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## The desirability of views of city skylines after dark

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## ABSTRACT

Three studies used digital color photographs to compare responses to natural scenes, skylines after dark, and skylines during the day (seven of each). Study 1 had 59 respondents rate the pleasantness of each scene. They gave similar ratings to Night Skylines and Natural Scenes, and rated each as more pleasant than the Day Skylines. Study 2 had 56 other participants choose from each of seven sets of each kind of scene the one they would most like to have as a framed print in their home or office, and to report the reasons. Participants chose Night Skylines most often, followed by Natural Scenes and then Day Skylines. While participants most often picked attractive as a reason for their choice, those who chose Night Skylines also picked exciting as the reason, and those who picked Natural Scenes also picked relaxing or peaceful as a reason. Study 3 obtained ratings of selected formal features of each scene. The 23 judges rated the Natural scenes as more natural, orderly, open, and curvilinear, less complex, and as having smoother transitions than either Day or Night Skylines; and they judged the Night Skylines as higher in complexity but lower in order than Day Skylines. The results suggest that preferences in relation to the scene categories may well depend on a mix of their formal characteristics and their content.

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## 1. Introduction

During the day the view from the New Jersey Turnpike is ugly. One passes a hodgepodge of ugly metallic chemical structures. After dark, this gets transformed into an interesting array of lights. We've experienced this day-night difference in many urban areas. While theory and research consistently finds that people prefer natural to built or urban scenes, we wondered if people might find one kind of urban scene appealing—skylines after dark. Perhaps examining it could also help explain whether the preference for nature comes from its form or content (connotative meanings associated with it). In 1865 Frederick Law Olmsted (1990, p. 502) described the experience of nature as healthy and re-invigorating. Transcendentalists, such as Emerson and Thoreau, also believed that a connection with nature was essential. "In the woods," Emerson (1836) wrote, "we return to reason and faith. There I feel that nothing can befall me in life, – no disgrace, no calamity, (leaving me my eyes,) which nature cannot repair." Thoreau echoed the idea of healing nature, when he wrote in an 1853 journal entry that nature is "but another name for health, and the seasons are but different states of health." (Sellers, 1999, p. 486). Of course, others

noted that historically people saw nature (particularly trees and woodlands) as the wilderness, "wild," scary and a source of evil (Burgess, 1996; Milligan & Bingley, 2007; Schama, 1995; Spirn, 1998; Ward-Thompson et al., 2004), suggesting that preferences now might have to do with learned positive associations with nature.

Research has found that natural and built environments are innate categories (cf. Rosch, 1977) in human perception (Kaplan, 1987; Ulrich & Ulrich, 1976; Wohlwill, 1983). Naturalness relates to the presence of foliage, vegetation, and trees and the absence of overt human intervention (Herzog, Kaplan and Kaplan, 1982; Ulrich, 1986). Naturalness is actually perceived naturalness, because what people judge as natural often involves human intervention (cf. Krieger, 1973). Studies have consistently found that preference increases with perceived naturalness and that people prefer environments perceived as natural to those perceived as human-made (Kaplan, 1987; Kaplan & Kaplan, 1989; Kaplan, Kaplan, & Wendt, 1972; Lamb & Purcell, 1990; Nasar, 1994), and that the experience of nature has restorative value (Cackowski & Nasar, 2003; Hartig, Mang, & Evans, 1991; Hull, 1992; Kaplan & Kaplan, 1989; Parsons, Tassinary, Ulrich, Hebl, & Grossman-Alexander, 1998; Ulrich, 1984; Ulrich et al., 1991). Yet, we do not know the degree to which the preference for naturalness derives from its formal qualities or its content.

Formal qualities refer to physical properties and relations, such as shape, proportion, scale, and complexity, to which humans

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respond quickly and “for their own sake” (Lang, 1987, p. 187). Observers would notice formal qualities that may benefit or injure them or that may support or interfere with their activities (Gibson, 1979). Zajonc (1984) referred to such qualities as *preferenda*.

*Content* involves more information processing. It combines the environment and the observer’s experience and associations with it. Thus, content involves mediating variables that reflect one’s internal representation of and associations with the environment (Moore, 1989). Kaplan and Kaplan (1989) suggests that preference for nature derives from its content, but that environmental preferences also involve other information processing, though it need not have calculation or be a conscious process.<sup>1</sup> Others have also focused on the content of nature, which conveys positive meanings (Jackson, 1997; Simpson, 1999). Ulrich (1983) offers a mix of a perceptual and cognitive approach, in which affect arises from both *preferenda* (such as formal and structural attributes of environments) and content, each of which requires little mental processing. In a more perceptual approach, Wohlwill (1983) suggests that the difference in preference between natural and built environments might arise from formal differences between them. He theorized that natural environments “are characterized by irregular lines, and irregular, rough textures,” while developed environments have “regular lines, rectilinear edges, sharp discontinuities, abrupt transitions, and highly regular, smooth surfaces” (pp. 14–15); and he noted that these attributes might place natural environments in the intermediate (and desirable) range of complexity, while developed environments would tend toward the less desirable extremes.

Does the preference for natural environments arise primarily from their formal characteristics, such as those described by Wohlwill (1983), or their content? Consider again city skylines after dark—a different kind of environment. Studies have not examined them, but perhaps people may find them visually appealing, as suggested by the day and night experience of the New Jersey Turnpike. As with nature, the appeal may arise from the form or content of the skylines.

For *form*, studies show that that preference varies with the complexity of the skylines—the number of different buildings (or entropy) and the number of ups and down in a skyline (Heath, Stnith, & Lim, 2000; Nasar & Imeokparia, 2002; Stamps, Nasar, & Hanyu, 2005). However, perhaps when the artificial materials (the concrete, glass, masonry, and metal of the cars) fade in the dark, the lights of the skyline may have some of the desirable formal attributes that Wohlwill (1983) assigned to natural environments. They may have complexity and order. Each building organizes the pattern of lights by having horizontal floors and offices stacked above another, but there is variation in which lights are on or off, giving the overall pattern some complexity within the order. In addition, while the concrete, glass, steel, lines, surfaces, textures, and sharp edges of the buildings fade, the lights may have smoother discontinuities and transitions, and movement (as lights flicker on and off, and as cars move through the environment) or assumed movement (related to those real-world features of the light).

As for *content*, at night, the undesirable content fades, replaced by the lights. Recognizing an association between complexity and undesirable urban content, Wohlwill (1976)

distinguished complexity (which might have undesirable content, such as poles, wires and signs) from visual richness (without such content). Movies, such as Manhattan or Sleepless in Seattle, may use the city skyline at night as an exciting or romantic setting. From a distance, it may convey excitement without the undesirable features, such as noise, physical and social incivilities, one might experience as a pedestrian in the city.

Thus, city skylines after dark may offer an opportunity for a test of the bases for the preference for natural scenes. When Kaplan et al. (1972) studied natural and urban scenes, they found that “Natural scenes were so overwhelmingly preferred over scenes of the built environments that only a single built environment scene (an outdoor park) was as preferred as the lowest rated natural scenes” (Kaplan, 1987, p. 7). Wohlwill (1976) found a similar pattern of preference for natural scenes over urban ones; and both studies found that none of the natural scenes achieved as high a level of complexity as the urban scenes.

Would city skylines after dark upset the pattern? What if they evoked similar levels of preference to natural scenes during the day? Similarities and differences in preference and formal attributes of the two kinds of scenes may explain the bases for preference. If the natural scenes and night skylines have similar preference scores and similar formal attributes, the preference for naturalness may arise more from form. If the two kinds of scenes differ in preference but have similar formal attributes, the preferences probably arise from content. If the two kinds of scenes have similar preference scores but different formal characteristics, the preference may arise from content. Finally, if the two kinds of scenes differ in both preference and formal attributes, the preference may arise from form.

We examined this question in three studies. The first had respondents rate the pleasantness of natural scenes, skylines during the day, and skylines after dark. The second had other respondents pick from sets of scenes (with examples from each kind of scene) the one they would most like to have as a print in their home or office. The third study had other respondents rate each scene for its complexity, order, naturalness, openness, upkeep, smoothness of transitions, curvilinearity, regularity of surface textures and lines, and smoothness of surface textures.

Think of a continuum of environmental experience from disinterested attention, where one experiences the environment as a separate object, to immersive or engaged, where one enters and participates in a setting (cf. Berleant, 1992). People may like the appearance of the lights of city skylines viewed as a distant object, but may dislike the immersive experience of the same city with its crowding, traffic, noise, litter, and light pollution. Humans often experience scenes at a distance, from the window of a home, car, train, office, or hotel, or from a yard or park. To get at the question of aesthetic preference, we intentionally sought responses to the scenes as separate objects. Though Berleant (1992) argued that one can feel drawn in and experience even a painting as immersive, we did not test whether respondents experienced the scenes as separate or immersive.

The studies were exploratory. Research has not shown whether the preference for nature arises from its form or content. While we expected people to find both natural scenes and skylines after dark more appealing than skylines during the day, we did not have an expectation about people’s preferences for natural scenes versus skylines after dark. Furthermore, while research and theory led us to expect differences in the formal features of nature scenes and skylines during the day, and some similarities between day and night skylines, we were unsure about the degree to which they would share formal features with natural scenes.

<sup>1</sup> Kaplan and Kaplan (1989) go beyond the preference for natural scenes over urban ones to describe four information-based characteristics of scenes that might affect preference—complexity, coherence (for the 2-dimensional experience), legibility, and mystery (for the 3-dimensional one). They arrived at this scheme at first in part from an examination of the qualities of the preferred scenes in the 1972 study.

## 2. Study 1: passive ratings of pleasantness

### 2.1. Method

#### 2.1.1. Participants

59 people completed the survey. With a mean age of 34.2 (17.2 SD) years, most were female (83.1 percent) and Caucasian (89.8 percent). 48.3 percent were married, 48.3 percent single, and the rest either divorced or widowed. The sample varied in education from high school graduate (3.4 percent), some college (1.7 percent), college degree (43.1 percent), masters degree (48.3 percent), and higher degree (3.4 Percent). Although the survey did not ask participants if they grew up in a rural, suburban or urban environment, it is likely they all lived in the Columbus, OH metropolitan area, where they were sampled.

The interviewer contacted potential participants on two weekday afternoons and one Saturday morning at a university computer lab. The lab tended to have more females than males, which may explain the larger number of female participants. On the weekdays, she approached everyone who could hear her (i.e. people not talking on a cell phone or listening to an iPod or other electronic device) and asked if they would participate in a short “survey on your environmental preferences.” If they said yes, she told them more about the study (see written version below). Only one person declined participation. If someone agreed to participate, the interviewer brought up the on-line survey on the computer and left so they could complete the survey on their own. On the Saturday morning, when the labs were relatively empty, she left slips of paper with the URL at the empty computer stations.

The slips of paper reads, “Environmental Preference Survey [URL].”

Please visit the above website to take a survey on your environmental preferences. Your responses will help us learn what people like and dislike in their surroundings. You will see pictures of places and be asked to evaluate each one. The survey should take no more than 15 min to complete.”

We assume that most people who agreed to participate did so, but we do not know for sure, because the interviewer left them after setting up the on-line survey for them. We also do not know how many people completed the survey because they saw the slip of paper with the URL.

#### 2.1.2. Stimuli

This study used 21 color photographs of environments as stimuli (Fig. 1): Seven showed skylines during the day, seven showed skylines after dark, and seven showed natural environments during the day.<sup>2</sup> We would have preferred to get the same view of the same skylines at day and night, but traveling to cities around the world for such a sample was beyond the scope of this study. Instead, we tried to get similar skylines for the day and night views. From freely available images from the Internet (Google images), we collected images that we hoped people would not recognize (i.e. we purposely excluded images that had well-known landmarks such as the Brooklyn Bridge or the Sydney Opera House); and we tried to select images that were alike in quality, centered, of similar proportions, similar density, and that lacked artistic or Photoshopped effects. Although we found photos of nature scenes after dark, all of them had artistic or Photoshopped effects. From the remaining set of sixty photos, we narrowed down to the final

twenty-one, again seeking controls for quality across the images and categories. We cropped some of the final images to have comparable amounts of foreground and space around the edges.

For skylines, we chose distant views with either water or nature along the edge, similar numbers of buildings, amounts of foreground space and sky space for the day and night photos. One nighttime skyline, seen from a hill, differs in having water along a side rather than the foreground. The number of different buildings in a skyline affects entropy, judged complexity and preference (Nasar & Imeokparia, 2002) and while the number of turns or skyline silhouette affects preference (Heath et al., 2000), its effect is small compared to that from the number of different buildings (Stamps et al., 2005). It is difficult to count and distinguish the number of different buildings in the photos, but we estimate that the day skylines had slightly fewer different buildings than the night ones (day ranged from 13 to 21, mean = 16.6; night ranged from 13 to 36 (mean = 18.3). (However, without the one 36-building night skyline, the numbers for the night and day skylines were similar, with a range from 12 to 23 and a mean of 15.4. As for buildings whose top defined the skylines, daytime and nighttime skylines had similar numbers (day: 5–10, mean = 7.0; night: 5–9, mean = 6.0). Each also had a similar number of building-width or larger open spaces between buildings (from 1 to 4 with means = 2.1) For the natural environments we chose scenes representative of those that research has found as well liked by adults—green savannas and open and smooth grasslands surrounded by deciduous forests (cf. Balling & Falk, 1982; Kaplan, 1987; Lyons, 1983; Woodcock, 1982), both of which offer the desirable open vistas (Herzog & Bryce, 2007; Herzog & Kropscott, 2004; Kaplan & Kaplan, 1989; Nasar & Fisher, 1993; Nasar, Julian, Buchman, Humphreys, & Mrohaly, 1983; Orians & Heerwagen, 1992; Woodcock, 1982). The final photos were narrowed from 60 to 29 to 21, as photographs that we judged as having similar photographic quality, similar eye-level perspectives, similar distances from the environments,<sup>3</sup> and, for the daytime scenes, similar lighting. For skylines, we avoided well-known skylines (such as New York, or Washington, D.C.) to avoid effects of familiarity.

#### 2.1.3. Procedure

The instructions on the web-based survey stated that we wanted people’s opinions about different kinds of places.

“It should take no more than 15 min to complete. We want to learn what people like and dislike in their surroundings. You will see pictures of places and be asked to evaluate each one.”

The procedures satisfied IRB protocols. It stated that all answers are confidential and anonymous and that participants could refuse to answer any question, refuse to participate, or withdraw without penalty or repercussion. And it asked only people older than 18 years old to proceed to the next page.

The first page thanked them for participating and explained that the survey had two parts, one in which they would see and evaluate 21 photos of real places, and another in which they would answer some questions about themselves. For the evaluations, it asked them to imagine they were in the environment looking at each real place shown, and to rate the place, not the quality of the photograph.<sup>4</sup> It stated that there were no right or wrong answers, and it asked for their honest opinion of each environment’s pleasantness on a 7-point pleasantness scale (Very Unpleasant, Unpleasant,

<sup>2</sup> We had wanted to include seven natural environments after dark, but the photos we found on the web looked like professional quality photographs (full moons, ocean waves and silhouettes of trees); and when we tried to alter daytime photos to become nighttime views, the results looked dark and undifferentiated.

<sup>3</sup> We did not want to compare skylines in the distance with closer, more immersive natural scenes.

<sup>4</sup> Note that while we asked them to imagine they were in a real environment looking at a real place, we worded the question to get a response to the environment out there, not ones they were immersed in.



Fig. 1. Three sets of seven scenes: Day nature, day skylines, night skylines.

Somewhat Unpleasant, Neutral, Somewhat Pleasant, Pleasant, and Very Pleasant).

## 2.2. Results

As expected, the participants rated the Night Skylines and Natural Scenes as more pleasant than the Day Skylines. They also gave the Night Skylines and Natural Scenes similar pleasantness scores (Fig. 2). The analysis showed statistically significant differences in pleasantness across the types of environment ( $F_{(2, 1163)} = 128.64, p < 0.001$ ). Bonferroni post-hoc comparisons found statistically significant differences between Night and Day Skylines ( $F_{(1821)} = 296.01, p < 0.000$ ) and between Natural Scenes and Day Skylines ( $F_{(1821)} = 172.89, p < 0.000$ ), but not between Night Skylines and Natural Scenes ( $F_{(1821)} = 0.78, p = 0.38$ ). The higher pleasantness scores for Night Skylines over Day Skylines ( $d = 0.88, r = 0.40$ ) and for Natural Scenes over Day Skylines ( $d = 0.81, r = 0.37$ ) represent large sized effects (Cohen, 1988), while the comparison of the Night Skylines to the Natural Scenes had a trivial sized effect ( $d = 0.05, r = 0.02$ ).

## 2.3. Discussion

The results for daytime scenes replicated the consistent findings of higher preferences for natural over developed or urban environments (Kaplan & Kaplan, 1989; Nasar, 1994). The

respondents preferred the Natural Scenes to the Day Skylines. However, in contrast to previous findings, the study also found a kind of urban scene that people liked at comparable levels to the natural ones: city skylines after dark. This suggests that contrary to more than thirty years of study, people do not always prefer nature to urban or built-up scenes. The natural scenes are representative of the kinds of scenes that previous studies have found as well-liked; and the skylines are typical of what Americans might see. We attempted to control features of scenes, such as photo quality, perspective, or distance from places portrayed. Still, one study of twenty-one scenes might have artifacts in the stimuli that affected the results. In addition, unintentionally every night skyline has water in the foreground, while only one of the day skylines does. Perhaps the water and reflections of building in it gives the night skylines a more natural and more appealing appearance. Even if the differences result more from the scene categories than artifact, we do not know the reasons for the preferences or the degree to which the formal characteristics of the three kinds of scene differ and might have affected preference. Study 1 did not gauge reasons for the preferences or the formal characteristics of each scene. Study 2 examines preference with a more behavioral-flavored measure and assesses reasons for the preferences. Study 3 examines the perceived formal characteristics of the scenes.

Perhaps different kinds of skylines and different kinds of natural scenes would produce different responses, as evidenced by the difference in preference for scenes in different biomes (Balling &



Fig. 1. (continued).

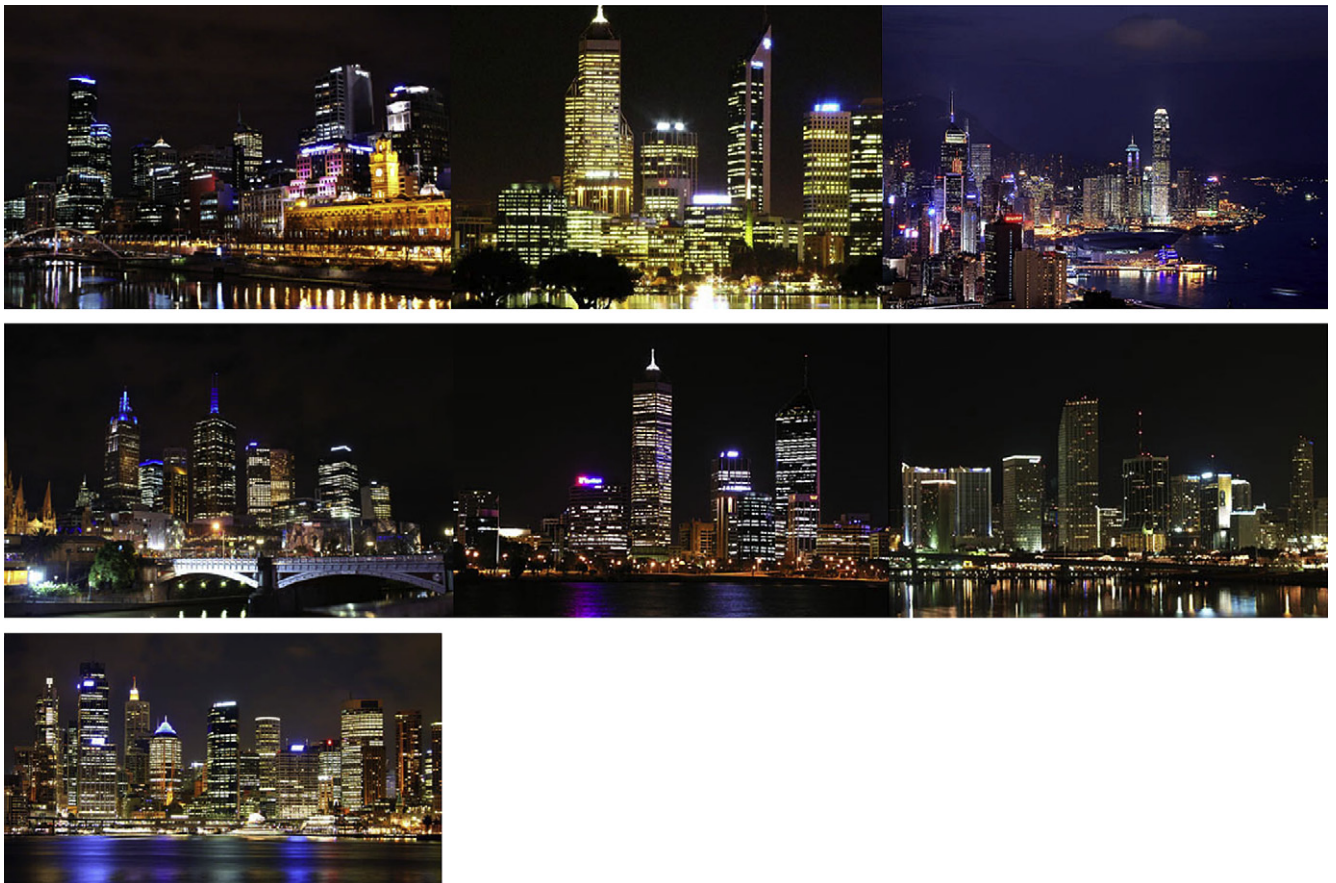


Fig. 1. (continued).

Falk, 1982; Han, 2007; Lyons, 1983; Woodcock, 1982). Furthermore, as our environments were not a random sample of such environments, they may not accurately represent the population of environments in each category. The striking finding of the desirability of night skylines calls for additional research to better understand it. Studies could attempt better control of the environments, possibly the use of artificial environments to remove any knowledge respondents might have about the places shown. They could seek a more representative sample of each category of environment, or more representative of views that people would likely experience. They could assess the photo quality, perspective, distance and other extraneous variables prior to the study to ensure that they do not vary across the conditions.

A more complete test would have had a  $2 \times 2$  design with Natural and Skyline Scenes shown in the Day and Night conditions. We could not obtain or simulate Natural environments after dark that showed much more than varying shades of darkness. Simulations or photos of Natural Scenes with artificial lighting after dark might capture nighttime views of Natural environments. As with skylines after dark, the vegetation might fade from view, but we suspect that unless the lighting avoided dark spots and hiding places, the nighttime views of natural scenes would increase fear of crime and thus depress preference (Nasar & Fisher, 1993).

As for the sample, although the participants lived in a large metropolitan area, we do not know the degree to which participants grew up in urban, suburban or rural areas. In addition, most participants were Caucasian females. Additional research would be needed to determine how well the results generalize to other populations. However, a meta-analysis suggests that they might generalize. That analysis, covering 40 studies, 1001 environments, 5301 respondents from 432 samples, 21 countries, and 13 groups, found strong agreement in preference ( $r = 0.82$ ) for all of the groups by gender, ethnicity, culture, student versus non-student, expert versus non-expert and political affiliation (Stamps, 1999).

### 3. Study 2: active choices for desirability

The Nighttime skylines and the Natural Scenes had similar pleasantness ratings in Study 1. While a good way to measure affective appraisals of environments, such ratings are a passive task that does not assess likely behavior related to preference. Would people respond similarly to a different and more active task assessing likely behavior? This study sought to test if a similar

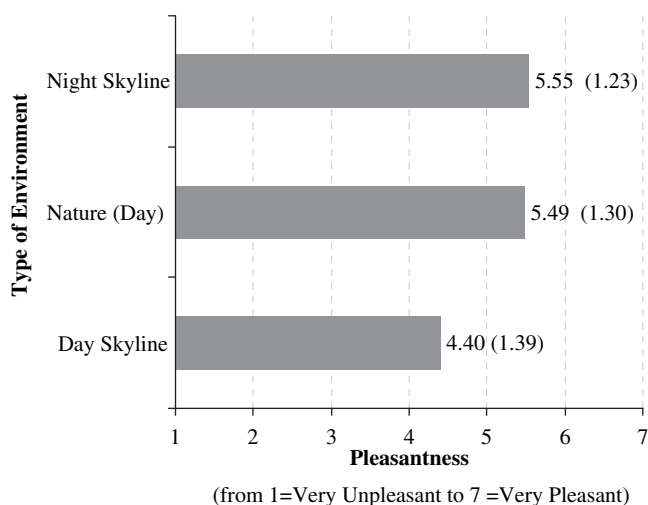


Fig. 2. Mean pleasantness (standard deviation) of each kind of environment.

pattern of response emerged for a more active task, related to an envisioned behavior. It also sought to get a better understanding of the emotional basis for the preference for the Natural Scenes and Nighttime Skylines.

Recall that natural scenes are restorative (Kaplan & Kaplan, 1989; Ulrich, 1983). In light of findings that the affective quality of environments has a pleasant, a calming and an exciting dimension (Russell & Snodgrass, 1989), the restorative value of nature suggests that responses to natural scenes are calming. Adding a multi-item restorative scale to each of twenty-one photos was unfeasible, but with a short checklist we sought to learn about the affective qualities underlying the preferences for each kind of environment. We expected preferences for nature to be associated with calmingness, and wondered if the preferences for night skylines might have a different basis.

#### 3.1. Method

We had respondents choose between sets of three scenes the most desirable one in each set. We also obtained the affective qualities for those responses to see if the affective qualities evoked by the different kinds of scenes were similar or different, and to learn about the affective bases for each kind of preference.

##### 3.1.1. Participant

A new sample of 56 people took part in Study 2. With a mean age 32.3 (11.0 SD) years, most participants were female (87.5 percent), Caucasian (96.4 percent), and married, engaged, or partnered (60.7 percent). Their education varied from high school degree (1.8 percent), some college (3.6 percent), college degree (48.2 percent), masters degree (41.4 percent), to higher degree (5.4 percent). The interviewer contacted participants at the same computer lab in the same way as in Study 1.

##### 3.1.2. Procedures

Study 2 used the same 21 stimuli, sampling procedures, and approach to get participants to the Survey Monkey site as in Study 1. However, instead of having participants view and rate each environment separately, Study 2 had them view and respond to seven sets of three environments (one natural, one night skyline, and one day skyline). The order of type of environment was varied across the sets, such that each type of environment rotated through the right, central, and left viewing position.

The instructions followed those of Study 1 up to the request for response. There it stated, "If you could choose one of these images to have as a framed print in your home or office, which one would you choose?" After the participant made the seven choices, the survey asked him or her to indicate the reason(s) for the choices: relaxing, exciting, peaceful, attractive, other (please specify). In relation to the salient affective qualities of places (Russell & Snodgrass, 1989), the checklist had one scale for the evaluative dimension (attractive), one for excitement (exciting) and two for calming (relaxing and peaceful).

#### 3.2. Results

Did the results for the active choice parallel those for the passive rating of pleasantness? Fig. 3 shows the tally of the 392 choices (7 photo sets  $\times$  56 participants). The results are similar to the pleasantness ratings in Study 1 in that Night Skylines and Nature scored better than the Day Skylines, but the results differ from the earlier pleasantness ratings in one way: Night Skylines scored better than Natural Scenes. Participants picked the Night Skylines most often, followed by the Natural Scenes and then the Day Skylines. The comparison between all three categories of

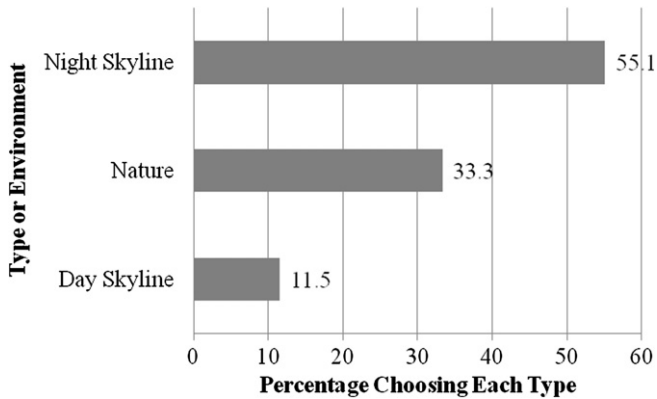


Fig. 3. Percentage of participants choosing a type of environment as most desirable for a framed print in their home or office.

scenes achieved statistical significance ( $X^2_{(2)} = 111.15, p < 0.000$ ), as did each pairwise comparison: Night Skylines vs. Natural Scenes ( $X^2_{(1)} = 20.94, p < 0.000$ ), Natural Scenes vs. Day Skylines ( $X^2_{(1)} = 41.29, p < 0.000$ ), and Night Skylines vs. Day Skylines ( $X^2_{(1)} = 111.15, p < 0.000$ ). These  $X^2$  values translate into a large effect size for the full model ( $r = 0.51$ ), a small to medium effect for Night Skyline over Natural Environments ( $r = 0.22$ ), a large effect for Natural Environments over Day Skylines ( $r = 0.31$ ) and a large effect for Night Skylines over Day Skylines ( $r = 0.51$ ). For five of the seven sets of scenes, more participants (between 57.1 percent and 71.4 percent) chose the Night Skyline than the Natural Scenes or the Day Skylines, and these differences achieved statistical significance ( $X^2$ 's  $_{(2)}$ , ranged from 16.96 to 38.29,  $p$ 's  $< 0.000$ ). For the remaining two sets of scenes, more of the participants (55.4 percent for one and 56.0 percent for the other) chose the Natural Scenes than the Night Skyline or Day Skyline ( $X^2$ 's  $_{(2)} = 18.14, 24.04$ ;  $p$ 's  $< 0.000$ ).

The reasons reported for the choice of Night Skylines differed from those for the choice of Natural Scenes. When asked why they had chosen the scenes they selected, overall participants most often checked attractive, followed by relaxing, peaceful, and exciting (Fig. 4). Additional reasons, each written in by one person, included: visually pleasing/composition, interesting, inspiring, energetic, open, colorful, green, and I'm not a city girl. People chose the Natural scenes for their calming quality and the Night Skylines for their excitement.

We analyzed the correlations between the frequency with which participants chose a type of scene and the reasons reported for the choices. The frequency of choice varied from 0 to 7 for Natural Scenes and for Night Skylines, and from 0 to 4 for Day

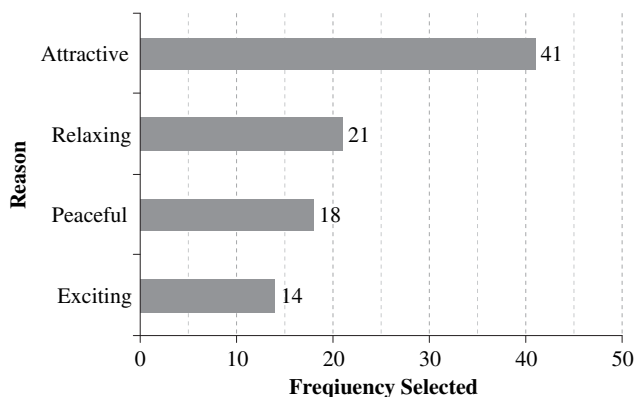


Fig. 4. Reasons selected for the chosen environments.

Skylines. A correlation analysis among the choices indicated a high correlation between relaxing and peaceful ( $r = 0.49, p < 0.01$ ) representing a large effect size. They were unrelated to exciting. We summed relaxing and peaceful into a composite calming scale. Table 1 shows the correlations. The number of Natural Scenes chosen had a positive correlation with the choice of the calming scale as a reason and an inverse correlation with the choice of exciting. Conversely, the number of Night Skylines chosen had a positive correlation with the choice of exciting as a reason and an inverse correlation with the choice of calming.

### 3.3. Discussion

The findings for the behavioral choices echoed those for rated pleasantness in Study 1, with one important exception. Although participants picked the Night Skylines and Natural Scenes more often than the Day Skylines, they picked the Night Skylines as preferred *more often* than the Natural Scenes. In addition, most participants reported that they made their choices based on attractiveness. While Study 1 contradicted more than thirty years of research in finding comparable preferences for Natural Scenes and Night Skylines, the present findings went a step further in finding higher scores for the Night Skylines. The findings might reflect a genuine preference for the Night Skylines over the Nature Scenes, or an artifact of the particular kind of choice. Thinking about the kind of picture you want on your wall in an office or home might raise contextual considerations, such as its fit to the décor, or the degree to which you want a dramatic or calming scene.

As for reasons for the choices, responses to a checklist of evaluative appraisals suggested that participants tended to pick the Night Skylines and Naturalness for different reasons. They said they picked the Night Skylines for their excitement and the Natural Scenes for their calmness. Participants could give open-ended responses, but they reported few.

Future research could control for or assess whether contextual considerations, such as those noted earlier, affect the choices. It could provide a longer list of options or open-ended responses for reasons behind the choices. It could ask people to choose the place they would most like to see, or ask it with different scenarios, such as which would you most like to see in waiting rooms for various kinds of professionals. In any case, for an image on the wall of their home or office, or for a short-term reaction to such an image, some people prefer something exciting (Night Skylines) and others prefer something calming (nature during the day). These emotional appraisals—exciting and calming—share an evaluative dimension; exciting mixes evaluation (which includes attractive) with higher arousal, and calming mixes it with lower arousal (Russell & Snodgrass, 1989). Thus, although participants chose both Natural Scenes and Night Skylines as attractive, they may have picked the Natural Scenes to reduce arousal and the Night Skylines to increase it.

As in Study 1, this study had a sample primarily of female Caucasians. Only tests with other groups can establish how well the results generalize to others, but the meta-analysis indicates that

Table 1

Correlations between the frequency participants picked a type of environment and their reasons for their choices.

	Nature	Night Skyline	Day Skyline
Relaxing/Peaceful	0.54**	-0.41**	-0.21
Exciting	-0.33*	0.31*	0.02
Attractive	-0.24	0.17	0.13

\* $p < 0.05$ , \*\* $p < 0.01$  with Bonferroni adjustments.

environmental preference relates more to characteristics of the environment than to characteristics of the observers and it indicates consensus on preference across a host of groups (Stamps, 1999).

At first glance, the choice of calming as the reason for choosing Natural Scenes and Exciting as the reason for choosing Night Skylines seems to suggest that the Natural Scenes are more restorative than the Night Skylines. However, research indicates that people can find restorativeness in built environments (Scopellitti & Guiliani, 2004) and that restorativeness can relate to excitement as well as calming (Korpela, 1992; Korpela & Hartig, 1996; Korpela, Hartrig, Kaiser, & Fuhrer, 2001). Excitement may relate to one aspect of the Kaplan and Kaplan's (1989) Attention Restoration Model—Fascination. Its relation to other aspects of the model—being away, extent, and compatibility—is less clear. An alternative, the stress reduction theory of restorativeness (Ulrich, 1983) would seem to suggest that the excitement associated with the Night Skylines might increase stress, but that would only apply to persons stressed or overloaded by high arousal (Wohlwill, 1976). Someone experiencing stress from boredom (not enough stimulation) might experience the excitement of night skylines as restorative. Thus, we see it as worthwhile for future research to assess the restorative qualities of views of Night Skylines in general and for people in different levels of arousal.

Although the two studies show high preference for Night Skylines, and different emotional bases for the preferences for Natural Scenes and Night Skylines, they do not indicate if the preferences arise from the formal characteristics or content of the scenes. For that, we need to know the formal characteristics of each kind of scene. Study 3 assesses the formal characteristics of the scenes and compares them across the scene types.

#### 4. Study 3: attributes of the scenes

Given the different reasons reported for choosing the Nighttime Skylines (excitement) and Natural Scenes (calm), we expected to find differences in the perceived formal characteristics of the two kinds of scenes. In addition, as individuals rated both kinds of scenes as more pleasant than Day Skylines, we expected the formal characteristics of the Day Skylines to differ from those of both the Night Skylines and Natural Scenes.

##### 4.1. Method

###### 4.1.1. Participants

A new group of 27 people volunteered to take part in Study 3. As five of them did not complete most of the survey, we dropped their responses. The resulting sample had twenty-two people (44.4 percent female, 55.6 percent male) with a mean age of 33.7 (11.5 SD years). They were all graduate students in city and regional planning.

###### 4.1.2. Procedure

Study 3 used the same 21 stimuli, as in Studies 1 and 2, and conducted the survey on Survey Monkey. We solicited participation via e-mail to graduate students in city and regional planning. An e-mail sent them to one of two forms, with different orders of stimuli. The survey had them rate each environment on nine 7-point bi-polar scales. Five were derived from Wohlwill's (1976) speculations about the formal characteristics of natural versus urban scenes:

1. Smoothness of transitions (abrupt transitions-smooth transitions)

2. Curvilinearity (rectilinear-curved)
3. Regularity of surface textures/lines (regular-irregular)
4. Smoothness of surface textures (rough-smooth)
5. Complexity (complex-simple) (also cited by Kaplan, 1987)

Four scales measure characteristics that studies have found related to preference and that might differ across the scene types:

1. Naturalness (natural-artificial) (Kaplan & Kaplan, 1989; Nasar, 1998; Wohlwill, 1976)
2. Order or coherence (orderly-chaotic) (Kaplan & Kaplan, 1989; Nasar, 1994; Wohlwill, 1976)
3. Openness (open-closed) (Herzog & Bryce 2007; Kaplan, 1987; Nasar, 1994)
4. Upkeep (well-kept-run down) (Nasar, 1998)

In theory, people should like order because it helps them make sense of what is going on (Kaplan, 1987). They should like openness because it helps them quickly decide on how easy it is to move in the scene (Kaplan, 1987) and it does not conceal an unexpected threat ahead (Nasar, 1993; Nasar & Jones, 1997). They should prefer well-kept to run-down environments because of higher status associated with well-kept environments (Duncan, 1973; Royse, 1969) and because run-down environments convey cues to a breakdown in the social order (Perkins & Taylor, 1996).

The survey varied the order of scales at random across the environments. After the ratings, it also asked respondents for their gender and year of birth.

##### 4.2. Results

Tests for inter-observer reliability across all nine scales showed a high Cronbach alpha score ( $\alpha = 0.92$ ), and tests of each of seven scales separately revealed acceptable to high inter-observer reliability scores (Orderly-Chaotic,  $\alpha = 0.79$ ; Surface texture: Regular-Irregular,  $\alpha = 0.79$ ; <sup>5</sup> Abrupt-Smooth Transitions,  $\alpha = 0.83$ ; Complex-Simple,  $\alpha = 0.94$ ; Natural-Artificial,  $\alpha = 0.97$ ; Open-Closed,  $\alpha = 0.95$ ; Rectilinear-Curved,  $\alpha = 0.97$ ). We dropped two scales with low reliability scores: well-kept - run down ( $\alpha = 0.25$ ) and rough-smooth surface textures ( $\alpha = 0.33$ ).

We expected the formal characteristics to differ across the scene categories and they did, primarily between the Natural Scenes and either the Day or Night Skylines. The judges rated the Natural Scenes as more natural, curvilinear, open, orderly, less complex, and with smoother transitions than either the Day or Night Skylines. For comparisons between the Natural Scenes and the Day Skylines see Fig. 5. For comparisons between the Natural Scenes and the Night Skylines see Fig. 6. The differences on each scale achieved statistical significance (Artificial,  $F_{2, 331} = 271.17$ ,  $p < 0.000$ ; Curvilinear,  $F_{2, 231} = 199.56$ ,  $p = 0.000$ ; Closed,  $F_{2, 231} = 106.43$ ,  $p = 0.000$ ; Smooth,  $F_{2, 231} = 41.49$ ,  $p = 0.000$ ; Simple,  $F_{2, 231} = 105.18$ ,  $p = 0.000$ ; Chaotic,  $F_{2, 231} = 14.37$ ,  $p = 0.000$ ).

Bonferroni post-hoc comparisons for the natural-artificial ratings show that the Natural Scenes were less artificial (i.e. more natural) than either the Daytime Skylines ( $d = -2.74$ ) or the Night Skylines ( $d = -2.61$ ). These differences represent large effects ( $r = -0.81$ ,  $p < 0.000$ ; and  $r = 0.71$ ,  $p < 0.000$ ). Bonferroni post-hoc comparisons between Natural Scenes and each kind of Skyline on

<sup>5</sup> Orderly-Chaotic achieved its score by dropping three less reliable raters, and Surface Texture: Regular-Irregular achieved its score by dropping two less reliable judges.

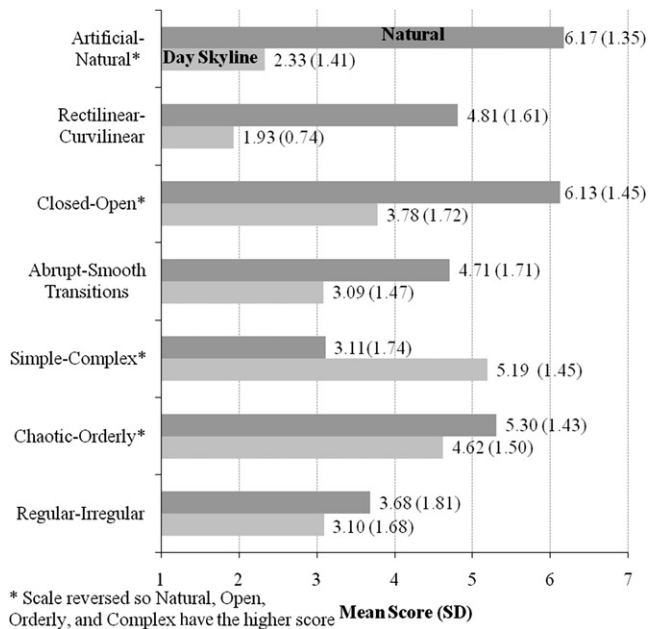


Fig. 5. Differences between natural scenes and day skylines.

the other scales show that the Natural Scenes were also less artificial, more curvilinear, more open, more orderly, less complex, and with smoother transitions than either the Day or the Night Skylines.

For the Natural Scenes versus the Day Skylines, the magnitude of the effects for artificial, curvilinear, open, and complex are large (absolute values of  $d$ 's > 1.29, and of  $r$ 's > 0.53,  $p$ 's < 0.001), as is the magnitude of the effect for smooth transitions ( $d = 1.03$ ,  $r = 0.46$ ,  $p = 0.12$ ). Similarly, for the Natural Scenes versus the Night Skylines, artificial, curvilinear, open, and complex have large effects ( $d$ 's > 1.31,  $r$ 's > 0.54,  $p$ 's = 0.000), as does smooth transitions ( $d = 0.89$ ,  $r = 0.41$ ,  $p = 0.64$ ). For orderly-chaotic, the comparison of Natural Scenes to the Night Skylines has a large

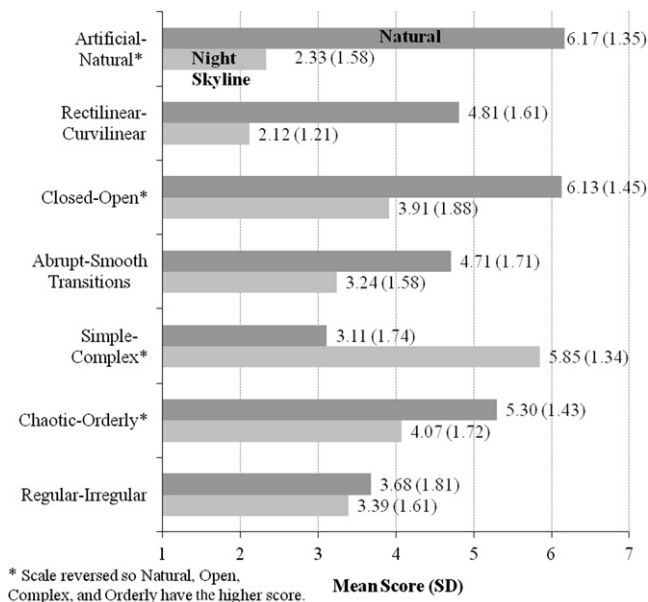


Fig. 6. Differences between natural scenes and night skylines.

effect ( $d = -0.78$ ,  $r = -0.36$ ,  $p = 0.09$ ), and the comparison to the Day Skylines has a small to medium effect ( $d = -0.46$ ,  $r = -0.23$ ,  $p = 0.03$ ). The Natural Scenes had more irregular surface textures and lines than either kind of skyline, and the Night Skylines had more irregular surface textures and lines than the Day ones. All effects for regular-irregular were small to medium ( $d$ 's < 0.35,  $r$ 's < 0.18,  $p$ 's < 0.05).

The two kinds of skylines had few differences (Fig. 7). The Day Skylines were higher in order but lower in complexity than the Night Skylines, with small to medium effects (Complex  $d = 0.33$ ,  $r = 0.17$ ,  $p < 0.000$ ; Orderly  $d = -0.47$ ,  $r = -0.23$ ,  $p = 0.02$ ). The two kinds of skylines had moderate levels of complexity and order. Neither one was extremely complex or chaotic.

#### 4.3. Discussion

The Natural Scenes differed in form from the day and night skylines in the same ways. In agreement with earlier findings (Kaplan et al., 1972; Wohlwill, 1976), the Natural Scenes had lower complexity and higher order than either the Day or Night Skylines. The complexity may play less a role in the preference than the content of the daytime views of Natural and Skyline scenes (Kaplan et al., 1972). Preference tends to increase with complexity (Nasar, 1994), but people preferred the natural scenes even though they are lower in complexity. This may have to do with the undesirable complexity in urban and natural scenes (Wohlwill, 1976). The Natural Scenes were also more orderly, open, and, as suggested by Wohlwill (1983), they had smoother transitions and were more curvilinear than either the Day or Night Skylines. Perhaps these formal features contributed to the preference for the Natural scenes, but they do not explain the similar preferences for the Night Skylines. On the other hand, the Night and Day Skylines had two differences in physical form. The two kinds of skylines did not differ in rated naturalness, in spite of the night skylines having water in the foreground and most day skylines not having it. Instead, they differed in complexity and order. The preferred the Night Skylines had higher complexity but lower order than the Day Skylines, but the effect for complexity was smaller than that for order. Preferences tend to increase with order, but the levels of complexity and order were moderate so the lower order may not have reduced preference. Thus, the preference for the Night Skylines over Day Skylines may arise from form but it may also arise from content or some unmeasured formal feature.

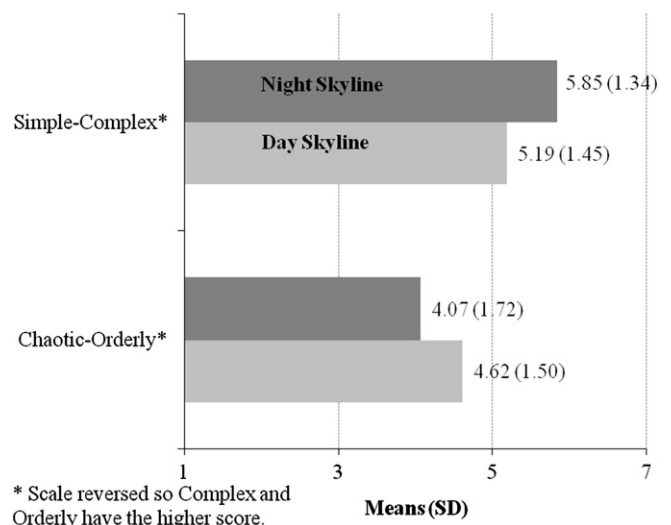


Fig. 7. Differences between night and day skylines.

## 5. Conclusions

The Night Skylines scored well. Participants rated them as equal in pleasantness to (Study 1) or as more pleasant (Study 2) than the Natural scenes, both of which participants rated as more pleasant than the Daytime Skylines. Recall that if preferences and formal characteristics are similar across environmental categories, the preferences for each category probably relate to the form, but if the formal characteristics differ, the preferences probably relate to the content associated with each category. The contradictory findings between Studies 1 and 2 for Night Skylines versus the Natural Scenes make inferences about the role of form or content more ambiguous.

One set of findings suggest that the evaluations arise more from content than form. Although the Natural scenes and Nighttime skylines differed in form, they evoked similar affective appraisals (Study 1). These findings suggest more of a role of content than form in the evaluations. The Natural Scenes differed from Day Skylines in both pleasantness (Studies 1 and 2) and form (including the absence of foreground water in the Day Skylines), which suggests a role of form, but one difference—the perceived naturalness—suggests a role of content in the appraisals.

Other findings, however, suggest a role of formal characteristics. The Day and Night Skylines differed in both form and affective appraisals (Studies 1 and 2), which suggests that form played more of a role than content in the evaluations, but one formal characteristic of the Night Skylines was a desirable one—higher complexity—and the other was an undesirable one—higher disorder—though at a smaller size effect than complexity. The Natural Scenes, which differ from Night Skylines in form, were selected less often than Night Skylines as preferred (Study 2), which suggests that formal characteristics may have affects the choices. However, the choices (Study 2) may have had biases from contextual effects. Thus, for pleasantness, the Study 1 findings may carry more weight. The similar evaluations in spite of differences in form in that study suggest the evaluations arise more from content than form.

The affective dimensions underlying the two kinds of evaluations differ: calming for Natural Scenes, and exciting for Night Skylines. Perhaps two processes underlie the environmental evaluations, one (the calming quality of natural scenes) related to a desire to lower arousal and the other (the exciting quality of night skylines) related to a desire to boost arousal (cf. Berlyne, 1971; Wohlwill, 1976).

We acknowledge potential limitations in the stimuli evaluated. Perhaps the photos obtained from the web do not adequately represent the three categories of environment. The skylines may not cover the range of city skylines, and the natural scenes, which are primarily green open fields with trees, do not cover views of natural environments or biomes with more or less drama and visual appeal. Future work would do well to explore a more representative sampling of natural scenes and skylines (cf. Brunswik, 1956).

Studies could introduce motion (cf. Heft & Nasar, 2000) either in the environment or the observer. For the environment, videos could capture the rustling of trees and other sounds in natural environment, as well as the moving lights of vehicles and the flickering of lights after dark. In addition to being more realistic, these qualities might affect preference. The natural environments may have “a relative absence of gross movement, or [by] motion of a less intense, less strongly kinetic” compared to developed environments, and in particular traffic (Wohlwill, 1983, pp. 17–18), but one would have to have experience real environments or videos of them to see if this were the case. Of course, in distant views of traffic after dark, the larger and more intense metallic cars and trucks disappear into white and red spots of light.

Perhaps rural residents would respond differently to the skylines than did the adults from the moderate sized Midwestern city we studied (cf. Wohlwill and Kohn, 1973). Children might exhibit a different pattern of response from the adults (Balling & Falk, 1982; Zube, Pitt, & Evans, 1983). If the preliminary findings hold, it makes sense to explore responses from different populations.

Cities and skylines after dark may have a special value to people. We need to know how well the findings of their pleasant and exciting quality hold up, and we need to know more about how the reasons behind the responses. A focus on preferences and restoration related to natural scenes may overlook the potential value of this one kind of environment, which may have its own kind of appeal to people.

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