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Chapter 4

Application of Attitude Theory in Wildlife Management: A Critical Review of Concepts and Processes

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Abstract

Consistency between people's attitudes and their subsequent behaviors is affected by different factors. This chapter reviewed relevant studies of attitudes and knowledge from applied fields of study. The authors focused on how prior relevant knowledge about an attitude object affects consistency between people's attitudes and their behaviors. Attitudes held by people who possess high levels of knowledge of an issue tend to be better predictors of subsequent behaviors than attitudes accompanied by low levels of knowledge. There is evidence that prior knowledge moderates the relationship between attitudes and behaviors by two processes: (1) accessibility and (2) stability, or strength. Implications of knowledge about a hypothetical predator restoration are examined using an information-processing model from social psychology. Understanding the effects of knowledge for information processing is useful to wildlife managers and communications experts who attempt to influence, persuade, and educate public stakeholders.

Keywords: attitude-behavior consistency, communication, wildlife education, information processing, moderation effects, prior relevant knowledge, social psychology

1. Introduction

Traditional attitude research in social psychology has investigated how people form overall evaluative judgments (i.e., attitudes) toward an array of entities and issues. When applied correctly, the attitude concept can be useful to researchers, studying the human cognitive and behavioral components of wildlife management issues [1–8]. The relationship between

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attitudes and people's actions is an important research topic, but why should we study attitudes if we are ultimately concerned with behaviors? If we accept (and are guided by) the assumption that cognitive structures such as beliefs, evaluations, and information in memory play a key role in determining behavior, the attitude concept becomes an important tool for understanding, predicting, and possibly modifying behaviors to better manage relationships between people and wildlife. Studying attitudes can allow access into the human mind, which is necessary to understand human behaviors, especially when we view people as rational actors.

The amount of knowledge possessed by individuals about attitude issues can be studied as a variable that affects the relationship between attitudes and behaviors [9–12]. Examining the concept of moderation, or third variable influence, is one approach to understanding potential effects of knowledge on attitude-behavior relationships. Moderators are third variables that have a long tradition in social science research [13]. Moderators are external variables (e.g., individual differences such as gender or level of education) that affect the strength and direction of the relationship between an independent variable (e.g., attitude) and a dependent variable such as intentions to act [2, 9, 13–15].

This chapter is focused on the extent to which prior knowledge about the attitude object affects or moderates attitude-behavior relationships in the context of wildlife management issues. Our objectives are to (1) discuss conceptual definitions of attitude, knowledge, and attitude-behavior consistency; (2) review findings from past moderation research on the effects of knowledge on the relationship between attitudes and behaviors; and (3) describe a linear information-based model of cognitive processing [16] to explore the implications of knowledge for attitude and behavior change. We present the model in the context of predator restoration in a national forest. Implications of knowledge are discussed relative to wildlife education programs designed to inform the public and influence attitudes and behaviors.

2. Concepts

2.1. Attitudes

Eagly and Chaiken [17] define attitude, as a psychological tendency (i.e., a state internal to a person) that is expressed by evaluating a particular object with some degree of favor or disfavor. An attitude must be toward something (e.g., an entity, an object, an issue, a person, etc.). In social psychology, entities that are evaluated are called attitude objects [17]. Individuals may hold attitudes toward a wide variety of objects, including social issues, wildlife issues, human groups, policies, specific individuals, and physical objects [18].

People's attitudes include (1) affect, or feelings and emotions; (2) cognition, or beliefs and thoughts; (3) behaviors, or actions; or (4) some combination of these elements [17, 19, 20]. It has been debated whether a behavioral component should be included in the definition of attitude because researchers tend not to use behavior in their operational measures of attitudes [21].

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This is particularly the case when the research objective is to predict behaviors. The concept of attitude is often confusing because of its multiple interrelated components. An attitude is the association in memory between an object and an evaluation [22]. The core of the attitude concept is the idea of evaluation [17, 20, 23].

2.2. The attitude-behavior relationship

Attitude-behavior consistency occurs when a person's behavior is consistent with his or her attitudes. People who hold positive attitudes should engage in behaviors which mirror, enhance, or support the object, and people with negative attitudes should engage in behaviors that avoid or oppose the object [17]. Predicting and explaining human behaviors are important practical goals for attitude research [20, 24]. Social scientists do not, however, consistently find substantial correlations between attitudes and behaviors, possibly due to limitations involved with measurement of the relationship [17]. Correlations between attitude and behavior measures often are not significant if these are not measured at similar levels of specificity, or correspondence [25–29]. Inconsistent attitude-behavior correlations can occur due to the influence of moderator variables external to the attitude-behavior relationship such as differences in social or economic characteristics [8, 26]. Research suggests that attitudes can determine behavior when they are based on knowledge that a person has about the issue [20].

2.3. Knowledge

Knowledge is the amount of information about an object, in memory, and associated with a person's attitude toward it as measured by knowledge listings, self-reports, and quizzes [30]. Knowledge must be relevant to the wildlife issue under study. According to Krosnick et al., level of knowledge can differentiate stable and strong attitudes from unstable and weak attitudes [30]. We review knowledge as a moderator, because knowledge about the attitude object has been shown to predict the extent to which people will act in accordance with their attitudes [10]. Learning about wildlife issues creates knowledge about wildlife and can affect education and communication about wildlife.

We found three distinct measures of knowledge in the research literature. These included: (1) thought listings [12, 31–33], (2) self-reports [10, 12, 33], and (3) objective quiz questions [3, 11, 15, 34]. Thought listings involve giving subjects a brief period to recall and list characteristics and facts they believe to be true about the issue and previous experiences they have had with the issue [35]. Self-reports involve asking people how knowledgeable or familiar they feel they are about an issue [12, 33, 35]. Researchers should not assume these two measures capture the same concept. Knowledge measured by thought listings, for instance, has been found to be weakly related to self-reported knowledge [30]. Quiz questions, which can be open-ended, multiple-choice, or true and false, measure accuracy of subjects' factual or objective knowledge about an attitude object or issue [35]. Accuracy of information (i.e., measured by quizzes) and amount of information (i.e., measured by thought listings) are most likely distinct dimensions of knowledge. Davidson indicated that both amount and accuracy of knowledge contribute to attitude strength, but data have demonstrated weak to moderate

relationships between these dimensions [36]. Furthermore, a person's objective factual knowledge about an attitude object is distinct from his/her subjective beliefs about it [16].

Moderation researchers should pay close attention to ensure that the intended type of knowledge is actually measured. We recommend measuring more than one type of knowledge, which allows for comparisons. Teel et al. measured two types of knowledge in their experiment of biased processing of natural resource information [33]. Alternatively, composite measures of knowledge such as Wood's measure of working knowledge should prove useful for testing moderator effects [12].

3. Moderating effects of knowledge

Researchers believe there are two processes by which knowledge about an attitude object can moderate the relationship between attitudes and behavior, namely accessibility and stability [10, 17, 36]. Attitude accessibility refers to the likelihood that the attitude will be activated automatically, or effortlessly and uncontrollably, from memory when the object is encountered [18]. More accessible attitudes are more highly correlated with behaviors and intentions than those that are not accessible [7, 17, 18, 37]. Attitudes accompanied by knowledge and experience are more likely to be readily accessed from memory than attitudes unaccompanied by knowledge and experience. Therefore, attitudes supported by knowledge tend to guide behaviors. In the accessibility process, high levels of knowledge tend to increase attitude accessibility, and attitude accessibility tends to enhance attitude-behavior consistency [14, 18]. Stability relates to two features of strong attitudes: resistance to change and persistence over time [16]. In the stability process, high levels of relevant knowledge increase attitude strength, and strong attitudes tend to guide behaviors more than weak attitudes because strong attitudes are resistant to change in the face of new information [36]. For a detailed explanation of attitude strength, see [38].

3.1. Accessibility

People with relatively high access to knowledge tend to act in a manner consistent with their attitudes [12, 32]. Wood et al. defined working knowledge as beliefs and prior experiences that spontaneously come to mind when a person is confronted with an attitude object [16]. Working knowledge was measured using two tasks [32]. First, subjects listed facts and characteristics they believed to be true about environmental preservation (i.e., the attitude object). Secondly, subjects listed past behaviors they had engaged in related to environmental preservation. Subjects were given a two-minute time limit to complete each task. This was done to ensure measurement of access to the most salient knowledge, not subjects' entire storehouse of relevant knowledge [12, 16]. Two weeks later, subjects were asked to sign and circulate pro-environmental petitions and participate in a recycling project. Subjects' responses to the petition requests and the amount of time they participated in the recycling project served as the behavioral measure. Subjects with relatively high levels of working knowledge tended to act in a manner congruent with their attitudes [32]. Subjects originally in favor

of environmental preservation recycled, signed, and agreed to circulate petitions, whereas subjects with less favorable attitudes were not as likely to do so. Subjects with relatively low levels of knowledge about environmental preservation demonstrated little attitude-behavior consistency [32]. This work supports a moderation effect for knowledge about an attitude object on attitude-behavior consistency. More knowledge resulted in greater behavioral prediction from attitudes.

Although Kallgren and Wood did not explicitly test the accessibility process of moderation, by adding the variable prior experience to their operational measure of working knowledge, they may have indirectly initiated the accessibility process [32]. The argument behind the accessibility process is that direct prior experience (versus indirect or no experience) with an attitude object increases the likelihood that an attitude will be accessed upon encountering an object [7, 14, 22]. Accessible, prior, and direct experience with an attitude object tends to be remembered by people, while they think about how to behave toward (or respond to messages about) an object or issue [14]. Direct experience provides information that is relevant to attitudes and can be accessed from memory to increase attitude-behavior consistency. In contrast, when a person has had only indirect experience with an attitude object, highly accessible attitudes do not develop, and the subsequent effect on behavior is relatively small [14].

Wood compared subjects having high access to knowledge about environmental preservation with those having little access to knowledge regarding subjects' susceptibility to persuasion. Subjects read a counter attitudinal message before completing the opinion questionnaire [12]. Subjects with little access to knowledge were more likely to change their attitudes to be more consistent with the message than subjects with high access to knowledge [12]. Subjects then completed a second questionnaire to elicit thoughts about the counter attitudinal message. It was concluded subjects with access to knowledge about environmental preservation produced arguments counter to the persuasive message. People who produced counter arguments tended toward less attitude change [12]. These findings suggested that attitude change was a function of retrieval of attitude-relevant information (i.e., counter arguments), rather than general access to working knowledge.

Working knowledge indirectly increased attitude-behavior consistency, possibly by increasing attitude accessibility [12]. Working knowledge, conversely, may have directly moderated attitude-behavior consistency via the stability route. Attitudes based on relatively greater knowledge are resistant to change upon encountering new information contrary to a person's attitude [36]. This alternative hypothesis highlights the need for research that more specifically investigates processes by which knowledge affects relationships between attitudes and behavior.

3.2. Stability

Researchers examined the effects of amount of information and beliefs about an attitude object (i.e., subjective knowledge) on intention-behavior and attitude-behavior consistency independent of prior experience with the attitude object. This approach is consistent with the definition of knowledge used in this chapter (i.e., the amount of information about an

object or issue, in memory, that accompanies a person's attitude). This conceptual definition of knowledge is different from the concept of working knowledge as used by Wood et al., which includes amount of direct experience with an attitude object or issue [16]. Future research could examine the extent of overlap between the two knowledge concepts because part of a person's overall relevant knowledge stored in memory could have been acquired through direct experience with the issue.

In a study regarding voting for political candidates, Davidson et al. investigated people's knowledge about candidates as a possible determinant of congruency between their intentions to vote and actual voting behaviors [36]. Knowledge was measured by asking subjects to list all the information and beliefs they possessed about each candidate. They found a significant interaction between intention and knowledge (i.e., moderation effect); as knowledge relevant to the behavior increased, so did the correlation between intention and behavior. Knowledge moderated intention-behavior consistency independent of prior experience and attitude certainty, which are two other established determinants of attitude-behavior consistency [36].

Two replications investigated potential effects of knowledge in the context of voting for social policy initiatives and having an influenza vaccination [10]. Procedures were similar to those used in the previous (i.e., political candidate) study except knowledge about the attitude object was measured using self-reports instead of thought listings. Results showed knowledge increased attitude/intention-behavior consistency. Davidson et al. concluded strong attitudes (i.e., those capable of guiding behaviors) are reinforced by greater knowledge, and attitudes lacking supportive knowledge are less likely to guide subsequent behaviors [10]. Based on the idea that strong attitudes are stable (i.e., resistant to change and persistent over time), knowledge appeared to moderate attitude-behavior consistency via the stability process.

Knowledge can indirectly affect attitude-behavior consistency by moderating the effects of thinking about reasons underlying attitudes. Researchers found analyzing underlying reasons for attitudes reduced the correlation between attitudes toward a political candidate and number of fliers that people were willing to distribute for that candidate for subjects with low knowledge about the candidate [11]. They used a quiz with 15 questions about candidates and issues to measure subjects' objective, or factual, knowledge. Subjects were then assigned to high or low knowledge groups via a median split of scores on the knowledge test [11]. The main finding was that thinking about reasons for attitudes lowered attitude-behavior consistency for subjects with low objective knowledge, but not for subjects who possessed high objective knowledge. According to the stability hypothesis, attitudes based on greater knowledge are more likely to withstand effects of new information produced by thinking about underlying reasons for attitudes than attitudes based on lower levels of knowledge [36].

Tarrant et al. studied moderating effects of objective knowledge about wildlife on the relationship between environmental values and attitudes toward wildlife protection (i.e., value-attitude consistency) [15]. Consistent with methodology in the Wilson et al. study, objective knowledge was measured using true and false quizzes [11]. Subjects were divided into high and low knowledge categories based on a median split of knowledge scores. A significant moderation effect was found for factual wildlife knowledge on the value-attitude relationship

for two of the four groups under study [15]. In the hunter and angler groups, higher levels of knowledge were consistently associated with value-attitude consistency. For the combined user-group (i.e., those who both bird watched and hunted or fished) higher knowledge levels significantly decreased value-attitude consistency. Perhaps the combined group relied on knowledge to form attitudes toward wildlife preservation instead of underlying values to reduce cognitive dissonance; this condition could be produced by internal conflict involved with thinking about competing values associated with consumptive and non-consumptive activities [15]. The negative finding for the combined group suggests that generalizations about direction of knowledge effects for value-attitude consistency should be made with caution. Further investigation of the influence of both objective and subjective knowledge on the value-attitude relationship should be addressed in future research.

The studies reviewed above indicate that knowledge about an attitude object tends to function as a moderator in a cognitive hierarchy [39] involving values, attitudes, intentions, and behaviors. These studies provide support for the hypothesis that attitudes based on greater amounts of knowledge are stronger and tend to guide subsequent behavior [36]. These findings support the stability hypothesis, and objective factual knowledge was found to moderate cognitive consistency [15].

4. Implications for wildlife education and communication

Persuasive communication involves use of messages to influence attitudes and behaviors, and its primary goal is to sway the hearts and minds of the audience; through a process of reasoning, the message exerts its influence by force of its arguments [40]. Presumably, it is the information, presented as arguments in the messages, that influences attitudes and behavior. When people encounter new information contained in a persuasive, or educational, message about a certain natural resource topic, they typically will either change their attitudes to be consistent with the message or maintain (i.e., reinforce) their initial attitudes toward the attitude object. What occurs cognitively between encountering the message and changing or maintaining attitudes is a complex process referred to by psychologists as information processing. A persuasive message can be viewed as incoming information, which requires active processing in some manner by the recipient of the message. How knowledgeable versus unknowledgeable people process incoming information is important for understanding the implications of prior, issue-relevant knowledge for wildlife communication and education.

Attitude change or stability often are outcomes of the influence of knowledge and emotion on reception of new information and on evaluation of what was received, not necessarily in this order [16]. Reception includes both attention to and comprehension of detailed information. Wood et al. presented a model that included both information processing and attitude change as functions of knowledge about an attitude object. The model employed the concept of working knowledge, which is defined as information, beliefs, and prior experiences that spontaneously come to mind when a person is confronted with an attitude object [12, 16]. We present hypothetical examples within this framework to demonstrate the effects of prior

relevant knowledge on information processing and attitude change (**Figure 1**). The model and examples are simplified to concretely illustrate the literature reviewed and to demonstrate implications of knowledge for communication and education.

The hypothetical issue we examine is wolf restoration in a national forest. The first example takes the perspective of an individual with high knowledge and minimal emotion toward the attitude object. For this condition (high knowledge/low emotion), Wood et al. posited that knowledge would enhance reception of valid information [16]. The high knowledge/low emotion person will evaluate whether information contained in the persuasive message is valid. The persuasive message contained arguments that supported wolf restoration, claiming restoration would benefit the ecological function of the national forest.

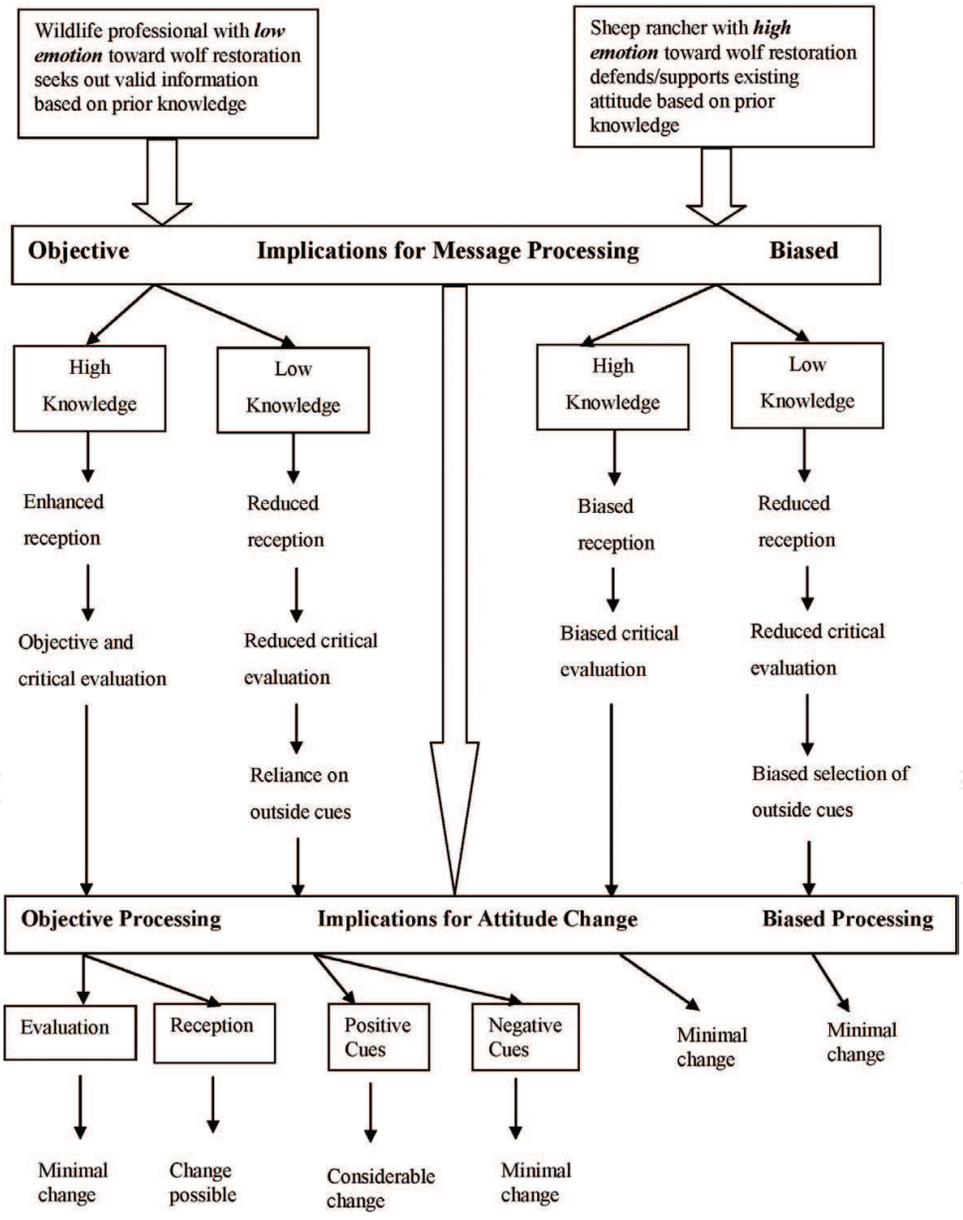


Figure 1. Information-based model of attitude change as a function of prior knowledge and emotion about wolf restoration, adapted from [16].

The first individual (i.e., hypothetical subject) to receive the communication is a visiting wildlife professional who has experience working with wolves and wolf restorations in Canada, but she has no strong emotional feelings toward wolf restoration in this particular national forest. Researchers found that she has a negative attitude toward wolf restoration for this forest. According to the model, when she encounters the pro-restoration message, her prior knowledge would tend to enhance reception (i.e., attention and comprehension) of the arguments, especially if she found the information therein to be valid. Her issue-relevant knowledge would enhance objective, critical evaluation of the new information contained in the message [16].

High knowledge is typically associated with minimal attitude change because of critical evaluation of the message. The model predicts no attitude change if the professional processed the information based on evaluation. This is because she should have used her knowledge to detect any weaknesses in the message's arguments, thereby supporting her initial attitude [16]. If, however, the message was processed based on reception rather than evaluation, her knowledge would tend to produce attitude change. In other words, she would have been persuaded because she attended to and comprehended technical details contained in the pro-restoration arguments. Persuasion tends to occur when high knowledge/low emotion individuals find arguments to be valid [16]. When there is little or no emotion involved with the attitude, knowledgeable people tend to objectively process information in messages better than unknowledgeable people. In the high-knowledge/low-emotion condition, knowledge has different implications for attitude change, depending on whether the basis for processing is reception (i.e., favoring change) or evaluation (i.e., resisting change).

In the second example, the individual receiving the pro-restoration message is a sheep rancher, who lives on and operates a ranch near the national forest boundary. Researchers found the rancher to hold a negative attitude toward wolf restoration, be highly emotional about wolf restoration, and have high knowledge about wolf restoration because he had represented a rancher's association during public meetings on the issue 5 years earlier at a similar national forest. According to Wood et al., this rancher's knowledge would enhance his ability to defend his existing attitude. The highly emotional rancher would have received the message in a biased fashion. The model predicts that he should give greater attention to and comprehension of information that supports his initial attitude and will discount any information that challenges his attitude about wolf restoration. The rancher's critical evaluations of the message would be biased because he would tend to favor information that supported his attitude over information that opposed his position [16]. Pro-restoration arguments contained in the message would tend not to change his initial, anti-wolf restoration attitude because of biased reception and evaluation (i.e., biased processing).

People whose attitudes are grounded in emotion and prior relevant knowledge tend to process incoming information in a way that protects and strengthens their initial attitudes [16]. Strong, emotionally grounded attitudes, which are reinforced by relevant knowledge about the issue, are resistant to change and persistent over time. In the example of the rancher, strong attitudes in opposition to restoration would tend not to guide behaviors that support wolf restoration. Strong attitudes would be more likely to guide anti-restoration behaviors because they were stable and backed by high knowledge [36].

The two hypothetical examples presented are extreme cases, which can approximate reality for controversial wildlife issues like predator restoration. We chose these for clarity and to allow the reader to better understand the complex model of information processing. In terms of emotion and knowledge about wolf restoration, middle-of-the-road people are probably more vulnerable to persuasion attempts of this nature than are people at the extremes [41]. On the other hand, people who lack knowledge about a particular issue of interest, such as wolf restoration, will tend to have less ability to attend to, comprehend, and critically evaluate arguments contained in a persuasive message [16]. Message recipients who possess minimal knowledge and emotion about wolf restoration tend to experience attitude change (assuming that they have formed an attitude toward restoration) when exposed to positive (pro-message) outside sources, or cues, such as credibility of the source [16]. The content of the persuasive message itself is not, however, likely to produce lasting attitude change because of a lack of clear reception and critical evaluation. Finally, recipients of the pro-restoration message who possessed high emotion and minimal knowledge would experience minimal attitude change because they would tend to selectively rely on outside cues or peripheral information that supported their initial, highly emotional attitudes [16].

Less knowledgeable people, who feel emotional about an issue, are probably less proficient at selectively receiving new information; their lack of issue relevant knowledge leaves them without an informed guide to negotiate information they encounter that attacks or supports their attitude during persuasion attempts [16]. For highly specific attitude objects, such as predator restoration, members of the general public will tend not to possess high levels of knowledge [3]. Persuasive messages, therefore, will tend not to be critically evaluated by members of the general public when narrow or technical issues are concerned, due to lack of issue-relevant prior knowledge. If however, outside cues or short-cut information (i.e., not contained in the message) are highly favorable (i.e., pro-message), then some attitude and behavior modification might occur. For example, attitude change could occur if the source of the communication was found to be highly credible.

People holding strong attitudes linked with high levels of knowledge and emotion are less likely to be persuaded. Similar to our hypothetical case study, forest management agencies, which may favor predator restoration for ecological reasons, tend to develop pro-restoration messages. Consider the sheep rancher who has a strong negative attitude and who is emotional toward wolf restoration, but who is also knowledgeable about wolf restoration. Other sheep ranchers in the vicinity of this national forest may share similar opinions and feelings. Bath found over 90% of members of the Wyoming Stock Growers Association to be against wolf restoration in Yellowstone National Park [1]. It is likely, however, that the majority of ranchers do not possess similarly high levels of knowledge as the individual rancher who had participated in earlier public debates over restoration. Despite lower knowledge, the model predicts minimal attitude change for the rancher group as a whole. These ranchers have stable and strong attitudes, which tend to resist change. It would be ineffective for forest managers to attempt to educate the ranchers about the benefits of having wolves in the national forest. Attempts to increase knowledge for unknowledgeable stakeholders, who are not emotionally involved, about wolf restoration could increase their ability to objectively

process pro-restoration information, thereby increasing the likelihood of producing supportive attitudes and behaviors [16].

The amount of issue-relevant knowledge possessed by user-groups, park visitors, and other members of the public, affected by wildlife management issues, influences the effectiveness of persuasion. Manfredo and Bright found that use of persuasive brochures specifying appropriate human behavior in bear country, in a northern Minnesota wilderness area, were effective for recipients possessing low knowledge about bears [42]. In contrast, the greater the self-reported prior knowledge about bears, the less effective the brochures were for changing behaviors in bear country [42]. Roggenbuck reviewed applications of persuasion and their effectiveness in natural resource and recreation management settings [43].

Figure 1 provides a tool for understanding the effects of knowledge on information processing and attitude change. Similar models and theories exist, which are appropriate in wildlife management settings [19, 44]. Additional models of information processing should be explored. The core of persuasion is the informational message [40]. Examining the manner in which people process information provided in messages is important for understanding the outcomes of persuasion attempts such as attitude and behavior change or attitude stability. Understanding the effects of knowledge for information processing provides useful information to wildlife managers when they attempt to influence and educate their stakeholders.

5. Recommendations for research and management

Researchers studying knowledge, attitudes, and behavior should carefully consider conceptual definitions and measures of knowledge. Thought listings, self-reports, and objective knowledge tests do not measure the same concepts. Additionally, it is important to know whether the knowledge measure employed includes direct experience with the issue, because knowledge and direct experience are separate dimensions of attitude strength [30]. Finally, moderator variables should be tested as continuous variables and not dichotomous variables to avoid range restriction [45, 46]. Careful consideration of these methodological issues can substantially improve attitude and moderation research in the wildlife management arena.

Educators and managers should identify levels of direct experience for visitor groups relative to wildlife management issues. Specific education programs should focus on increasing direct experience for people who visit and recreate in protected areas and other natural resource settings, especially for those who are inexperienced and unfamiliar with particular wildlife policies [3].

When designing communication and education programs, wildlife educators, interpreters, and managers should consider knowledge levels of their audiences. Prior and relevant knowledge about the issue, problem, or resource affects how people process messages and information. Training programs should be conducted by attitude theory experts to help managers and interpreters use information about knowledge and attitudes more effectively. Published literature in human dimensions has provided useful examples that should be reviewed to increase understanding of how people process information.

Educators and communicators should attempt to increase memory and enhance information processing abilities for visitors and user-groups, as opposed to simply imparting facts [47, 48]. Knowledge cannot strengthen attitudes and consistently guide wildlife behaviors unless it is retained in memory and recalled upon exposure to a management issue. Managers should encourage first-time users to think about and discuss resource issues to repeatedly pair attitudes with objects to increase attitude accessibility [7]. Repeated communication efforts using multiple sources should be used to increase visitors' awareness of issues [22]. When developing information campaigns, environmental communicators should consider not only the repetition of the message and number of sources but also the presentation style and format [49, 50]. Natural resources professionals should investigate which types of educational approaches are most effective for increasing retention and unbiased processing. Persuasion that is effective and unbiased requires information that is both understandable and unrestrictive to the public's processing abilities; wildlife managers should tailor messages to the educational levels and reading abilities of their target audiences and present messages in a context in which audience members are most likely to pay attention [51].

Wildlife managers must learn under what conditions do what kinds of attitudes held by what kinds of people predict what kinds of behavior because the attitude-behavior relationship is not universally strong [14, 52]. In addition to knowledge, socioeconomics, situational factors, and individual differences may influence attitude-behavior consistency [53]. Prediction of behaviors will be most effective when knowledge, attitudes, and behaviors are measured at comparable levels of specificity. The correspondence rule is indispensable when attempting to predict human behavior from attitudes [25]. General behaviors usually result from general attitudes and specific behaviors from specific attitudes.

6. Conclusion

We explored implications of knowledge for changing attitudes and behaviors and addressed concerns among researchers and managers about the utility of assessing human attitudes and quality of attitudinal data [2]. Our review revealed that prior knowledge about an attitude object affects consistency between peoples' attitudes and their subsequent behaviors toward wildlife management decisions. Attitudes of people who possess relatively high levels of relevant knowledge about a wildlife issue better predict subsequent behaviors than attitudes accompanied by low levels of knowledge. Past research indicates that knowledge about an attitude object is a reliable determinant of attitude-behavior consistency and can influence value-attitude relationships. The processes by which knowledge moderates attitude-behavior relationships deserve further study. Two proposed processes include stability and accessibility [36]. Understanding how these processes influence attitudes and behaviors will increase the utility of attitudinal information. Wildlife managers need to know when, why, and for whom attitudes will or will not predict behaviors to improve their public communication and education programs.

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