

Assessing the Social Construction of Visual-Spatial Preferences for Wilderness Impacts

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EXECUTIVE SUMMARY: This follow-up study examines visual-spatial differences in preferences for cliff scenery and the visual impacts of fixed-anchors in the Twin Peaks and Mt. Olympus Wilderness areas as an expansion of a recently published article in this journal, "Evaluating visual impacts of near-view rock climbing scenes," which detailed visual impacts of climbing in a frontcountry area. Visitor responses to photo-based measures of visual preference were obtained during on-site interviews conducted at Big Cottonwood Canyon. A series of photo-questionnaires were distributed during the summer of 2003. Questionnaires contained randomly ordered photos taken spatially at cliffs along accessible hiking trails of both wilderness areas. Two hundred twenty five respondents rated a series of 27 photos for visual preference. Evaluations were undertaken 1) to determine a variety of controls for whether scenes containing fixed-anchors were significantly higher or lower in visual preference than scenes with anchors excluded; and 2) to determine whether camouflaging and distance of viewer to anchors significantly influenced visual preference. Results of statistical tests (repeated ANCOVAs, factor analysis, and paired t-tests) confirmed four of five a priori hypotheses. These results suggested that any future regulations to eliminate fixed-anchors in these two wilderness areas on the basis of visual impact are justified only for the use of brilliant colored anchors placed within near-views. Furthermore, bans are not justified on the basis of significant visual impact for camouflaged anchors placed at distant views. Interestingly, sport climbers, who depend solely on fixed-anchors to ascend climbs, did not prefer to view scenes containing fixed-anchors any more than traditional climbers. This result is contrary to views of wilderness management personnel and climbing media reports. The results also suggested that, for wilderness managers to reduce visual impacts, they should implement policies requiring anchors to be camouflaged and high off the ground in order to avoid viewing by wilderness visitors. Lastly, through education about low-impact practices, managers should be able to reduce negative attitudes and perceptions concerning the management of fixed-anchors as well as future impacts to the resource.

KEYWORDS: Fixed-anchors, visual preference, visual impacts, wilderness.

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Introduction

The importance of examining visual impacts in wilderness is demonstrated by the emergence of new techniques to manage and evaluate the quality of wilderness landscapes (Manning, 1998). According to the 1964 Wilderness Act, wilderness managers are required to conduct scenery management as part of their mandate to preserve wilderness conditions. However, managers and visitor groups often have competing interpretations of this act and different social attitudes relative to the experience and perception of wilderness. A number of recognized approaches have been developed to evaluate the visual perception of natural scenery. Yet, few visual perception researchers have attempted to understand the social construction of preference for wilderness scenery (Chenoweth, 1991; Shelby & Harris, 1985). Given the reported differences in social attitudes concerning wilderness scenery (Manfredo et al., 1990), it is surprising that researchers have not more closely examined the social construction of visual preference for near-view scenes and the subsequent methods to reduce visual impacts within these scenes. Given this gap in the landscape perception literature, the purpose of this paper is to contribute to understanding the social construction of visual preference for near-view, wilderness impacts.

Social construction refers to exposure to various social worlds that can influence visitor perceptions and behaviors in wilderness settings. The term was originally derived from Berger and Luckmann's (1966) studies of social institutions. They propose that institutions, thought to be experienced as concrete entities, are actually social constructions in which the title of the institution (i.e., the Mt. Olympus Wilderness) is often associated with attitudes towards its potential actions. After an institution has been socially constructed, they are considered to be experienced as objective in a visitor's social world. Below the institutional level, visitors may construct individual meaning through specific social interactions. Schutz (1967) and Ricoeur (1981) discuss the cognitive processes that allow for such social constructions. Their research suggests that humans interpret information by recognizing that it is deeply intertwined with the social situations encountered. Thus, these authors theorize that perception of landscapes is often less objective because it is constantly being constructed differently among individuals according to their backgrounds and positions in the social environment. Individuals immersed in some social worlds (i.e., wilderness purists) prefer wilderness scenery to be pristine as a consequence of the learned values that they share for the institution of wilderness. In contrast, other individuals immersed within different social worlds prefer wilderness scenery as a function of a particular wilderness activity (i.e., climbing specialization).

Examination of the recent literature reveals that visual preference for scenes containing evidence of human impacts is socially constructed. Traditional theoretical approaches to evaluating scenic quality have been primarily developed through studies of distant landscape scenes with less

emphasis on the social meanings associated with specific near-view content (Jones, 2003). However, an increasing number of studies suggest that visual preference is constructed through significant social experiences that often occur from one's learned interaction with specific scene content (Chenoweth, 1991; Jones et al., 2000; Kaltborn, 1997; Tuan, 1974). Thus, evaluation of visual preference, using approaches that are relatively less socially-driven, would not be appropriate for explaining factors that influence preference for visual impacts in wilderness which are tied to social meanings shared among visitors (i.e., those developed through shared attitudes, education, and environmental commitment).

A number of studies have demonstrated the social construction of preferences for human impacts in natural environments. Lutz et al. (1999) conducted a photo-based study and found that there were significant differences between rural and urban participants for perceptual rankings of photographs of natural areas with varying degrees of human impact or activity. The scenes captured in these photos were ranked as to whether they were wilderness or nonwilderness and contained the following human impacts or installations in and surrounding wilderness: (1) a valley with agriculture in the foreground; (2) a coastal scene with at least one cottage; (3) an Inuit community; (4) a clear-cut and a logging road; (5) an aerial shot of a hydroelectric dam, ranching country; and (6) a dirt road, several cows, and a fence post. Overall, researchers found that rural visitors consider areas containing human intrusions to be wilderness more than urban visitors. Hammitt and Patterson (1995) and Jones (1995) reported similar findings in a study conducted in Cumberland Gap, Tennessee. Paired t-tests demonstrated significant differences among visual preference for photos containing a strip mine and photos with the strip mine excluded. Furthermore, these researchers found that urban and rural town factors with evidence of human impact (roads, buildings in surrounding towns) were scored significantly lower in visual preference than natural factors with little or no evidence of human intrusion.

The study reported in this paper is a follow-up study from a previous study reported in the *Journal of Park and Recreation Administration* by Jones (in press). Further evidence of the social construction of visual preference for near-view impacts was reported in the first study of the visual impacts of fixed-anchors and climbing chalk. The author defined fixed-anchors as any sling, bolt, piton, or other type of permanent anchor used for rock climbing. The setting for this study was a frontcountry climbing area in Rock Canyon within the Uinta National Forest. A series of 16 photos were rated by 143 respondents for the degree of visual preference on a 5-point Likert-type scale. The results revealed that when controlling for whether visitors were willing to participate in a chalk clean-up day, there were significant differences between photo factor scores for simulated (anchors removed) and unsimulated photos (contained anchors). Jones found that when willingness to participate in a clean-up day was high, visual preference ratings were significantly higher for photos with anchors re-

moved than for the same photos with anchors present. Likewise, when willingness was low, ratings of visual preference were significantly lower for these same photos. While this study demonstrates the perception of visual impacts in a frontcountry setting, studies need to be undertaken of visual impacts of climbing in designated wilderness, an environment where visitors are likely more sensitive to impacts and are more variable in their attitudes towards management practices.

In sum, only a few studies reported within the visual preference literature have specifically focused on examining the social construction of scenery perception. The studies that have reported these relationships have not produced results that can be generalized to near-view impacts in wilderness. Given the mandates that guide wilderness managers, it is important to determine how visitors construct preferences for near-view impacts in wilderness, particularly, since these are commonly viewed impacts to wilderness areas.

Visitor Attitudes

To more critically analyze the social construction of preference for natural environments it is important to understand the role of learned attitudes in the construction process (Azjen & Fishbein, 1975; Bandura, 1977, 1986). One concept discussed as influencing visual preference is visitor attitudes towards management regulation (Jones et al., 2000). A number of researchers have emphasized the need to further understand the relationship between visitor attitudes and recreation impacts as an essential, and often less examined, method of improving wilderness management (Bright & Tarrant, 1999). These researchers explain that attitudinal studies can assist wilderness managers in determining the desired conditions, preferences, standards, and limits for recreational use in wilderness areas. Stankey (1972) and others also discuss that wilderness planners should include the diversity of attitudes among visitor groups since providing quality recreation opportunities in wilderness depends on matching opportunities with preferences. Furthermore, Schuster et al. (2001) argue that managers need to be aware of the shared attitudes and differences concerning potential management actions in order to judge and gain cooperation for management policies.

Several attitudinal studies have suggested that wilderness visitors prefer a less than "pure" wilderness, as defined in the act, and that they often have preference for recreation conveniences ordinarily restricted in wilderness areas (Bultena & Taves, 1961; Hendee, 1968; Young, 1978; Lucas, 1980). These studies have revealed that some visitors in wilderness areas prefer installations such as picnic tables, wells, toilets, and washrooms. In contrast, Stankey (1973) studied wilderness purists. In his study he found that wilderness purists preferred an area where there were few other visitors, facilities, and regulations, and that nonpurists preferred more facilities and had more tolerance towards wilderness regulations.

Other attitudinal studies of wilderness have supported the social construction of preferences in wilderness. Lutz et al. (1999) emphasize that

wilderness quality, as defined by managers and legislation, may differ significantly with the socially constructed attitudes of visitors. Likewise, Wagar (1966) argues that visual preference is a social concept that is often highly subjective and personal while Bell, Fisher, and Loomis (1978) state that attitudes toward the natural landscape are dependent on its physical conditions and individual perceptions of the landscape.

Given the available literature, it can be concluded that wilderness is both a physical and social condition defined by a variety of visitor preferences and attitudes (Hollenhorst & Jones, 2003; Scoyen, 1969). Thus, it could be implied that a group of visitors to wilderness areas may form their preferences for these environments through a process of prior exposures to attitudes shared among social groups and others who have similar world views.

Climbing Specialization

Attitudes and preferences of wilderness visitors have been discussed in the literature as being related to recreation specialization. A number of researchers have implied that recreation specialization is a valid predictor of visual preference (Daniel & Boster, 1976; Ulrich, 1977; Virden & Schreyer, 1988). Several researchers have reported significant relationships between attitudes and preferences of highly specialized and novice recreation users within outdoor recreation settings (Ewert & Hollenhorst, 1994; Schreyer & Lime, 1984).

Byran (1977) originally proposed the recreation specialization concept as a range of behaviors related to the skill, equipment use, experience, and values of visitors. Bryan proposed that visitors enter a process of recreation socialization in which they approach their activities differently according to their level of development in the activity. He further theorized that specialized groups of recreationists have a common set of attitudes and values for their activity and the resources on which it depends. Thus, differences in preferences for recreation settings can become more salient among wilderness visitors with higher specialization coupled with a stronger resource dependency.

By classifying subgroups of recreation users, researchers have been able to predict differences in preferences for impacts to natural environments. For example, Virden and Schreyer (1988) found that hiking specialization was significantly related to preferences for physical, social, and managerial settings. They found negative correlations with a number of visual impacts including outhouse toilets at campsites, signs, paved roads, well-maintained trails, and presence of logging and mining. A study of canoeing specialization on Virginia rivers demonstrated that specialization was correlated with respondent preferences for eleven impact behaviors (Wellman, et al., 1982). Williams and Huffman (1986) further employed these same measures of specialization in a laboratory experiment and found some significant relationships between specialization and respondent preferences for pairs of photographs depicting different recreation activities, settings, and social contexts.

The specialization of rock climbers has not been fully investigated. Schuster et al. (2001) categorized specialization of rock climbers into three groups: sport, traditional, and hybrid and found significant differences between these groups in their attitudes towards management. Ewert and Hollenhorst (1994) examined specialization as somewhat multi-dimensional to include Experience Use History (EUH), involvement, skill, locus of control, and involvement. They found that as involvement in rock climbing increases, preferences for convenient climbing venues increase while preferences for remote wilderness conditions decrease. Overall, the researchers found that the degree of naturalness of the area was not important to rock climbers as opposed to whitewater kayakers. However, while Ewert and Hollenhorst examined the relationship between naturalness and specialization using a multi-dimensional approach, they did not measure specialization with items to assess individual specialization categories (i.e., top-rope, sport, and traditional climbing). Thus, less is known about differences in preferences for naturalness among individual categories of climbing specialization.

The first author's seventeen years of extensive experience as a rock climber suggests that the rock climbing community recognizes that climbers fall into several progressive specialization categories. Thus, for purposes of this paper climbing specialization will include the following three categories: (1) top-rope climbers, (2) sport climbers and (3) traditional climbers (Jones & Hollenhorst, 2002). Top-roping involves the use of a solid anchor system and has been practiced in the United States since the turn of the twenty first century. Today, this climbing system involves two expansion bolts drilled into the cliff top or a tree with nylon webbing and carabiners attached to a rope. The rope is attached to the climber, to the above system, and then to a belayer, such that extensive falling can be prevented. Generally, this category is the least specialized type of climbing requiring only a simple knowledge of belay and anchor rigging.

Sport climbers are at the next level of specialization in climbing. This method began in the early 1980s with the introduction of climbs protected only by expansion bolts that are drilled and hammered into the rock. This type of climbing requires the use of a high number of fixed-anchors (i.e., six to twelve expansion bolts to protect falls for climbs of 80 feet in height). Generally, the potential dangers when falling on a sport climb are not life threatening with an average fall of approximately 20 feet between mostly reliable anchors.

Traditional climbing was established as a clean ethic of climbing by early pioneers in the Yosemite Wilderness during the 1950s that decided that fixed-anchors anchors (pitons) scarred the rock. These climbers defined traditional climbing as the use of fixed-anchors being placed only when no removable protection (i.e., passive steel chocks and camming units) was available on very difficult or blank sections of stone (Jones & Hollenhorst, 2002). Currently, traditional climbers identify with the ethics of the early Yosemite pioneers. This specialization group of climbers

established the first “leave-no-trace” ethic for climbers. Traditional climbers have a higher risk of injury than the members of the other two categories because of the potential for removable, natural protection to fail or slide out of the rock when placed in either soft rock or when placed marginally.

In sum, climbing specialization is an evolving concept with little established literature to date. However, the connections between preferences for climbing in wilderness seem to be linked to the attitudes of climbers concerning the placement of fixed-anchors. The top-rope climber is the least dependent on fixed-anchors of the three specialization groups and, thus, should have the most positive attitude towards management that limits fixed-anchors.

Environmental Commitment

A review of the literature revealed little, if any, prior research applications for the concept of environmental commitment to protecting the natural environment. The closest representation of the concept reported in the literature was a study by Lutz et al. (1999) that employed the Wilderness Environmental Protection Scale, an adapted version of Dunlap and Van Liere’s (1978) New Environmental Paradigm Scale. The Wilderness Environmental Protection Scale provides an indication of how concerned visitors are about protecting the environment and provides a measure of environmental commitment. However, the validity of this scale may be in question because the researchers found no significant differences in attitudes towards wilderness protection between rural and urban participants. Despite being a strong attitudinal scale, because of its global nature, this scale does not fully address the construct of on-site environmental commitment and, thus, a gap remains in the literature concerning this construct.

Card and Rose (1985) conducted an ecological attitude inventory of undergraduates in which students rated their (1) level of environmental knowledge; (2) verbal, actual, and emotional commitment to the environment; and (3) the degree to which they spoke, behaved, and felt positively toward the environment. Relative to environmental commitment, results of their study demonstrated a lower level of verbal, actual, and emotional commitment to the environment than expected for senior forestry and recreation majors. Although the authors concluded that their sample population might have not been previously exposed to an adequate amount of environmental knowledge or to a sense of commitment, the results appeared to fail in validating the employed scale. Furthermore, Hini and others (1995) examined the relationship between general environmental attitudes and behaviors that reflected degrees of environmental commitment. Behaviors which were significantly related to environmental attitudes included whether the respondent had signed a petition about an environmental issue, given funds to support an environmental nonprofit, participated in a protest for an environmental cause, and was a member of a nonprofit with the goal of preserving the environment. Lastly, Young,

Williams, and Roggenbuck (1991) examined wilderness involvement, a concept similar to environmental commitment, and found that visitors to the Cohutta wilderness were highly involved with the area. However, contrary to Young et al.'s expectations, wilderness involvement failed to correlate with conditions that were acceptable to visitors (i.e., number of people seen on trails).

Overall, the concept of environmental commitment deserves much more attention in the peer-reviewed literature. It is surprising that few, if any, studies reported in the peer-reviewed literature have established a valid and reliable scale of environmental commitment since the concept is so closely tied to the social construction of visual preference as well as other forms of environmental preference.

Study Purpose

The previous review of literature details the managerial and empirical basis for assessing visual impacts of fixed climbing anchors. The conceptualization developed from the literature suggests that visual preference for near-view wilderness impacts is strongly influenced by socially constructed concepts including attitudes towards management, specialization, and environmental commitment. Given that the relationship between visual preference and these three concepts is underdeveloped, the purpose of this study is to determine whether the social construction of preference significantly influences responses concerning near-view visual impacts in wilderness. In addition, because of the recent number of bans of fixed-anchors by wilderness managers, who have cited concerns for visitor impacts without an empirical basis, a further purpose of this study is to attempt to determine whether fixed-anchors are, indeed, a significant visual impact. To address the above study purpose, the following five alternative hypotheses were formulated:

(H₁) When environmental commitment is high, visual preference for scenes containing fixed-anchors will be significantly lower than for the same scenes with anchors excluded.

(H₂) As climbing specialization increases from top-roping to traditional climbing, visual preference for scenes containing fixed-anchors will be significantly higher than for the same scenes with anchors excluded.

(H₃) As attitudes towards management regulations of wilderness use become more positive, scenes containing fixed-anchors will be rated significantly lower than the same scenes with anchors excluded.

(H₄) At near-view distances (4 to 16 feet), visual preference for scenes containing camouflaged anchors will be significantly higher than for scenes containing brilliant anchors.

(H₅) As the spatial distance of photos containing brilliant fixed-anchors decreases (exposures from 4 to 16 feet), visual preference will be significantly lower.

Methods

The Research Setting

The study was conducted on-site during the third week of July 2003 in the Twin Peaks and Mt. Olympus Wilderness areas in Utah. In order to assess both climbers and nonclimbers, the sampling locations were located on the edge of the two wilderness boundaries within Big Cottonwood Canyon, a world-recognized climbing area near Salt Lake City, Utah. The Mt. Olympus Wilderness area is on the north side of the canyon, while Twin Peaks Wilderness area is on the south side of the canyon. These wilderness areas have central hiking trails that are within a few feet of many popular climbs. Big Cottonwood Canyon is a relatively long canyon and has hundreds of technical sport and traditional climbs of nearly every difficulty grade within the boundaries of the two target wilderness areas.

Sampling

Following Hull and Stewart's (1992) recommendations for on-site assessments, visitors were approached at the trailhead after they returned from viewing the scenery and asked to volunteer to participate in the study. On-site interviews were administered to a total of 225 volunteers over the age of 15 from 10:00 a.m. to 6:00 p.m. on five days. Research assistants were instructed to systematically sample one person per group every ten minutes. These days were selected on consecutive weekends and two weekdays.

Visual preference responses to 27 near-view scenes were collected. Scenes represented cliff faces typically encountered while hiking trails within the wilderness boundaries on either side of Big Cottonwood Canyon. Three photo sites were used and exposures were repeated at two-foot intervals. For the purpose of statistical analysis, only photos with four-foot intervals will be examined from 4 to 16 feet in exposure distances. Three of the original photos were simulated (i.e., touched up) to remove evidence of fixed-anchors. Sampling schedules and collection points at different trailheads were selected to ensure visitation from different sub-groups of climbers as well as nonclimbers.

The first 21 photos were randomly-ordered. The remaining six photos were paired-comparisons and were ordered in the questionnaire according to anchor present and anchor excluded, respectively. This procedure was employed to allow visitors to discern the effects of impacts as consistent with a similar study of a simulated strip mine conducted by Hammitt and Patterson (1995) and Jones (1995). Visitors were instructed to respond to the degree of visual preference by rating each scene as to how much they liked it (1 = not at all to 5 = very much).

The measures of specialization, EUH, and specialization were developed or adapted to assess items that captured the social construction of visual preference for climbing impacts based on Chenoweth's (1991) notion of the social construction of preferences as well as the methods of Jones, Patterson, and Hammitt (2000) and Ewert and Hollenhorst (1994).

Climbing specialization was measured with three levels derived from the following items: (1) "Have you ever participated in technical-rope rock climbing?" (2) "Do you climb on the lead?" and (3) "What type of lead climbing gear do you climb with?" For the second item, climbers were asked to indicate whether they lead climb using one or more of the following: a) "quickdraws to clip to bolt anchors," b) "removable/natural protection," and c) "aid climbing protection." Participants were designated as top-roping when it was indicated that they participated in technical climbing but did not lead climb. Sport climbing was designated when climbers indicated that they lead climbed only with quickdraws clipped to bolts. Traditional climbing was designated when climbers indicated that they lead climbed with either removable/natural and/or aid climbing protection.

The use of multiple measures to define experience use history (EUH) was based on the procedure used by Schreyer et al. (1984), who rationalize that it is important to consider the frequency and duration of participation to evaluate EUH. EUH was computed with the following items: (1) "Have you visited either the Mt. Olympus or Twin Peaks wilderness areas in Big Cottonwood Canyon?" (2) "Have you visited Big Cottonwood Canyon?" (3) "How many (number of) different, individual years have you visited Big Cottonwood Canyon?" (4) "How many times per year do you typically visit the Big Cottonwood Canyon?" (5) "Over the last 3 years, about how many total visits have you made to Big Cottonwood Canyon?"

Four categories of EUH were defined as follows: *first time visitors*, *novices* (one or two visits to Big Cottonwood), *some history* (> 2 total visits but who did not visit on a regular basis/< 2 visits per year), and *regular visitors* (> 2 total visits per year). Three categories of locality were defined according to the number of miles traveled from home: *local* (< 50), *intermediate* (50-200), and *nonlocal* (>200). Categories for region of residence were defined as *regional* and *nonregional*. *Regional* residence included Utah and Idaho residency within 200 miles of Big Cottonwood Canyon based on the assumption that these regions of residence have rock outcroppings similar to those found in the region of this canyon. *Nonregional* included all of the remaining states and regions more than 200 miles from Big Cottonwood Canyon.

Measures of attitudes towards management regulation were assessed by asking, "How much would you support or oppose the following wilderness management actions in Twin Peaks and Mt. Olympus Wilderness areas in Big Cottonwood Canyon?" Two factors were derived from six items on a five-point semantic differential scale (1 = strongly support to 5 = strongly oppose, see Table 1). The measure of environmental commitment ($\alpha = .73$) was assessed by asking individuals to rate a 5pt semantic differential scale (from 1 = strongly support to 5 = strongly oppose) using the following three items: (1) participate in a trail clean-up day, (2) become a member of an environmental organization if asked, and (3) preserve wilderness as pristine areas. The previous three items were used to compute a single score and were modified from items employed by Jones (in press) as well as Hini and others (1995).

Table 1
Dimensions of Attitudes Towards Management, Big Cottonwood Canyon, 2003

ITEM	Factor Loadings	Mean ¹ Rating	Factor Mean	Factor ² Alpha Value
<u>Access Opportunity</u>			3.76	.72
Provide more opportunities for hiking in the wilderness area	.815	4.05		
Provide more access to the wilderness area for all recreation users	.683	3.48		
<u>Management Regulation</u>			3.96	.77
Provide more controls to reduce conflicts between wilderness area users	.793	3.56		
Provide more controls to reduce environmental impacts of recreational use of the wilderness area	.795	3.64		
Decrease the number of fixed-anchors placed in the canyon within wilderness boundaries	.717	2.57		
Decrease the number of climbers allowed in the wilderness at any one time	.709	2.37		

¹Means based on a five-point scale, where 1 = Strongly Support and 5 = Strongly Oppose.
²Factor analysis consisted of Principal Components Analysis with Varimax Rotation.

Analyses

To examine the variability of the sample, a series of descriptive statistics were calculated for the following measures: climber/nonclimber, visitor experience use history, gender, age, distance traveled to site, number of times climbed in the last year, and years of climbing experience.

Secondly, for purposes of examining the first three hypotheses, a principal components factor analysis (PCA) was employed to generate photo factor scores. Two factor scores were computed from three sets of two photos each (exposed at four foot distances) with the following characteristics: anchors present and anchors excluded (touched photos). Using an unrotated factor matrix, an extraction of factors was determined by eigenvalues > 1. Photos were assigned to a specific factor if they displayed a factor loading > .40. Each of the two factor scores was used in analyses testing the first three hypotheses. Using a similar set of procedures as the above, a single factor score was computed from the three environmental commitment items for the purpose of testing H₁. Next, a factor analysis, using varimax rotation, as well as a similar extraction of factors and factor loading assignments as the procedure above, was also conducted for the items concerning attitudes towards management. The second factor, Management Regulation, was computed in this procedure (see Table 1) for the subsequent analysis employed in testing H₃.

H₁ and H₃ were assessed with repeated measures ANCOVAs. The dependent variable in these analyses was the presence of anchors. The photo factors of Anchors Present and Anchors Excluded were entered as within

subjects factors. For H_1 , a covariate, Environmental Commitment, was entered as a control variable. Similarly, for H_3 , a covariate, Management Regulation, was entered as a control variable.

H_2 was assessed with a repeated measures ANOVA. The dependent variable in this analysis was also the presence of anchors. Climbing specialization was entered as a between-subjects factor. Pairwise and multiple comparisons using Bonferroni adjustments were employed to determine differences in visual preference among levels of climbing specialization.

H_4 was evaluated with a paired t-test to determine differences between two photos containing brilliant and camouflage anchors at four-foot distances of photo exposure. These two photos were chosen so that differences between techniques to camouflage anchors would be the most obvious to visitors.

H_5 was tested with a repeated measures ANOVA. The dependent variable was the distances of photo exposure for the brilliant anchors. Four photos, taken at 4, 8, 12, and 16 foot exposure distances, were entered consecutively into levels of the model. These distances were selected to represent typical viewing distances for both hikers and climbers, which are the predominant user groups in the study areas. Results of each of the analyses in this study were interpreted to be significant at the $p < 0.05$ level.

Results

When evaluating the homogeneity of the sample, results of descriptive statistics demonstrated that the sample population had a mean age of 29.5 years ($SD = 10.9$). In addition, 65% ($n = 142$) of the sample was male and 35% ($n = 75$) were female. More than a third (38%, $n = 128$) were nonclimbers (never technically climbed) and 59% ($n = 128$) considered themselves as having participated in technical climbing (3% did not respond to this item). The average number of years of climbing experience was 5.0 years ($SD = 5.3$) indicating that there was a wide range of climbing experience within the study population. The average number of times that climbers had participated in their activity in the past 12 months was 28.1 times ($SD = 40.9$). The mean number of miles traveled from place of residence was between zero and 50 miles radius of the study site ($M = 1.73$, $SD = 1.37$). The mean level of experience use history (EUH) fell within the “some history” category which revealed that the average visitation was greater than two total visits over a lifetime but less than two visits per year ($M = 2.8$, $SD = .57$).

H_1 stated that when environmental commitment was higher, scenes containing fixed-anchors would be rated significantly lower than ratings of the same scenes with anchors excluded. The results of hypothesis testing confirmed H_1 . When controlling for Environmental Commitment, a repeated measures ANCOVA revealed that, for visual preference, there was a statistically significant difference [$F(1, 187) = 5.468$, $p < .020$] in presence of anchors photo factor scores between the Anchors Present factor and the

Anchors Excluded factor. Interpretation of the marginal means revealed that as environmental commitment increased, visual preference for the Anchors Present factor decreased while visual preference for the Anchors Excluded factor increased.

H₂ stated that with higher levels of climber specialization, scenes containing fixed-anchors would be rated significantly higher than the same scenes with anchors excluded. Results failed to fully confirm this hypothesis. However, as expected, and supportive of construct validity, results of a repeated measures ANOVA demonstrated that there was no significant within-subjects effect for climber specialization [$F(2, 105) = 2.575, p < .081$]. The between subjects effects for climber specialization indicated that there was a significant difference between the two photo types based on three levels of climber specialization [$F(2, 105) = 4.107, p < .007$]. Pairwise comparisons (see Table 2) of the levels of climber specialization further investigated the differences. Results of these tests indicated that two of the three levels of specialization were different, based on differences in photo factor scores. Thus, differences between photo factor scores were significantly higher for the top-rope climbers than for the traditional or sport climbers.

Table 2
Pairwise Comparisons of Climber Specialization for Differences in Photo Factor Scores, Big Cottonwood Canyon, 2003

Specialization Level		Mean Difference	Std. Error	Sig. level ^a
Top-Rope	Sport	-.338	.148	.024
	Traditional	-.451	.147	.003
Sport	Top-Rope	.338	.148	.024
	Traditional	-.113	.152	.457
Traditional	Top-Rope	.451	.147	.003
	Sport	.113	.152	.457

^a adjustments for multiple comparisons: Bonferroni

Multiple comparisons, employing Bonferroni adjustments, were used to determine differences in levels of climbing specialization for each of the two photo factor scores. No significant differences in visual preference among levels of specialization were found for the Anchors Excluded factor (see Table 3). However, for the Anchors Present Factor, as expected, sport climbers rated visual preference significantly higher than top-rope climbers. Also as expected, traditional climbers rated the Anchors Present factor significantly higher than the tope-rope climbers (see Table 4). However, contrary to H₂, there were no significant differences between traditional and sport climbers in visual preference ratings of the two factors. Thus, consistent with expectations, as specialization increases from top-rope climbing to traditional climbing, there is a significant desensitization to visual impacts of climbing.

Table 3
Multiple Comparisons of Climber Specialization for the
Anchors Excluded Factor, Big Cottonwood Canyon, 2003

Specialization Level		Mean Difference	Std. Error	Sig. level ^a
Top-Rope	Sport	.030	.229	1.000
Sport	Traditional	-.316	.235	.549
Traditional	Top-Rope	.285	.228	.639

^a adjustments for multiple comparisons: Bonferroni

Table 4
Multiple Comparisons of Climber Specialization for the
Anchors Present Factor, Big Cottonwood Canyon, 2003

Specialization Level		Mean Difference	Std. Error	Sig. level ^a
Anchors Present Factor				
Top-Rope	Sport	-.705	.209	.003
Sport	Traditional	.090	.214	1.000
Traditional	Top-Rope	.616	.207	.003

^a adjustments for multiple comparisons: Bonferroni.

H₃ stated that when controlling for attitudes towards management regulations, scenes containing fixed-anchors would be rated significantly lower than the same scenes with anchors excluded. The results of hypothesis testing confirmed H₃, and demonstrated that when support for management was high, visual preference ratings were significantly higher for the Anchors Excluded factor than for the Anchors Present factor. When controlling for the Management Regulation factor, a repeated measures ANCOVA revealed that, for visual preference, there was a statistically significant difference [$F(1, 191) = 53.944, p < .000$] in the presence of anchors photo factor scores. Interpretation of the marginal means revealed that when support for management regulations was high, visual preference for the Anchors Present factor was low while visual preference for the Anchors Excluded factor was high.

H₄ stated that scenes containing camouflaged anchors would be rated significantly higher than scenes containing brilliant anchors. Exclusive of the anchors, these scenes were comparable in terms of lighting, rock-type, and rock coloration. Confirming this hypothesis, results of a paired t-test between photo 22 (Brilliant Anchor at 4 ft.) and photo 26 (Camouflaged Anchor at 4 ft.) revealed that, for visual preference, there was a statistically significant difference [$t(196) = -2.199, p = .029$].

H₅ stated that as the spatial distance of photos containing brilliant fixed-anchors increases (exposures from 4 to 16 feet), visual preference ratings will be significantly lower. Results of a repeated measures ANOVA revealed that, for visual preference, there was a statistically significant difference [$F(3, 573) = 3.769, p < .011$] in test time scores between 4 and 16 foot spatial distances of exposures of brilliant anchors (Photos 22, 2, 15, & 14). Photos containing brilliant fixed-anchors exposed at four-foot spatial distances were significantly less preferred than photos exposed at sixteen foot distances.

Conclusion

The results of hypothesis testing supported four of the five hypotheses. Low environmental commitment and negative attitudes towards regulations were related to a low perception of visual impacts of fixed-anchors. Furthermore, color-coded camouflaging of anchors at the closest views (4 feet) was a significantly more preferred technique of anchor placement than the placement of brilliant anchors at the same distance. In addition, the results demonstrated that the closer a wilderness visitor is able to view a fixed-anchor, the more the anchors are viewed as a significant impact.

Contrary to expectation, as specialization increases, there is a desensitization effect for impacts. While there are no differences in visual preference for climbing impacts among traditional and sport climbers, the least experienced category of climbers, top-ropers, were significantly more sensitive to the impacts than the latter two groups. This finding is consistent with Bryan's (1979) theory and suggests that as climbers become more specialized they gain more resource dependency and desensitization to the impacts of their behaviors occurs. Thus, despite the commonly held belief among the climbing community that sport climbers are "pro-anchors" and traditional climbers are "anti-anchors," future researchers should attempt to establish the reliability of our finding that preferences for pristine cliff environments decrease, overall, with increased climbing specialization. Given this relationship, there appears to be a stronger functional preference among more highly specialized climbers as opposed to top-rope climbers because both traditional and sport climbers frequently utilize bolts for lead climbing while top-rope climbers use them much less often (i.e., trees may be available for anchors).

Consistent with the results of Jones et al. (2000), the above findings support the notion of a social construction of visual preference. Furthermore, the finding that the environmental commitment, attitudes towards management regulation, and specialization measures significantly influenced preferences for scenes containing visual impacts suggests that visual preference is much more tied to attitudinal measures than previously theorized. In other terms, the results of this study suggest that visual preference for wilderness scenes is rooted in a process of learning via exposures to wilderness use and recreation social groups. This finding builds on the findings of Ewert and Hollenhorst (1994) whose aforemen-

tioned study suggests, that as individuals become more involved in different recreation social worlds (climbers vs. kayakers), they subsequently have different preferences for the natural character of an area. Given these aforementioned relationships, researchers concerned with scenery evaluation should employ similar social measures in future studies concerned with the assessment of visual impact. These findings shed new light on the visual preference construct and indicate the importance of developing a stronger framework for assessing visual impacts that is more closely grounded in social learning.

Management Implications

Given that visual preference for cliff scenery was found to be socially constructed, managers should more strongly consider addressing these impacts through social mitigation. Educating individuals about environmental issues and the negative impact that fixed-anchors can have on a resource, when low-impact practices are not engaged, is the prime directive that this study gives to managers. The majority of wilderness areas in the U.S. post little information at trailheads about how to practice low-impact anchor placements. Through increased education, climbers will reduce their own impacts and wilderness purists will understand that a social process has been engaged to change or preserve conditions of wilderness. The data from this study suggests that educational efforts should be directed at the more experienced climber subgroups. With such a process, it is surmised that attitudes towards management of anchors may become less negative and policies supported as a whole. Given the reported study results, it is recommended that managers should select from the following alternatives to reduce visual impacts of climbing: (1) camouflage anchors to a color code of the surrounding cliff face; (2) place anchors at least 16 feet above the trail to reduce the likelihood of visual impacts; and (3) ban anchors on the basis of significant visual impacts. Banning is, indeed, an option, based on the finding of significant visual impacts in this study, and, as previously mentioned, many wilderness managers are currently advocating this option through management planning. However, as evidenced by the study results, a number of the low-impact techniques will significantly reduce visual impacts of fixed anchors and, thus, in some cases, reduce the need for bans as a means of resolving impact concerns.

Finally, as Schuster et al. (2001) emphasize, there is a disparity in the attitude towards management actions between climbers and wilderness managers that causes difficulty in forming partnerships that are critical to meeting management goals. Thus, to foster partnerships, future studies should consider normative evaluations of climbing impacts to further understand differences in preferences among visitors. Normative evaluations of these impacts should assist managers in prescribing limits acceptable among the majority of stakeholders involved in this highly controversial management process.

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