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Preference for Urban Buildings as a Function of Age and Nature Context

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PREFERENCE FOR URBAN BUILDINGS AS A FUNCTION OF AGE AND NATURE CONTEXT

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ABSTRACT: Preferences for urban buildings were studied as a function of building age and nature context. The primary finding was that old buildings were preferred over contemporary buildings when building care was equated statistically, but the reverse was true in the absence of such control. Thus, when older buildings are disliked, poor maintenance is likely to be a contributing factor. A natural context enhanced building preference, but only when it was well maintained. In general, rated building care and nature care were positively related to preference and to each other. Thus the results highlighted the substantial impact of building age and both building and nature care on building preference. Other analyses suggested that the positive impacts of age and nature context on preference were at least partly mediated by their generally positive impacts on variables such as complexity, mystery, and coherence.

Recently, the owners of a manufacturing business in a large Midwestern city donated their land and buildings to a local university and moved away to the suburbs. University officials announced their intentions to raze the buildings as a preliminary step in their master plan for the development of a downtown campus. Preservationist groups pointed out that some of the old buildings contained rare architectural features and sug-

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gested that the university, acting in the public interest, ought to incorporate those buildings into the master plan, rather than demolish them. University officials promised to consider the suggestion carefully. A few months later, the officials announced that preserving the old buildings was not cost-effective and that saving tax dollars necessitated their demise. The buildings were razed.

There is nothing unique about this story. Most readers will recall similar stories from their own cities and towns. Sometimes the preservationists win, but as often as not, they lose to the more compelling demands of "progress." It would surely be useful in the ongoing debate over the preservation of older buildings if environmental psychology could speak with a clear voice on the issue of the noneconomic value of such buildings. Are older buildings generally preferred to more modern buildings? If not, are they sometimes preferred, and is it possible to identify the circumstances under which older buildings have high preference? Answers to these questions would have practical utility to the preservationist movement and theoretical value in advancing our understanding of the factors affecting building preferences.

AGE

Research on the relationship of building age and building preference has produced mixed results. Frewald (1989) reviewed eight earlier studies, six of which showed or implied a preference advantage for older urban settings. In the remaining two studies, older-building categories were either least preferred (Herzog, Kaplan, & Kaplan, 1976) or in the middle of a set of five urban categories (Herzog, Kaplan, & Kaplan, 1982). More recent research presents a cloudier picture. Some studies have found a positive relationship between building age and preference (Hull, 1992; Stamps, 1994; Widmar, 1984), others have found a negative relationship (Herzog, 1989, 1992), and still others have produced mixed results (Day, 1992; Stamps, 1991).

The most informative recent study on age and building preference is Frewald's (1989) doctoral dissertation. She argued that age is likely to be confounded with physical condition of urban buildings unless care is taken to avoid that possibility. Such a confounding would bias preference in favor of modern buildings. So Frewald carefully sampled 52 buildings that varied in a number of relevant characteristics but were in similar physical condition (confirmed by ratings of a panel of judges). Under these circumstances, older-building categories were clearly preferred over modern-building categories. The relevance of building maintenance to preference for residential settings has also been documented by Nasar (1981, 1983).

Given this background, our study sought to resolve past contradictory findings and to further test Frewald's proposition about building maintenance. Building age was varied systematically by selecting an equal number of urban settings containing old and contemporary buildings as stimuli to be rated for preference. In addition, ratings of both age and building care were obtained from independent groups of raters. Frewald's analysis implies that rated age should be negatively related and rated building care positively related to building preference. Rated age also served as a validity check on the selection process for building age, and rated building care permitted comparison of the (selected) age-preference relationship before and after statistical adjustment for building care. Because we did not attempt to control building care in our sample of settings, contemporary buildings should be rated higher in preference than older buildings, if Frewald is correct. However, after adjusting for building care, the results should reverse, and older buildings should be preferred.

Frewald's data on rated descriptor variables offer insight into why older buildings were preferred over modern buildings. She found that the older-building categories were also rated higher on physical features contributing to visual richness (decoration, natural materials, curves, articulated walls), legibility (distinctiveness), and mystery (opportunity for exploration, promise of further information). Studies by Day (1992) and Nasar (1983)

offer independent support for the utility of visual richness as a predictor of building preference. Legibility and mystery are key predictor variables in the Kaplans's informational model of environmental preference (S. Kaplan & Kaplan, 1978, 1982; R. Kaplan & Kaplan, 1989), and visual richness is similar to, although somewhat broader than, another of the Kaplans's predictors, complexity (how much information the setting contains). The relevance of complexity as a predictor of building preference is also indicated by three studies mentioned earlier (Stamps, 1991, 1994; Widmar, 1984).

Frewald argued that the informational model provided a plausible theoretical account of why older buildings were preferred. To check this possibility, we obtained ratings of complexity and mystery. Frewald also argued that older buildings should be higher in the fourth of the Kaplans' predictors, coherence (how well organized the setting is), but ratings of coherence failed to support her position. Given the strong trend toward symmetry and rectilinearity in the design of contemporary buildings, we feel that Frewald's argument for higher coherence in older buildings lacks credibility. Nonetheless, as a check, we also obtained ratings of coherence.

NATURE CONTEXT

Focusing on building age alone is surely unrealistic. Building preference must also depend on the environmental context surrounding the building. Although many aspects of surrounding context could be investigated, one of the most commonly manipulated elements of context is nature in the form of landscaping. Here again it is useful to pose both general and specific questions regarding the nature context of buildings. Does a natural context always enhance building preference? What properties of a natural context may be more or less helpful in enhancing building preference?

The literature on nature in the urban environment is extensive. R. Kaplan (1983) and Schroeder (1989) provide reviews. The research supports the following conclusions:

1. The presence of nature in urban settings is associated with enhanced preference reactions.
2. Unkempt nature in urban settings is less preferred than well-maintained nature.
3. Trees are highly valued components of urban nature.

More recent research has generally supported these conclusions (Herzog, 1989; Hull & Harvey, 1989; Sheets & Manzer, 1991). Orland, Vining, and Ebreo (1992) represent a rare failure to find a positive impact of street trees, but they added one street tree to slides of residential settings that already had quite a bit of nature on the properties. Schroeder and Cannon (1987) had shown earlier that the impact of street trees is lessened when there are many yard trees. Sheets and Manzer (1991), on the other hand, compared slides of urban settings with no nature to the same settings with nature added and found a significant positive impact of nature on "emotional pleasure." Sommer and colleagues (Sommer, Guenther, & Barker, 1990; Sommer, Summit, & Clements, 1993) have begun to make distinctions among species of street trees, showing significant differences in rated aesthetic value across species.

Based on this background literature, we decided to vary systematically a second variable called nature context with three conditions: none (no nature), untended nature, and tended nature. Obviously, the variable really includes two separate variables, presence/absence of nature and tendedness of nature. Because tendedness of nature cannot vary in settings without nature, we chose to collapse the two nature variables (presence and tendedness) into one. The result was a completely balanced 2×3 (Age $\times$ Nature Context) factorial design, with 10 settings selected as stimuli for each cell of the design. Appropriate comparisons within the nature-context variable permit separate assessment of the two nature components, presence and tendedness.

The nature-context independent variable led to the inclusion of two more rated descriptor variables, amount of nature and nature care. They may be seen primarily as validity checks for the two aspects of nature context, presence and tendedness.

Both should also be positively related to building preference. Among the remaining rated descriptor variables, two are of primary interest in relation to urban nature context. First, rated coherence should yield results similar to those for rated nature care because a typical component of care is the orderly arrangement of urban landscape elements. Thus rated coherence should be higher in settings with tended nature than in those with untended nature. Moreover, rated coherence should be positively related to preference. Two recent studies (Herzog, 1989, 1992) support the latter prediction. Second, the environmental preference literature strongly suggests that whenever nature is involved, mystery is a relevant predictor (R. Kaplan & Kaplan, 1989). Rated mystery should be positively associated with the presence of nature and also positively related to preference.

INTERACTION

Does nature context influence preference the same way for old and contemporary buildings? Or is the effect of nature context different for the two types of buildings? If the former, then the selected independent variables (age and nature context) combine by simply adding their separate effects. If the latter, then the selected independent variables interact, and the specific form of the interaction would have to be delineated and taken into account in both practical application and theoretical explanation. There is neither literature nor clear theory to support a firm prediction regarding interaction. However, it seems plausible that compared to a tended-nature context, untended nature might decrease preference more for contemporary than for older buildings, producing an interaction of age and nature context. By Frewald's account, untended nature might seem more out of place with contemporary buildings because they are more likely to be well maintained than are older buildings. In any event, the balanced factorial design of our study allowed us to get a clear reading on how building age and nature context worked together in affecting preference reactions.

OTHER METHODOLOGICAL ISSUES

The foregoing discussion of preference ignores the issue of perceived safety. There is a substantial literature (e.g., Fisher & Nasar, 1992; Loewen, Steel, & Suedfeld, 1993; Nasar & Fisher, 1993) indicating that urban nature, which positively affects preference, may sometimes increase concerns about safety or fear of crime. This is especially true when the nature elements are seen as hiding places for criminals. There are many unanswered questions here. It is by no means clear when urban nature will evoke an aesthetic response versus a safety response. It is not even clear that various indicators of safety (safety, fear of crime, perceived danger) are getting at the same thing (e.g., compare Nasar, 1981, with Herzog & Smith, 1988). There is much room for meaningful future research. For now, it is clear that the current study has no bearing on perceived safety-security-danger. The results apply only to the situation where participants are oriented toward preference reactions.

Finally, the settings were presented as color slides. Clearly, the results apply only to static visual attributes of the settings. Most validity research supports the use of photographic surrogates to assess the impact of static (but not dynamic; see Hetherington, Daniel, & Brown, 1993) visual attributes of environments, both natural and urban (Hershberger & Cass, 1973; Sommer et al., 1993; Stamps, 1990; Trent, Neumann, & Kavashny, 1987; Zube, Simcox, & Law, 1987). A study by Hull and Stewart (1992) suggests that photographic surrogates provide valid results for aggregate data but not for individual participants. Because our study focused on aggregate results, this limitation poses no problem.

METHOD

PARTICIPANTS

The sample consisted of 453 undergraduate students, 269 females and 184 males, at Grand Valley State University. The

students received extra course credit for participation. Thirty sessions consisting of 4 to 23 participants were run.

STIMULI AND DESIGN

The settings consisted of 60 color slides of urban buildings. Ten slides were selected for each of the six conditions formed by crossing two levels of building age (old and contemporary) with three levels of nature context (none, untended, and tended). Examples of a setting from each condition are presented in Figures 1a to 1f). Finding settings with no nature proved difficult, especially in the case of contemporary buildings. We had to resort to slides in which a portion of the ground floor was omitted from view. The final sample of slides contained one such instance in the old-none condition and five in the contemporary-none condition. There is no clear indication that this maneuver affected the results, but the possibility should be kept in mind. Building function varied widely and included commercial, educational, industrial, cultural, governmental, and (very few) residential structures. Buildings with clear indications of function (e.g., signs) were avoided. None of the settings contained people, because they have been found to be powerful distractors (Herzog et al., 1976). All settings were photographed in summer and early fall. Natural elements were always green (no fall colors), and extreme weather conditions (e.g., excessive cloudiness) were avoided. All slides were oriented horizontally.

PROCEDURE

All participants in each session rated each of the 60 settings on the same one of eight variables. All ratings used a 5-point scale ranging from 1 = *not at all* to 5 = *a great deal.* The dependent variable was preference, defined as "how much you like the environment depicted, for whatever reason." There were seven rated descriptor variables. Age was "How old are

(Text continues on page 58)

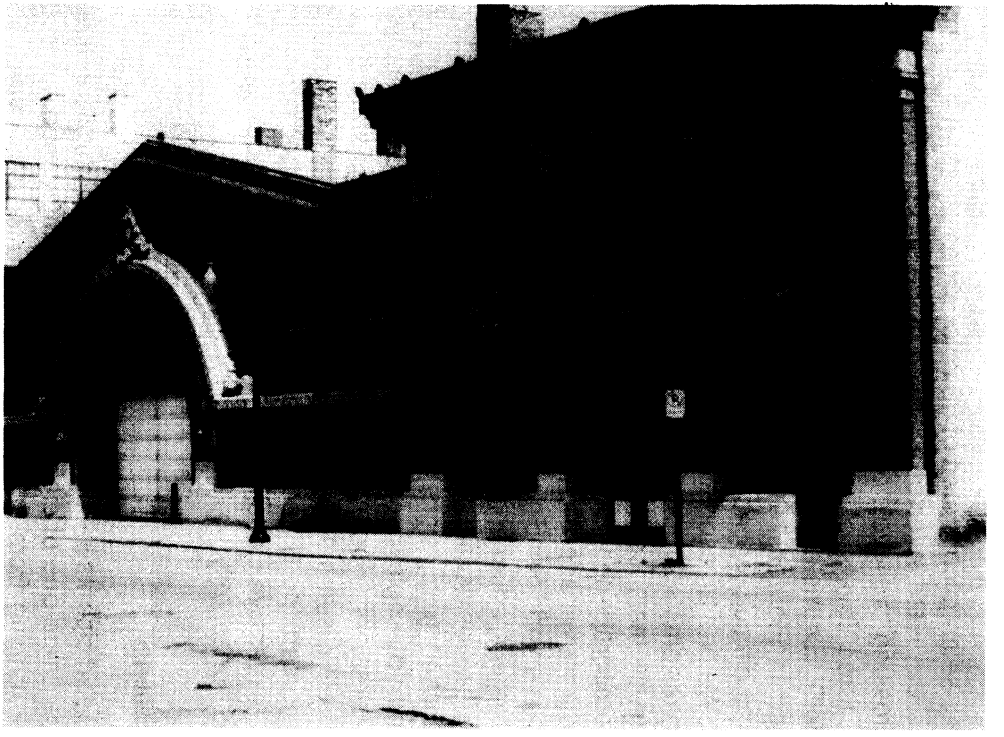

Figure 1a: Setting From the Old-None Condition

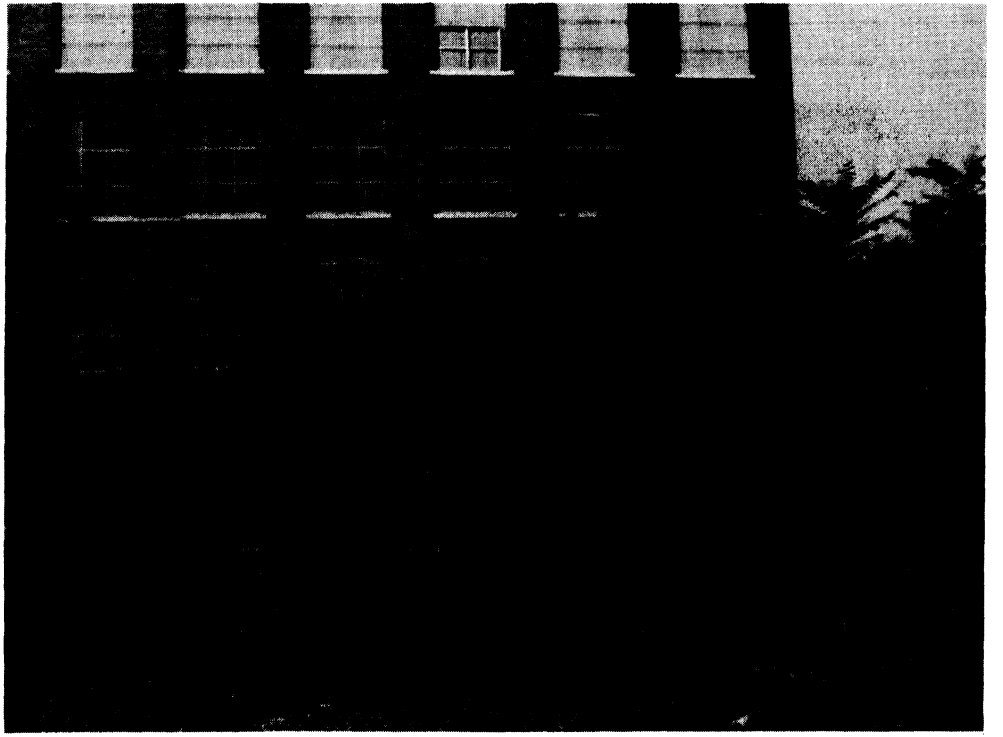

Figure 1b: Setting From the Old-Untended Condition

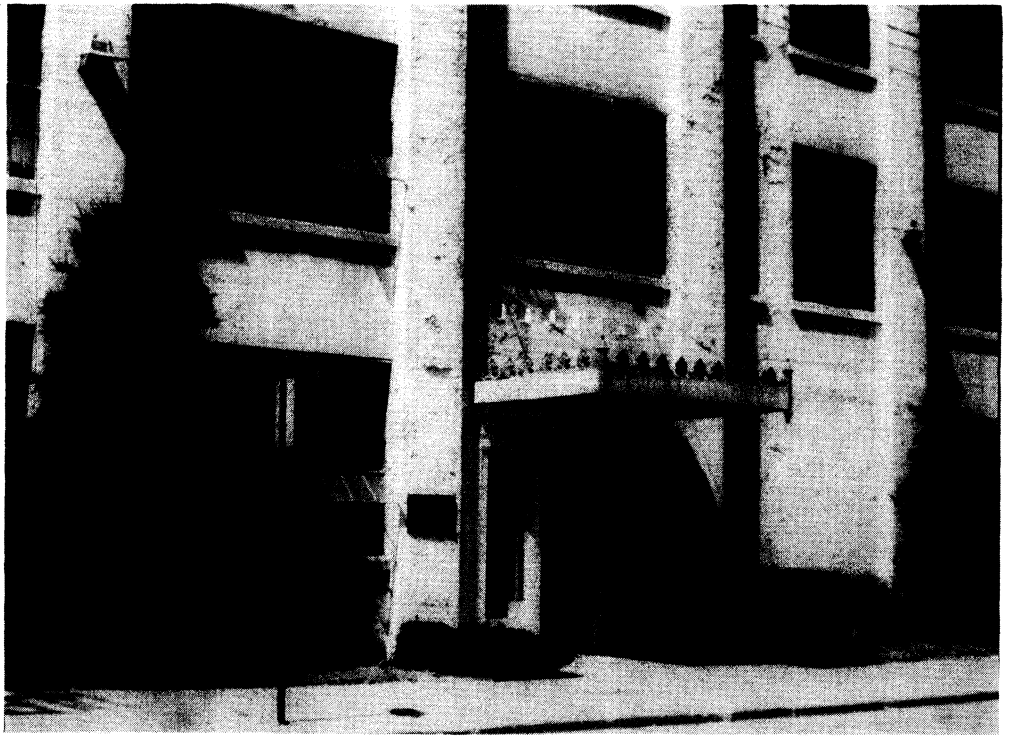

Figure 1c: Setting From the Old-Tended Condition

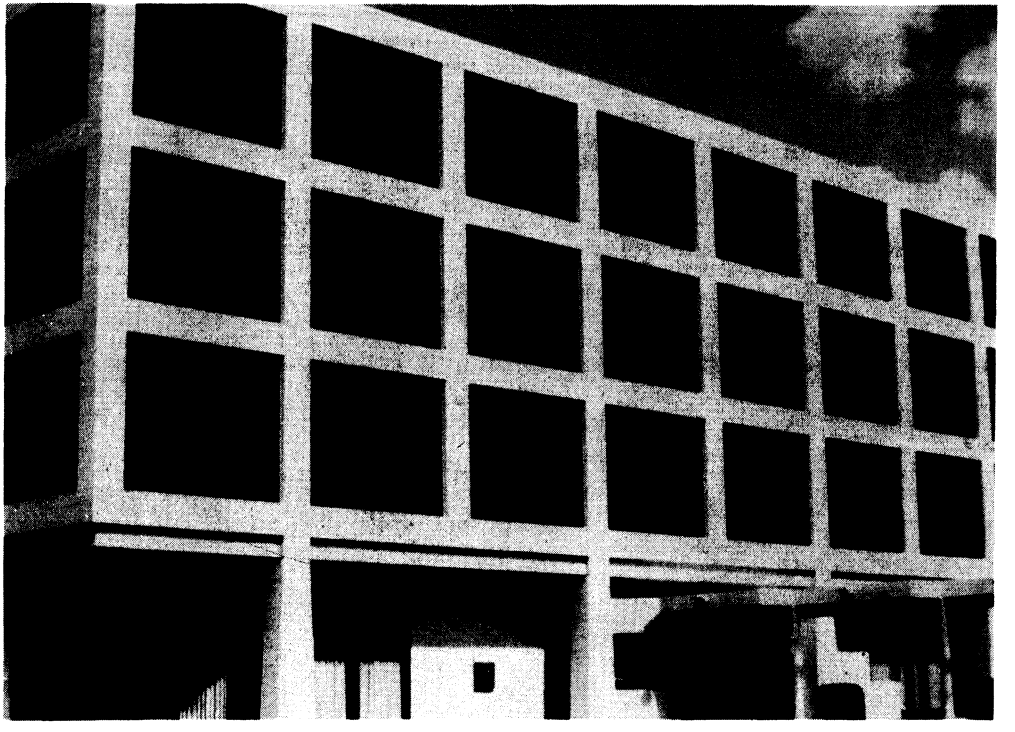

Figure 1d: Setting From the Contemporary-None Condition

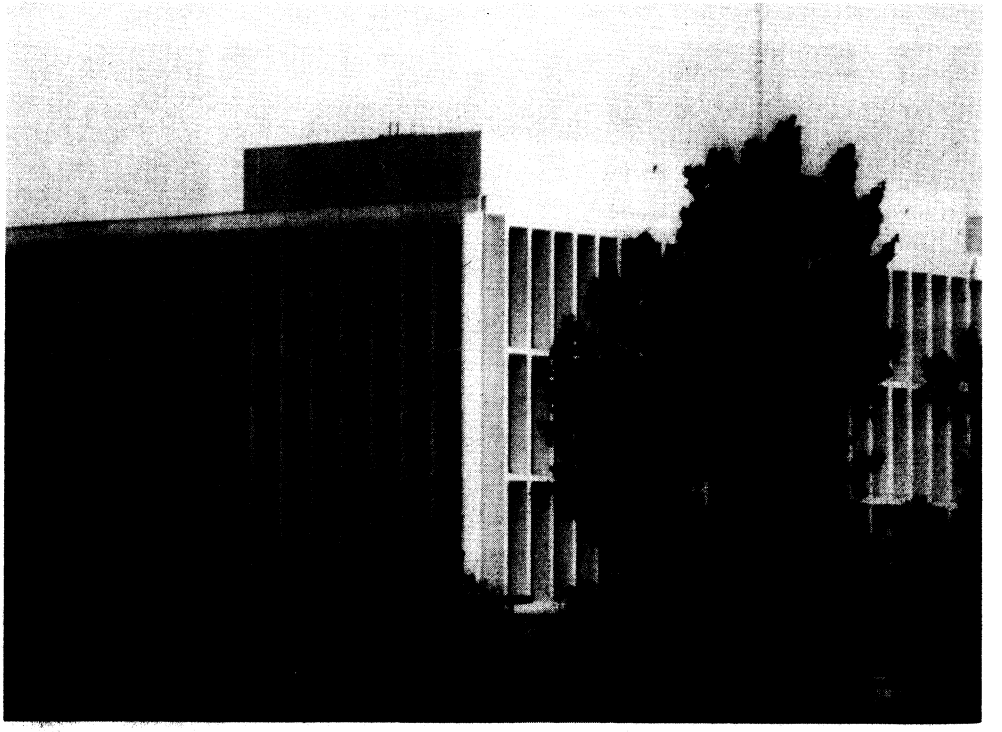

Figure 1e: Setting From the Contemporary-Untended Condition

Figure 1f: Setting From the Contemporary-Tended Condition

the buildings and other human structures in the setting?" The instructions emphasized that "you are rating for OLDNESS . . . OLD structures get a HIGH rating (5); NEW structures get a LOW rating (1)." Nature was "How much foliage or vegetation is there in the setting?" Nature care was "How well tended or well cared for does the nature (foliage, vegetation) in the setting appear to be?" Participants were instructed to circle the slide number on their response sheets and omit a rating for any setting that contained no nature. Building care was "How well tended or well cared for do the buildings in the setting appear to be?" Complexity was "How much is going on in the scene? . . . how much is there to look at?" A high rating meant that "the scene contains a lot of information." Mystery was "How much do you think the environment promises more to be seen if you could walk deeper into it? Does the environment seem to invite you to enter more deeply into it and thereby learn more?" Coherence was "How well does the scene 'hang together'? How easy is it to structure and organize the scene?"

Sessions proceeded as follows. First, five sample slides were rated to help participants get used to the task and the rating scale. Then participants rated 64 slides, presented in two sets of 32 each, with a brief intermission between sets. In both sets, the first and last slides were fillers, intended to absorb any beginning- or end-of-set effects that might have influenced the ratings. Sample and filler slides spanned all six conditions of the research design, with each condition represented at least once. The remaining 60 slides from both sets yielded the data for analysis and included 10 slides for each Age × Nature-Context condition. These 60 slides were presented in three different orders. One of the orders was used for each third of the sessions, and one third of the groups rating each variable received each presentation order. One order was generated randomly with these constraints: (a) no two consecutive slides from the same condition; (b) no more than two consecutive slides with the same value of either age or nature context; and (c) half of the slides in each condition must appear in each half of the entire set of slides. The second presentation order was the reverse of the first order, and the third order was derived by

interchanging the halves of the first order. Viewing time was 15 seconds for each slide.

Order of variables rated across sessions was haphazard with the exception that in each third of the sessions, preference was rated three times and each of the descriptor variables once. The goal was to achieve the greatest stability in the aggregate results for the dependent variable, preference. Final sample sizes were 151 for preference, 48 for age, 46 for building care, 43 for mystery, 42 each for nature care and coherence, 41 for nature, and 40 for complexity.

RESULTS

Unless otherwise specified, analyses were based on two different types of scores as raw data. The first, a person score, was the mean rating for each participant for all 10 settings in each condition of the Age × Nature-Context factorial design. Thus, for each rating variable, every participant had a person score for each condition in the factorial design. The second type of score was a setting score, the mean for each setting based on all participants who rated each variable. Thus, for each rated variable, every setting had a setting score. Because the research design was balanced, means for person and setting scores are identical. Tests of inference were carried out on both person and setting scores, and only results with $p < .05$ in both analyses were considered statistically significant.

THE PREDICTION OF PREFERENCE

Age. Are old buildings less liked or more liked than contemporary buildings? To find out, preference was first analyzed solely as a function of the selected independent variables, age and nature context, via analysis of variance. The effect of selected age was significant ($p < .05$), with contemporary buildings rated higher in preference than old buildings (means of 2.77 and 2.35, respectively). To determine if it is age per se or some other factors that contribute to this result, analyses of

covariance were performed, using each of the qualifying rated descriptor variables as covariates. (Nature care did NOT qualify for analysis of covariance.[1]) Because each participant rated only one variable, the analyses of covariance were possible only with setting scores. Table 1 contains the adjusted preference means from the analyses of covariance for each of the six qualifying descriptor variables. Each covariate was significantly related to preference, negatively in the case of age and positively for the other five covariates. As indicated in the first two columns of Table 1, the effect of selected age on preference was significant after adjusting for each of the covariates except rated age and coherence. After statistical adjustment for rated nature, complexity, or mystery, the preference difference associated with selected age was in the same direction (contemporary buildings preferred) as before the adjustment. However, in agreement with Frewald's prediction, adjusting for rated building care reversed the effect of selected age on preference.

The significant reversal of the effect of selected age on preference with rated building care as a covariate was paralleled by a similar, but nonsignificant, reversal with rated age as a covariate. This pattern of findings suggests that building care, not age per se, is the more relevant variable. To pursue this notion further, an analysis of covariance including all six qualifying covariates in the same analysis was performed. The main purpose of the analysis was to see how each covariate would fare in the presence of the other covariates. The result was that all of the covariates except rated age were significantly and positively related to preference. Rated age was not significantly related to preference. In addition, all significant effects involving the selected variables disappeared. Thus all effects of age, selected or rated, disappeared, whereas building care continued to be positively related to preference.

Nature context. Is the presence of nature important to preference for urban buildings, and does it matter whether the nature is tended or not? In the analyses of preference as a function of the selected independent variables only, the effect of selected nature context was significant ($p < .01$). The mean preference ratings were 2.41, 2.09, and 3.18 for the none,

TABLE 1
Mean Preference Ratings at Each Level of the Independent Variables, Age and Nature Context, After Adjustment for Each Qualifying Descriptor Variable as a Covariate

	Independent Variable				
	Age		*Nature Context*		
Covariate	*Old*	*Contemporary*	*None*	*Untended*	*Tended*
Age	2.83	2.30	2.38^{a}	2.15^{a}	3.15^{b**}
Nature	2.34	2.78**	3.27^{a}	1.56^{b}	2.86^{a**}
Building care	2.76	2.37**	2.29^{a}	2.64^{b}	2.75^{b**}
Complexity	2.21	2.91**	2.79^{a}	2.13^{b}	2.77^{a**}
Mystery	2.21	2.91**	2.64^{a}	2.02^{b}	3.02^{c**}
Coherence	2.43	2.70	2.04^{a}	2.62^{b}	3.04^{b**}

NOTE: For nature context, means not having a common superscript differ significantly at $p < .05$ in Tukey-B tests.
*$p < .05$ and **$p < .01$ for the effect of the independent variable.

untended, and tended conditions, respectively. Each pair of means was compared via the Tukey-B test (Wike, 1971). The tended mean was significantly greater than either of the other two, which did not differ from each other. Thus it appears that the presence of nature enhances preference for urban buildings, but only when the nature is tended.

Here, too, it is useful to see if the pattern of results for the selected independent variable is affected by other factors. The last three columns of Table 1 contain the adjusted preference means for the effect of selected nature context from the analyses of covariance. As indicated, the adjusted effect of nature context was significant in each analysis, but the pattern of preference means differed for different covariates.[2] Only in the case of age as a covariate did the pattern of pairwise comparisons via the Tukey-B test exactly match the pattern without the covariate. With respect to the remaining covariates, two points are noteworthy. First, tended nature was preferred over no nature except when adjusting for the amount of nature present or for complexity. Furthermore, when adjusting for these covariates, no nature was actually preferred over untended nature. Second, tended nature was preferred over untended nature except when adjusting for building care or coherence.

Interaction. Does the presence and kind of nature have a different effect on preferences for contemporary buildings as compared to old buildings? In general, the answer is no. In none of the analyses described above was the interaction of selected age and nature context significant. Thus the pattern of results for nature context was the same for both contemporary and old buildings: Tended nature enhanced preference; untended nature did not.

On the question of interaction, there was one small fly in the ointment. Rated nature care could not be used as a covariate because it interacted with the selected variables (see Note 1). The interaction was explored by performing a separate regression of preference on nature care within each of the four nature-present conditions.[3] The results are summarized in Table 2. With $df = 8$ (10 settings per condition), the regression was significant in all conditions except contemporary-untended where it was nearly significant. The interaction means that there were some significant differences among the four slopes (or, equivalently, among the four correlations). Inspection of the slopes and correlations suggests that the relationship between nature care and preference was stronger for old buildings and for tended-nature context.

RATED DESCRIPTOR VARIABLES

Table 3 contains mean ratings for each of the rated variables at each level of the selected independent variables, age and nature context. These means reflect the effects of selected age and nature context when each rated variable is treated as a dependent variable.

Validity checks. The top three lines of Table 3 contain results for rated descriptor variables that correspond directly to the selected independent variables. Thus the results serve as validity checks. Among these descriptor variables, the effect of selected age was significant only for rated age. In contrast, the effect of selected nature context was significant for both rated nature and rated nature care, but not for rated age. The Tukey-B test for the effect of nature context on rated nature showed that

TABLE 2
Regression of Preference on Nature Care in Each of the Nature-Present Conditions

Condition	*Slope(b)*	*Correlation(r)*	p
Contemporary-untended	.54	.58	.08
Contemporary-tended	.64	.73	.02
Old-untended	.84	.71	.02
Old-tended	1.63	.92	.00

NOTE: $df = 8$ for each p value.

TABLE 3
Mean Ratings for Each Rated Variable at Each Level of the Independent Variables, Age and Nature Context

	Independent Variable				
	Age		*Nature Context*		
Rated Variable	*Old*	*Contemporary*	*None*	*Untended*	*Tended*
Age	4.04	2.06**	2.98	3.18	3.00
Nature	2.62	2.58	1.19^{a}	3.48^{b}	3.13^{b}**
Nature care	2.53	2.83		1.60	3.75**
Building care	2.66	3.67**	3.31^{a}	2.48^{b}	3.70^{a}**
Complexity	3.01	2.69*	2.43^{a}	2.81^{b}	3.32^{c}**
Mystery	2.94	2.67*	2.59	2.87	2.96
Coherence	3.03	3.18	3.52^{a}	2.53^{b}	3.27^{a}**

NOTE: For nature context, means not having a common superscript differ significantly at $p < .05$ in Tukey-B tests for both person and setting scores.
*$p < .05$ and **$p < .01$ for the effect of the independent variable in both person- and setting-score analyses.

each of the nature-present conditions had significantly greater means than the none condition and also that the nature-present conditions did not differ from each other. All of these results are exactly what would be expected from successful selection of building age and the two components (presence and tendedness) of nature context. An unexpected finding was a significant interaction of selected age and nature context on rated age ($p < .01$ in analyses of both person and setting scores). The means for this interaction are presented in the left half of Table 4. The Tukey-B test[4] showed that the age comparison was significant for each level of nature context. Thus the validity of

selected age was not compromised. The pairwise comparisons also showed that the three means were all equal for the old level of selected age. In contrast, at the contemporary level of selected age, the mean for the none level of nature context differed from each of the other two means, but those two means did not differ from each other. It thus appears that a nature context can have a modest effect on the perceived age of urban settings containing contemporary buildings.

Descriptors as mediators. The last four lines of Table 3 summarize the effects of selected age and nature context for the remaining rated descriptor variables. The theoretical analysis in the introduction suggested that each of these variables would play a mediating role in the relationship between the selected independent variables and preference. Thus certain effects of the selected independent variables on these descriptor variables were expected. As predicted, the effect of selected age was significant for all of these descriptors except coherence, with old buildings rated lower in building care and higher in complexity and mystery. Selected nature context was expected to affect two of these descriptors, coherence and mystery. For coherence, the expected result was obtained: Settings with tended nature were rated significantly higher than those with untended nature. The lack of the predicted effect of nature context on rated mystery occurred because the effect just missed statistical significance for setting scores ($p = .06$; $p = .002$ for person scores). However, a planned comparison of the specific prediction made in advance, higher mystery in the nature-present conditions combined than in the none condition, was significant for both person and setting scores ($p < .001$ and $p < .025$, respectively).

There were a few unanticipated significant results involving these descriptor variables. The effect of selected nature context was significant for both building care and complexity. For building care, the untended condition was rated lower than either of the other two conditions, which did not differ from each other. All three conditions differed in rated complexity, with the none condition lowest and the tended condition highest. In addition, for complexity there was a significant interaction of the selected

TABLE 4
Interaction Means for Rated Age (Left) and Complexity (Right) as a Function of the Independent Variables, Age and Nature Context

	Nature Context					
	Age Rating			*Complexity Rating*		
	None	*Untended*	*Tended*	*None*	*Untended*	*Tended*
Age						
Old	4.24	4.01	3.87	2.84	2.84	3.36
Contemporary	1.72	2.35	2.12	2.02	2.78	3.27

independent variables. The interaction means are presented in the right half of Table 4. The Tukey-B test showed that the age comparison was significant only for the none level of nature context. For the old level of selected age, none of the pairwise comparisons were significant. For the contemporary level of selected age, mean rated complexity was significantly lower for the none level of nature context than for the other two levels. The means for the untended and tended levels did not differ significantly.

RELIABILITY OF MEASUREMENT

Reliability was assessed by computing coefficient alpha. With participants as the units of analysis and settings as items, alpha was .92 for preference and ranged from .83 (age) to .94 (nature) for the rated descriptor variables. For nature care, the alpha of .85 was based on only the 40 settings in the nature-present conditions as items. With settings as the units of analysis and participants as items, alpha was .99 for preference and ranged from .90 (mystery) to .99 (four variables) for the rated descriptor variables. For nature care, the alpha of .99 was based on only the 38 settings that were never omitted by raters. The omitted settings included all 20 in the nature-absent conditions plus two others in the nature-present conditions that were judged to contain no nature by at least one rater. In general, alpha was higher with settings (mean = .96) than with participants (mean = .90) as the units of analysis.

DISCUSSION

AGE

Our study complements Frewald (1989) in showing that when building care is controlled, old buildings are preferred to contemporary buildings. Frewald used procedural control (selecting buildings similar in perceived care), and we used statistical control in arriving at this common conclusion. Our study also showed clearly that prior to adjustment for building care, the contemporary buildings were preferred. Moreover, among the descriptors investigated, only the adjustment for building care reversed this preference. Adjustment for rated age yielded a similar but nonsignificant trend, presumably because age itself is not the relevant variable. When all of the covariates were included in the same analysis, all effects of age disappeared, but building care was still positively related to preference. It thus appears likely that the naturally occurring association of building age with lower perceived maintenance can account for past findings of a preference advantage for modern buildings, as proposed by Frewald. Methodologically, this implies that researchers investigating building age need to control building care, directly or indirectly, to obtain valid results.

Frewald's theoretical analysis, based on the Kaplans's informational model of environmental preference, offered several factors to account for the preference advantage of old buildings. Specifically, she proposed that old buildings should be higher in visual richness, mystery, and coherence than modern buildings. We were able to confirm her predictions for complexity (a component of visual richness) and mystery. Neither she nor we succeeded in confirming the prediction for coherence. For reasons given in the introduction, it seems unlikely to us that the prediction for coherence is correct. We agree with Frewald that the major contributor to the preference advantage of old buildings is visual richness, as embodied in such design features as ornament, curves, articulated walls, natural materials, varied colors and textures, and fancy windows. Frewald's results on these features are very much in need of replication

because they were based on a panel of only five judges who rated each setting for over 20 individual features. The emphasis in this discussion on physical features should not be interpreted as dismissing the importance of nonphysical features. It seems likely that old buildings might also have an advantage in terms of shared meanings attached to them, another fertile area for future research.

The practical implications of the findings on age are straightforward. Our results provide strong support for both the movement to preserve and restore older buildings and recent trends in architecture to return to some of the visual-richness features (curves, columns, varied textures and colors) of older buildings. Compared to razing and replacement, improvement in building care and visual richness represent modest investments with a significant payoff in enhanced visual quality.

NATURE CONTEXT

Our results for nature context confirm the existing literature in suggesting that the presence of nature generally enhances preference for urban settings and that tended nature is preferred over untended nature. These conclusions are further supported by the positive relationships between preference and both rated nature and nature care in the covariance and regression analyses. We can now add that nearby untended nature does not enhance preference for urban buildings relative to the absence of nature and may actually detract from preference. The evidence for the latter proposition is that the untended-nature condition was significantly lower in preference than the none condition after adjusting for rated nature.

The effect of nature context on the informational descriptors (complexity, mystery, coherence) provides insight into how these descriptors mediate the relationship between nature context and preference. For example, an effective nature context consists in part of enhanced coherence, that is, an impression that the natural elements in the setting are arranged in an orderly fashion. Comparison of the tended and untended settings in Figure 1 illustrates this point visually and also suggests

that a second component of tendedness is how well manicured the natural elements are. This aspect of tendedness was reflected in its strong impact on rated nature care (Table 3). A nature context also adds mystery and complexity. Nature enhances mystery by partially concealing the buildings, thereby inducing the viewer to infer unseen building features from those that are visible. Although the results for complexity were unanticipated, it makes sense that nature enhances complexity by providing more information to be processed. This can be a welcome relief in visually impoverished settings. The interaction of the selected variables on rated complexity (Table 4) suggests that contemporary buildings without nature may be a prime example of such impoverishment. As expected, all three informational descriptors were positively related to preference, in agreement with the general predictions of the Kaplans (R. Kaplan & Kaplan, 1989).

Unquestionably, nature maintenance was confounded with building maintenance in this study. The pattern of means for nature care and building care was identical in the nature-present conditions (Table 3), and among the rated descriptors, the two care variables had their greatest overall correlation (r = .77) with each other. This explains why the effect of selected tendedness of nature disappeared after adjusting for rated building care (Table 1). It is not surprising that nature maintenance and building maintenance go together in real-world settings. To tease apart their effects on preference, future researchers will have to resort to either very careful selection of settings or computer-aided manipulation of the maintenance variables.

INTERACTION

The selected variables did not interact in their effect on preference. Thus, on the average, the presence and tendedness of nature had about the same effect on preference for both old and contemporary buildings. However, there was an interaction involving the selected variables, rated nature care, and preference. Exploration of that interaction revealed that within

the nature-present conditions, the positive relationship between nature care and preference was stronger for old buildings and tended-nature context (Table 2). The practical implication is that the same increment in nature care will have more impact for older buildings and for urban settings that have already achieved a certain level of nature care (tended vs. untended).

Given the small samples of settings (10 per condition), it seems prudent not to emphasize the nature-care interaction, pending replication. The far more important result is that maintenance matters. Both building and nature maintenance can substantially enhance preference. Because maintenance is more likely to be a problem with older buildings, its benefits for such buildings should be stressed. It now seems clear that with equivalent maintenance, older buildings are preferred to modern buildings. Thus any investment in improved maintenance, particularly for older buildings, can significantly improve the visual quality of the urban environment.

LIMITATIONS

Three cautionary notes should be stressed. First, our sample consisted of college students, and thus caution is appropriate in generalizing the results to other populations. One might very well expect affection for older buildings to be greater for an older population than for students. The generality of our results remains to be determined.

Second, we would like to reiterate that in real-world urban settings, the presence of nature may evoke either (or both) of two sharply contrasting reactions: aesthetic appreciation or concern for personal safety. Factors affecting which reaction is more likely or which one dominates when both are evoked are topics very much in need of further research. Our results have potential application only to situations in which safety concerns are not a significant issue.

Third, we are well aware of the dangers in using analysis of covariance for adjustment of means rather than for controlling individual differences (e.g., Pedhazur & Schmelkin, 1991). Nonetheless, we feel that when the results from such adjust-

ment are consistent with prior research and plausible theory, the danger to valid conclusions is greatly reduced. We believe that to be the case for the major conclusions of this study.

NOTES

1. To qualify for analysis of covariance, the potential covariate must not interact with the independent variables. To assess such interaction, each rated descriptor was used as a measured independent variable, along with the two selected independent variables, in a separate analysis of variance based on setting scores. Only in the case of nature care were the pooled interactions of the measured and selected independent variables significant ($p = .017$). Thus analysis of covariance was performed with each of the remaining descriptors.

2. Tukey-B tests to follow up significant effects of selected nature context from the analyses of covariance were performed, using the corrected formulas supplied by Wildt and Ahtola (1978).

3. The none condition for selected nature context was omitted from all analyses involving rated nature care. Most nature-care raters followed instructions and did NOT provide a rating for settings containing no nature. In the rare instances where such ratings were made, it makes little sense to take them seriously.

4. Tukey-B tests for significant interactions incorporated Cicchetti's (1972) modification for interaction tables.

REFERENCES

Cicchetti, D. V. (1972). Extension of multiple-range tests to interaction tables in the analysis of variance: A rapid approximate solution. *Psychological Bulletin, 77,* 405-408.

Day, L. L. (1992). Placemaking by design: Fitting a large new building into a historic district. *Environment and Behavior, 24,* 326-346.

Fisher, B. S., & Nasar, J. L. (1992). Fear of crime in relation to three exterior site features: Prospect, refuge, and escape. *Environment and Behavior, 24,* 35-65.

Frewald, D. B. (1989). *Preferences for older buildings: A psychological approach to architectural design.* Unpublished doctoral dissertation, University of Michigan.

Hershberger, R., & Cass, R. (1973). The adequacy of various media as representations of the designed environment. *Man-Environment Systems, 3,* 371-372.

Herzog, T. R. (1989). A cognitive analysis of preference for urban nature. *Journal of Environmental Psychology, 9,* 27-43.

Herzog, T. R. (1992). A cognitive analysis of preference for urban spaces. *Journal of Environmental Psychology, 12,* 237-248.

Herzog, T. R., Kaplan, S., & Kaplan, R. (1976). The prediction of preference for familiar urban places. *Environment and Behavior, 8,* 627-645.

Herzog, T. R., Kaplan, S., & Kaplan, R. (1982). The prediction of preference for unfamiliar urban places. *Population and Environment: Behavioral and Social Issues, 5*, 43-59.

Herzog, T. R., & Smith, G. A. (1988). Danger, mystery, and environmental preference. *Environment and Behavior, 20*, 320-344.

Hetherington, J., Daniel, T. C., & Brown, T. C. (1993). Is motion more important than it sounds?: The medium of presentation in environment perception research. *Journal of Environmental Psychology, 13*, 283-291.

Hull, R. B., IV. (1992). Image congruity, place attachment, and community design. *Journal of Architectural and Planning Research, 9*, 181-192.

Hull, R. B., IV, & Harvey, A. (1989). Explaining the emotion people experience in suburban parks. *Environment and Behavior, 21*, 323-345.

Hull, R. B., IV, & Stewart, W. P. (1992). Validity of photo-based scenic beauty judgments. *Journal of Environmental Psychology, 12*, 101-114.

Kaplan, R. (1983). The role of nature in the urban context. In I. Altman & J. F. Wohlwill (Eds.), *Behavior and the natural environment* (pp. 127-162). New York: Plenum.

Kaplan, R., & Kaplan, S. (1989). *The experience of nature: A psychological perspective.* New York: Cambridge University Press.

Kaplan, S., & Kaplan, R. (Eds.). (1978). *Humanscape: Environments for people.* Belmont, CA: Duxbury (Division of Wadsworth).

Kaplan, S., & Kaplan, R. (1982). *Cognition and environment: Functioning in an uncertain world.* New York: Praeger.

Loewen, L. J., Steel, G. D., & Suedfeld, P. (1993). Perceived safety from crime in the urban environment. *Journal of Environmental Psychology, 13*, 323-331.

Nasar, J. L. (1981). Visual preferences of elderly public housing residents: Residential street scenes. *Journal of Environmental Psychology, 1*, 303-313.

Nasar, J. L. (1983). Adult viewers' preferences in residential scenes: A study of the relationship of environmental attributes to preference. *Environment and Behavior, 15*, 589-614.

Nasar, J. L., & Fisher, B. (1993). "Hot spots" of fear and crime: A multimethod investigation. *Journal of Environmental Psychology, 13*, 187-206.

Orland, B., Vining, J., & Ebreo, A. (1992). The effect of street trees on perceived values of residential property. *Environment and Behavior, 24*, 298-325.

Pedhazur, E. J., & Schmelkin, L. P. (1991). *Measurement, design, and analysis: An integrated approach.* Hillsdale, NJ: Lawrence Erlbaum.

Schroeder, H. W. (1989). Environment, behavior, and design research on urban forests. In E. H. Zube & G. T. Moore (Eds.), *Advances in environment, behavior, and design* (Vol. 2, pp. 87-117). New York: Plenum.

Schroeder, H. W., & Cannon, W. N., Jr. (1987). Visual quality of residential streets: Both street and yard trees make a difference. *Journal of Arboriculture, 13*, 236-239.

Sheets, V. L., & Manzer, C. D. (1991). Affect, cognition, and urban vegetation: Some effects of adding trees along city streets. *Environment and Behavior, 23*, 285-304.

Sommer, R., Guenther, H., & Barker, P. A. (1990). Surveying householder response to street trees. *Landscape Journal, 9*, 79-85.

Sommer, R., Summit, J., & Clements, A. (1993). Slide ratings of street tree attributes: Some methodological issues and answers. *Landscape Journal, 12*, 17-22.

Stamps, A. E., III. (1990). Use of photographs to simulate environments: A meta-analysis. *Perceptual and Motor Skills, 71*, 907-913.

Stamps, A. E., III. (1991). Public preferences for high rise buildings: Stylistic and demographic effects. *Perceptual and Motor Skills, 72*, 839-844.

Stamps, A. E., III. (1994). Formal and nonformal stimulus factors in environmental preference. *Perceptual and Motor Skills, 79*, 3-9.

Trent, R., Neumann, E., & Kavashny, A. (1987). Presentation mode and question format artifacts in visual assessment research. *Landscape and Urban Planning, 14*, 225-235.

Widmar, R. (1984). Preferences for multiple-family housing: Some implications for public participation. *Journal of Architectural and Planning Research, 1*, 245-260.

Wike, E. L. (1971). *Data analysis.* Chicago: Aldine-Atherton.

Wildt, A. R., & Ahtola, O. T. (1978). *Analysis of covariance.* Beverly Hills, CA: Sage.

Zube, E. H., Simcox, D. E., & Law, C. S. (1987). Perceptual landscape simulations: History and prospect. *Landscape Journal, 6*, 62-80.