Back to the (Visualization) Laboratory: Using Focus Groups to Generate Qualitative and Quantitative Results

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Abstract
This article introduces the immersive focus group as a mixed-methods approach in planning research. Using the immersive focus group we generate genuine knowledge of both quantitative and qualitative data about the diverse and nuanced perceptions of forest landscapes in order to then extract planning decisions. The article elaborates on the deployment of focus groups in a particular venue: the immersive theater laboratory. In doing so, we hope to position the immersive focus group as a viable tool for planning research. We conclude with a discussion of the advantages and disadvantages of this approach and its potential further development.

Introduction

Over the past quarter century, planning and policy practitioners and researchers have embraced the idea of bottom–up, collaborative planning with multiple stakeholders as opposed to a centralized and behind-closed-doors planning model. This shift, usually referred to as the communicative turn in planning (Healey 1996; Huxley and Yiftachel 2000), describes a move toward more inclusive, participatory planning frameworks. This turn is associated with and effected by the transition to a governance model of urban affairs (Allmendinger and Tewdwr-Jones 2002; Newman and Clarke 2009; Nuissl and Heinrichs 2011), as new conceptual paradigms, reflecting changing practical needs, are emerging and planning practices are being reformed (Gurran, Austin, and Whitehead 2014; Sager 2012). However, this shift and its associated demand for effective tools to facilitate such integration have yet to be fully realized. The positivist approach, which has dominated planning schools (Healey 2013), has been well suited for centralized planning frameworks of practices and further enhances them, but it cannot provide the tools necessary to enable more collaborative approaches. In order to operationalize new integrative planning paradigms, new tools need to both effectively capture and integrate public opinion into planning, and to facilitate the participation of the public in planning processes. In response, efforts to develop and update planners' toolboxes, usually based on social science methods for studying public opinions, behaviors and perceptions, are on the rise (Eizenberg and Shilon 2016; Jupp and Inch 2012). Many of these new tools include both positivist and constructivist,

that is, mixed-methods, approaches (Morgan 2007). While the literature on mixed methods and the integration of qualitative methods into planning research is still sparse, an emerging body of research integrates qualitative methods into planning (Eizenberg and Shilon 2016; Gaber and Gaber 2007; Rigolon and Flohr 2014).

This paper seeks to contribute to the efforts that aim to update planners' toolboxes by advocating an integrative approach to research. In particular, we wish to demonstrate how the *immersive focus group* is able to actualize the best aspects of mixed-methods focus group research and thus serve as an effective tool for integrating diverse stakeholders into the planning process. Focus groups were developed within the field of marketing and communication, but they were later adopted for use in social science research because of their relative advantages, including their ability to query multiple respondents simultaneously and to obtain insights via group interactions (Bloor et al. 2001). Focus groups have been primarily used to facilitate and observe the configuration of group dynamics and the construction of norms or to elucidate the ways in which a group understands a social phenomenon. They have been used most intensively in

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public health and family planning and in program/policy evaluation research (e.g., Kroll, Barbour, and Harris 2007; Webb and Kevern 2001). While collaborative and participatory planning focus on consensus-making between diverse stakeholder, understanding the multiple ways in which the focus group tool may be deployed in planning research and practice and the different results they may yield, is generally underdeveloped.

In this article, we illustrate the potential of the focus group method to generate qualitative and quantitative data for planning research. In particular, we analyze the use of focus groups within a visualization laboratory—the immersive focus group (description below)—to study stakeholder perceptions of landscapes. The objective of this paper is threefold:

1. Contributing to the literature on focus groups by investigating ways of utilizing this tool, particularly through advanced technological venues
2. Demonstrating how focus groups can be employed as a mixed-methods approach by extracting and analyzing both qualitative and quantitative data. The literature on focus groups has understood this tool primarily as a qualitative method (Morgan 1997) and paid less attention to the type of quantitative data that can be extracted from these groups (exceptions include Massey 2011; Ryan et al. 2014).
3. Delineating the advantages and disadvantages of focus groups use in planning research in general and in studying landscape perceptions in particular.

We situate our study within both positivist and constructivist research traditions to learn about landscape perceptions within an ethnically, professionally, and demographically diverse population. The article begins with a brief review of the process of integrating qualitative research principles and methods into policy and planning with an emphasis on the use of focus groups. Next, it presents the milieu—the visualization laboratory, visualization methods, and visualization as a tool for policy and planning. It then discusses the implications of mixed-methods research for the planning discipline, explaining the ways in which we integrate the methodology, the technology, and the kind of products that arise from such research. Finally, the discussion touches on the specific contributions of focus groups in the visualization laboratory setting, as well as the limitations of this tool. We conclude with specific insights for research on landscape perceptions.

From the Lab and Back

Since the great battle within the social sciences in the 1980s and 1990s that characterized the clash between the positivist approach and the constructivist approach to science, both approaches have become more self-critical with regard to

their potential to generate knowledge (Denzin 2010). For example, practitioners of positivist science have acknowledged their tendency for reductionism, whereas constructivists have acknowledged their limited capacity to generalize their results (Amaratunga et al. 2002; Guba and Lincoln 2005). However, this awareness also generated new interactions between the previously irreconcilable approaches and created a more integrative approach to research by finding new ways to combine, mix, and translate these two methodological approaches.

Mixed-methods research, perhaps the most prevalent among integrative approaches, is not a synthesis of the two: a reality can ontologically be either objective or subjective; it cannot be both at the same time (Ivankova and Kawamura 2010; Morgan 2007). This integrative approach can instead be understood as a unique, third research paradigm (Christ 2009). It offers a synergy based on the understanding that each approach contributes to the overarching goal of knowledge production, which is particularly useful when addressing the complexities of culturally diverse settings (Fielding 2012; Mertens 2007). The proposed research seeks to contribute to this third paradigm by investigating the application of a method, currently used as part of the constructivist arsenal, within a mixed-methods approach to research. We examine the development and application of a data collection and analysis tool—the immersive focus groups—for its potential to contribute to the work and research of contemporary planners who face a new planning culture. As we explain below, we use a focus group method within a new immersive visualization laboratory to generate data for a mixed-methods analysis. In this artificial laboratory environment, we investigate the boundaries of focus group discussions and assess the added value and drawbacks of this tool. In a way, *we take constructivist research back to the lab*, but, in doing so, we reveal a complex picture that integrates the various opinions of the public. This knowledge, which we suggest is useful for planners, can emerge from a combination of qualitative and quantitative analyses of focus group interactions.

Focus Groups in a Visualization Lab

In general, focus groups are considered part of the qualitative research toolbox, and a qualitative analysis approach is thus assumed to accompany this path of inquiry (Krueger and Casey 2000). Their particular advantages are associated with the efficiency of simultaneously accessing multiple informants for observation and inquiry. Focus groups are more than just group interviews (which are quick and convenient ways of gathering people's responses to research questions); they are instead structured meetings among multiple stakeholders that are designed to facilitate group interactions. Such interactions can reveal insights into social norms and collective ideas. As part of a multiple methodologies research plan, focus groups provide excellent information that can assist in survey preparation, insights that can

help develop a deeper understanding of survey results, and opportunities to engage the public in research (e.g., in participatory action research), among other things (Bloor et al. 2001; Farnsworth and Boon 2010; Kamberelis and Dimitriadis 2011). Finally, one of the more appealing advantages of focus groups is their ability to allow for discussion without interference from the researcher/moderator. These unstructured discussions between focus group participants enable a spontaneous interaction between members that is bounded only by a topic (sometimes not even a question) and the moderator is only an observer.

Planners tend to work with and study groups (rather than individuals). As such, focus groups, which are tools for structured and systematic data collection, are uniquely suited for planning processes. Although focus groups are suggested as an important tool for planning research and practices in the twenty-first century (Eizenberg and Shilon 2016), surprisingly little has been written about the use of focus groups within this discipline (Propst et al. 2008) or on the multiplicity of products that can be generated from their use (Ryan et al. 2014).

Using focus groups requires making several methodological decisions and special preparations. Two important methodological decisions are to select an appropriate *venue* for the focus group[1] and to prepare a *focus group outline* or protocol in order to stimulate the dynamics and discussion among participants. However, as Ryan et al. (2014) note, other more subtle decisions can affect the type of information that focus groups generate. Such decisions include what roles the moderator and the participants play in the interactions; how structured or unstructured the discussions between participants should be; and whether polemical discussion should be avoided or encouraged.

Three distinctive types of knowledge that can be derived from focus groups have been identified, including "Simple Qualitative Description," "Rich Description," and "Narratives" (Ryan et al. 2014, 332). This article examines the use of focus groups for the generation of an additional type of knowledge: hypothesis-driven quantitative knowledge.

The burgeoning influence of information technology (IT) in research has also affected the evolution of focus group methods. New research on the use of focus groups is addressing new technologies that mediate discussions, such as computers, telephones, and the internet (e.g., Bloor et al. 2001; Krueger and Casey 2000). The present study portrays and examines the use of focus group tool, as part of a mixed-methods research approach, using visualization technology in the immersive theater laboratory. We describe the coupling of the focus groups method and the visualization lab venue as *immersive focus groups*. By bringing the focus group format into the modern technological environment of the visualization laboratory, we address our objective of studying the potential for the wider use of focus groups in planning and policy. The next section elaborates on this venue's uniqueness.

Use of visualization in social research and planning. As a research tool, visualization is well established in both qualitative and quantitative research. In the former, visualization is usually used in two ways: to present research results and to generate responses from participants through, for example, the visualization of future plans (Crang 2003). In the latter, visualization is widely used, for example, to identify preferences and to assess recognition capacities (e.g., Arriaza et al. 2004). From the low-tech, handheld photos presented to participants, to the more recent advances in eye-tracking technologies that encouraged a new surge in studying people's foci when they look at landscapes (Duchowski 2002, 2007; Blascheck et al. 2014), visualization research is applied in diverse disciplines and with varied research approaches. In landscape research, visualization is used to understand, among other things, stakeholders' aesthetic and functional preferences, attitudes, and visions, generating theoretical and practical implications for planning, design, and management (Orenstein, Zimroni, and Eizenberg 2015). This research utilized the immersion experience enabled by the visualization laboratory to gather data on diverse stakeholders' perceptions of forested landscapes. Understanding the complex meanings of the forest to relevant stakeholders yields practical recommendations for forest management in general and for post-fire management strategies in particular. In addition, because we are proposing and testing a new coupling of methodologies (i.e., the focus group within the visualization laboratory) for landscape perception studies, we subject our research design itself to evaluation.

The innovative technology of the visualization laboratory enables the use of panoramic, high-definition photographs of landscapes in a way that provides an immersive experience to participants. Participants' entire field of view is filled with visuals of landscapes, and scanning and understanding details, even small ones, is made possible (for more details, see Orenstein, Zimroni, and Eizenberg 2015). The immersion experience within the projected visual is believed to have a stronger sensual impact than less immersive media (such as handheld photos) and, in turn, to generate a heightened emotional response (Barroso et al. 2012; Codispoti and De Cesarei 2007; Danahy 2001).

Elsewhere, we have expanded on the unique qualities of the visualization lab in landscape perception research (Orenstein, Zimroni, and Eizenberg 2015). We have suggested that the projection's sheer size and detail, the ability to switch between and to compare various scenes, and (in the context of our research) the social interactions and the isolation of the focus groups within the laboratory encourage participants' deep engagement with the landscape. The combination of these qualities (immersion, comparison, and isolation), unique to the visualization laboratory, seem to synergistically encourage rich insights into stakeholders' perceptions of landscapes. Our experiences are validated by similar work in visualization laboratories (Edsall and Larson 2009; Larson and Edsall 2010). Finally, following Hanich
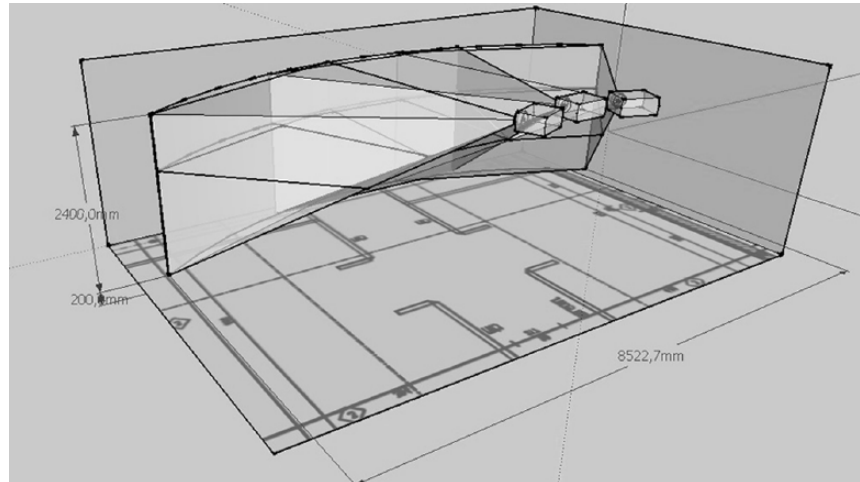
Figure 1. Blueprint of the VizLab.

(2010), we have discussed the impact of immersion on multiple audiences and its amplification of participants' collective responses (Orenstein, Zimroni, and Eizenberg 2015).

In the following sections, we will present the use of focus groups in the visualization laboratory and the type of data that are generated. Finally, we will discuss some specific advantages of using the focus groups method in combination with innovative visualization technology.

Research Methodology: Using Focus Groups in the Laboratory

In our research, the newly established visualization lab in the Faculty of Architecture and Town Planning at the Technion (VizLab; http://viz-lab.net.technion.ac.il/) served as the hosting venue for focus groups. The laboratory consists of a 9.2 × 6.8–m room, with a 2.4 m high curved screen providing a 7 m radius and 75° field of view (Figures 1). Images are projected across the entire expanse of the screen using three high-definition projectors (5,740 × 1,200–pixel resolution). A high-resolution camera, equipped with a wide-angle lens, was purchased to collect images that match the projection resolution.

Our discussions were designed to understand how the forested landscapes should be planned and managed, and, following Macnaghten and Urry's (1998) notion of *contested nature*, we inquired about the multiple ways in which different users perceive and use forest settings. This concept implies the highly diverse, ambivalent, and even conflicting senses of the environment among people in different groups. The research advanced two guiding objectives: to generate a deep and comprehensive understanding of the values and services that people (users) attach to various forested landscapes and to differentiate between the needs and values of different groups with regard to different uses and settings.

In 2014, we assembled in the VizLab ten focus groups with a total of seventy-four participants. Different types of stakeholders were recruited as participants in a snowball sampling. Categories of stakeholders included residents in close proximity to the forests of Mt. Carmel on Israel's northern Mediterranean coast, with representation of youth and adults, and Jews and Druze. In addition, participants included different professionals: forest managers, planners, ecologists, and landscapers. Of all participants, 46 percent were female, 84 percent were Jews, 11 percent were Druze, 34 percent were teens under eighteen years of age, 20 percent were between the ages of nineteen and thirty-four, and 42 percent were aged thirty-five and older. Each session lasted approximately ninety minutes.

The focus group discussions consisted of three formal stages and two intermediate stages, which were open [or relatively informal] enough to allow for various interactions to occur. In the formal stages, participants responded to questions by writing in their responses on questionnaires. The intermediate stages were designed to facilitate a discussion among participants vis-à-vis the projected landscape visuals of the Carmel Forest. Unlike common landscape perception research that uses visualization, the protocol did not direct participants' attention to specific structural elements or specific sensations (e.g., auditory, fear, or pleasure as in Andrews and Gatersleben 2010; Berto 2005; Pheasant et al. 2010). Instead, we attempted, as much as is possible in a controlled laboratory environment, to create a holistic experience of the projected site and to let participants converse about the most dominant elements of the experience in a collective discussion.

In Stage 1, participants were asked to "name" each of the ten landscape visuals projected before them in their questionnaire. Then, in Stage 2, participants were asked to choose four "favorite" sites (i.e., four of the ten visuals) and to write why they would choose to spend time in these sites. Stages 1

and 2 are common to focus groups and seek to enable each participant to formulate ideas and opinions that are unfettered by group dynamics and influences. In this way, once the discussion opens up, each participant has prepared and written down his or her ideas to share with the group. This strategy helps avoid the social desirability bias, on the one hand, and problematic silences due to some participants' difficulties in disclosing their opinions in the presence of more dominant participants or conflicting ideas, on the other hand (Hollander 2004).

Within the VizLab environment, these two "naming" and "prioritizing" stages had an even greater purpose and took on more significance with regard to use of focus groups in landscape perception research. First, participants' quiet exposure to visuals of the landscapes in a dark laboratory (with only enough light to enable writing) facilitates each individual's immersion in the (visualized) landscape. While immersed in the projected landscape, participants connect with the landscape's most immediate and dominant feature(s) as they attempt to determine the correct name for each visual. Based only on the results of this first stage, the research team is then able to quantify the various meanings and qualities that different people perceive regarding different sites. The second stage of prioritizing landscapes is based on participants' desires to be in the selected sites, and this stage is not uncommon in preference-focused research. However, some unique differences also arise through the combination of this tool (focus groups) and this venue (VizLab). Participants are asked to write down their reasons for choosing these specific sites. At this point, facilitators do not instruct participants as to what kind of explanation they are interested in (i.e., physical features, activity, aesthetic, etc.); they instead allow each individual to relate to her or his personal understanding of the landscape in this response.

These two initial stages prepare participants for Stage 3, intermediate discussion, which entails many different opinions and often spirited and emotional arguments. The discussion covers each visual, starting from one participant's first choice through the nine remaining visuals (with the facilitator asking "Who chose this picture?" and "Why?" for each of the visuals). Facilitators' questions throughout the discussion only probe for additional reasons that participants choose or do not choose each site.

In **Stage 4**, participants are asked to write down the activities in which they would like to engage in the sites of their choice. A **second discussion** opens up after Stage 4 to identify users' activities in the different sites and the characteristics of the sites that support their activities—for example, the structural elements, cultural symbols or atmosphere that propel these activity choices.

All the focus group sessions were audio and video recorded and then transcribed. At least one observer besides the facilitator was present in the lab, taking notes on participants' nonverbal behaviors, group dynamics, and informal conversations and remarks.

Analysis

In this section, we present the rich possibilities of focus group use within the mixed-methods approach to enhance planning research in general and landscape perception research in particular. Table 1 presents a summary of the different results, both qualitative and quantitative, that can be extracted from each stage of the focus group meetings. Following the table, some of these results (marked with an asterisk) are elaborated further.

As the table presents, Stage 1 yielded "tags" for sites that are qualitatively analyzed to define each site as perceived by participants. They comprise the sites' plots or narratives from the perspective and in the words of the perceiver and reveal that which people notice about each site: for example, its physical features, cultural symbols, and potential activities. This narrative can also be analyzed with regard to the types of perceptions, for example, holistic or particular, that are activated by forest visuals. A quantitative analysis of this information is deployed to differentiate between different groups' (e.g., based on ethnicity, age, and academic background) perceptions of the sites.
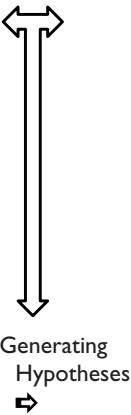
Stage 2 yielded a quantitative analysis of preferences—of the entire sample and of different groups—in some cases revealing the dominance of preferences for specific landscapes over others. Individual explanations (in writing) for choosing the site enable us to attach meaning to preference but also see (qualitatively) if different groups share meanings as well as preferences. In other words, we can assess the ways in which the perceptions of landscapes are grounded in the cultures of different groups.

Stages 3 and 5 consisted of open group discussions, which yielded rich, complex, and contested stories about the landscapes. Focus group discussions are the backbone of this tool; they allow unanticipated issues, conflicts, and dynamics to surface, stimulated by differences in participants' perceptions. Through a thematic analysis, these discussions are then organized into dominant themes and subthemes, which tell the story of the landscape and the variations in this story among different groups.

The story, or stories, of a landscape is rich with information regarding participants' memories, spectrum of emotions, attachment (or lack of thereof) to the landscape, as well as its cultural representation. The narrative of a specific landscape is constructed from this analysis. In our research, the second open discussion (Stage 5 in Table 1) also contributes important information on the manner in which people perceive the site's structure and its affordances in relation to participants' preferred activities and their hopes for the site's future. This kind of information lends itself to applied inferences regarding forest management and planning. The group process also generated the variables for the statistical analysis.

Stage 4 yielded users' descriptions of activities, the activities that are linked to particular sites for specific reasons, and the site's perceived qualities that make specific activities

Table 1. Qualitative and Quantitative Products of Focus Groups (*Elaborated upon in the Results Section).

	Qualitative Analysis		Quantitative Analysis
Stage 1: Naming visuals	• Defined perceptions • Identification of significant elements of the environment*	⇕	• Number of occurrences of particular terminologies or themes • Most common identifications/significant elements* • Difference between groups*
Stage 2: Choosing "favorite" sites and reasoning	• Types of values/meanings that are attached to landscapes ["simple description"]		• Total number of times that particular sites are selected • Preference differences between groups*
Stage 3: First intermediate discussion	• The story of the landscapes, memories, cultural symbols, positive and negative emotions, and ambivalence (rich description)* • Agreement and disagreement regarding the meanings of landscapes among different people/groups	Generating Hypotheses ⇨	• Frequency with which particular terminologies or themes are used • Frequency with which combinations of terminologies or themes are used • Comparison of landscape meanings among groups*
Stage 4: On-site activities	• A description of people's aspirations in using forest sites		• Distribution of activities by site/landscape/group
Stage 5: Second intermediate discussion	• The ways in which people perceive the connection between the site [e.g., its structure and design] and the activities in which they would like to participate		• Effect of the sociodemographic group on nature preference

possible. A quantitative and qualitative comparison then suggested how different groups understand different landscapes' affordances and how they prefer to use them.

Results

This section draws several examples from the process of qualitative and quantitative analyses of the focus groups in the VizLab and the products that this process yielded. These products elucidate the different capacities of the focus group tool, as used in a mixed-methods approach, for landscape perception research. Therefore, this section presents three analytical steps. First, we identify the "salient perceptions" of landscapes by focus groups participants. Next, a qualitative analysis reveals the meanings attached to these landscapes and portrays the "richness of perceptions" of the landscapes among participants and across specific groups. Finally, based on the qualitative analysis, we develop three hypotheses regarding group differences in landscape perceptions and test our hypotheses using quantitative analysis.

Salient Perceptions

The salient perception of a landscape refers to what people first perceive when they view that landscape. What do they notice? Since eye-tracking technology was not used, we do not have information on the objects of fixation of the eyes. Nevertheless, we do have complementary information on what the most salient feature was for them in the landscape, its "immediate"

symbolic representation. While people generally perceive the environment holistically, the analysis of the qualitative data that emerged in the focus groups, mainly in the discussions and in the individual questionnaires, suggests a tendency toward specific and distinguishable salient perceptions.

The analysis of the focus group transcriptions identified the main categories of salient perceptions related to the landscapes that were projected in the VizLab. These categories evolved out of participants' free association within the immersive environment, first in their individual questionnaires and then in the open discussions. In both cases, the format of the focus group made these associations possible. In this format, the moderator occupied an ancillary position (compared with other qualitative tools) and allowed participants to first develop their own perceptions and then, during discussions, to develop collective perceptions. This process produced a wide array of identifications ("names") for each site (see, e.g., Figure 2) that were then divided into salient perceptions for each visual, salient perceptions by group, and salient thematic perceptions for different landscape types (see, e.g., Figure 3).

This initial analysis provides a first glimpse into the construction of nature and, through quantitative analysis, into the ways in which different groups tend to perceive a site. This analysis can also be further explored vis-à-vis forest planners' intended designation of sites and the potential modifications in management and planning to better fit public perceptions and desires. For example, respondents often identified the olive tree orchard in Figure 2 according to its
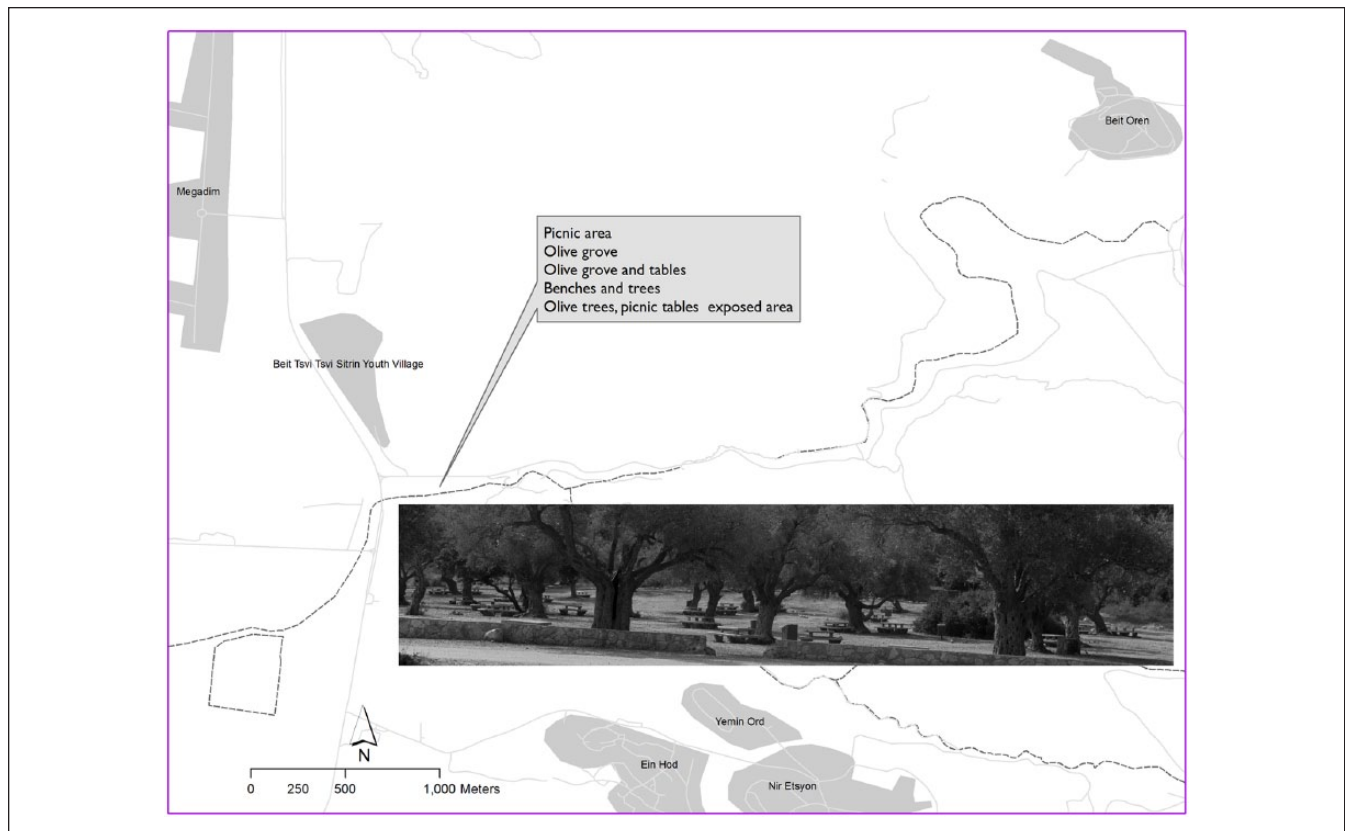
Figure 2. Naming landscapes—example of visual 1.

functionality—"picnic area" appeared in almost all titles—and this functionality is linked to human-inserted objects—for example, tables and benches.

Even when the flora—olive trees—were recognized and noted in the title, the aforementioned functional objects were also mentioned in most cases. Then, coding the titles into five categories (Figure 3) provided a comparative metric of the prevalent perceptions regarding each landscape. Figure 3 presents the distribution of categories in three of the analyzed visuals. This presentation clearly shows how differently each landscape is perceived. Further analysis (not presented here) connects salient perceptions and site morphology.

The naming of a visual is highly suggestive of what people initially perceive in a landscape, and it may relate to their choice to engage with or avoid this landscape. However, these names do not reveal much about what these landscapes represent. To obtain a better understanding of these landscapes, we used the data collected in the open discussions and the questionnaires, which yielded various perceptions, understandings, and meanings regarding these sites.

Richness of Perceptions

A thematic analysis of the data in relation to the main themes and subcategories yielded a different narrative for each visual, which included the meanings, symbols, cultural contexts, emotions, and experiences associated with that visual. Table 2 lists the main categories and subcategories.

Next, we used these data to produce a quantitative analysis, documenting how often these categories were mentioned. The dominant perceptions of a single site, including dominant meanings and symbols, repeatedly surfaced among multiple participants. Differences in individual perceptions of each site were also assessed in quantitative terms. How did a specific group tend to attach meanings to the different sites in the forest? In this way, we identified areas of consensus and conflict/disagreement in the perceptions of people from different social and demographic groups. These differences, which may be explained by different cultural values, needs, and practices, are crucial when working with forest inhabitants and users to plan for multiple publics.

The "being away" category was strongly associated with the visuals of the Carmel forest. However, further analysis of the "being away" subcategories suggests that only two sites evoked a sense of wilderness, a matter that is particularly important to forest managers and ecologists (see Figure 4). Interestingly, a further comparison of these groups shows that youth, compared with adults, generally perceive sites in terms of how "far from the crowd" they are. For youth, the
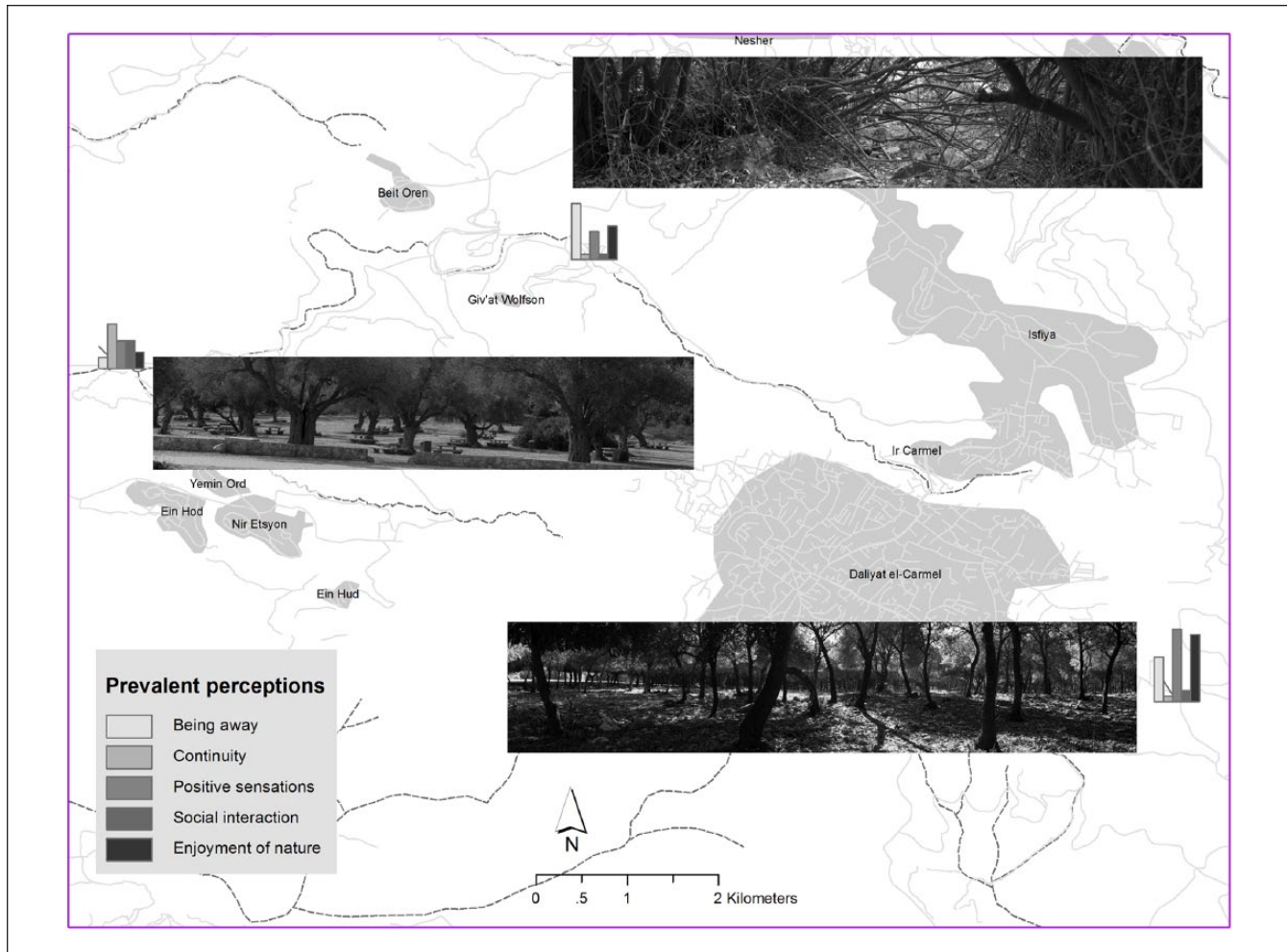
Figure 3. Salient thematic perceptions of visuals 1, 2, and 3.

forest sites are places for group solitude (see Figure 5 for a differentiation of groups' perceptions).

Other comparisons revealed different themes between other groups. For example, for Druze participants (whose towns are located in the heart of the forest), the forest is not associated with *being away*; it instead represents a *continuity* in their lives. They associated forest sites and elements of nature to homey feelings and family heritage; thus, a major part their *enjoyment of nature* involved integrating nature into history and into everyday life. Meanwhile, for Jewish respondents who lived both in and around the forest, these landscapes were more often associated with *being away* and the *enjoyment of nature* itself (e.g., its greenness, diversity, and breezes). Both groups perceived the forest as a place for *social interactions*.

Variance in Perceptions between Groups—A Quantitative Analysis

The identification of different themes among different groups, as described in the preceding sections, and our ability to

extract quantitative data from the focus group discussions enabled us to propose specific questions that could be addressed with a statistical analysis. Previous research has shown that particular demographic groups are more or less sensitive to human structures within otherwise green landscapes (Buijs, Elands, and Langers 2009; Zube and Pitt 1981; see discussion). We were thus prompted to test whether particular demographic groups had stronger or weaker preferences for more or less "natural" scenes (i.e., undisturbed by human structures). In particular, we suspected differences between professionals and students of ecology, on the one hand, and the general population, on the other. Furthermore, based on observations and focus group protocols, we observed qualitative differences between Druze participants and Jewish participants with regard to their preferred landscapes and the themes that they associated with those landscapes.

To test whether these differences were valid, we derived three types of quantitative data from the participant survey. First, we noted demographic variables (female/male, adult/ youth, Druze/Jewish, and ecologist/nonecologist). Second,

Table 2. Main Categories of Perceptions and Subcategories.

Main Category: Forest Perceptions	Perceptions Related to This Category
Being away	Away in time
	Away in space (remoteness)
	Away from people (far from the crowd)
	Wilderness
	Adventure (challenge)
	Out of the ordinary (escape)
Continuity	Nearby space
	Organized and clean landscape (man-made)
	Homey atmosphere
	An ordinary place
Positive sensations	Relaxation
	Freedom
	Inspiration
	Curiosity
Social interactions	Meeting friends and family
	Family trip
Enjoyment of nature	Diversity (e.g., landscapes, plants, colors)
	Integration (e.g., between nature and history; nature and man-made environment; trees and water; mountain and sea)
	Green
	Renewal, landscape rehabilitation
	Shade
	Air/breeze

we generated an index of the degree of human intervention for each of the fifteen sites that were shown to participants.[2] Third, we quantified how many times each participant mentioned each theme (which had been coded as part of the qualitative analysis) during the discussion protocols. The themes included distance, nature, feeling, social contact, continuity, and openness.

Specifically, we tested the hypothesis that sociodemographic group affiliation leads to statistically distinct preferences for particular landscapes. Our assumptions, based on both the literature, previous familiarity with the research site, and our qualitative review of the focus group protocol, were as follows:

1. Particular demographic groups will show stronger preferences for more natural scenes (i.e., scenes that include fewer signs of explicit human intervention) than other groups based on their preferred landscapes (Buijs, Elands, and Langers 2009; Gee and Burkhard 2010; Zube and Pitt 1981). Ecologists will show stronger preferences for more natural scenes as compared to nonecologists; Druze will show less aversion to scenes with signs of human intervention than non-Druze.

2. Particular demographic groups will express unique thematic associations with various landscapes compared with other demographic groups (e.g., Rishbeth 2001). Based on the frequency, participants use particular thematic references when they discuss the various landscape scenes. Druze (whose communities are located within the forested landscape) will associate landscape scenes with the theme of continuity, while non-Druze will associate the scenes with the theme of distance. Young people will more often associate the landscape with social interaction as compared to adults.

To examine these assumptions, we constructed linear models to assess the effect of the sociodemographic group (including five independent variables: frequency of visits to the Carmel, occupation [ecologist/nonecologist], ethnicity, gender, and age category) on our nature preference index (Question 1) and on the six themes (distance, nature, feeling, social contact, continuity and openness) (Question 2). The results of the statistical analysis showing relationships with high probability of effect of independent variables (rows) on dependent variables (columns) are reported in Table 3 (see appendix for a full description of the statistical analysis). The variables showing a strong relationship are noted with a double asterisk, and those showing a moderate relationship are noted with a single asterisk.

As shown in Table 3, ecologists responded in significantly different ways than the rest of the sample group. In particular, as expected, they preferred more "natural" landscape scenes, that is, those that have fewer discernable signs of human activity, more than the other groups. They were less likely than other respondents to consider the landscape scenes as places for social contact and gatherings, as they preferred (as revealed in the protocol) to distance themselves from other people and to find opportunities for solitude and study.

Only one statistically significant difference was found between ethnicities; Jewish respondents more strongly preferred natural over "built" landscape scenes. While this preference may be due to the concentration of ecologists within the Jewish ethnicity category, it was corroborated via observations from the discussions. Druze participants were nearly unanimous in preferring scenes with built spaces, ranging from neighborhoods to picnic benches and couches. This finding further supports the aforementioned studies that found notable differences among different ethnic groups with regard to preferences for natural scenes (Buijs, Elands, and Langers 2009; Zube and Pitt 1981).

Compared with adults, youth were less likely to refer to "nature" in their narratives of the various scenes. They were also significantly more likely to discuss the landscape scenes in terms of places for social gatherings and activities. No significant differences were found between the responses of male and female participants. Finally, those who visited the
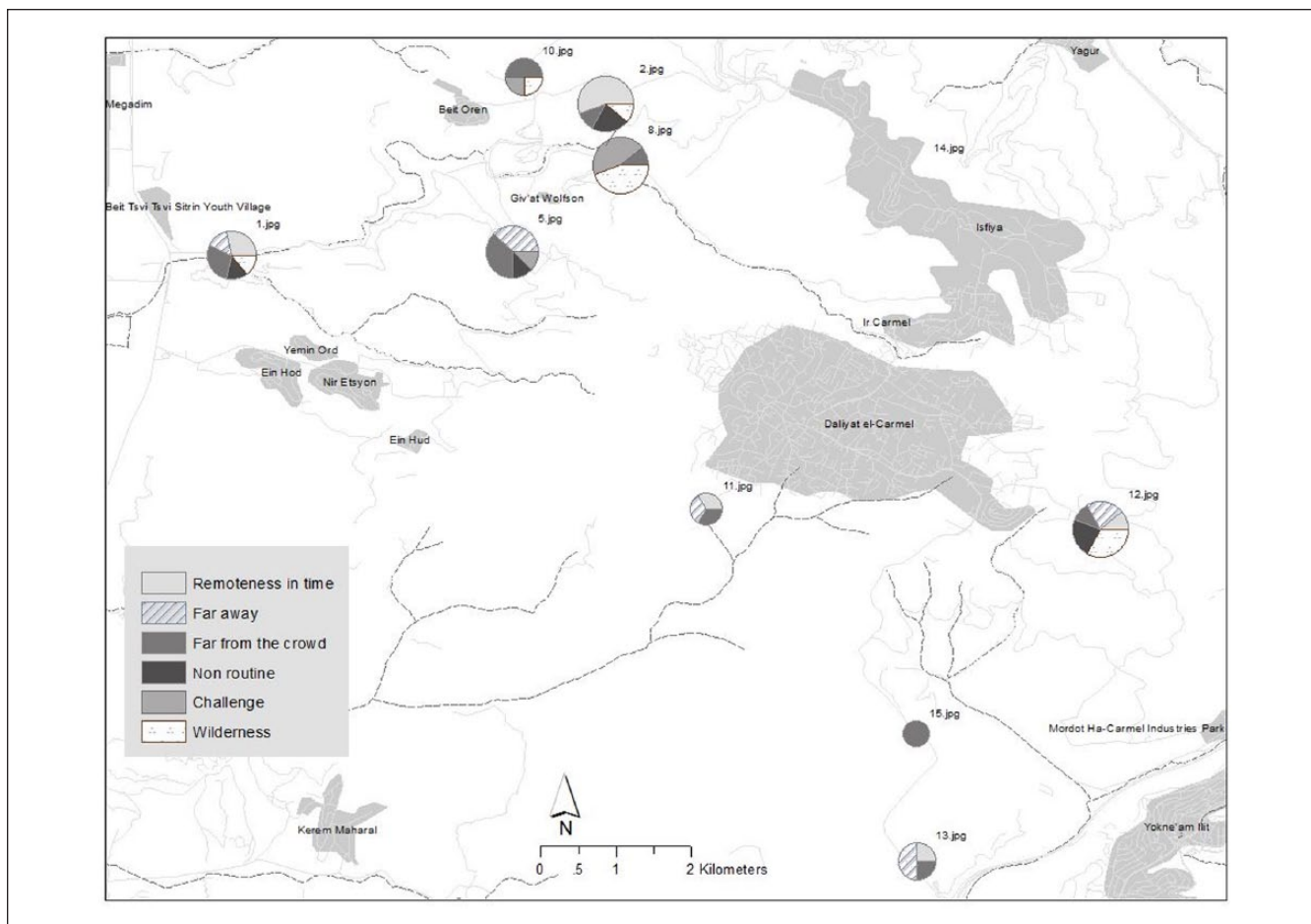
Figure 4. Subcategories of the main category "being away."

Carmel Forest less often also more often reported preferences for landscape scenes with human development. Additionally, these infrequent visitors were less likely to refer to the landscape scenes as sites for social contact and gatherings.

Discussion

In this article, we introduce immersive focus groups as a mixed-methods approach to examine users' perceptions of forest landscapes and their desires regarding the use and design of these landscapes. By placing focus groups in a particular venue, that is, the immersive theater laboratory, we hope to remove the focus groups tool from the qualitative arsenal and relocate it within the mixed-methods arsenal. Using this research design for landscape perception research indeed helped to uncover and deepen our understanding of the nuanced perceptions of forest landscapes, on the one hand, and to test for variations among different cultural, age, and background groups, on the other. Although the benefits and capabilities uncovered in the present research do not include all of the methodologies' potential (see Table 1), this

research provides a glimpse into the potential of immersive focus groups to generate new knowledge through combined quantitative and qualitative analyses.

Immersive focus groups reveal formal and informal dynamics within the same research session. The formal parts are instrumental in configuring the distribution of landscape preferences, the distribution of common uses of various landscapes, and the configuration of group differentiations. The informal parts are instrumental in gaining richer and more diverse information, as discussions evolve among participants and often shift in new directions that the researcher-moderator does not anticipate. This method produces a less hierarchical research dynamic that is still contained within the perceptual boundaries of the visual input and the framed setting of the focus group event.

Despite their promise, the immersive focus groups used through a mixed-methods approach have some clear disadvantages that must be addressed. The main challenge is also one of this tool's major advantages: its capacity to generate unanticipated data and results that lead in unexpected directions. While open or semi-structured interviews are geared to allow all aspects of a case or a phenomenon to surface and
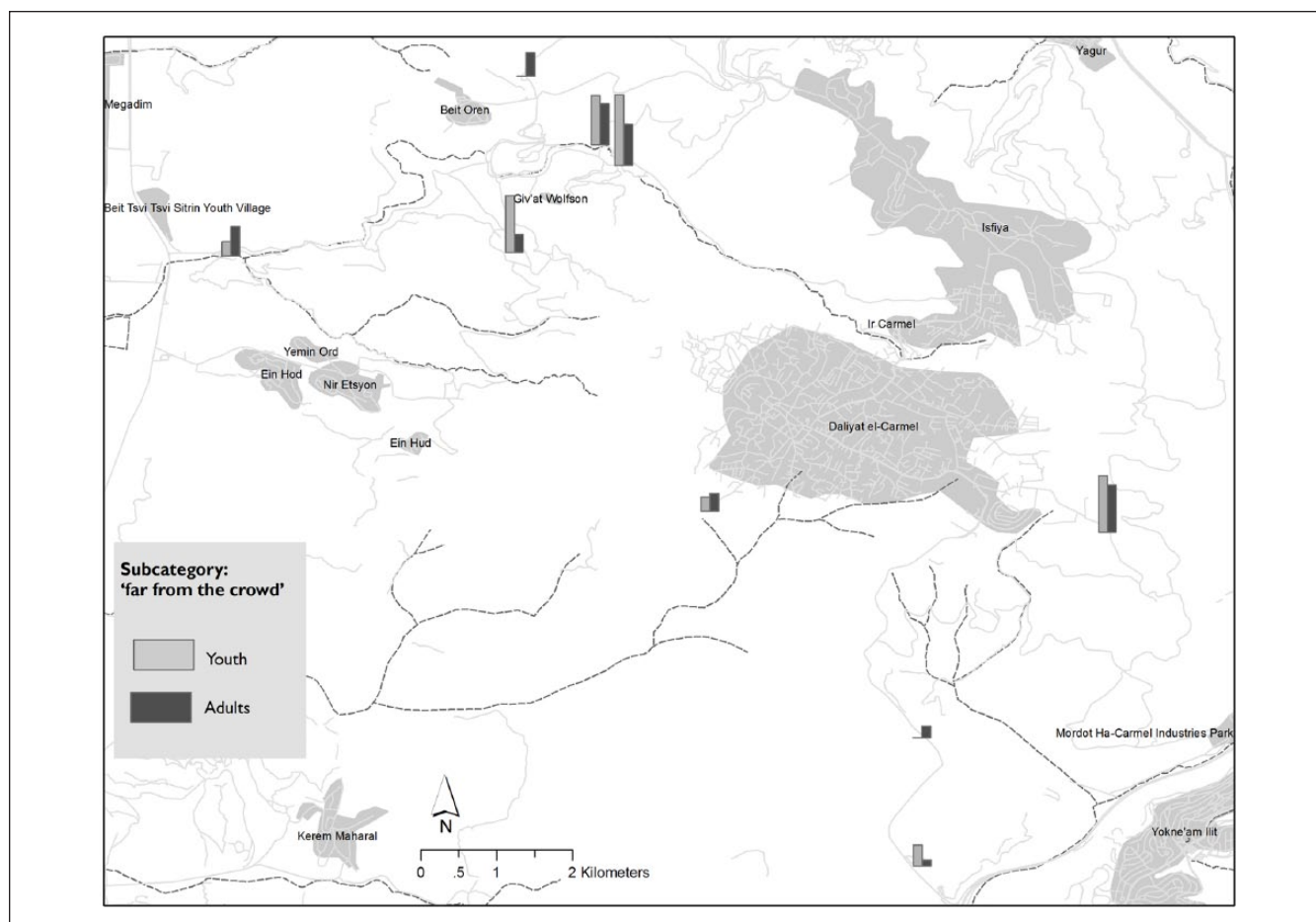
Figure 5. Youth and adult differences within the subcategory "far from the crowd."

Table 3. Effect of the Sociodemographic Group on Nature Preference.

Variable	Nature Index	Nature	Feeling	Social Contact	Distance	Continuity
Intersect	3.53 ± 0.16	−0.12 ± 0.32	−1.32 ± 0.29	−2.00 ± 0.52	−1.62 ± 0.28	−1.79 × 0.36
Ecologist: no	–	–	–	–	–	
Ecologist: yes	0.19 ± 0.15**	0.04 ± 0.14	0.05 ± 0.16	−1.01 ± 0.56**	0.04 ± 0.14	−0.26 × 0.34
Ethnicity: Druze	–	–	–	–	–	
Ethnicity: Jewish	0.30 ± 0.22**	−0.14 ± 0.31	0.04 ± 0.22	−0.15 ± 0.47	0.05 ± 0.25	0.03 × 0.26
Age: adult	–	–	–	–	–	
Age: youth	0.02 ± 0.06	−0.53 ± 0.29**	0.21 ± 0.25	0.87 ± 0.50**	0.04 ± 0.14	0.04 × 0.17
Gender: female	–	–	–	–	–	
Gender: male	−0.04 ± 0.08	−0.01 ± 0.11	0.06 ± 0.16	0.01 ± 0.16	−0.00 ± 0.10	−0.22 × 0.31
Visits: high	–	–	–	–	–	
Visits: low	−0.15 ± 0.14*	−0.15 ± 0.23	0.02 ± 0.12	−0.72 ± 0.56**	−0.00 ± 0.11	0.04 × 0.18

Note: The variables showing a strong relationship are noted with a double asterisk, and those showing a moderate relationship are noted with a single asterisk.

questionnaires are used to test well-constructed hypotheses, focus groups within the mixed-methods approach strive to achieve both, while being neither. For example, we approached the research with a particular notion of "nature" (i.e., multiple natures) and thus sampled participants from diverse demographics; however, we did not anticipated the wide gap between ecologists' perceptions of the site and those of average users (from different backgrounds). This gap, based on ecology/nature-related education backgrounds, was apparent among youth (nature-related youth groups vs. unaffiliated youth) and among adults (professional ecologists vs. nonspecialists). One direct conclusion from our

research project is the importance of carefully constructing the sample with regard to the respondents' education, disciplinary expertise, and profession in future research, that is, understanding participant differences based on their affiliations with different epistemological communities rather than ethnicity, social class, age, and gender alone. However, this unanticipated result brings to the fore the inapplicability of the traditional structure of quantitative analyses, whereby a priori hypotheses are generated and then examined (or what may be considered unknown exogenous variables). In the same vein, qualitative research is also unable to generate significant comparative results.

As our research, following previous research (Macnaghten and Urry 1998; Gobster 2001), showed, nature is highly contested and interestingly not only between the hegemonic perception and that of minority groups, but between those professionals who plan, develop, and maintain the forest and the actual users (regardless of the ethnic/economic/political group they are affiliated with). Hence both planning research and planning practices, which aspire to involve the public in meaningful ways (Corburn 2003), can benefit from immersive focus groups as a mechanism through which disagreements and agonistic views about spaces and their production can be raised in a constructive framework; these disagreements can then be compiled and translated into a thoughtful and legible output. The application of both quantitative and qualitative approaches enables both researchers and practitioners to organize, analyze, and practically apply these diverse perceptions.

The immersive focus group can make an important and powerful contribution to landscape perception research. It is one of several emerging methods that are augmented by the visualization laboratory such as 3-D immersion, eye-tracking, and virtual reality. Some of these methods, such as eye-tracking, have already made an important contribution in providing "an unobtrusive, on-line measure of visual and cognitive information processing" and have influenced various fields (e.g., neuroscience, psychology, industrial engineering and human factors, marketing/advertising, and computer science) (Duchowski 2002, 457). As technologies develop, we need to understand how to better combine these methods in order to obtain an even more detailed and precise understanding of human landscape perceptions, for example, to develop our understanding of strategies for scene viewing, which is still considerably lacking (Duchowski 2007). Unlike the immersive focus group of the current study, these other methods are applied primarily at the individual level—that is, for following the responses of one person. The immersive focus group derives its major strengths from group interaction and shared experiences.

We propose that some progress in understanding can be provided by the immersive focus groups method in the VizLab environment. In this environment, participants' attention and, in turn, their conversations are directed to the site(s) under investigation. The projected images fill participants'

sightlines, and the milieu shields them from any interfering stimuli. While research conducted in the VizLab (or any laboratory for that matter) eliminates various aspects of in situ experience, it enables researchers to choose the visuals of various compositions and uses of landscapes and, more specifically, to decide about the specific angle, time of day, and makeup of people to be visually captured. While we were not trying to create a real-life laboratory environment, by integrating forest sounds and smells, for example, the lab milieu was nevertheless able to generate a very focused and deep discussion that allowed participants to reveal their own perceptions, past experiences, political or social agendas and even auditory and olfactory sensations that were evoked by the immersive visual setting (Orenstein, Zimroni, and Eizenberg 2015).

In conclusion, we highlight the opportunity presented by combining these approaches in a single research project and the importance of developing and fine-tuning the practice of mixed-methods research, particularly in socially and culturally complex settings.

Future research may combine the immersive focus groups method with eye-tracking technology and through discussing with participants the on-line results of their eye-movements, enriching the knowledge on strategies for landscape perception. Similarly, as technologies developed (and become more accessible), group interaction may be attained via avatars in a three-dimensional landscape.

Appendix

Statistical Analysis

Using the statistical program R.2.12.2, we built three linear models to assess the effect of the sociodemographic group (including five independent variables: number of visits to the Carmel, occupation [ecologist/nonecologist], ethnicity, gender, and age category) on our nature preference index. Additionally, four generalized linear models with binomial error structures were built to explore the effects of demographic characteristics (independent variables, as in the previous model) on the six themes (distance, nature, feeling, social contact, continuity and openness). We tested the model's assumptions using residual and leverage plots.

For model selection, we used the model-averaging approach (Burnham and Anderson 2002) with package MuMIn. Following this method, all models were ranked based on the Akaike information criterion with a correction for small sample size (AICc). For the variables from the most parsimonious models (i.e., ΔAICc <4), we averaged their estimates and standard errors weighted by each model's AICc (Burnham and Anderson 2002). The model averaging yielded the post-probability (PP) of an explanatory variable affecting the dependent variable and considered the number of times that the term appeared significant in the selected models. We identified the variables whose model-averaged 95% confidence intervals did not include zero and that had a

PP of at least 0.7 as "strongly" supported by the model and the variables that fulfilled only one of these conditions as "moderately" supported (Gray et al. 2009).

Notes

1. A good location for a focus group is considered one that (a) is equally inclusive for all participants, (b) enables the development, facilitation, and documentation of group dynamics, (c) brings people together in a comfortable social environment, and (d) is accessible to all (Bloor et al. 2001).
2. To generate the index, each of the authors independently ranked each picture on a five-point scale (1 being completely developed, e.g., urban nature, and 5 being completely natural, e.g., very few discernable human constructs). The index value was the average of the three rankings.

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