

CHAPTER 13

The role of education and communications in proactively and adaptively managing visitor use of parks and protected areas.

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Park and protected area (PPA) managers face complex challenges when managing visitor use, such as changing visitor characteristics, recreational demands, and visitation trends; limited budgets; and inappropriate visitor behaviors. Managers seeking to address these challenges while also providing for visitor enjoyment generally employ a range of strategies, including education. Education is often used in PPAs for several reasons, including enhancing visitors' enjoyment of their experience (e.g., Powell et. al., 2012); fostering appreciation and learning (e.g., Powell et. al. 2008; 2009; Taff et al., 2014); and promoting stewardship and protecting resources by reducing inappropriate behaviors and/or minimizing impacts on resources (e.g., Miller, Freimund, & Blackford, 2018; Miller, et al., 2019; Powell et. al., 2018; Schwartz et al., 2018; Vagias & Powell, 2010; Vagias et al., 2014). Education in PPAs is often referred to as interpretation because of its informal nature, and it can take many forms including live programs, signs, and exhibits (Ham, 1992). If designed well, this interpretation/education has the potential of accomplishing multiple outcomes (enjoyment, appreciation, behavior change), but this is not guaranteed (Ham, 2013). By using proper planning and theoretically based education and communications strategies, managers of PPAs are much more likely to achieve their goals. This chapter will review established strategic approaches for accomplishing these three interrelated educational goals: increasing enjoyment; fostering appreciation and learning; and reducing inappropriate visitor behaviors. It will also provide case studies from successful education studies to demonstrate how theory is turned into practice.

Education in Park and Protected Area Settings

Education is often provided in PPAs to enhance visitor experiences (Ham, 2013; Powell et. al., 2009). In fact, education is first and foremost used to achieve part of the mission of the U.S. National Park Service by “providing for the enjoyment” of the visiting public (NPS, 2014). Additionally the passage of the National Park Service Centennial Act (HR4680) (2016) reinforced that another key part of the mission of the National Park Service (NPS) is to provide education to enhance public awareness, understanding, and appreciation of the resources of the park system.

Another important mission of many PPA systems is to protect and preserve the historic, cultural, and/or natural resources of the park (e.g., Sellars, 1997). To achieve this, PPA managers typically employ multiple strategies, including direct (e.g. enforcement, regulations, etc.) and indirect (e.g. communication, education, interpretation) management actions (Hendee & Dawson

2002; Ham & Krumpe, 1996; Manning, 2003). In most settings, education is a preferred strategy, as it provides managers “light-handed” options for reducing resource impacts (Hendee & Dawson, 2002; Manning, 2003). However, enhancing the visitor experience, inspiring appreciation and learning, and decreasing inappropriate behaviors is a challenging task for many reasons, including the non-captive nature of PPA audiences, limited contact time between park personnel and the public, and the varying backgrounds and motivations of visitors.

Not All Behaviors Are Created Equal

Many places like libraries, museums, churches, have explicit behavioral norms associated with them. For example, a library has an assumed set of socially acceptable behaviors including being quiet to allow others to read. Although some argue that parks also have a set of agreed upon socially acceptable behaviors (norms), such as the Leave No Trace practices (Backman et al., 2018; Lawhon et al., 2019; Vagias, et. al 2014; Vagias & Powell, 2010), not all visitors likely share the same norms. This is especially true as parks serve more and more diverse audiences (Miller et al., 2018a). Managers should not assume visitors know how to behave to prevent damage to resources, protect the visitor experience, or keep themselves safe (Vagias, et. al 2014; Vagias & Powell, 2010). Education and communication strategies are thus appropriate across PPAs.

When discussing the use of education/interpretation for influencing behaviors that erode the visitor experience and/or threaten/damage important resources, one must first acknowledge that education’s effectiveness is contingent on whether the visitor intentionally performs the behavior AND knows the impact (i.e., doing it on purpose), or whether the behavior results from ignorance or is unintentional (Manning, 1999). Generally, education works best when individuals either accidentally perform a behavior, are unfamiliar with the rules, or are unaware of the potential impacts of their actions. These naïve behaviors are the focus of this chapter. More information regarding influencing intentionally performed violations is found in other sources (e.g. Stern, 2018).

Influencing unintentional yet inappropriate behaviors in PPAs involves reinforcing a positive behavior, adding a new behavior, and/or stopping the performance of the negative behavior (Ham, et. al, 2007). Many land managers mistakenly believe that if people “know enough” they will think and act appropriately (e.g., Ham 2013). Following this logic, they develop fact-based campaigns, which often fail for a number of reasons (e.g., Ham, 2013).

However, expanding bodies of research reveal that many choices we make everyday are influenced more by habit, emotions, social norms, immediate gut reactions, cognitive biases, or our relationships with others than by factual reasoning based on prior or newly acquired knowledge (Schultz, 2011; Stern, 2018). In short, choices and behaviors are based on a far wider array of factors than knowledge.

Although understanding, predicting, and influencing human behavior is particularly complex and context specific, theories in psychology and social psychology provide models for understanding how education/communications can be used to influence human behavior (e.g., Heimlich & Ardoin 2008; Ham et. al, 2007; Miller, 2019; Stern, 2018). We review a number of theories that show promise for enhancing the visitor experience, improving appreciation and learning, and promoting positive stewardship behaviors.

Social norm theory, norm activation theory, and park and protected areas

Research on social norms suggests that most people conform to the behaviors of those around them. Thus, Social Norm Theory is especially useful for influencing the behaviors of the minority of people that do not conform to behaviors that most people already perform. Most people want to blend in and do not want to be singled out for performing inappropriate behaviors. Applying social norm theory in PPAs requires two steps. First, managers should mention a “reference group,” a group that the intended message recipients share values with and may associate with (e.g., fellow park visitors, their friends and family, other people “just like you”). Second, managers should highlight that the desired behavior (e.g., staying on the trail, packing out trash) is widely performed. For example, if a manager wanted to dissuade visitors from leaving designated trails and causing plant and soil impacts, they may develop signs and other communications strategies that reinforce these points: “Join thousands of other visitors in protecting and preserving this national treasure. Stay on all designated trails.”

While some desired behaviors are widely accepted norms in parks (e.g., staying on the trail, not littering), other behaviors may be less obvious to visitors and require additional steps. Norm Activation Theory suggests that by adding an explanation of the consequences of performing a behavior and appealing to personal responsibility for its consequences, people are less likely to be careless about it. In effect, these strategies “activate” personal norms, making actions in line with them more likely. Consider the following normative message: “Join the thousands of other visitors who have taken the care to preserve this national treasure. Stay on all

designated trails to protect the fragile plants and stop erosion. Even just a few foot steps can make a big difference!” In this case, the message not only communicates personal responsibility and a social norm, but also clearly articulates the problem and consequences of going off trail. If coupled with a compelling photo of erosion resulting from foot traffic, it becomes even harder for visitors to deny their own personal responsibility for their actions.

Another theory, Value-belief norm theory, extends norm activation theory as it relates to environmental issues by including the held environmental values of an audience (Stern, 2000). According to the theory, held environmental values ultimately underpin the attitudes toward specific issues and guide future behavior. These environmental values have generally been categorized in two ways. Some argue that environmental values reflect a biospheric (ecologicistic perspective that considers all species), altruistic (considers costs and benefits to all humans), and egoistic (strict individual utilitarian perspective) orientation (Stern and Dietz, 1994; Stern, 2000), while others simplify these into two categories, an anthropocentric/utilitarian perspective (the environment is for human consumption) and an eco-centric/moralistic perspective (all species have moral standing and intrinsic value) toward the environment (Dunlap and Van Liere, 1978; Bogner and Wiseman, 2003). Understanding the held values of an audience provides insight into what arguments may motivate a person better. Take the previous message: “Stay on all designated trails to protect the fragile plants and stop erosion.” This provides a biospheric or ecocentric argument and value framing by referencing impacts on fragile plants. If we were to change the message to “Stay on all designated trails to protect the beauty of this landscape for future generations and to maintain the good condition of the trail for future visitors,” it would reflect a more utilitarian or egoistic value. If we are able to understand the values of our audiences, messaging can be adapted. This typically requires some baseline research.

Elaboration Likelihood Model

One challenge of communication in PPAs is how to get visitors to notice, engage, and internalize messages about appropriate behaviors. The elaboration likelihood model (ELM; Petty and Cacioppo 1979, 1981) suggests that people engage communications through two potential routes: the peripheral and central (Petty and Cacioppo 1979, 1981, 1986; Ham et al. 2007). The peripheral route to persuasion refers to messaging responses that are almost automatic, require little mental effort, and are strongly influenced by context and subtle cues, such as the

characteristics of the messenger (i.e., a ranger in uniform) or a visual or physical nudge in favor of the behavior (i.e. a simple fence, post, or small reminder sign with a symbol on it; Petty and Cacioppo 1979, 1981, 1986). For example, in a PPA, a ‘do not litter’ or ‘recycle’ sign next to a well-placed garbage can elicit action with very little mental engagement. Sometimes, however, park management agencies need visitors to think more deeply to understand both the reason for a desired action and its implications (e.g., Lackey & Ham, 2003, 2004).

The central route to persuasion refers to when a message stimulates awareness, interest in a topic, and mental engagement (Miller et al., 2018c; Powell et. al., 2018; Vezeau, et. al., 2017), or what Petty and Cacioppo (1979, 1981, 1986) refer to as elaboration.

If a communication effort leads to ‘elaboration,’ or substantive cognitive processing, the potential for changing visitor attitudes and subsequent behaviors increases (Petty and Cacioppo 1979, 1986; Petty, Cacioppo, and Goldman, 1981). Attitudes developed through the central route are relatively accessible, persistent over time, resistant to change, and predictive of behaviors (Petty, McMichael, and Brannon, 1992). Research suggests that in contexts such as PPAs where audiences are free to leave or ignore communications, educational approaches need to be crafted with care to ensure they promote elaboration (Lackey & Ham, 2003; Miller et al., 2018b; Miller et al., 2019; Powell, et. al, 2018). Ham (1992; 2013) suggests that to elicit elaboration, a message should be thematic, organized, relevant (to the visitor), and entertaining (e.g., TORE model). Thematic messaging refers to communicating a clear idea that promotes intellectual and emotional connections rather than relating individual and isolated facts and figures. Organization refers to the structure of the message so that an audience can easily understand and follow the communication. Relevance refers to the need to make the message important and applicable to activities and interests of the target audience (e.g., Pratakis & Greenwald, 1993; Gilbert, Pelham, & Krull, 1988). Making messages enjoyable and entertaining is often overlooked by park agencies in an effort to maintain professional standards (Ham, 1992; Ham, 2013). Adding simple humor, compelling images, or fun interactive elements can go a long way in increasing enjoyment.

Several researchers suggest that combining the ELM with other theories that guide the specific content of the message has higher potential for influencing behaviors than in simply considering the ELM alone (e.g., Ham, et al., 2007; Miller et al., 2018b; Miller et al., 2019; Powell & Ham, 2008). The ELM provides ideas about how to get people to focus on a message.

Other theories tell us more about what the message should actually be (Stern, 2018).

Theory of Planned Behavior

The theory of planned behavior (Ajzen 1991; 2002), an extension of Ajzen and Fishbein's (1980) theory of reasoned action, provides a more holistic approach to message development. The TPB contends that behavioral intentions rely on a person's beliefs and underlying attitudes toward the performance of a behavior and his/her expectations and evaluations of the likely outcomes of that behavior, subjective norms and pressures (see norms section above in this chapter), and their perceived behavioral control in performing it (Ajzen, 2002). Perceived behavioral control refers to how hard one thinks it will be to perform a behavior, considering one's own ability and likely barriers they may confront. More recently, TPB was expanded as the Reasoned Action Approach, but the framework is largely unchanged (Fishbein & Ajzen, 2011). The overarching conclusion of TPB is that a visitor's decisions to behave in a certain way (i.e., walking off trail) should be consistent with their beliefs regarding: the potential negative and/or positive ramifications of performing the behavior, the social acceptability of performing that behavior, and perceived barriers to performing that behavior (Ajzen, 1991; Ajzen & Fishbein, 2005; Fishbein & Ajzen, 2011; Pooley & O'Connor, 2000; Miller, 2019).

From a messaging perspective, focusing on explaining the relevant benefits and costs of performing a behavior (e.g., trampling of plants and soil erosion), the social acceptability of performing this behavior in a park context (norms), and removing barriers to performance should enhance efficacy (Miller, 2019). Removing barriers could involve communicating the ease of performance of the behavior or providing clear and simple alternatives, such as clear trail barriers or easily accessible recycling bins in highly visible locations.

Case Studies of Education in Parks and Protected areas

Given all these theories and frameworks you may be wondering, "How can managers utilize research guided by these theories to craft effective messaging?" To answer this question, we provide several examples from the field.

Case Study 1: Research on Leave No Trace Behaviors in National Parks.

The Leave No Trace (LNT) education program is used world-wide to increase visitor

knowledge about behaviors that reduce negative social and environmental impacts. Composed of seven broad principles, LNT is adapted to local ecological and social contexts to provide recommendations regarding specific behaviors (i.e., camping in desert environments versus rain forest environments). However, one challenge the program faces is how best to communicate messages to ensure visitors to parks and wilderness areas follow recommendations (Lawhon et al., 2019; Marion & Reid, 2001; Miller, Borrie, & Harding, 2001; Roggenbuck, 1992; Schwartz et al., 2018).

To better understand how to craft messages that lead to LNT behaviors, the NPS wilderness office supported a study that used the Theory of Planned Behavior (TPB) (Ajzen, 1991) to investigate visitor LNT behaviors. The study included an assessment of beliefs and underlying attitudes toward the performance of a behavior, social norms and pressures related to the behavior, perceived behavioral control, and difficulty in performing behaviors (Vagias, et al., 2014). Groups of survey questions were developed to measure visitors' opinions regarding each of these concepts, which were then used to identify which attitudes and beliefs led to backcountry-visitors' intentions to perform recommended LNT practices. The study also extended TPB to investigate whether knowledge of LNT recommended behaviors had any relationship with intentions to perform recommended behaviors (Vagias, et al., 2014; Vagias & Powell, 2010). The study occurred in two National Parks with extensive backcountry visitation, Glacier National Park (GNP), Montana and Olympic National Park (ONP), Washington. Visitors were intercepted for 5 weeks during peak summer use at backcountry permit stations within both parks and asked to complete a contact card. These visitors were later mailed questionnaires with 73% ($n=312$) of ONP and 68% of GNP ($n=279$) completing the survey.

The results of the study provided insight into how more effective persuasive communication strategies and educational messaging could be designed. First, visitors to national parks are not the same and this may influence how they respond to messaging. While both populations were primarily white and highly educated, backcountry visitors to ONP were older ($M=41.4$ vs. 36.2) and had 8 years more backcountry camping experience than GNP backcountry visitors ($M=21.6$ vs. 13.4) (Vagias, et al., 2014). Second, visitors think of LNT principles and behaviors as interconnected and appear to develop a global LNT attitude. However, there were exceptions. Visitors to ONP felt that having a campfire is an important part of the backcountry camping experience. In GNP campfires also appeared important but more so

for larger groups. In other words, visitors think about campfire behaviors differently than other LNT recommended behaviors such as carrying trash out or moving rocks or logs to make a campsite more comfortable (Vagias et al., 2012). Lastly, the attitudes that influenced the behavioral intentions of backcountry visitors varied depending upon location and context. Results from GNP suggest that targeting perceived difficulty of performing LNT, subjective norms, and knowledge about LNT would be most effective in influencing intentions to comply with LNT practices. For ONP, targeting only the perceived difficulty (or ease) of performing recommended LNT behaviors appeared most influential.

While typical LNT promotional materials primarily target the knowledge of visitors about LNT practices (e.g., <https://lnt.org/why/7-principles/>), the results of this study suggest that this will not be effective in improving compliance. Instead, the research provides guidance for managers on how to craft messaging for a specific audience in that particular context. Upon deeper reflection, this makes perfect sense—the environment where LNT is operationalized is different. ONP receives on average over 10 feet (3 meters) of rain a year while GNP receives 2 feet (0.6 meters) on average. Temperatures and the availability of downed wood around campsites are also different. If managers wish to change a particular behavior, a targeted message pertaining to this particular behavior is necessary.

Case Study 2: A theory driven approach for increasing bear safety behaviors in Yellowstone National Park

During the summer of 2016, researchers studied how to improve communications about bear safety while hiking in Yellowstone National Park (YNP), the oldest and one of the most visited parks in the US National Park System (NPS, 2017a). Known for its large populations of charismatic mega-fauna, including grizzly and black bears, YNP regularly experiences human-wildlife conflicts (Olliff & Caslick, 2003). Of these conflicts, interactions with grizzly bears is the most concerning for both visitors and managers (Olliff & Caslick, 2003). When a grizzly and a person make physical contact, it usually ends poorly for all involved. Grizzly bear attacks happen at a rate of about 1 per year and occur almost exclusively in the backcountry (NPS, 2017b). While deaths from bear attacks are rare in YNP, between 2011 and 2015, grizzly bears killed three visitors (NPS, 2017b). With this recent increase in deaths from grizzly/people conflicts, the National Park Service sponsored research to investigate better ways of crafting interpretive messaging to better influence visitors' bear safety behaviors. To achieve this goal,

researchers studied over 600 day hikers on two different trails using intercept surveys guided by the conceptual framework in Figure 1.

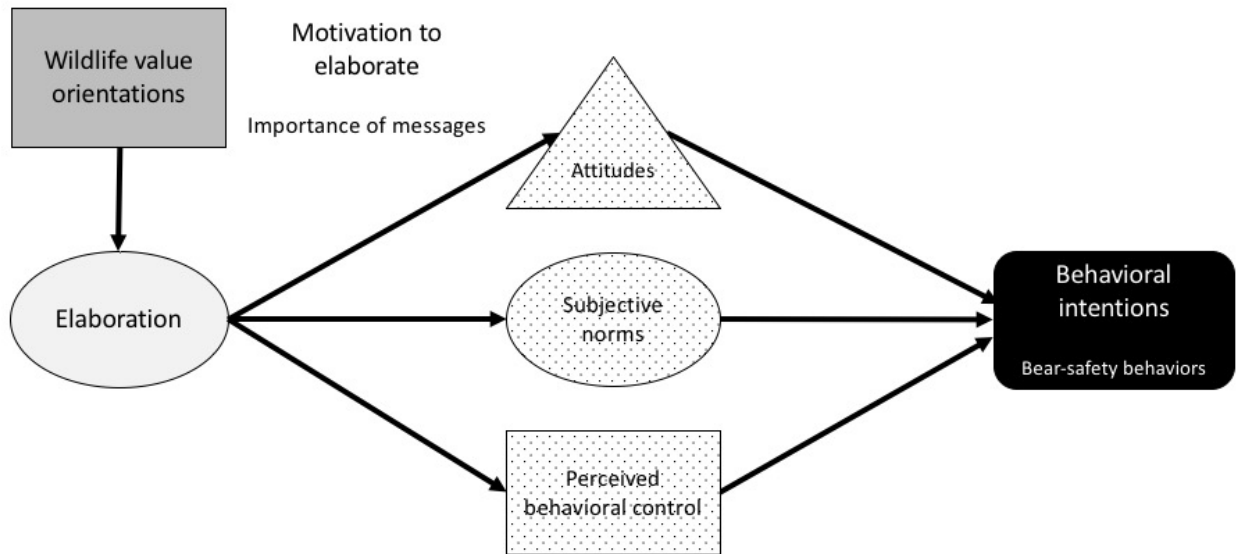


Figure 1. A conceptual framework merging wildlife value orientations, Elaboration Likelihood Model, and the Theory of Planned Behavior.

The framework, guided by the integration of value orientations, ELM and TPB (Miller et al., 2018b; 2018c; Miller et al., 2019; Miller, 2019), sought to understand the relative influence of key value orientations, triggers of elaboration, attitudes related to the benefits/costs of performing the behavior, perceived norms around the behaviors, and finally the perceived self-efficacy of visitors in performing the behaviors on intentions to follow bear-safety behaviors.

Audience characteristics, and specifically characteristics of their reference groups, play an important role in whether some groups find messages relevant while others may not (Ham, 2013). In this bear safety study, wildlife value orientations (Fulton et al., 1996) varied amongst dayhikers with some holding more mutualistic values (e.g. eco-centric) and others holding more anthropocentric (e.g. human-centered or utilitarian) values (Miller et al., 2018b). The results showed messages that more closely matched dayhikers' wildlife values increased message relevancy. For instance, visitors who had more mutualistic values rated messages that incorporated mutualistic content as more important (Miller et al., 2018b). This included messages like "Taking safety precautions while hiking helps keep Yellowstone's bears healthy,

safe, and wild” and “You are entering a place that is home to many bears. It is your responsibility to know how to behave.” These results supported using wildlife-value framing in messages (Teel, Dietsch, & Manfreda, 2015) as a critical first-step to improve communications.

The research also sought to identify how to elicit elaboration about messages and its impact on dayhiker bear safety behaviors (Miller et al., 2019). The research demonstrated that more elaboration increases positive attitudes toward the behavior, subjective norms regarding the behavior, and perceived behavioral control (TPB components of the model) to impact behavioral intentions (Figure 1) (Miller et al., 2019). The research also demonstrated that attitudes (toward the potential outcomes related to performance) and subjective norms had the greatest potential for developing message content designed to impact on dayhiker bear safety behaviors, although perceived behavioral control could also be useful (Miller et al., 2019; Miller, 2019). Scientists and managers applied the results of the work in their communications about bear safety. As an example, a video on social media draws from the research to improve communications (Figure 2; Facebook, 2018) by focusing on mutualistic framing about protecting bears and subjective norms about protecting your friends and family while in the backcountry by performing recommended bear-safety behaviors.

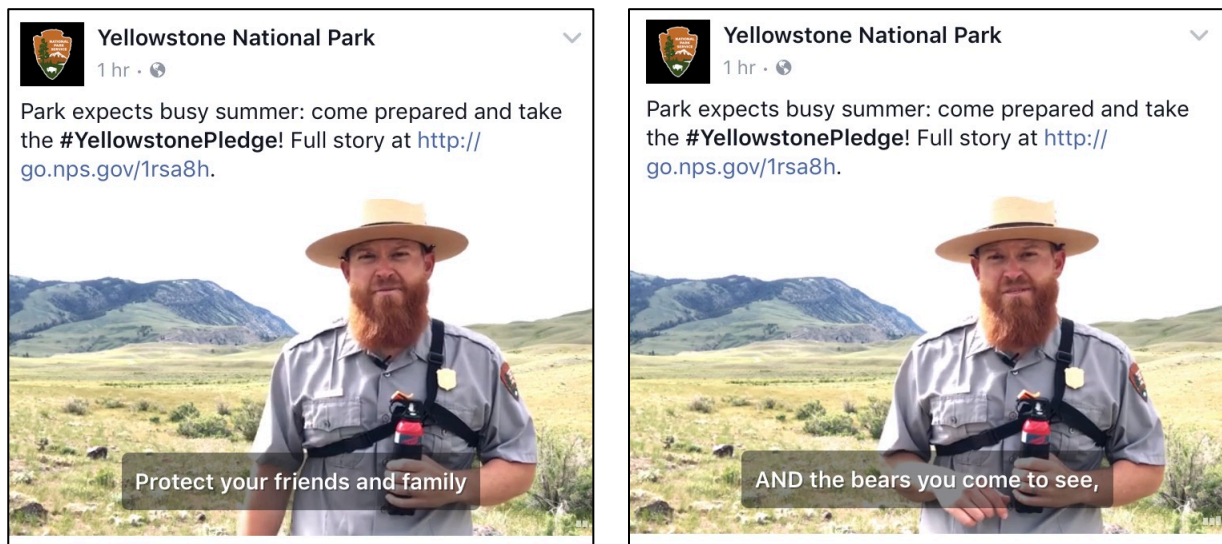


Figure 2. Yellowstone National Park implemented components of this research in communications. In the video shared via social media above (Facebook, 2018), messages use mutualistic value framing and target subjective norms.

Conclusions

Managing visitors to PPAs is challenging. Educational and communication strategies are light-handed tools that managers can use to enhance the visitor experience, promote learning, and promote appropriate visitor behaviors that protect important resources. However, crafting effective educational messages may be ineffective without understanding several key points:

1. **Research is critical.** Audience research provides guidance regarding the potential leverage points and factors that can be used to inform the development of more effective persuasive communication strategies. Research can also test the relative effectiveness of different communication strategies or approaches (e.g., Abrams, et al., 2020; Seyranian, Sinatra, & Polikoff, 2015).
2. **Visitor characteristics need to be identified.** Each park and their corresponding visitors are unique. Even the visitors within a PPA have differences that are relevant to communication strategies (Miller, Freimund, & Blackford, 2018). Research should be used to identify the perspectives of diverse visitors regarding key management issues or desired behaviors that are unique to the location. The same message may not be effective for all visitors, and messages should be tailored to specific audiences identified in visitor studies.
3. **Specificity matters.** One behavior is not the same as others. For example, take two common behaviors: riding public transportation versus recycling. The social norms, the benefits and costs, and the relative ease or difficulty in performing each of these behaviors depends upon context. In some PPAs public transportation is free and widely available, while in others public transport is not available or limited. Even widely accepted and expected behaviors such as recycling can have barriers to performance in some parks (Miller et al., 2019). For example, in PPAs where recycling is not available, visitors may be asked to take recyclable trash with them. In each case, the context influences visitor perceptions about behaviors. Therefore, messaging regarding a specific behavior that works in one park may not work in another.
4. **Draw upon the wider library of social science theories.** We present a small collection of common theories in this chapter. Multiple other theories can be applied to visitor management in parks. Identity theory (Stets & Burke, 2000) can be helpful

in formulating messages for positive behavioral effects. Labeling visitors in positive ways, for example, as “people who care,” can shift mindsets toward the proposed behavior more so than simply requesting the behavior. Identity theory also provides insights into triggering or off-putting language that can turn visitors off to park messaging. Other communicative framing techniques can also have powerful effects. For example, it has been repeatedly demonstrated that people tend to be more motivated to take action to avoid a loss to something they care about than to achieve new gain (Kahneman, 2011). A wide array of such theories are presented in Stern (2018) along with ways to apply them to specific communications challenges.

References

- Abrams, K.M., Leong, K., Melena, S. & Teel, T. (2020) Encouraging Safe Wildlife Viewing in National Parks: Effects of a Communication Campaign on Visitors’ Behavior. *Environmental Communication*. 14(2), 255-270. DOI: 10.1080/17524032.2019.1649291
- Ajzen, I. (1991). The theory of planned behavior. *Organizational Behavior and Human Performance*. 50, 179–211.
- Ajzen, I. (2002). Perceived behavioral control, self-efficacy, locus of control, and the theory of planned behavior. *Journal of Applied Social Psychology*, 32(4), 665–683.
- Ajzen, I. and Fishbein, M. (1980) *Understanding Attitudes and Predicting Social Behavior*. Englewood Cliffs, NJ: Prentice-Hall.
- Ajzen, I., & Fishbein, M. (2005). The influence of attitudes on behavior. *The handbook of attitudes*, 173(221), 31.
- Backman, C. L., Vaske, J. J., Lawhon, B., Vagias, W. M., Newman, P., Coulson, E., & Taff, B. D. (2018). Visitors’ views of Leave No Trace Principles across a National Park, a National Forest, and three state parks. *Journal of Park and Recreation Administration*, 36(4).
- Bogner, F. X., & Wiseman, M. (2003). A higher-order model of ecological values and its relationship to personality. *Personality and Individual Differences*, 34: 783-794.
- Clifford, S., Iyengar, V., Cabeza, R., & Sinnott-Armstrong, W. (2015). Moral foundations vignettes: A standardized stimulus database of scenarios based on moral foundations

- theory. *Behavior research methods*, 47(4), 1178-1198. Facebook. (2018). *Yellowstone National Park*. Retrieved from <https://www.facebook.com/YellowstoneNPS/>
- Dunlap, R., & Van Liere, K. (1978). The “new environmental paradigm.” *Journal of Environmental Education*, 9(4): 10-19.
- Fishbein, M., & Ajzen, I. (2011). *Predicting and changing behavior: The Reasoned Action Approach*. Psychology press.
- Fulton, D. C., Manfredi, M. J., & Lipscomb, J. (1996). Wildlife value orientations: A conceptual and measurement approach. *Human Dimensions of Wildlife*, 1(2), 24–47.
- Gilbert, D. T., Pelham, B. W., & Krull, D. S. (1988). On cognitive busyness: When person perceivers meet persons perceived. *Journal of Personality and Social Psychology*. 54(5), 733–740.
- Ham, S. (1992) *Environmental Interpretation*. Golden, CO: North American Press.
- Ham, S. H., Brown, T. J., Curtis, J., Wieler, B., Hughes, M., & Poll, M. (2007) *Promoting persuasion in protected areas; A guide for managers*. Sustainable Tourism Cooperative Research Centre, Gold Coast, Australia.
- Ham, S. H. (2013) *Interpretation: Making a difference on purpose*. Fulcrum Publishing. Golden, CO.
- Ham, S. and Krumpe, E. (1996) Identifying audiences and messages for nonformal environmental education: A theoretical framework for interpreters. *Journal of Interpretation Research* 1 (1), 11–23.
- Heimlich, J. E., & Ardoin, N. M. (2008). Understanding behavior to understand behavior change: A literature review. *Environmental education research*, 14(3), 215-237.
- Hendee, J. C., & Dawson, C. (2002). *Wilderness management: Stewardship and protection of resources and values* (3rd ed.). Golden, CO: Fulcrum Publishers.
- Kahneman, D. (2011). *Thinking, fast and slow*. New York, NY: Farrar, Strauss, and Giroux.
- Lackey, B. K., & Ham, S.H. (2003) Contextual Analysis of Interpretation Focused on Human-Black Bear Conflicts in Yosemite National Park. *Applied Environmental Education & Communication* 2 (1): 11–21.
- Lackey, B. K., & Ham, S.H.. (2004) Assessment of Communication Focused on Human-black Bear Conflict at Yosemite National Park. *Journal of Interpretation Research* 8 (1): 25–40.
- Lawhon, B., Taff, B. D., Newman, P., Vagias, W. M., & Miller, Z. D. (2019). Understanding

- attitudes and support for Leave No Trace: Informing communication strategies with frontcountry state park visitors. *Journal of Outdoor Recreation, Education, and Leadership*, 11(1).
- Manning, R. E. (1999). *Studies in outdoor recreation: Search and research for satisfaction* (2nd ed.). Corvallis: Oregon State University Press.
- Manning, R. E. (2003). Emerging principles for using information/education in wilderness education. *International Journal of Wilderness*, 9(1), 20-27.
- Marion, J. L., & Reid, S. E. (2001). Development of the United States leave no trace program: An historical perspective. In M. B. Usher (Ed.), *Enjoyment and understanding of the national heritage* (pp. 81–92). Edinburgh, Scotland: Scottish Natural Heritage & the Stationery Office.
- Miller, T., Borrie, W., & Harding, J. (2001). Basic knowledge of factors that limit the practice of low-impact behaviors. Draft report on file at: U.S. Department of Agriculture, Forest Service, Rocky Mountain Research Station, Aldo Leopold Wilderness Research Institute, Missoula, MT:University of Montana.
- Miller, Z. D. (2019). A Theory of Planned Behavior approach to developing belief-based communication: day hikers and bear spray in Yellowstone National Park. *Human Dimensions of Wildlife*, 24(06), 1–15. <https://doi.org/10.1080/10871209.2019.1655682>
- Miller, Z. D., Freimund, W., & Blackford, T. (2018a). Communication perspectives about bison safety in Yellowstone National Park: A Comparison of international and North American Visitors. *Journal of Park and Recreation Administration*, 36(1), 176–186. <https://doi.org/10.18666/JPRA-2018-V36-I1-8503>
- Miller, Z. D., Freimund, W., Metcalf, E. C., & Nickerson, N. (2018b). Targeting your audience: Wildlife value orientations and the relevance of messages about bear safety. *Human Dimensions of Wildlife*, 23(3), 213–226. <https://doi.org/10.1080/10871209.2017.1409371>
- Miller, Z. D., Freimund, W., Metcalf, E. C., Nickerson, N. P., & Powell, R. B. (2019). Merging elaboration and the theory of planned behavior to understand bear spray behavior of day hikers in Yellowstone National Park. *Environmental Management*, 63(3), 366–378. <https://doi.org/10.1007/s00267-019-01139-w>
- Miller, Z. D., Freimund, W. A., & Powell, R. B. (2018c). Measuring Elaboration and Evaluating Its Influence on Behavioral Intentions. *Journal of Interpretation Research*, 23(1), 27–44.

- NPS. (2014). *Achieving relevance in our second century*. Washington, DC: National Park Service.
- NPS. (2017a) Bear-inflicted human injuries and fatalities in Yellowstone.
<http://www.nps.gov/yell/learn/nature/injuries.htm>
- NPS (2017b) Bear safety. Yellowstone National Park.
<https://www.nps.gov/yell/planyourvisit/bearsafety.htm>
- Olliff, T., & Caslick, J. (2003). Wildlife – human conflicts in Yellowstone: When animals and people get too close. *Yellowstone Science*, 1(18), 18–22.
- Petty, R. E., & Cacioppo, J. T. (1979) Issue involvement can increase or decrease persuasion by enhancing message-relevant cognitive responses. *Journal of Personality and Social Psychology* 37: 1915–1926.
- Petty, R. E., & Cacioppo, J. T. (1981) *Attitudes and Persuasion: Classic and Contemporary Approaches*. Dubuque, IA: William C. Brown.
- Petty, R. E., & Cacioppo, J. T. (1986) The Elaboration Likelihood Model of Persuasion. In *Advances of Experimental Social Psychology*. Vol. 19, edited by L. Berkowitz, 123–205. SanDiego, CA: Academic Press.
- Petty, R. E., Cacioppo, J. T., & Goldman, R. (1981) Personal Involvement as a Determinant of Argument-Based Persuasion. *Journal of Personality and Social Psychology* 41: 847–855.
- Petty, R.E., McMichael, S., & Brannon, L.A. (1992). The elaboration likelihood model of persuasion: Applications in recreation and tourism. In M.J. Manfredi (Ed.), *Influencing Human Behavior: Theory and Applications in Recreation, Tourism, and Natural Resources Management* (pp. 77–101). Champaign, IL: Sagamore Publishing.
- Pooley, J. A., & O'Connor, M. (2000). Environmental education and attitudes: Emotions and beliefs are what is needed. *Environment and behavior*, 32(5), 711-723.
- Powell, R.B., Brownlee, M.T.J., Kellert, S. R. & Ham, S.H. (2012) From awe to satisfaction: Immediate affective responses to the Antarctic tourism experience. *Polar Record*, 48(2), 145-156.
- Powell, R. B., Vezeau, S.L., Stern, M.J., Moore, D.D., & Wright, B.A. (2018) Does interpretation influence elaboration and environmental behaviors? *Journal of Environmental Education Research*, 24(6), 875-888.
DOI:10.1080/13504622.2017.1339302

- Powell, R.B. & Ham, S.H. (2008) Can ecotourism interpretation really lead to pro-conservation knowledge, attitudes, and behavior? Evidence from the Galapagos Islands. *Journal of Sustainable Tourism*, 16(4), 467-489. DOI:10.1080/09669580802154223
- Powell, R.B., Kellert, S. R., & Ham, S.H. (2008) Antarctic tourists: Ambassadors or consumers? *Polar Record*, 44(230), 233-241.
- Powell, R.B., Kellert, S. R., & Ham, S.H. (2009) Interactional theory and the sustainable nature-based tourism experience. *Society and Natural Resources*, 22(8), 761-776.
- Pratkanis, A. R., & Greenwald, A. G. (1993). Consumer involvement, message attention, and the persistence of persuasive impact in a message-dense environment. *Psychology and Marketing*, 10, 321–332.
- Roggenbuck, J. W. (1992). Use of persuasion to reduce resource impacts and visitor conflicts. In M. J. Manfredi, (Ed.), *Influencing human behavior: Theory and application in recreation, tourism, and natural resources management*. Champaign, IL: Sagamore.
- Sellars, R. W. (1997) *Preserving Nature in the National Parks: A History*. Yale University Press, New Haven, CT.
- Seyranian, V., Sinatra, G. M., & Polikoff, M. S. (2015). Comparing communication strategies for reducing residential water consumption. *Journal of Environmental Psychology*, 41, 81-90.
- Schultz, P. W. (2011). Conservation means behavior. *Conservation Biology*, 25(6), 1080–1083. <https://doi.org/10.1111/j.1523-1739.2011.01766.x>
- Schwartz, F., Taff, B. D., Lawhon, B., Hodge, C., Newman, P., & Will, E. (2018). Will they leave what they find? The efficacy of a Leave No Trace education program for youth. *Applied Environmental Education & Communication*, 17(4), 299-309.
- Stern, M. J. (2018). *Social science theory for environmental sustainability: A practical guide*. Oxford University Press.
- Stern, P. C & Dietz, T. (1994). The Value Basis of Environmental Concern. *Journal of Social Issues*, 50(3): 65-84.
- Stern, P.C. (2000) Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, 56(3): 407-424.
- Stets, J. E., & Burke, P. J. (2000). Identity theory and social identity theory. *Social psychology quarterly*, 224-237.

- Taff, D., Newman, P., Lawson, S. R., Bright, A., Marin, L., Gibson, A., & Archie, T. (2014). The role of messaging on acceptability of military aircraft sounds in Sequoia National Park. *Applied Acoustics*, 84, 122–128. <https://doi.org/10.1016/j.apacoust.2013.09.012>
- Teel, T. L., Dietsch, A. M., & Manfredi, M. J. (2015). A (social) psychology approach in conservation. In: N. J. Bennett, & R. Roth (Eds.), *The conservation social sciences: What?, how?, and why?* (pp. 21–25). Vancouver, BC: Canadian Wildlife Federation and Institute for Resources, Environment and Sustainability, University of British Columbia.
- Vagias, W. M. & Powell, R.B. (2010) Backcountry visitors' Leave No Trace attitudes. *International Journal of Wilderness*, 16(3), 21-27.
- Vagias, W.*, Powell, R.B, Moore, D, & Wright, B.A. (2012) Development, psychometric qualities, and cross-validation of the Leave No Trace attitudinal inventory and measure (LNT AIM). *Journal of Leisure Research*, 44(2), 234-256.
- Vagias, W.M., Powell, R.B., Moore, D.D., & Wright, B.A. (2014) Predicting behavioral intentions to comply with recommended Leave No Trace practices. *Leisure Sciences*, 38(5), 439-445. DOI:10.1080/01490400.2014.912168
- Vezeau, S.L., Powell, R. B., Stern, M.J., Moore, D., & Wright, B. (2017) Development and validation of two scales for measuring elaboration and behaviors associated with stewardship in children. *Environmental Education Research*, 23(2) 192-213. DOI:10.1080/13504622.2015.1121377