall
Durham, NH 03824
josh.carroll@unh.edu

Alan Bright
Colorado State University

Abstract.—Wildfire in the West has become a controversial natural resource issue that has divided the public's perceptions regarding its management, and forest managers are now faced with the difficult task of making sound decisions while balancing these varying concerns. Two widely used wildfire management practices are prescribed fire and mechanical thinning. In order to better understand the public's position regarding these two techniques, we have drawn upon the concept of integrative complexity, which is defined as a protocol for measuring the complex way that people think about issues. This paper presents the psychometric process by which a combination open-ended and fixed-item scale was developed to measure complexity of thought that is consistent with integrative complexity. The resulting scale is designed for use in large surveys across any number of natural resource issues, thus allowing the information generated to be generalizable to broader populations, which is often impractical with this originally qualitative research method.

1.0 INTRODUCTION

Fire is both natural and needed by forest ecosystems. It provides essential functions such as regeneration of vegetation, elimination of disease and insect threats, proper forest reproduction, wildlife habitat improvement, and the reduction of fuels. Though these benefits are noteworthy, there are also costs associated with wildland fire. These include threats to private property, natural resource harvests, air quality, and scenic beauty. It is this trade-off between wildland fire benefits and costs that complicates the issue and causes differences in public beliefs toward fire management.

1.1 Current Wildfire Management

Due to nearly 100 years of fire suppression by federal land management agencies, many forests in the U.S. are now loaded with fuels and, as a result, severe wildfire conditions exist (Pyne 2001). Response to the historical strategy of strict fire suppression has included two common management actions designed to reduce fuels in the forest: prescribed burning and mechanical thinning. Prescribed burning is defined as fire applied to a specific land area under selected weather conditions to accomplish predetermined, well-defined management objectives. Mechanical thinning reduces the amount of vegetation in the forest by physically removing selected trees and plants with the intention of decreasing the likelihood of large, uncontrollable fires. It often involves heavy equipment (e.g., bulldozers) and/or light equipment (e.g., chainsaws) entering the forest for the cutting of trees based upon a predetermined spacing or pattern technique. It has become a viable option along with prescribed fire for removing fuel and reducing wildfire potential.

1.2 Identifying Public Perceptions of Wildland Fire Management

The policy of government land management agencies has only recently emphasized more proactive approaches to reducing wildfire risk through the use of prescribed burning and mechanical thinning. This shift has troubled some communities and groups with interests in forested areas because of the dangers associated with prescribed fires going awry and the impacts of heavy machinery and road building that accompanies mechanical thinning (Kneeshaw et al. 2004). The public has expressed much concern related to these issues, and as a result, public perceptions of fire management have become an important consideration for agencies charged with managing areas susceptible to wildland fires. Understanding the public's perceptions of wildfire management can (a) help agencies recognize when policies might be supported by the public, (b) alert agencies when policies may run into public opposition, and (c) help agencies develop information to garner

support for potentially controversial strategies. With public support, the agency can manage more efficiently, spending time and money on the resource, as opposed to legal battles and policy adjustments. Research on public perceptions of fire management has been occurring for 20 years. For example, studies examining the acceptance of fire management strategies (e.g., Stankey 1976; Cortner et al. 1984), have suggested that education can influence public acceptance (e.g., Taylor & Daniel 1984). Shelby & Speaker (1990) found that among other factors, the success of prescribed burning campaigns aided in the public's acceptance of prescribed burning, though there was difficulty in fully accepting this management practice due to past messages of the risks and impacts of fire. Manfredo et al. (1990) concluded that influencing the public's beliefs about fire will likely alter their attitudes toward fire, and ultimately their acceptance of management practices regarding this issue. In this way, it becomes apparent that citizens' beliefs are a key element to understanding and perhaps influencing its acceptance of fire management strategies. In a panel research study, Shindler and Toman (2003) used specific belief measures (e.g., "the use of fuel treatments in the Blue Mountains is unnecessary and should not be utilized") to examine support for prescribed burning and mechanical thinning. They found that over the four-year period between 1996 and 2000, support for these activities in the Blue Mountains remained relatively constant. Identifying specific beliefs and attitudes toward fire management strategies provides important information for managers, but this information is often limited to a "laundry list" of what people believe about fire management.

1.3 Limitations of Current Attitude and Belief Research Regarding Fire Management

Burtz (2002, unpublished dissertation) suggested that it is insufficient to simply understand what people think about wildfire and its management; it is necessary to understand *how* people think about the issue. People often have many thoughts about issues such as wildland fire management, many of which (a) may not be consistent, (b) are based on emotions, experience, or neither, and (c) may or may not be based on values, which have been shown to be linked to attitudes (e.g., Fulton et al. 1996). This variety of information

regarding people's thoughts about wildfire management is an important aspect of the complexity toward which they think about the issue. This level of complexity describes how individuals think about an issue, that is, the structure of their beliefs. One concept that is based on this structure of beliefs is integrative complexity (Tetlock 1989). Its use in research can provide additional information on how people think about an issue such as wildfire management. Traditionally it is a qualitative measure. This paper describes the process by which a fixed-item scale to measure the concept of integrative complexity was developed.

1.4 Conceptual Framework: Integrative Complexity

Integrative complexity is a protocol for measuring a way of thinking. It can be used to describe the structure of the thoughts people have about an issue such as wildland fire management, over and above the content, and is based on the number of aspects of a problem people consider (Tetlock 1989). Two factors that are measured within the context of integrative complexity are differentiation and integration. Differentiation focuses on whether a person acknowledges that there is more than one side or dimension to an issue or problem (Baker-Brown et al. 1992). Someone who sees an issue as black or white (e.g., prescribed burning is dangerous and bad) is exhibiting low differentiation on that subject, whereas one who sees two dimensions to an issue (e.g., prescribed burning is sometimes beneficial to the forest ecosystem but also entails some potential dangers to humans) shows somewhat higher differentiation, and someone who sees several dimensions exhibits even higher differentiation (Bright & Barro 2000). The second factor that is important for integrative complexity is integration, which refers to the development of complex connections among the differentiated characteristics and is related to the relative importance of perceived arguments for and against an issue (Baker-Brown et al. 1992). It is the recognition of interrelations among the different perspectives or dimensions that were acknowledged in the differentiation stage of measurement (Wallbaum 1993). Therefore, the presence of integration regarding an issue requires that the individual has first exhibited an adequate amount of differentiation (Tetlock 1989).

1.5 Uses of Integrative Complexity

Integrative complexity was originally studied for pre-existing political speeches. For example, Tetlock (1981, 1989) examined the integrative complexity of United States congresspersons to see if conservatives differed in integrative complexity on political issues from their liberal counterparts. Tetlock (1984) also analyzed reasoning of members of the British House of Commons, and American versus Soviet foreign policy-makers (Tetlock 1985, 1988). Wallace and Suedfeld (1988) measured integrative complexity of 16 leaders before, during, and after seven international crises. Tetlock et al. (1994) examined debates over slavery in antebellum America. There have also been integrative complexity analyses of public issues outside of the political arena. Kristiansen & Matheson (1990) analyzed integrative complexity of public attitudes toward nuclear weapons, while Dillon (1993) compared integrative complexity of arguments on abortion between statements made by “pro-choice” and “pro-life” advocates. In a natural resources context, integrative complexity has been utilized to look at how coursework in environmental education affected college students’ level of integrative complexity regarding endangered species (Bright & Wyche 1998), and attitudes toward plant and wildlife protection (Bright & Barro 2000). Finally, integrative complexity has been used to assess public attitudes toward wildfire (Burtz 2002, unpublished dissertation). In addition to understanding how people think about an issue, integrative complexity may also play a role in steering management decisions on topics that produce strong, polarized positions among stakeholders. When managers consider the level of integrative complexity that a particular group has about an issue, they can guide their own delivery and enforcement of their management practices, as well as develop information appropriate to different levels of complex thinking. For example, managers dealing with wildfire are in a particularly difficult position with regard to messages of the past (e.g., fire suppression, fire is evil) and the current understanding that prescribed fire is needed. Many land management agencies make references to the importance of gaining public support (Clute 2000), and that this “is not an easy task for there are many barriers to such an endeavor-not the least of which is the attitude of the

American public” (Clute 2000, p. 59). Clute (2000, p. 61) goes on to suggest that there is a need for a method to “better communicate wildland fire messages in such a manner as to meet societal needs, address community needs/concerns, gain public support, and comply with organizational mandates, all while utilizing the best science and technology available” (Clute 2000, p. 61). The utility of integrative complexity may be found in its implications for messaging and framing messages in appropriate contexts and levels of complexity. It is recognized that individuals will best respond to information (e.g., a forest management campaign) that is set at the level of knowledge and complexity at which they function (Hunsberger et al. 1992).

1.6 Measuring Integrative Complexity

Traditional methods for measuring the public’s integrative complexity use the paragraph completion test (Schroder et al. 1967). This involves respondents writing an essay about an issue and describing their attitudes and beliefs toward an issue. Each respondent’s essay is analyzed by several raters for differentiation and integration. Scoring for integrative complexity ranges from 1 to 7, where 1 represents the lowest integrative complexity score and 7 represents the highest. Specific descriptions of scores along the integrative complexity continuum are described below (Bright & Barro 2000, Wallbaum 1993).

- 1: no differentiation, individual sees the issue in only black or white terms
- 3: individual acknowledges at least two viewpoints and there may be positive and negative aspects of each
- 5: individual acknowledges not only multiple viewpoints, but that there is a moderate level of interactions and tradeoffs among the alternatives
- 7: suggests the individual also has deeply held basic values between the alternative issues

Intermediate scores of 2, 4, and 6 can be assigned if raters have difficulty deciding on a score of 1, 3, 5, or 7. Table 1 provides examples of passages and their coding score for integrative complexity (Bright & Barro 2000). For a complete list of all the criteria that determine integrative complexity scoring, see Baker-Brown et al., 1992.

Table 1.—Examples of passages about species protection, their overall integrative complexity (IC) score, and individual coder scores

IC Score	Passage
1; both coders = 1	I feel that we should try to leave what life and animals that are in their own habitats alone and try our best to protect them and the environment around them.
2; both coders = 2	Yes but with some restraint. In my opinion the quality of human life comes before the protection of diverse life forms. I would place preservation ahead of pure economic gain.
3; coder 1 = 4, coder 2 = 3	I feel we have to find a balance between the environment and population. It's important to maintain the wildlife and plant life of the wilderness, but people also need jobs. I feel that animals will move to other habitat if man interferes with their areas.
4; both coders = 4	I believe in protecting the diversity as long as it is done with a reasonable budget and fiscally responsible management. The problem with programs like this is that they take on a life of their own. If an endeavor such as this can be done without being over done, than I am for it. But experience tells me otherwise.
5; coder 1 = 4, coder 2 = 5	To a degree yes we must monitor the ecology. However, the government simply seems to go overboard sometimes, as it does in every area it touches. Too many administrative programs exist; some conflict; all are expensive. The idea is a good one but it seems we go about things in an all or nothing fashion. We have evolved to the place where we can determine the degree that a species or animal affects the other living things it interacts with. We need to curb the human problems worldwide—especially overpopulation or this question will one day be moot.

Note 1: there were no scores of either 6 or 7 in the study these data were drawn from

Note 2: results presented here were adapted from Bright and Barro (2000)

Note 3: grammatical errors were left in passages to depict responses verbatim

1.7 Drawbacks of Traditional Measurement of Integrative Complexity

While the use of integrative complexity allows researchers to more deeply investigate an individual's beliefs, the measurement process can be time-consuming and requires significant effort from both researchers and respondents. For example, respondents are asked to complete written or typed essays, and as a result response rates to mail surveys can suffer. Bright and Barro (2000) point out that one main reason for low response rates to mail surveys using a traditional method of measuring integrative complexity is that many respondents found that writing an essay was either too difficult or time-consuming. Another important factor in the measurement of the construct is how well respondents understand the instructions for completing the survey. In the case of using essays to generate integrative complexity scores, instructions must make clear to the subjects that the composition should reflect opinions, valuations, or judgments, and should not be merely a descriptive account, which would not be a scorable response for complexity (Baker-Brown et al. 1992). There are also several concerns for scientists who engage in traditional integrative complexity research. Scoring the essays is quite time-consuming and requires several researchers working cooperatively to come to agreement

on appropriate scores. As noted above, the paragraph completion test requires at least two researchers (often three or more are used) to score every essay for every respondent, and then discuss scores and their reasoning. This is a difficult and lengthy process. Finally, the qualitative nature of integrative complexity data makes it unfeasible to be used on a large-scale application, and restricts its generalizability from a small sample to broad populations. This impedes its use in many potentially valuable studies, and has limited the measurement of integrative complexity in large survey research.

2.0 GOALS OF THE STUDY

The goal of this study was to develop an alternative and functional method for measuring integrative complexity. We apply it to public perceptions of prescribed burning and mechanical thinning. A scalar measure would overcome the limitations of essay completion methods of integrative complexity and has additional benefits. First, a fixed-item scale is easier to complete for respondents. The scale measure does away with the essay, and replaces it with fill-in spaces and circling of a number. Since it has been pointed out that respondents are reluctant to write an essay about a topic (Bright & Barro 2000), this fill-in approach should yield a higher response rate. Second, increased simplicity of completing a scale enables the

concept to be used in more broad social science studies, allowing a larger sample to be obtained. Third, the use of a larger sample allows integrative complexity to be used in studies where an important objective is to obtain results generalizable to a population. Fourth, the scale makes the scoring more quantifiable and overcomes the challenges associated with translating qualitative data into quantifiable measurement. Lastly, the systematic and quantifiable measure of the integrative complexity scale allows for the concept's use in theoretical models of attitudes and behavior. To accomplish the goal of the study, four specific objectives were identified.

Objective 1: To create a fixed-item scale which will yield integrative complexity scores.

Objective 2: To measure integrative complexity of thought regarding two wildfire management techniques (i.e., prescribed burning and mechanical thinning) using the traditional essay completion method.

Objective 3: To measure integrative complexity of two wildfire management techniques (i.e., prescribed burning and mechanical thinning) with the newly developed scale, using the same sample of respondents as the traditional methods test.

Objective 4: To determine the extent to which the two measures of integrative complexity are correlated.

3.0 METHODS

3.1 Development of the Fixed-Item Scale

The scale was designed to measure the two primary components of integrative complexity: differentiation and integration. Differentiation is conceptualized as the extent to which a respondent recognizes alternate sides of the issue of wildfire. It is traditionally measured by counting the number of positive and negative statements about an issue in an essay. High differentiation is indicated by an equal, or near equal number of arguments on both sides of an issue. We designed our scale to be consistent with the traditional method of measuring differentiation. In order to do this, we asked respondents to first list potential "arguments for" and "arguments against" each wildfire management technique. This provided an indication of the number of positive and negative aspects that they were considering,

much like the traditional methods of seeking these out from within an essay. Integration is conceptualized as how the respondent recognized interrelationships between the different sides to the issue and is linked to the relative strengths of the perceived arguments on both sides. Traditionally, a researcher subjectively infers the level of integration from the respondents' writing and their apparent level of involvement with the topic. In the scale, we measured integration by asking respondents to indicate the strength of each argument they had listed. For example, if an individual gave a "for" argument the same value or strength as an "against" argument, this suggests the respondent recognizes similar or equal value to both sides of the argument, an attribute of a more highly integrated individual.

3.2 Scoring Differentiation, Integration, and Integrative Complexity

Differentiation was measured as a value between zero and one, based on the ratio of arguments for and against the issue. The lesser of the total arguments "for" or "against" was divided by the greater of the two to arrive at the differentiation value. A value of zero reflected no differentiation, while a value of 1 reflected the highest differentiation. For example, an individual who listed three arguments for and two arguments against prescribed burns would obtain a ratio of 2 to 3, or a differentiation score of 0.67. A ratio of 3 to 4 would result if an individual listed 3 arguments for and 4 arguments against prescribed burns for a differentiation score of 0.75. Therefore, higher differentiation is also reflected somewhat in a higher total number of arguments, beyond the relatively balanced number of arguments on both sides of the issue.

3.3 Scoring Integration

A ratio, resulting in a score between zero and one, was calculated for integration. The means of the strengths of the arguments "for" and the arguments "against" the issue, respectively, were calculated. The smaller mean was divided by the larger to yield the integration score. By continuing the previous example where an individual listed three arguments for and two arguments against prescribed burns we can illustrate the scoring of integration. If the three arguments for prescribed burns were considered to be strong arguments (e.g.,

6, 6, 7), the mean for the strengths of the arguments for prescribed burning would be $(6 + 6 + 7)/3$, or 6.3. If the two arguments against prescribed burning were perceived to be weak arguments (e.g., 2, 3), the mean of the arguments against prescribed burning would be $(2 + 3)/2$, or 2.5. Therefore, the integration score for this respondent would be the lesser value divided by the larger, or $2.5 / 6.3$, yielding an integration score of 0.4. Again, an integration score of zero indicates no integration, while an integration score of one indicates high integration.

3.4 Generating Integrative Complexity

Integrative complexity was measured as the product of the differentiation and the integration scores. This calculation would again yield a value between zero and one. Taking the example from above to completion, a differentiation score of 0.67 and an integration score of 0.4 would yield an integrative complexity score of 0.67×0.4 , or 0.27.

3.5 Test of the Integrative Complexity Scale

The following procedures were conducted to test the integrative complexity scale. Subjects consisted of 72 undergraduate students from two different natural resources and recreation classes at Colorado State University. There were a total of 63 usable essay and scale pairs for the two issues (i.e., prescribed burning and mechanical thinning) that were tested. The final analysis was done with 63 essay and scale pairs, 33 for prescribed burning, and 30 for mechanical thinning.

- Step 1 Respondents were divided at random and placed into one of two groups: a prescribed burning group and a mechanical thinning group, representing the issue they would be writing about.
- Step 2 For each group, one half of the respondents began by writing an essay about their assigned topic, while the other half completed the scale first.
- Step 3 After finishing, those who had written an essay worked on the scale, while those who had completed the scale worked on an essay.

The following analyses were conducted:

1. An independent samples t-test was conducted to determine if there was a significant difference in the traditional integrative complexity score for those who had completed the essay first and those who had completed it last.
2. An independent samples t-test was conducted to determine if there was a significant difference in the scale-generated integrative complexity score for those who had completed the scale first and those who had completed it last.
3. Pearson's correlation was obtained between the traditional essay score and the scale score for both prescribed burns and mechanical thinning. It is presumed that a higher correlation between the two methods indicates a better fixed-item measure of the construct.

4.0 RESULTS

4.1 Test for Response Bias

The test for bias on the order of completion of the essay and scale showed no significant differences in integrative complexity score. For the essay method, those who had completed the essay first had a mean integrative complexity score of 3.17, while those who had completed it second had a mean score of 2.91, ($n = 33$, $t = .731$, $p = .467$). For the scale method, those who had completed the scale first had a mean integrative complexity score of .592, while those who had completed it second had a mean of 0.482, ($n = 30$, $t = 1.78$, $p = .078$).

4.2 Test of Scale

The Pearson correlation between the integrative complexity scores for the two measurement methods for prescribed burning was $r = .81$, $p < .01$, $n = 33$, indicating a strong effect size. For the mechanical thinning issue, the correlation of the integrative complexity scores between the essay and the scale was $r = .77$, $p < .01$, $n = 30$, also indicating a strong effect size.

5.0 DISCUSSION

5.1 Summary of Integrative Complexity Scale Construction

The pretest of the integrative complexity scale yielded a strong correlation between the scale and essay results for both prescribed burning and mechanical thinning. Psychometrically, the scale defines the attributes of differentiation and integration and uses a straightforward approach to their measurement. Based on the high correlation with the traditional measurement of integrative complexity, the developed scale appears to be a functional substitute for use on larger and more broad attitude surveys.

5.2 Agreement of Measures

It is difficult to capture a truly qualitative component of human cognition with any measure, let alone a quantitative one. While the correlation between the scale and the essay method was strong, it was not 1.0. Therefore, it is concluded that the scale created was not an exact measure of integrative complexity, but rather a measure that seems to reflect and correlate well with the results obtained from traditional integrative complexity methods, suggesting that the scale captures a cognitive component of complex thinking. An appropriate question would be whether subsequent uses of the scale would generate the same or similar results. Complex thinking about two distinct wildfire management strategies was tested, and results of both correlated well with traditional methods. This supports the scale's potential use and adaptability to other natural resource issues.

5.3 Strengths in Integrative Complexity Scale

There are a number of benefits to the fixed-item scale for measuring integrative complexity. First, the scale is easier to use than the traditional methods of essay writing and essay scoring, which taxes respondents and researchers alike. It is simple to fill out, and less time-consuming to score. Second, the scale has power in terms of its open-ended format as opposed to other closed-item scale construction methods. By being open-ended, it avoids the potential short-falls of other scales. Fixed-item scales may lose relevance over time as important aspects of specific issues change. The open-ended format overcomes this issue of lack of pertinence. For example, fixed-item scales

often represent researcher-generated items. This scale always yields respondent-generated items, improving the relevance of the items. With regard to the open-ended nature of the scale, it can be used on any number of topics with little alteration. Lastly, the quantifiable nature of the scale, combined with the previous benefits, can enhance its use in the construction of broader social psychological models of value, attitude, and behavior.

5.4 Application of Results of the Integrative Complexity Scale

Information about the integrative complexity with which a public views an issue can be used to inform managers about how people think about natural resource issues, in this case wildfire management. The results will help managers understand how their actions will be received by the public. One very difficult challenge that managers face is the balance between resource decisions (i.e., those decisions that are made based on ecological integrity of the resource) and public preferences (which may not consider ecosystem health). Beyond this is the imminent and binding threat of litigation, which can waste much of managers' time, money, energy, and concern. The results of this study aim to provide information about the public constituency which can be used by managers to make more informed decisions. For example, if over 90 percent of the respondents differentiate between the advantages and disadvantages of prescribed fire and mechanical thinning, and also identify integrative relationships, then managers would be urged to acknowledge this in their management plan and delivery of information to their stakeholders. However, if it is identified that respondents' hold low levels of differentiation and integration about a topic, then managers may find that management plans will be more widely accepted if they consider these lower levels of integrative complexity while enforcing their policy and sharing information. Beyond this, integrative complexity may be used as a tool to analyze how policy decision-makers (or agency managers) make decisions, similar to traditional uses. In that application, it is used essentially to investigate at what levels of integrative complexity our policy makers are functioning. This would shed light on how much consideration policy makers are giving to multiple sides of controversial issues such as natural resource management.

6.0 LITERATURE CITED

- Baker-Brown, G.; Ballard, E.; Bluck, S.; De Vries, B.; Suedfeld, P.; Tetlock, P. 1992. **The conceptual/integrated complexity scoring manual**. In: Motivation and Personality: Handbook of Thematic Content Analysis. Charles P. Smith, ed., Cambridge University Press: New York, NY.
- Bright, A.D.; Barro, S.C. 2000. **Integrative complexity and attitudes: A case study of plant and wildlife species protection**. Human Dimensions of Wildlife. 5: 30-47.
- Bright, A.D.; Wyche, S. 1998. **The effect of environmentally based coursework on perceptions of a natural resource issue**. Proceedings of the Seventh International Symposium on Society and Resource Management, Columbia, MO.
- Burtz, R. Unpublished dissertation. Department of Natural Resources Recreation and Tourism, Colorado State University, Fort Collins, CO, 80521.
- Clute, K. 2000. **A perspective from wildland communicators**. Communicators Guide. 59-66.
- Cortner, H.J.; Zwolinski, M.J.; Carpenter, E.H.; Taylor, J.G. 1984. **Public support for fire-management policies**. Journal of Forestry. 82(6): 359-361.
- Dillon, M. 1993. **Argumentative complexity of the abortion discourse**. Public Opinion Quarterly. 57: 305-314.
- Fulton, D.; Manfredi, M.J.; Lipscomb, J. 1996. **Wildlife value orientations: A conceptual and measurement approach**. Human Dimensions of Wildlife. 1: 24-47.
- Hunsberger, B.; Lea, J.; Pancer, S.M.; Pratt, M.; McKenzie, B. 1992. **Making life complicated: Prompting the use of integrative complexity thinking**. Journal of Personality. 60: 95-114.
- Kneeshaw, K.; Vaske, J.J.; Bright, A.D.; Absher, J.D. 2004, June 2-6. **Acceptability norms toward wildland fire management**. Paper presented at the 10th International Symposium on Society and Resource Management, Keystone, CO.
- Kristiansen, C.M.; Matheson, K. 1990. **Value conflict, value justification, and attitudes toward nuclear weapons**. Journal of Social Psychology. 130(5): 665-675.
- Manfredi, M.J.; Fishbein, M.; Haas, G.E.; Watson, A.E. 1990. **Attitudes towards prescribed fire policies**. Journal of Forestry. 99(7): 19-23.
- Pyne, S.J. 2001. **Year of the Fires, the story of the great fires of 1910**. Viking, New York, NY.
- Schroder, H.M.; Driver, M.J.; Streufert, S. 1967. **Human Information Processing**. New York: Holt, Rinehart and Winston.
- Shelby, B.; Speaker, R.W. 1990. **Public attitudes and perceptions of prescribed burning**. In: J.D. Walsted; S.R. Radosevich; D.V. Sandberg, eds. Natural and prescribed fire in Pacific NW forests: 253-260.
- Shindler, B.; Toman, E. 2003. **Fuel reduction strategies in forest communities: A longitudinal analysis of public support**. Journal of Forestry. September: 9-15.
- Stankey, G.H. 1976. **Wilderness fire policy: An investigation of visitor knowledge and beliefs**. Res. Pap. INT-180. Ogden, UT: U.S. Department of Agriculture, Forest Service, Intermountain Forest and Range Experiment Station.
- Taylor, J.G.; Daniel, T.C. 1984. **Prescribed fire: Public education and perception**. Journal of Forestry. 82(6):361-365.
- Tetlock, P. 1981. **Personality and isolationism: Content analysis of senatorial speeches**. Journal of Personality and Social Psychology. 41: 737-743.
- Tetlock, P. 1984. **Cognitive style and political belief systems in the British House of Commons**. Journal of Personality and Social Psychology. 46: 365-375.

- Tetlock, P. 1985. **Integrative complexity of American and Soviet foreign policy rhetoric: A time series analysis.** *Journal of Personality and Social Psychology.* 49: 1565-1585.
- Tetlock, P. 1988. **Monitoring the integrative complexity of American and Soviet policy rhetoric: What can be learned?** *Journal of Social Issues.* 44: 101-313.
- Tetlock, P. 1989. **Structure and function in political belief systems.** In: A.R. Pratkanis; S.J. Breckler; A.G. Greenwald, eds. *Attitude Structure & Function* (pp. 129 151). Hillsdale, NJ:Erlbaum.
- Tetlock, P.; Armor, D.; Peterson, R.S. 1994. **Slavery debate in antebellum America: Cognitive style, value conflict, and compromise.** *Journal of Personality and Social Psychology.* 66(1): 115-126.
- Wallace, M.D.; Suedfeld, P. 1988. **Leadership performance in crisis: The longevity-complexity link.** *International Studies Quarterly.* 32: 439-451.
- Wallbaum, A.B.C. 1993. **Integrative complexity, international crises, and cognitive management.** pp. 34-44. In: *Conflict and social psychology.* K.S. Larsen, ed. Sage Publications, London.