

Influencing Park Visitor Behavior: A Belief-based Approach

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EXECUTIVE SUMMARY: Communication is a key component in management strategies designed to influence park visitor behavior and minimize social and ecological impacts. However, messages targeting management problems are often delivered without a real understanding of the specific underlying visitor beliefs. This paper applies the theory of planned behavior in the design and evaluation of messages targeting park visitor induced management problems. The method enables specific identification of how messages influence visitor beliefs and behavior. This enables managers to target and refine their messages in a measured, purposeful way for maximum effectiveness. Belief elicitation and measurement surveys were conducted at two Australian park sites, Badger Weir picnic area and Yellagonga Regional Park. The survey results informed the content of messages targeting specific problem behaviors at each site. Message interventions were installed at each site and their effectiveness evaluated based on a second belief measurement survey, and observations of visitor behavior. While the interventions were effective, repeat visitors with strong intentions and habitual behaviors seemed less prone to influence using this method. Despite overall increases in compliance at the two sites, the tested interventions were not successful in influencing salient beliefs or corresponding attitudes of these highly experienced visitors. This presents an additional challenge to parks managers. Visitors who engage in habitual behavior require an alternative approach involving different messages and different message delivery systems relative to their counter-parts. While more overt enforcement could be applied to address entrenched behaviors, alternative efforts might begin in the communities where local repeat visitors live, using a campaign style of communication.

KEYWORDS: theory of planned behavior, behavioral influence, problem behavior, habitual behavior, Australia

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Communicating with national park visitors is an important indirect management method. However, much remains to be learned about when and where it might be most effective, and why. Explaining the success or shortcomings of communication applied as a management tool can be difficult in the absence of adequate substantiated theory. For example, Bradford and McIntyre (2007) designed and tested two types of message to prevent use of “social trails” in a Canadian national park. Although the general approach was based on theory, it appears that the message content was based on the experience and ideas of the authors and park managers. While they found significant influences on visitor behavior (reduced use of the trails), Bradford and McIntyre (2007) rely on past studies to explain this result in general terms. Theoretically based approaches could allow better understanding of how communication can contribute to mitigating park visitor management problems in a specific context. The theory of planned behavior provides such a framework. This approach identifies what visitors think about a behavior associated with a management problem, enabling the design of targeted messages.

Social psychology research has demonstrated that people make behavioral decisions generally consistent with three kinds of beliefs. These are behavioral beliefs, normative beliefs and control beliefs. Ajzen (1991) conceptualized this as the theory of planned behavior (TPB). Figure 1 describes the TBP in terms of the three types of belief and the relationship between these and subsequent behavior.

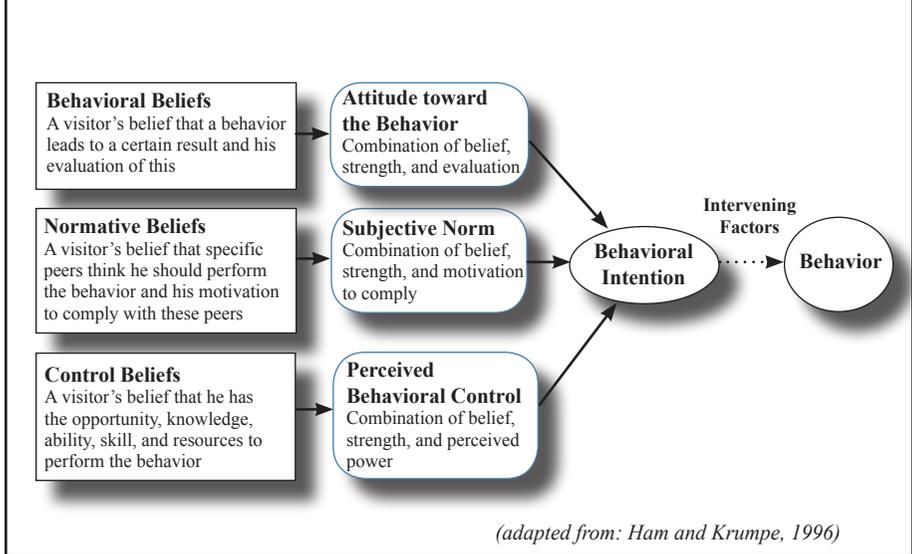
Figure 1 indicates that behavioral intention is the key link between behavioral attitudes and acting out the behavior. Behavioral intention refers to the strength of the visitor’s prior intention to perform or not perform a specific behavior. Strong behavioral intentions are generally more predictive of actual behavior than weak intentions, taking into account intervening factors such as time between intention and acting.

A person may have many beliefs related to a given behavior. Designing messages that impact on one or more of these beliefs may in turn influence the consequent behavior. However, whether that person will perform the behavior is normally determined by a small subset of key beliefs called “salient beliefs” (Fishbein & Ajzen, 1975). Comprehensive reviews of this research are available in Fishbein and Ajzen (1975), Fishbein (1980), Fishbein and Manfredo (1992), and Ajzen and Fishbein (2005). These studies consistently conclude that communication targeting salient beliefs will influence the behavior more than communication guided by guesswork or managers’ intuition (Ajzen, 1992).

Types of Behavior Amenable to Persuasive Influence

The effectiveness of the TPB approach to behavioral management depends partly on the type of visitor behavior. Messages designed using TPB principles are most effective in influencing misguided or uninformed behaviors. It will be less influential on behaviors that emanate from malicious intent or addiction (Ham, 2007). Greater influence will also occur when visitors commit themselves to an on-site behavior once in the park rather than before arrival (Geller, Winett, & Everett, 1982; Lehman & Geller, in press). This means that TPB-

Figure 1. Theory of Planned Behavior.



based communication will not be as effective in influencing behaviors such as criminal acts by visitors as it will be for behaviors resulting from ignorance or naiveté.

Among the behaviors that do not readily lend themselves to persuasive influence are so-called "habitual behaviors." Habitual behaviors include actions that have become so routinized through frequent repetition that reasoning no longer precedes behavioral decisions. Instead, according to a number of researchers (e.g., Aarts, Verplanken, & Van Knippenberg, 1998; Conner & Armitage, 1998; Verplanken & Orbell, 2003) habitual behavior results from an automatic behavioral response triggered by simple stimulus cues. Thus, when the habit is activated, reasoning is unnecessary. This means influence through persuasive communication will not be effective because there is no reasoned decision to perform the behavior (Manfredo & Bright, 1991).

Habituation has been linked to a number of behaviors, including travel mode choice (Bamberg, Ajzen, & Schmidt, 2003), seatbelt use (Mittal, 1988), eating (Verplanken & Faes, 1999), use of non-addictive controlled substances (Orbell, Blair, Sherlock, & Conner, 2001), and vehicular speeding (Conner, Smith, & McMillan, 2003). Likewise, a number of psychologists have documented the inability of the TPB to account for relationships between frequent past behavior and future behavior (Ajzen, 1991; Ajzen & Fishbein, 2005; Albarracín, Johnson, Fishbein, & Muellerleile, 2001; Conner & Armitage, 1998; Ouellette & Wood, 1998). An implication of this is that attempts to alter visitors' beliefs about behaviors performed many times previously are not likely to be successful in influencing the behavior.

Since visitors to a park bring varying degrees of behavioral experience with them, we would expect those with less experience to be more amenable to persuasive influence than those who have more experience with the behavior. Therefore, it would be advantageous to know ahead of time whether the visitors at a given park are frequent repeat performers of the problem behavior or relatively new to it. As Roggenbuck (1992) suggests, the most highly experienced visitors might require a more complex management approach involving not just persuasive communication but other interventions such as incentives,

disincentives, rewards, punishments, and so on. A wider, community-based communication campaign may also be warranted. Thus, TPB research conducted in advance of designing a persuasive communication intervention could determine the extent to which the target behavior is habitual or novel to intended message recipients.

This purpose of this study was to apply the TPB in the design and evaluation of messages targeting problematic visitor behaviors at two Australian parks. The main objectives were to identify and measure beliefs associated with a specific problem visitor behavior at each site to inform the design of a theory-based message. The relative effectiveness of the theory based messages in influencing park visitor behavior was then evaluated.

Description of Study Sites

The results presented are from two study sites selected based on consultation with park managers in two Australian states. The sites were selected based on the location of a prevalent behavior unique to each state. Brief descriptions follow.

Badger Weir Picnic Area, Yarra Ranges National Park, Victoria. Badger Weir picnic area is located in the Yarra Ranges National Park, 92 km east of Melbourne, the state capital of Victoria. Badger Weir Picnic Area is sheltered by mature ash and gum forest. The hollows in the older trees provide homes and nesting sites for many native birds and mammals. Picnicking at Badger Weir is a popular activity for local and interstate visitors. Food either left behind or openly offered to birds is viewed as one of the key management issues in Yarra Ranges National Park. Additional information about Badger Weir can be found online at http://www.parkweb.vic.gov.au/resources05/05_0504.pdf

Yellagonga Regional Park, Western Australia. Yellagonga Regional Park is a 1,400-hectare (3,460-acre) recreation and conservation reserve located within the metropolitan area of Perth, Western Australia. It protects an area considered to have significant cultural, ecological, recreational, and landscape value. Yellagonga encompasses a chain of lakes and wetlands, remnant bush land, and recreational open space and is bordered by residential and commercial use areas. It contains popular areas for picnicking and walking dogs. For additional descriptions of the park, see http://www.naturebase.net/component?option=com_hotproperty/task/view/id,7/Itemid,755/

Method

The TPB guided the methods applied. The process began by working with each state park agency to prioritize problem visitor behaviors and select one of the behaviors as a research focus. Subsequent field research involved three phases respectively aimed at identifying visitor beliefs underpinning the selected behavior (belief elicitation), isolating salient beliefs with maximum persuasion potential for targeted communication interventions and experimentally evaluating the belief-based interventions. These various activities were carried out as follows:

Step 1: Problem Identification Workshops

The researchers conducted problem identification workshops with each state park management agency in order to reach consensus on a behavior of interest for that state's parks. The research team facilitated each workshop using a modified nominal group technique to organize discussions and gather data. Participants in each workshop included between 15 and 25 parks managers and tour operators. Participants identified the most problematic visitor behaviors in their state's parks and rated them based on the degree of urgency. Through this process, a rank-ordering of priority problem behaviors emerged.

Discussions with key parks management agency individuals of each state enabled selection of one behavior as the focus for further investigation. The agencies specified the behavior they would like visitors to do or not do in order to minimize the identified management problem (Table 1).

Table 1. Definitions and Management Implications of Target Behaviors.

State	Behavioral Definition	Rationale (management problem)
Victoria	Visitors using the Badger Weir Picnic area in Yarra Ranges National Park will not feed the birds.	Feeding considered to increase bird aggression toward site visitors, negatively influence the health of bird populations and reduce natural foraging behavior.
Western Australia	Dog walkers in Yellagonga Regional Park will keep their dogs on leashes.	Free-roaming dogs perceived as increased risk to wildlife, through disturbance of habitat, stalking and hunting, leaving scent that deters wildlife and disease from dog excrement.

Step 2: Field Research

Following TPB procedures, the field research at each site was carried out in three phases: the belief elicitation phase, the belief measurement phase, and the intervention evaluation phase.

Phase 1: visitor beliefs elicitation survey. The elicitation phase identified a pool of salient beliefs that have potential for persuasion. Following widely applied TPB methods, a small convenience sample of visitors was interviewed in order to capture the range of possible salient beliefs. This involved data collectors conducting elicitation surveys using a semi-structured interview procedure. Data collectors were trained in the principles of the TPB and appropriate interview procedures. An introductory script was provided for approaching and inviting park visitors to participate in the survey, in accordance with university research ethics requirements. For this phase of the research, interviews were conducted until theoretical saturation was reached. Theoretical saturation was determined when continued visitor interviews revealed no more new responses by subsequent participants.

Following the methodology of Middlestadt, Bhattacharyya, Rosenbaum, Fishbein, and Shepherd (1996), each interview consisted of three pairs of open-ended questions corresponding to each type of belief in the TPB framework. Behavioral beliefs were elicited by asking respondents to associate both positive and negative outcomes of performing the target behavior. Normative beliefs were determined by asking respondents who they thought approved or disapproved if they performed the target behavior. Control beliefs were identified by asking visitors what makes performing the target problem behavior easier or more difficult. Application of the survey format at the sites was as follows:

Badger Weir. The belief elicitation phase at Badger Weir occurred over four weekends in January and February 2006. Compliers were visitors observed not feeding the birds in the picnic area. Non-compliers were visitors observed intentionally (rather than acciden-

tally) feeding the birds with either food scraps or bird seed brought on-site. Saturation was reached after 22 compliers and 14 non-compliers were interviewed as a convenience sample.

Yellagonga Regional Park. The belief elicitation phase at Yellagonga Regional Park occurred over seven days in April 2006. Compliers were visitors observed keeping their dogs on leashes while walking through the park. Non-compliers were visitors observed walking with their dog off of leashes at any time in the park. Saturation was reached after 14 compliers and 17 non-compliers were interviewed as a convenience sample.

Following procedures employed in prior studies (e.g. Middlestadt et al., 1996; Beeton et al., 2004; Lackey & Ham, 2003; Ham & Weiler, 2005; Curtis, 2007), a content analysis of survey responses identified the salient beliefs. Universal categories were developed and inter-rater reliability between multiple coders tested. Based on each analysis, the most frequently mentioned beliefs at each site were identified. In this way, an inventory of visitors' behavioral beliefs, normative beliefs, and control beliefs salient to the desired behavior at each site was generated.

Phase 2: measurement of salient visitor beliefs. Phase 2 of the field research comprised of a fixed-response questionnaire to measure the strength and direction of each of the selected salient beliefs (Table 2). The questionnaire was administered to separate samples of observed compliers and non-compliers at each site. Badger Weir visitors were surveyed over six weekends during April and August 2006. Badger Weir picnickers were sample based on observed compliance or noncompliance and visitor willingness to participate. Fifty compliers and 47 non-compliers completed questionnaires. Yellagonga dog walkers were surveyed over four weekends and eight week days during August 2006. Owing to the small dog walker population at Yellagonga, all visitors with dogs were surveyed. Sixty-six compliers and 39 non-compliers completed questionnaires.

Salient beliefs identified at each site determined the wording of the fixed-item survey used at the given site. Site-specific examples of the wording are provided in the results section of this paper. In general, the measurement strategy for the two belief-type components was based on recommendations by Francis et al., (2004). In addition, identified repeat visitors indicated their frequency of visitation (daily, weekly, monthly, yearly).

Analysis of phase 2 data involved comparisons of mean belief scores between compliers and non-compliers. The belief strength score for each belief was multiplied by the respective paired evaluation, motivation to comply or power responses to obtain a cross product score. The cross products represent the belief-based attitude that in turn provides an indication of how strongly the belief favors or disfavors the target behavior. The higher (more positive) the cross product score, the more likely the person is to carry out the behavior.

Beliefs with cross products most different between compliers and non-compliers and amenable to persuasive influence were targeted in intervention messages. The persuasion potential of statistically significant belief scores was decided through group consensus using research team member discussions. Team members included the authors in addition to two experts in communication theory and behavioral influence at Monash University, Australia. These interventions were evaluated in the final phase of field research. The target beliefs identified for each study site are as follows.

Badger Weir

1. If I do not feed the birds, they will not rely on humans for their survival (behavioral belief)
2. If I do not feed the birds, they will not harass people for food (behavioral belief)

Table 2. Visitor Characteristics.

	Badger Weir N=151	Yellagonga State Park N=150
Gender		
Male	45.7%	45.3%
Female	54.3%	54.7%
Origin		
Intrastate	87.2%	98.7%
Interstate	3.4%	0.7%
International	9.4%	0.7%
Repeat Visitor	53.0%	94%
First-time Visitor	47.0%	6%
Frequency of Visit		
Daily	-	62.4%
Weekly	1.9%	28.4%
Monthly	11.1%	6.4%
Yearly	87.0%	2.8%
Compliers	65.7%	63.3%
Non-compliers	34.3%	36.7%

Yellagonga Regional Park

(Note that in relation to dog walking, 'lead' is the Australian term for 'leash')

1. If I keep my dog on a lead, it will be less of a nuisance to other people and dogs in the park (behavioral belief)
2. I believe that other dog owners in the park think that I should/should not keep my dog on a lead (normative belief)

Based on these beliefs, message interventions were designed and installed at each site using A-frame signs. These were developed in close consultation with staff from each park management agency. Note that in this instance, analysis of the belief measures found no salient control beliefs. Consequently no control beliefs were targeted in the subsequent message intervention. The respective interventions were as follows (Figures 2–3):

Phase 3: experimental evaluation of interventions targeting selected beliefs. Phase 3 involved evaluating the influence of messages targeting the selected beliefs at each site. The primary dependent variable was observable visitor behavior along with each targeted belief and visitors' attitude to the behavior.

Data collection relied on a questionnaire similar to that used in phase 2, including identical measures of the same beliefs. Analysis compared the interventions' behavioral

Figure 2. Message Interventions for Badger Weir.

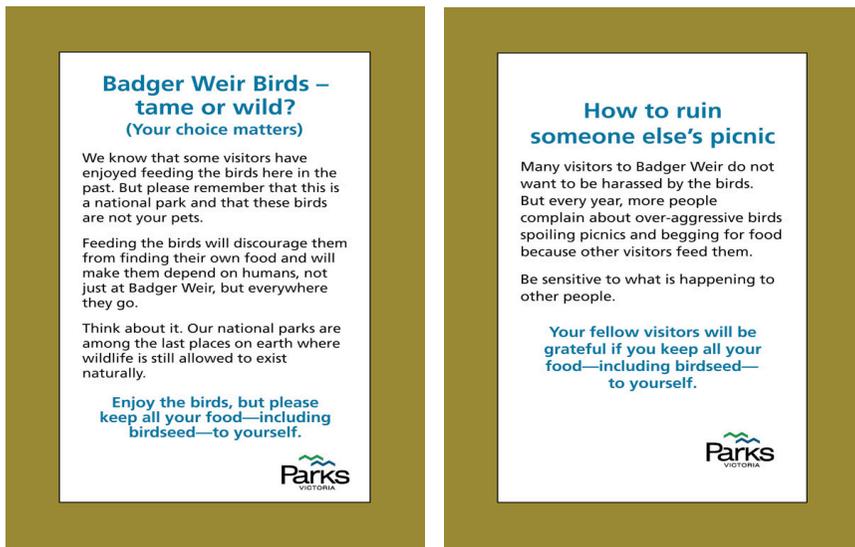
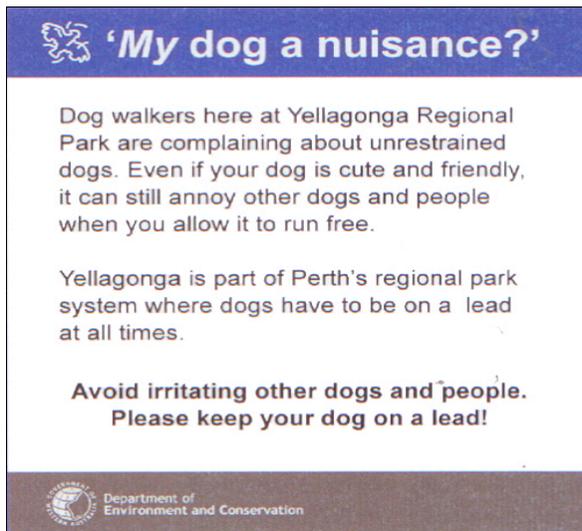


Figure 3. Message Intervention for Yellagonga Regional Park.



compliance rates and resultant belief scores, both against one another and a control condition to evaluate effectiveness. Data collection at Badger Weir occurred over several weeks during January and April, 2007. The behavior of 273 randomly selected visitor groups was unobtrusively observed. During the control phase (existing signage), 87 picnickers were observed, 118 during the *Your choice matters* treatment, and 68 during the *How to ruin someone else's picnic* treatment. Once determined to be compliers or non-compliers, a subsample was surveyed in which a total of 151 picnickers completed a questionnaire over the course of the interventions.

Owing to the small population, all dog walkers at the Yellagonga Regional Park site were observed and approached for involvement in the survey. Data collection occurred over eight weekends and 10 weekdays in January, February, and March 2007. A total of 230 dog walkers were observed, of which 150 agreed to complete a questionnaire. This included 105 surveyed during the control phase (existing signage, 61 compliers, 44 non-compliers) and 45 during the treatment phase (34 compliers, 11 non-compliers). This paper focuses on the results of this evaluation.

Data Analysis

Unless otherwise specified, all belief measurement data was analyzed with one-way ANOVAs and t-tests using the SPSS statistical package. All observational data was analyzed manually using Chi-square analysis. All statistical analysis was conducted at the $\alpha=0.05$ confidence interval.

Findings

A comparison of visitor data between sites revealed an interestingly high proportion of locally resident repeat visitors to both Yellagonga Regional Park and Badger Weir. In particular, visitors to Yellagonga repeatedly visited primarily on a daily or weekly basis, indicating a frequently repeated behavioral routine associated with dog walking. This is discussed further in the evaluation of the message treatments.

Interventions

Table 3 presents the results of observed behavior recorded at each site. The experimental conditions in the left-hand column represent the message interventions applied at each site. Badger Weir had two separate messages evaluated in addition to the control, while Yellagonga Regional Park had one message: intervention and control. For Badger Weir, the observational data shows the percentage of groups in which one member complied with the desired behavior under the treatment and control conditions. For Yellagonga Regional Park, the data shows the percentage of individual dog walkers observed to keep their dogs on leashes.

The Badger Weir observational data indicated a different result for each treatment. Under the control condition (in which the pre-existing signage was the only communication in place), 69% of visitor groups did not feed the birds. The *Your choice matters* treatment resulted in a 10% increase in compliance to 79%. Conversely, *How to ruin someone else's picnic* resulted in a 10% decrease to 59% compliance. Chi-square analysis indicated the statistical difference between compliance associated with the two treatments was significant $\chi^2(1, N = 118) = 8.46, p = 0.004$. However, the 10% increase from the control condition with *Your choice matters* $\chi^2(1, N = 118) = 2.56, p = 0.143$ and 10% decline from the control with *How to ruin someone else's picnic* $\chi^2(1, N = 118) = 1.72, p = 0.237$ were not significant. Thus, our observations of behavior suggest that neither intervention statistically outperformed the existing signage in terms of achieving compliance at Badger Weir.

Table 3. Observed Behavior under Control and Treatment Conditions.

Experimental Condition	Number of Visitor Groups observed	Number of Observed Compliers	Percentage Compliance
Badger Weir			
Sign 1 <i>Your choice matters</i>	118	93	78.8%
Sign 2 <i>How to ruin someone else's picnic</i>	68	40	58.8%
Control (existing signage)	87	60	69.0%
Yellagonga Regional Park			
<i>My dog a nuisance?</i>	125	96	76.8%
Control (existing signage)	105	61	58.1%

Observational data at Yellagonga Regional Park indicated about 58% of walkers in the study area kept their dog on the leash under the control condition (in which the pre-existing signage was the only communication in place). The treatment (*My dog a nuisance?*) was associated with an observed compliance within the study area of around 77%. The 19% difference in compliance rates between the control and treatment was significantly different $\chi^2(1, N = 118) = 9.22, p = 0.003$. In this case, the intervention appeared to have some impact on compliance rates over and above that of the pre-existing signs. It appears that the message intervention Yellagonga Regional Park resulted in increased observed compliance while the message interventions at Badger Weir had no additional influence over the pre-existing signage at the site.

To better understand the effect of the message interventions, the impact on the salient belief and attitude measures was analyzed for each site using one-way ANOVAs (Table 4). The statistical values are included in the final column. Direct attitude was measured using responses to separate attitude statements toward complying with the desired behavior. The sum of the cross products of the salient beliefs provided the belief-based attitude. According to the Elaboration Likelihood Model (Petty & Cacioppo, 1986), persuasion can occur either through a central route or peripheral route. If the message interventions achieved persuasion through the central route, significant differences in the targeted belief and one or both of the attitude measures ought to ensue. If an impact on the targeted belief did not occur, then the observed effect on behavior presumably would have occurred through the peripheral route (Ham, 2007). The difference between the two is important for parks managers, since it is well established that persuasion achieved through the central route is stronger, more enduring, and more predictive of message-relevant behavior in the future (Petty & Cacioppo, 1986).

Attitudinal analysis of the Badger Weir data suggested neither intervention was successful in achieving any kind of persuasive effect on beliefs. In both interventions, the cross-product of the belief it targeted was not statistically different from the control group. The Badger Weir findings suggest that despite the 20% greater success of *Your choice matters* in terms of behavioral compliance rates (79% versus 59%), neither intervention had an impact on the target belief or respondents' attitude to the behavior of not feeding birds.

Table 4. Comparison of Mean Cross-product and Attitude Scores for Target Salient Beliefs in the Control and Treatment Sign Groups.

Badger Weir	Control (n=32)	Sign 1 (n=55)	Sign 2 (n=63)	One-way Anova Results <i>F(df values) F stat, p value</i>
Birds not relying on humans for their survival (cross-product)	13.59	9.44	12.60	F (2, 147) = 2.075, p = 0.129 No differences
Birds will not harass people for food (cross-product)	10.03	8.07	11.11	F (2, 148) = 1.229, p = 0.295 No differences
Belief-based attitude	50.87	46.69	52.87	F (2, 140) = 0.330, p = 0.720 No differences
Direct attitude	14.21	15.18	15.13	F (2, 129) = 0.409, p = 0.665 No differences
Yellagonga Regional Park	Control (n=105)	Sign (n=45)		
Dog will be less of a nuisance (cross-product)	2.90	3.62		F (1, 148) = 0.017, p = 0.897 No difference
Other dog owners think I should keep dog on lead (cross-product)	2.17	2.88		F (1, 145) = 0.847, p = 0.359 No difference
Direct attitude measure	4.98	5.31		F (1, 147) = 0.827, p = 0.365 No difference
Belief-based attitude	3.47	7.02		F (1, 147) = 3.224, p = 0.075 No difference

The lack of influence of the message interventions at Badger Weir could perhaps be a function of bird feeding as a habitual behavior among visitors. To assess this, we compared the frequency of compliers among first-time and repeat visitors. We reasoned that if repeat visitors were more likely to feed the birds than first-time visitors, the behavior might be more ingrained, and therefore less amenable to persuasive influence. In addition, we compared the mean prior intentions of repeat and first-time visitors. If bird feeding is habitual among repeat visitors, their prior intentions should lean more toward non-compliance (feeding) as compared to first-time visitors. A comparison of the compliance rates of first-time and repeat visitors demonstrated first-time visitors were significantly less likely to feed the birds (94% versus 71%; $\chi^2 (1, N = 118) = 13.689, p = 0.000$). In addition, the prior intention of repeat visitors leaned in favor of feeding the birds, whereas first-time visitors were decidedly in favor of not feeding the birds ($F (1, 149) = 13.66, p = 0.000$). Taken together, these findings provide evidence that feeding the birds at Badger Weir may be a comparatively entrenched use pattern by frequent repeat visitors and not amenable to persuasive influence.

As a further test of this hypothesis, an analysis of intervention impacts only on first-time visitors' key belief cross-products and attitude measures, then just repeat visitors, was conducted (Table 5). When only first-time visitors are considered, *How to ruin someone else's picnic* outperformed the control condition in its impact on the target belief (not feeding birds will lead them to not harass people for food). Notably, *How to ruin someone else's picnic* outperformed *Your choice matters* on the belief that "not feeding birds will mean that they won't rely on humans for their survival," even though the other intervention targeted this belief. This result suggests a type of effect Fishbein and Ajzen (1981) termed "impact," in which a strong, persuasive effect on a salient belief can lead to impacts on other beliefs not specifically mentioned in the message. Neither intervention produced a significant change in the belief-based attitude. This was possibly because so many salient beliefs were involved that a change in more than half of them would be required to make a significant difference in overall attitude, particularly considering the small and unequal sub-sample sizes. Performing the same analyses on the sub-sample of repeat visitors showed no significant differences between the interventions and control for any belief or attitude. These findings point to a significant difference between first-time visitors and repeat visitors, possibly because of a habitual influence on the latter. That is, the repetition of bird feeding over a period of time appears to be associated with increased resistance to messages intended to passively influence this behavior.

Yellagonga Regional Park results present a more complex picture. Despite the increased observed compliance during the message intervention, results of the belief and attitude analysis suggest the intervention was not successful in achieving any kind of persuasive effect. In addition, neither measure of subjective norm (direct or belief-based)

Table 5. Comparison of Badger Weir First-time Visitors' Mean Cross-product and Attitude Scores for Control and Treatment Sign Groups (n = 71)

	Control (n=17)	Sign 1 (n=31)	Sign 2 (n=23)	Statistically significant differences $\alpha=0.05$
Birds not relying on humans for their survival (cross-product)	13.06	7.65	15.30	Sign 2 > Sign 1 ($t = -3.38, df = 50, p = 0.01$)
Birds will not harass people for food (cross-product)	6.76	1.16	13.52	Sign 2 > Control ($t = -3.62, df = 38, p = 0.000$) Sign 2 > Sign 1 ($t = -4.16, df = 51, p = 0.000$)
Belief-based attitude	60.06	39.70	55.36	$F(2,64) = 3.002, p = 0.058$ No differences
Direct attitude	13.76	15.74	17.32	Sign 2 > Control ($t = -1.68, df = 36, p = 0.02$)

nor attitude (direct or belief-based) changed significantly as a result of the intervention. Although the belief-based attitude for the Yellagonga Regional Park treatment condition was more than twice that of the control group, it fell short of significance possibly due to the unequal sizes of the two samples. This combination of results (a significant impact on immediate behavior accompanied by a modest impact on the belief-based attitude in the absence of an impact on targeted beliefs) suggests that the 19% increase in compliance was possibly due to a peripheral-route persuasive effect. That is, respondents may not have engaged entirely with the intervention message but instead reacted to a non-message cue such as the authoritative source of the message (DEC) or the presence of the data collectors. Unfortunately, this cannot be verified without additional data. Note also, that since the range of the four-item belief-based attitude was -36 to +36, these rather small means (3.47 and 7.02, respectively) show that neither group's attitude toward keeping their dogs on a leash was very positive. So while a peripheral-route persuasive effect might have occurred in the immediate time frame, the observed difference in compliance rates is probably ephemeral. The data supports this in the intervention's lack of measured impact on any relevant belief combined with a failure to produce a stronger attitude impact. This is consistent with ELM studies that have found peripheral-route impacts to be short-lived and behaviorally unpredictable beyond a short time frame (Petty & Cacioppo, 1986; Petty, McMichael, & Brannon, 1992).

The apparent contradiction between observed behavior and belief measures might alternatively be a function of the research project itself rather than the treatment applied to the park. That is, the differences in results between observed behavior and measured beliefs may be explained in terms of dislocation of behavior or avoidance behavior on the part of non-compliers. Observations by the data collectors corroborate this interpretation. They reported some respondents kept their dogs on a leash only as long as they felt they were in view of the researchers. In some cases, respondents who were initially recorded as compliers by a data collector were later observed letting their dogs off the leashes. It is also possible that in some cases the same respondents who complied on the day they were interviewed might well have let their dogs run free the next day.

As with Badger Weir picnickers, Yellagonga Regional Park attracts a significant proportion of repeat users who walk their dogs in the park. Of the 150 dog walkers surveyed, 94% were repeat visitors who lived adjacent to the park. They primarily walked their dog in the area on a daily or weekly basis. Thus, it is possible that repeatedly walking dogs at Yellagonga Regional Park falls into the category of habitual behavior. Owing to the dominance of repeat visitors in the sample, relational statistical comparisons between repeat and first-time visitor behaviors were not possible. Consequently, we compared the mean prior intentions of compliers and non-compliers to gain some insight into the strength of their pre-arrival dispositions.

Results of this analysis indicate that walking the dog on or off the leash is associated with a strong prior intention to do so. Non-compliers arrived with a strong intention in favor of walking their dogs off the leashes, while compliers leaned decidedly toward the intention to walk with their dogs on the leashes ($\chi^2 = 67.17$ $df = 6$; $p = 0.000$). Given the very high repeat visitation by local resident dog walkers to Yellagonga, their daily or weekly frequency of repeat visitation, and their strong intentions toward non-compliance, it may be assumed that dog walking behavior at Yellagonga Regional Park is habitual in nature. Thus, dog walking behavior may not be very amenable to on-site persuasive influence. Dog walkers at Yellagonga Regional Park appear committed to compliance or non-compliance prior to arriving at the site, possibly out of habit and possibly because they do not think viable alternatives exist.

Conclusion and Implications

In terms of an experimental evaluation of applying theory-based messages targeting a range of visitor behaviors, it is apparent that the theory and methodology in this study were successful. More than 90% of first-time visitors at Badger Weir did not feed the birds, while at Yellagonga Regional Park, the intervention led to a 19% increase in walkers keeping their dogs on leashes. While circumstances at Yellagonga suggest the behavioral impact might be at least partially due to non-message factors (such as the presence of the research team), the increase in dog walkers who kept their pets on leashes is encouraging, because it suggests that a combination of communication and direct management has potential to address the problem.

Both Badger Weir picnickers and Yellagonga dog walkers demonstrated evidence of habitual or entrenched repeated behavior. Habitual behaviors are difficult to influence using persuasive communication. The lack of reasoning in the performance of habitual behavior means it is less amenable to persuasive influence (Aarts et al., 1998; Conner & Armitage, 1998; Manfreda & Bright, 1991; Verplanken & Orbell, 2003). At both sites, repeat visitors had strong prior intentions toward non-compliance. Despite overall increases in compliance at the two sites, in neither case did tested interventions successfully influence the salient beliefs or corresponding attitudes of these highly experienced visitors. This presents an additional challenge to park managers. Visitors who engage in habitual behavior require an alternative approach involving different messages and delivery systems to their counterparts. Such efforts might begin in the communities where local repeat visitors live, using a campaign style of communication.

While the message interventions may not have effectively influenced beliefs in relation to the habitual behaviors at Yellagonga and Badger Weir, the approach enabled an identification of why this was so. Thus, evidence was accessed in terms of why the messages may not have worked as intended and that alternative management approaches may be required. In some cases, direct management techniques such as patrolling and actively enforcing policy violations may be necessary. Alternatively, a broader community-based campaign of education could be applied.

The effectiveness of the communication interventions was based on the elicitation of visitor beliefs. These identified the salient visitor beliefs underlying each of the target behaviors as opposed to managers making educated guesses. Without these careful analyses in advance of designing the interventions, the selection of beliefs to target, and ultimately the messages themselves, may have missed the mark. A strong recommendation for informing persuasive communication interventions is to begin with a careful belief elicitation phase. This is essential in identifying the salient beliefs that actually underlie the visitor behavior in the specific setting. Intuiting the beliefs, or guessing at them based on personal experience or the results of studies conducted elsewhere, will almost certainly render the messages based on them error prone if not completely ineffective.

Several research implications for park managers were derived from this study:

- A TPB approach enables managers to identify and measure beliefs regarding a specific behavior, enhancing their ability to influence that behavior.
- A TPB-based approach can inform managers as to why a specific message intervention did or did not work.
- Attempts to alter visitors' beliefs about behaviors they have performed many times previously are not likely to be successful in influencing the behavior.
- Highly experienced visitors might require a management approach involving additional interventions such as incentives, disincentives, rewards, and punishments.

- Behaviors deemed habitual require a broader communication strategy targeting the communities where local repeat visitors live, using a campaign style of communication.

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