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The challenge of self-enhancement bias for educational programs designed to encourage natural shorelines

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Abstract

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This study proposed and found support for a potential barrier to successful implementation of programs designed to promote natural shorelines along residential property. Increased residential development around lakeshores in the Upper Midwest is associated with reduced wildlife habitat, lower biodiversity, and degraded water quality compared to undeveloped shorelines. Property owners can reduce the impact of shoreline development through personal choices, such as planting native vegetation or allowing natural flora to regrow. Various educational programs encouraging more natural shorelines have been implemented; however, evaluative research on their success and studies about improving these programs are scant. This study explored how the phenomenon of self-enhancement bias may cause property owners to over-estimate the natural state of their shorelines, preventing remedial action they otherwise might take if a more accurate self-assessment were available. Surveys were mailed to 212 property owners on 2 lakes in northwest Wisconsin. Biologists' assessments of the "naturalness" of each property parcel's shoreline were compared with survey data from residents indicating their own perceptions about how natural their shorelines were. Results revealed that residents evaluated their own shorelines significantly more natural than did the biologists. This pattern is consistent with the hypothesis that self-enhancement bias may be a barrier to educational programs designed to encourage more natural shorelines among lakeshore property owners. Based on these findings, the authors offer recommendations for lake and water resource managers to potentially improve the efficacy of such programs.

Key words: bias, choices, conservation, decision making, education, evaluation, lakes, motivated cognition, natural shorelines, self-enhancement, self-evaluation

Residential development around lakeshores in the Upper Midwest has increased significantly in recent decades (Baker et al. 2008), and the recently completed National Lakes Assessment survey (US EPA 2010) listed disturbance to lakes from shoreline development as the number one threat to lakes. Restoration of impaired waters is gaining increasing attention across the United States (Welle and Hodgson 2011). Fortunately a variety of actions are available to property owners to mitigate the impact of development, such as selectively planting native vegetation or allowing remnant natural vegetation to grow in the near-shore zone

of their property and the littoral zone along it. The benefits of more natural shorelines may include increased plant diversity (Elias and Meyer 2003), reduced algae (Rosenberger et al. 2008), higher numbers of animals such as frogs and native birds (Lindsay et al. 2002, Woodford and Meyer 2003, Henning and Remsburg 2009), as well as larger and more abundant fish populations (Radomski and Goeman 2001, Helmus and Sass 2008).

Although these benefits are well known to biologists, many property owners choose to maintain various harmful aspects of more suburban style landscaping on their lakeshore lots, such as removing natural vegetation, planting expansive lawns, and applying excessive fertilizer. This article

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presents a study of 2 lakes in northwest Wisconsin and hypothesizes a potential barrier to effective public participation of residents in these programs. Specifically, we explore how the well-established phenomenon of self-enhancement bias may influence property owners to overestimate the natural state of their shoreline and prevent remedial actions they otherwise might take if a more accurate assessment were available. After reviewing empirical findings and the theoretical background, we compare biologists' assessments of the "naturalness" of each property parcel's shoreline with survey data from residents indicating their own perceptions about the state of their shoreline property.

Managing lakeshore property can be viewed as representing a range of possible behaviors from actively maintaining a highly groomed shoreline (e.g., manicured lawns, raked beaches) on one end of a spectrum, to allowing the shoreline to grow completely natural on the other end of the spectrum. Many property owners choose a groomed state, but from a water resources and habitat perspective, a more natural state is preferred; therefore, a goal of some conservation programs designed to protect local lakes is to encourage property owners to refrain from or minimize mowing, removing natural plants or trees, or otherwise grooming their shoreline.

For programs that encourage more natural shorelines, owners with less natural shorelines must evaluate their property and determine it to be more groomed than they believe is desirable. When an individual evaluates his or her own shoreline, however, that person is subject to cognitive biases that are not present when evaluating the shoreline of a third party. An individual's shoreline is an extension of his or her self; they own it, and its current state is a direct result of past choices and behaviors. Evaluating one's own property is a form of self-evaluation, and because people like to think of themselves as good and intelligent we are biased to evaluate ourselves and our property favorably. If an individual were to accept that his or her shoreline were in an undesirable state for protecting water quality and wildlife habitat, then the individual would also have to accept that fact as a consequence of his or her own actions, and that some of those decisions had been unwise. This is an unpleasant thought that most individuals would be motivated to avoid.

The process described above is an example of what psychology literature refers to as motivated cognition. Motivated cognition (Kunda 1990) was developed from the theory of cognitive dissonance. In its original formulation, cognitive dissonance theory stated that holding 2 contradictory beliefs creates an unpleasant cognitive state for an individual, which causes that individual to change one or both of the beliefs to reduce the unpleasantness by making them more compatible with one another (Festinger 1957). Refinement of the theory suggests that cognitive dissonance and the accompanying desire to reduce it are aroused only under conditions that

threaten one's self-image as a good and intelligent person (Aronson 1968, Greenwald and Ronis 1978, Kunda 1990). Again, in our case, the threat for property owners is that a more objective, accurate evaluation of their shoreline may reveal that it is more groomed than is ideal; if they believe that a natural shoreline is desirable, this puts them in the uncomfortable position of acknowledging that they have made choices about landscaping near their lakeshore that are not in accordance with their beliefs. Holding the 2 beliefs "natural shorelines are good" and "my shoreline is not in a natural state" would be expected to cause unpleasant dissonance for an individual, a situation that individual would be motivated to avoid. This motivation could unconsciously influence the individual's evaluation of their shoreline, biasing them to evaluate it more positively than they otherwise might. Prominent theories of behavior change, including the theory of planned behavior (Ajzen 1985) and the theory of reasoned action (Ajzen and Fishbein 1980), also suggest that a precondition of behavior change is that an individual believes their current behavior is not in alignment with a desired outcome (e.g., protecting their lake). If a property owner views his or her own shoreline overly favorably due to this known perceptual bias in human cognition, such a misperception would reduce the likelihood that the owner would take steps to change behavior and restore the shoreline to a more natural state.

Motivated cognition has been validated in a variety of contexts where people have a disproportionate tendency to favorably assess their material environments (Balcetis and Dunning 2006, 2007, 2010) and positively evaluate themselves and their past behaviors (Kunda and Sanitioso 1989, Sanitioso et al. 1990). Furthermore, self-enhancement seems to be greatest for ambiguous evaluations, which could be defined in multiple ways compared to evaluations with more strict definitions (Dunning et al. 1989).

For our purposes, while it is convenient for us to dichotomize the state of shorelines as "natural" or "groomed," in reality they fall somewhat ambiguously on a continuum. By definition, residential shoreline property makes a transition from a built environment (the house) to a natural ecosystem (the lake). How far from the water's edge does the "shoreline" extend? Does tall grass count as natural, or must shrubs and trees be present? How many shrubs? How many trees? Authoritative answers to questions such as these may not be readily available, and owners may find few examples of natural shorelines around the lake for comparison. The inherent ambiguity in the transition from house to lake is fertile ground for self-enhancement bias in their evaluations as a result of the process of motivated cognition described above.

The consequences of such bias can manifest not just in beliefs, but also in behaviors. An experiment on water conservation in California used the "hypocrisy paradigm" to

leverage cognitive dissonance for encouraging participants to take shorter showers (Dickerson et al. 1992). The randomized study compared shower durations for control participants to participants who were made explicitly aware of their past water consumption via a series of questions. They found that participants who answered the questions and made a public commitment to conserve water took significantly shorter showers than control participants. Although at the beginning of the experiment all participants agreed that conserving water was a worthwhile goal, asking participants in the experimental condition to explicitly and objectively consider their past water usage through the experimenter's questions made them more aware of that belief, as well as more objectively aware of their past behavior. To reduce the unpleasant cognitive dissonance of simultaneously valuing water conservation and realizing they had wasted water in the past, participants changed their behavior. Beyond the domain of environmental resource conservation, Dunning et al. (2004) reviewed empirical behavioral findings across 3 domains—health, education, and the workplace—and found significant negative behavioral impacts from inaccurate self-assessments in all 3.

This study's hypothesis is that property owners will show a general bias to evaluate their personal shoreline more positively than an evaluation by an objective observer because the owners are motivated to avoid the self-threatening conclusion that their actions and decisions have caused their shoreline to be in an undesirable state. If this hypothesis is correct, then we should expect a substantial discrepancy between homeowners' lay assessments of their own shorelines and assessments of the same properties conducted by others. Finding such a result would suggest that providing property owners with more objective information about the states of their properties, either directly or with self-evaluation tools, may be a useful strategy for promoting natural shorelines.

Methods

We tested our hypothesis with a sample of 212 lakeshore property owners in northwestern Wisconsin around 2 small lakes with no inlet or outlet, classified as seepage lakes: Long Lake (251 ac) and Des Moines Lake (229 ac) in Burnett County (Figure 1). Two professionally trained biologists categorized individual property parcels' shorelines from a boat and focused on the area within 35 feet of the lake edge, the area of the lakeshore regulated by Wisconsin's shoreland zoning standards and administered by county zoning staff. The biologists used 3 categories of decreasing naturalness—natural, mixed, and groomed—based on disturbed square footage using a visual shoreland assessment survey methodology developed by personnel at the Wisconsin Department of Natural Resources (D Conkil, WDNR,

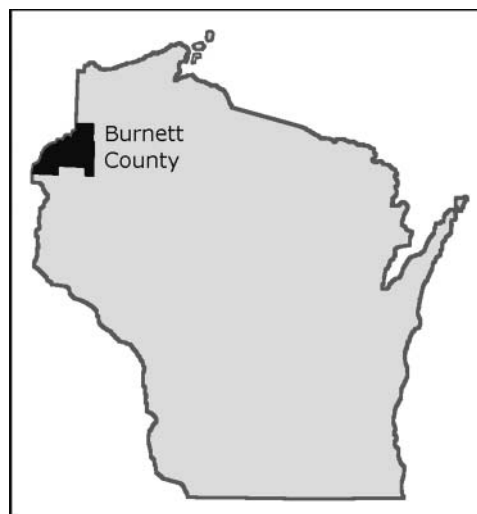


Figure 1.—Study area in Burnett County, Wisconsin.

2010, pers. comm.). The methodology is similar to that used by the Score Your Shore manual published by the Minnesota Department of Natural Resources. The biologist's ratings were then compared with survey responses from the properties' owners.

Surveys were initially mailed to residents on 7 July 2008. Reminder postcards were sent to 180 owners who had not returned the survey within 1 week, and a second survey was mailed on 24 July to the 155 owners who had not yet responded. The focal survey question asked residents to rate the current state of their property's shoreline (35 foot wide strip of land parallel and adjacent to the lake edge on each property) as "completely natural," "part natural and other parts manicured," or "all well manicured and maintained." The 3 points of this rating scale approximately corresponded to the 3 categories used by the biologists.

Analysis

Our hypothesis that shorelines would be rated more natural by their owners than by the biologists was tested in 2 steps. First, a single "bias" score was calculated for each resident from their property's 2 ratings (one from the biologists, the other from the owner). Because both ratings assessed 3 categories of the degree to which shorelines were natural, bias scores could be calculated by subtracting the resident's rating from the biologist's rating. A resulting bias score of 0 would indicate no bias; the resident and the biologist were in complete agreement. A positive bias score would indicate that the resident evaluated their shoreline as being in a more natural state than the biologist's rating, either by 1 or 2 categories. Conversely, a negative bias score would indicate that the resident rated their property as less natural than the

Challenge of self-enhancement

Table 1.-Range of possible bias scores. Bias scores were calculated as the difference between the biologists' evaluation and the property owner' self-evaluations.

| | Biologists' Evaluation | | |
|--|------------------------|--------------|----------------|
| | Natural (1) | Mixed (2) | Groomed (3) |
| Property owners' self-description of shoreline | | | |
| natural (1) | 0 | +1 | +2 |
| mixed (2) | -1 | 0 | +1 |
| groomed (3) | -2 | -1 | 0 |

biologist's rating (Table 1). For example, if a property was rated by the biologist as groomed but the property owner rated it as natural, the bias score would be calculated as 3 minus 1, resulting in a bias score of +2, suggesting that his or her self-evaluation may have been affected by self-enhancement bias. After calculating a bias score for each respondent, a single sample t-test was used to test whether systematic bias was present in our sample (i.e., whether the grand mean of the bias scores was reliably different from zero).

Results

Of the 212 households contacted, 163 returned completed surveys, yielding a response rate of 78%. Only 17% of respondents lived on the lake year-round, while 83% were seasonal residents. The average age of respondents was 59, with a minimum age of 40 and a maximum age of 84.

The biologists' evaluations included 41 properties rated as natural (25%), 40 rated as mixed (25%), and 82 rated groomed (50%). Among owners, 67 rated their properties as completely natural (41%), 91 rated them as part natural and other parts manicured (56%), and only 5 rated their property as all well manicured and maintained (3%; Table 2). Notably, of the 82 properties that the biologist rated as groomed, 20 (24%) were rated by their owners as natural, and 58 (71%) were rated by their owners as mixed. Only 4 (5%) agreed with the biologist and rated their properties as all well manicured and maintained (Table 2).

A histogram of respondent bias scores (Fig. 2) shows that 60% of property owners had a positive bias score. The mean bias score was significantly different than zero, $t(162) = 9.79, p < 0.0001$.

Discussion

This study investigated a potential barrier to public participation in efforts to promote lake health. Specifically, we tested the hypothesis that self-enhancement bias for posi-

Table 2.-Distribution of bias scores. Cell values show the number of properties at each combination of biologist and resident ratings. Parentheses show the bias score associated with each combination, repeated from Table 1.

| | Biologists' Evaluation | | |
|--|------------------------|---------|---------|
| | Natural | Mixed | Groomed |
| Property owners' self-description of shoreline | | | |
| natural | 27 (0) | 20 (+1) | 20 (+2) |
| mixed | 13 (-1) | 20 (0) | 58 (+1) |
| groomed | 1 (-2) | 0 (-1) | 4 (0) |

tive self-evaluation could cause property owners to evaluate their own shorelines as more natural than biologists' evaluations. The results are consistent with that hypothesis. A highly significant majority of survey respondents evaluated their property's shoreline as being more natural than it was evaluated by the biologist.

An important limitation to the findings of this correlational study is its assumption that at the time they completed the survey, property owners believed that a natural state for their shoreline was in at least some ways desirable. One reason to believe that assumption is likely valid is that since 2000, Burnett County (the county of our sample) has offered a Shoreline Incentive Program to promote natural shorelines. Enrollment in this program requires property owners to leave their shore in a natural state for perpetuity. In exchange they receive an enrollment payment of \$250, a credit of \$50 per

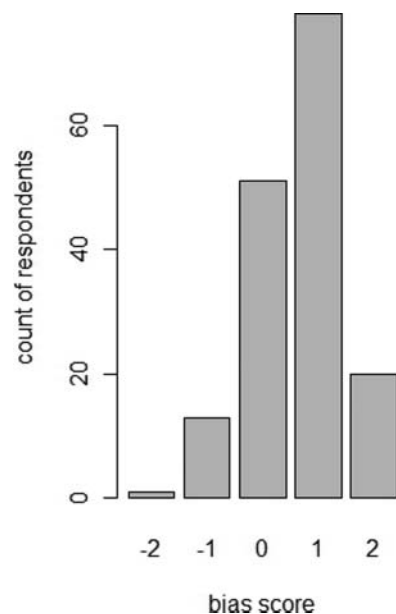


Figure 2.-Histogram of bias scores. Positive bias scores suggest self-enhancement bias.

year off of their property taxes, and other benefits. Participating residents were also asked to display a sign featuring the name of the program and a program logo for their neighbors to see. While future research should address this limitation, it is reasonable to expect most residents had likely come into contact with the pro-natural message of that program or others, either through mass or personal communication or via the signs.

An additional limitation arises from potential differences between the set of categories used by the biologists and the scale used by the property owners. One important difference may be the timeframe considered for the evaluation; the biologists had only a 1-day “snapshot” view of the shoreline, whereas the owners may have considered longer-term habitual maintenance. Fortunately, if this were a source of random noise in the ratings, we would expect a statistically equal number of properties to have been viewed on days when they were more groomed than normal as properties viewed on days when they were less groomed than normal. If it were a source of systematic noise in the ratings, for example if a majority of property owners believed that their shoreline was typically less groomed than it appeared on a particular day, that would be consistent with previous findings on the influence of self-enhancement bias on memory of past behaviors (Klein and Kunda 1993). In either case, this potential temporal difference in the rating systems would not alter our conclusions.

An alternative explanation of our results is that study participants may have bought or inherited their lakeshore property in a groomed or manicured state and falsely believed that its state at that time was its natural state. Such a belief could contribute to the perception that the shoreline is more natural than justified by objective criteria, reducing the likelihood that the owner will take steps to restore the shoreline to a more natural state.

Another possible explanation for the results is the considerable difference in ecological knowledge possessed by property owners and the biologists. By definition a biologist is an expert, while the public are generally novices regarding lake ecology, and the majority of residents in our sample were likely less skilled at objectively evaluating the state of their shorelines as compared with the biologists. This explanation is not exclusive with the self-enhancement explanation we have offered, however. Both forces likely contributed to the higher naturalness ratings given out by the owners than by the biologist, and achieving an accurate evaluation of one’s shoreline requires both knowledge of characteristic natural features and an ability to overcome self-enhancement bias.

Further study could investigate the relationship between knowledge and self-evaluation in this domain and add support to the hypothesis that self-enhancement bias affects

property owners’ evaluations of their shorelines. While in the current study each owner rated only one shoreline (their own), a future experiment could ask owners to rate photos of the shorelines of multiple participants in addition to their own. If self-enhancement bias is an important factor, we would expect the rating each owner gives his or her personal shoreline to be higher than the average rating received from other participants. Future studies could also include measures of other variables likely to affect property owner beliefs, attitudes, and behaviors related to their shoreline. One important variable is knowledge of lake ecology, which could be measured by asking respondents to indicate agreement or disagreement with a mix of correct and incorrect statements that vary in difficulty. Another important construct is a property owner’s perceived desirability of a natural shoreline, aggregated along multiple dimensions including aesthetic preference, ethical responsibility, and normative social pressure. Multiple indicators and reverse coding could be used to increase the reliability of the instruments designed to measure those constructs. Questions asking about past shoreline maintenance behavior such as mowing frequency, changes to the shoreline since purchasing the property, and whether maintenance is performed by the owner or a professional landscaping company would provide a richer view of behavior than the temporal snapshot available in the current study. Lastly, multiple measures of perceived shoreline naturalness could be used to capture more variance between property owners than was available with the 3-point scale used in the current study.

Our results suggest that agencies can promote natural shorelines by providing property owners with tools to reach objective evaluations of their shorelines’ current states and make better informed decisions. One such tool is currently offered by the Minnesota Department of Natural Resources. The *Score Your Shore Manual*, and the companion *Score Your Shore Quick Guide*, encourages lake groups and lake property owner to self-assess the state of their shoreline and to consider behaviors that would restore more natural conditions where appropriate (Minnesota Department of Natural Resources 2010).

Programs that seek to encourage natural shorelines by providing objective evaluation tools must also include a mechanism to reinforce the desirability of a natural shoreline. If this is not done, then objective self-evaluation tools could actually have the unintended effect of decreasing natural shorelines, the so called “boomerang effect.” This could happen because owners of groomed shorelines might respond to the threat to self from a negative evaluation by changing (i.e., diminishing) their belief in the importance of a natural shoreline to match their behavior, rather than changing their behavior to match their belief. Recent research suggests that affirmation or reinforcement of a belief

(i.e., natural shorelines are desirable) can be effective at preventing such a boomerang effect, so long as it takes place before the evaluation is conducted (Critcher et al. 2011).

This study sought to provide water resource managers with information about why some lakeshore property owners may choose to maintain their shorelines in a less natural state, even if doing so reduces the overall health of the lake. We presented evidence consistent with the hypothesis that a significant percentage of property owners hold an overly favorable view of their shoreline, falsely believing it to be in a more natural state than it truly is due to self-enhancement bias. Such a misperception could be a potential barrier preventing change in shoreline landscape maintenance behavior by some property owners who agree with the value of a natural shoreline but currently maintain their shoreline in a less natural state because they believe it to be more natural than it really is. More work is needed to further test that hypothesis and the interaction of self-enhancement bias with other variables such as knowledge, but if correct it could provide valuable insight into the decision-making process of individual property owners by identifying a previously unacknowledged barrier to natural shoreline restoration.

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