Methodological Issues in Measuring Crowding-Related Norms in Outdoor Recreation

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Based on theoretical and methodological similarities between research on recreation-related norms and contingent valuation, three methodological issues—question format, starting point bias, and information bias—are explored as they apply to measuring crowding-related norms of visitors to two national parks. Few statistically or substantively significant differences in crowding-related norms were found to be associated with these methodological issues. Study findings suggest that measures of crowding-related norms may be relatively “robust,” and this may add weight to the “validity” of the theory and methods associated with crowding-related norms in outdoor recreation.

Keywords crowding, norms, outdoor recreation, methodology

Normative theory and methods have attracted increasing attention in outdoor recreation research and management. In particular, norms may have special application to setting standards of quality for recreation experiences. As applied in outdoor recreation, norms are generally defined as standards that individuals and groups use for evaluating behavior and social and environmental conditions (Donnelly, Vaske, & Shelby, 1992; Shelby & Vaske, 1991; Vaske, Graefe, Shelby, & Heberlein, 1986). If recreation visitors have normative standards concerning relevant aspects of recreation experiences, then such norms can be measured and used as a basis for formulating standards of quality. Standards of quality are a vital part of contemporary park and outdoor recreation management frameworks, including Limits of Acceptable Change (Stankey, Cole, Lucas, Peterson, Frissell, & Washburne, 1985), Visitor Impact Management (Graefe, Kuss, & Vaske, 1990) and Visitor Experience and Resource Protection (Manning, 1998; Manning, 1999; National Park Service, 1997).

Theory underlying norms and its application in the context of outdoor recreation has been the subject of ongoing discussion in the scientific and professional literature. For

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example, it has been argued that norm theory may not apply to outdoor recreation because
resulting "norms" (1) may not be enforced by any type of social sanction, (2) may not
involve modifications of personal behavior, and (3) may not be widely shared across social
groups (Heywood, 1996a; Heywood, 1996b; Noe, 1992; Roggenbuck, Williams, Bange, &
Dean, 1991). Alternatively, it has been argued that a more expansive interpretation of norm
theory be adopted in outdoor recreation based on the rationale that (1) outdoor recreation
may involve emerging norms for which strong sanctions and a sense of obligation have yet to
fully evolve, (2) recreation-related norms may apply to social and resource conditions as well
as behavior because such conditions are a function of individual behavior, (3) recreation-
related norms may regulate collective rather than individual behavior; and (4) research has
documented some degree of consensus regarding a number of recreation-related norms
(Donnelly et al., 1992; Shelby & Vaske, 1991).

Research attention has only recently begun to focus on methodological issues associ-
ated with measuring recreation-related norms. For example, visual approaches to measuring
crowding-related norms have been developed, and this approach may have special applica-
tion in high-density recreation areas (Manning, Lime, Freimund, & Pitt, 1996; Manning,
Lime, & Hof, 1996). Alternative evaluative dimensions used to measure recreation-related
norms have also been explored (Manning, Valliere, Wang, & Jacobi, 1999). Articles by
Hall, Shelby, and Rolloff (1996) and Hall and Roggenbuck in this volume also explore
methodological issues associated with measuring crowding-related norms. The purpose of
this article is to continue to expand methodological research. Three methodological issues—
question format, starting point bias, and information bias—are explored as they relate to
measurement of crowding-related norms in national parks.

Methodological Issues
Review of scientific literature in fields of study related to recreation-related norms can
be suggestive of a number of methodological issues that warrant research attention. For
example, a recent review of literature on both normative standards (as applied to parks and
outdoor recreation) and contingent valuation (as applied in the field of resource economics)
identified a number of theoretical and methodological issues common to both areas of
research (Manning, Lawson, & Frymier, 1999). From a broad theoretical standpoint, both
of these areas of research—contingent valuation and normative standards—are concerned
with exploring respondents’ thinking with respect to provision and management of natural
resources (e.g., the economic value of visiting a national park, or the acceptable number
of other park visitors). Moreover, from a similarly broad methodological standpoint, both
areas of study rely primarily on survey research (i.e., they elicit from respondents a dollar
value of visiting a national park, or the acceptability of encountering a range of other park
visitors). Based on comparative review of the literature in both of these areas of research,
three methodological issues were selected for study as they might apply to measuring
crowding-related norms in outdoor recreation.

Question Format
Application of normative theory to outdoor recreation relies on survey methods. Thus, issues
of question format are pertinent. A principal issue concerns attempts to reduce respondent
burden: how can questions be asked so they are easier or less time-consuming to answer,
or both? The choice of question format can have a substantive influence on the amount of
time involved in responding to survey questions, and might affect the answers ultimately
derived. In the outdoor recreation literature, this issue has been manifested in the form of “long” or close-ended questions (sometimes called the repeated item format) versus “short” or open-ended questions (Manning, Valliere et al., 1999; Hall & Roggenbuck, 2002). The former ask respondents to evaluate multiple levels of recreation-related impacts (e.g., a range of density levels), while the latter asks respondents to simply report the maximum level of impact acceptable.

Contingent valuation research, which has become a common approach to measuring the economic value of public goods, has focused considerable attention on the issue of question format, or “elicitation technique,” as it is often referred to (Manning, Lawson, & Frymier, 1999). Mitchell and Carson (1989) identify nine elicitation methods used in contingent valuation research, categorized by whether respondents report an actual economic value for the resource (i.e., willingness to pay), and whether a single valuation question or a series of questions is asked.

The most widely used elicitation methods in contingent valuation research have been open-ended (direct question), and dichotomous choice (“yes” or “no”). In open-ended questions, respondents are asked to state a maximum dollar amount they would be willing to pay for the resource being valued. In dichotomous choice (close-ended) questions, respondents are told how much each individual would have to pay for the resource, and then asked to indicate whether they would be willing to pay that amount. The dichotomous choice method is so named because only two responses (“yes” and “no”) are available (Arrow, Solow, Portney, Learner, Radner, & Schuman, 1993).

Both the open-ended and dichotomous choice question formats have advantages and disadvantages for survey research (Loomis, 1990). Using open-ended questions is a more direct measure of willingness to pay, or in normative research, an individual’s normative standard. However, the open-ended format is more burdensome to respondents as it requires them to offer a response with little or no assistance. As a consequence, the open-ended question format potentially increases the likelihood that respondents will not answer the question. For example, in the contingent valuation literature, there tends to be an unacceptably large number of nonresponses and zero bids from individuals with actual willingness to pay values greater than zero (Desvousges, Smith, & McGivney, 1983).

The dichotomous choice question format provides a potential improvement over the open-ended question format in that respondent burden is substantially decreased. However, responses to dichotomous choice questions only provide a bound on individuals’ actual willingness to pay, (or normative standard), and therefore a relatively large sample size is needed to estimate willingness to pay (or a normative standard). These issues are explored in this article by examining the affect of three question formats—long, short and dichotomous choice—on crowding-related normative standards of hikers at Arches National Park, Utah.

Starting Point Bias

Findings from contingent valuation research suggest that the efficiency of the dichotomous choice research approach can be increased if the dichotomous choice question is followed by further dichotomous choice questions (Carson, Hanemann, & Mitchell, 1986). This elicitation technique is referred to in the contingent valuation literature as single-bounded or multiple-bounded dichotomous choice, depending on the number of follow-up questions. However, the use of single-bounded and multiple-bounded dichotomous choice question formats may result in “starting point bias.” In the context of contingent valuation research, starting point bias concerns the degree to which an initial bid amount proposed for the
resource being valued may ultimately influence the willingness to pay estimated in the study. Contingent valuation studies that use a single-bounded or multiple-bounded dichotomous choice format ask the respondent to indicate with a "yes" or "no" response whether they would be willing to pay a proposed dollar amount for the resource. The next question poses a higher dollar value for those individuals who selected a "yes" response to the previous question, and a lower dollar value to those individuals who responded "no." Starting point bias is a concern if the initial dollar amount proposed affects the magnitude of willingness to pay estimated in the study (e.g., higher starting bids result in greater willingness to pay values than lower starting bids).

Similarly, in visual (or more conventional narrative/numeric) approaches to normative research, the order in which photographs (or narrative/numeric descriptions) of recreation-related impacts are presented to respondents could potentially bias responses. For example, a respondent may reveal one set of norms if the order in which photographs are presented depicts greater impacts first, followed by lesser impacts, than if the order were reversed. Several studies have explored the issue of starting point bias in the contingent valuation literature, but findings are inconclusive (Rowe, D'Arge, & Brookshire, 1980; Desvousges et al., 1983; Thayer, 1981). In this article, we explore the issue of starting point bias as it relates to normative research, using data from a study of day hikers in Grand Canyon National Park, Arizona.

Information Bias

Studies from contingent valuation suggest that the amount and type of information provided in surveys can influence responses. For example, varying amounts of information on the ecological and social services of wetlands were found to influence willingness to pay for wetland protection; the more services described, the higher the willingness to pay estimates (Bergstrom, Stroll, & Randall, 1990). Information on willingness to pay of other respondents has also been found to influence individual willingness to pay responses (Rowe et al., 1980). Ajzen, Brown, and Rosenthal (1996) conclude more generally that the nature of the information provided can affect willingness to pay estimates, and that subtle contextual cues can bias these estimates, especially when the good being valued may have low personal relevance to respondents.

Termed "information bias," this issue has been found to have implications for photographic surveys designed to measure aesthetic preferences for varying forest conditions. In such studies, responses may be influenced by differences in landscape perspectives viewed by respondents. Differences in landscape perspectives are analogous to information provided in contingent valuation studies because landscape perspectives may provide information or visual cues regarding resource conditions. For example, Daniel and Boster (1976) note that the selection of different photographic perspectives may introduce bias, possibly affecting respondent judgments. Researchers studying the effects of gypsy moth on near-view aesthetic preferences used sites with topography ranging from relatively flat to very steep, and report that different photographic stimuli may have influenced their findings (Hollenhorst, Brock, Freidmund, & Twery, 1993). Brown, Richards, Daniel, and King (1989) conclude that further research addressing the validity of photo-based judgments is warranted.

Along with studies in contingent valuation and forest aesthetics, information bias in the form of landscape perspective has potential implications for surveys designed to measure, normative standards of crowding using photographic techniques. A study conducted at Grand Canyon National Park explored the issue of information bias on crowding norms by asking respondents to evaluate photographs with different landscape perspectives.
Study Methods

Data regarding question format were gathered as part of a study of crowding norms at Arches National Park in 1998 (Lime, Manning, & Freimund, 2001). Three representative samples of hikers to Delicate Arch, a principal park attraction, were administered questionnaires to measure norms for the maximum acceptable number of people at one time at this site. A visual approach to measuring crowding norms was employed whereby respondents rated the acceptability of photographs showing a range of visitors at the arch. The surveys were administered as respondents completed their hike. The first survey was administered to a sample of 100 visitors and used a conventional “long” question format whereby each respondent was asked to examine and rate the acceptability of all of the study photographs based on the number of people shown in the photographs. The second survey was also administered to a sample of 100 visitors and used a conventional “short” question format whereby each respondent was asked to examine all of the study photographs and indicate the one that showed the highest number of visitors acceptable. The third survey was administered to 415 visitors and used the dichotomous choice question format whereby each respondent was shown one randomly selected study photograph and asked to judge if it was “acceptable” or “unacceptable” based on the number of people shown in the photograph.

Data regarding the methodological issue of starting point bias and information bias/landscape perspective were gathered as part of a study of day use hiking at Grand Canyon National Park in the summer of 1997 (Manning, Cole, Stewart, Taylor, & Lee, 1998). Representative samples of day hikers on several types of trails were interviewed concerning crowding-related norms and other issues. A visual approach to measuring crowding-related norms was employed whereby respondents rated the acceptability of a series six photographs showing a range of hikers along a 50-meter section of trail. The survey was administered as respondents completed their hike.

The issue of starting point bias was addressed in the survey administered to hikers along the Rim Trail, the trail that winds along the South Rim of the Canyon. The survey was administered to 264 hikers. Approximately half the sample was presented and asked to rate the acceptability of the six photographs in increasing order (beginning with the photograph showing no hikers through the photograph showing 18 hikers) and the other half of the sample was presented and asked to rate the acceptability of the photographs in decreasing order.

The issue of information bias/landscape perspective was addressed in the survey administered to hikers along the Bright Angel Trail, the principal trail that connects the South Rim of the Canyon and the Colorado River. The survey was administered to 310 hikers. Two sets of photographs were prepared for this survey, with one set administered to approximately half the sample and the other set administered to the other half of the sample. Both sets of photographs showed the same range of hikers along the same 50-meter section of trail. However, one set of photographs was taken looking “up” the trail (showing a characteristic “closed in” view) while the other set of photographs was taken looking “down” the trail (showing a characteristic “open” view).

Study Findings

Question Format

Crowding-related norms for the three samples of visitors to Delicate Arch are shown in Table 1. The norm for the conventional “long” question format was derived by constructing a social “norm curve” using the mean acceptability ratings of the sample for each of the photographs. The norm is the point at which the norm curve crosses the zero point of the
TABLE 1 Crowding-Related Norms for Alternative Question Formats

<table>
<thead>
<tr>
<th>Question format</th>
<th>Crowding norm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Long form</td>
<td>35.8</td>
</tr>
<tr>
<td>Short form</td>
<td>27.3</td>
</tr>
<tr>
<td>Dichotomous choice</td>
<td>31.8</td>
</tr>
</tbody>
</table>

*Point where mean acceptability curve crosses the zero point of the acceptability scale.

The alternative methods for deriving the three crowding-related norms do not allow for statistical tests of differences. However, the norms derived are clearly in the same general range; all would suggest a standard of quality of approximately 25–35 people at one time at Delicate Arch. The relationship between the conventional long and short question formats is the same found in other studies; that is, the short question format used in the context of the visual research approach leads to lower estimates of crowding-related norms than the long question format (Manning, Valliere et al., 1999). Potential reasons for this relationship are described in Manning, Valliere, and others (1999), and suggest that the long question format may provide more valid estimates of crowding-related norms, especially when using a visual research approach. The dichotomous choice question format resulted in a norm that is almost exactly between the norms derived from the long and short question formats.

Starting Point Bias

Norm curves for the two samples of hikers on the Rim Trail at Grand Canyon National Park are shown in Figure 1. These curves were constructed using the mean acceptability ratings of each sample for each of the photographs. T-tests for differences of means were calculated for each of the six pairs of means comprising the norm curves. Statistically significant differences at the .05 level were found for only two of the six pairs of points. In both of these cases (for the photographs showing 0 and 6 people) photographs presented in increasing order resulted in higher acceptability ratings than photographs presented in decreasing order (3.70 versus 2.88 and 1.45 versus .93, respectively). However, these differences are substantively small as represented in Figure 1. Indeed, the two norm curves appear nearly identical, and both lead to crowding-related norms (the point at which the norm curves cross the zero point of the acceptability scale) in the range of 8 to 9 people at one time along a 50-meter section of trail.

Information Bias/Landscape Perspective

Norm curves for the two samples of hikers on the Bright Angel Trail are shown in Figure 2. These curves were constructed using the mean acceptability ratings of each sample for each of the photographs. T-tests for differences of means were calculated for each of the
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FIGURE 1 Norm curves for two samples of hikers on the Rim Trail.

Six pairs of means comprising the norm curves. Statistically significant differences at the .05 level were found for only one of the pairs of six points. In this case (for the photograph showing 6 people) the photograph taken from the perspective of looking down the trail (a relatively open view) resulted in a higher acceptability rating than the photograph taken from the perspective of looking up the trail (a relatively closed view) (2.04 versus 1.64, respectively). However, these differences are substantially small as represented in Figure 2. Indeed, the two norm curves appear nearly identical and both lead to crowding-related norms (the point at which the norm curves cross the zero point of the acceptability scale) in the range of 8 to 9 people at one time along a 50-meter section of trail.

FIGURE 2 Norm curves for two samples of hikers on the Bright Angel Trail.
TABLE 2 Crowding-Related Norms for Alternative Evaluative Dimensions for Respondents Viewing Two Sets of Photographs Using Alternative Landscape Perspectives

<table>
<thead>
<tr>
<th>Evaluative dimension</th>
<th>Landscape perspective</th>
<th>Crowding norm</th>
<th>T-test</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preference</td>
<td>Up the trail (closed view)</td>
<td>3.30</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Down the trail (open view)</td>
<td>3.46</td>
<td>t = 0.58; p = 0.57</td>
</tr>
<tr>
<td>Acceptability</td>
<td>Up the trail (closed view)</td>
<td>7.04</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Down the trail (open view)</td>
<td>6.74</td>
<td>t = 0.25; p = 0.63</td>
</tr>
<tr>
<td>Management action</td>
<td>Up the trail (closed view)</td>
<td>9.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Down the trail (open view)</td>
<td>8.88</td>
<td>t = 0.74; p = 0.47</td>
</tr>
<tr>
<td>Tolerance</td>
<td>Up the trail (closed view)</td>
<td>13.05</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Down the trail (open view)</td>
<td>12.54</td>
<td>t = 1.47; p = 0.14</td>
</tr>
</tbody>
</table>

Respondents were also asked, using the “short” question format, to judge the photographs using four alternative evaluative dimensions—preference, acceptability, management action, and tolerance (Manning, Valliere et al., 1999). Results are shown in Table 2. While there are clear and often substantive differences in the norms associated with the alternative evaluative dimensions (as has been found in previous studies), there are no statistically significant differences between the two samples of respondents who viewed the two sets of study photographs.

Conclusion

Findings from the methodological issues explored in this series of studies suggest several conclusions. First, comparative review of related scientific literature can be an efficient and effective way to identify relevant methodological issues. Contingent valuation research can be seen to share fundamental theoretical and empirical approaches with research on normative standards in outdoor recreation (Manning, Lawson, & Frymier, 1999). However, research on contingent valuation is more highly developed, and review of this literature can be useful in identifying methodological issues that may be relevant to normative standards. Issues of question format, starting point bias, and information bias were derived from the literature on contingent valuation, and may be important in measurement of crowding-related norms in that these issues may affect estimates of crowding and related norms, and may suggest potential advantages and disadvantages of alternative methodological approaches.

Second, measures of crowding-related norms in outdoor recreation may be relatively “robust” in that they were not greatly influenced by the methodological issues explored in this study. All three question formats used in the study of crowding-related norms at Arches National Park resulted in norms in the same general range. The conventional short question format reduces respondent burden, but may underestimate crowding-related norms (at least in the context of the visual approach) compared to the conventional long question format (Manning, Valliere et al., 1999). While the long question format is more burdensome, it generates a richer data set by virtue of the norm curve that can be derived. The dichotomous choice question format estimated a crowding-related norm in the middle of the range suggested by the conventional long and short question formats. The response burden is low for individual respondents, but a relatively large sample size is needed to conduct the required logistic regression analysis.

Neither the starting point used in normative research nor the landscape perspective used in study photographs appears to have a substantial affect on measurement of
crowding-related norms. While some statistically significant differences were found to be associated with these alternative research approaches, the norm curves derived from the long question format are strikingly similar and lead to substantively similar estimates of crowding-related norms. Moreover, no statistically significant differences were found between the crowding-related norms derived from the alternative landscape perspective photographs for any of the four evaluative dimensions using the short question format.

Third, the generally robust nature of the measures of crowding-related norms explored in this series of studies may add weight to the validity of crowding-related norms. As noted at the beginning of this article, norms in outdoor recreation are generally defined as standards that individuals and groups use for evaluating behavior and social and environmental conditions. Normative research is designed to estimate such standards. The alternative research approaches explored in this series of studies resulted in generally comparable estimates of crowding-related norms. These findings suggest that park and outdoor recreation visitors may have relatively well-formulated standards of appropriate use levels and other recreation-related impacts, and that such standards tend to emerge even from alternative research approaches.

Clearly, more research is warranted on methodological issues in measuring crowding and other norms in outdoor recreation. The series of studies described in this article should be replicated in other contexts to determine the degree to which study findings might be generalized. Moreover, a number of other methodological issues warrant similar research attention. Review of the research literature in other, related fields of study may be a productive approach to identifying such issues.

Note

1. For example, the norm for the long form of the question was defined as the point at which the social norm curve crossed the neutral point of the acceptability scale. Thus, there is no variance associated with this measure.

References


