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Complexity, Age, and Building Preference

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ABSTRACT: The authors explore the role of complexity in the relation between building age and preference. Age was assessed as a categorical (via stimulus selection) and a continuous (via ratings of 64 color slides of urban buildings) variable. In either case, the authors replicated earlier research in showing that modern buildings were preferred over older buildings when building maintenance was not controlled, but when it was controlled, the relation reversed, and the older buildings were better liked. However, when a composite-rating measure of complexity was introduced, a somewhat different pattern emerged. Complexity interacted with rated age. The nature of the interaction was that throughout most of the range of complexity scores, age was negatively related to preference, but at the higher end of the complexity range, there was no relation between age and preference. Other findings: Buildings with visible entrances were preferred to those without, and distant views were preferred over near views.

Until recently, the relation between age and preference for urban buildings was unclear. Research had produced mixed results (for a review, see Herzog & Gale, 1996). However, two studies clarified matters. The first was Frewald's (1989) doctoral dissertation. She showed that with a sample of buildings carefully selected to be in similar physical condition (confirmed by ratings of a panel of judges), older buildings were clearly preferred over modern buildings. Herzog and Gale followed up by showing that older buildings

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were preferred over modern buildings when perceived building care was controlled statistically, but the reverse was true in the absence of such control. Taken together, these studies demonstrate that the relation between building age and preference depends on the level of building maintenance. When maintenance is controlled, older buildings are generally higher in preference.

Frewald's (1989) agenda was theoretical as well as empirical. She argued that the Kaplans' informational model of environmental preference (R. Kaplan & Kaplan, 1989; S. Kaplan & Kaplan, 1978, 1982) provided a plausible account of why older buildings are preferred. In that account, older buildings are higher than modern buildings in the key predictors of the informational model: complexity, legibility, mystery, and coherence. Frewald showed that her 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), but not coherence (how well-organized the setting is). Visual richness is similar to the informational predictor complexity (how much information the setting contains). Other studies have supported the utility of visual richness (Day, 1992; Nasar, 1983) and complexity (Stamps, 1991, 1994; Widmar, 1984) as predictors of building preference. On the whole, then, past research is supportive of a role for three of the four informational predictors in the age-preference relation for buildings.

In modern statistical parlance, Frewald (1989) seemed to imply that the informational predictors act as mediators of the age-preference relation. To establish mediation, four conditions must be met (Baron & Kenny, 1986; Evans & Lepore, 1997; Evans & Maxwell, 1997). First, the relation between the independent (age) and dependent (preference) variables, after adjusting for any relevant control variables (building maintenance), must be significant. Second, the potential mediator (e.g., complexity) must be related to both the independent and dependent variables. Third, the potential mediator must not interact with the independent variable. (If it does interact, it is a moderator variable rather than a mediator, and the nature of its moderating effect should be explored.) Fourth, when the effects of the potential mediator are partialed out, the relation between the independent and dependent variables must be significantly reduced (partial mediation) or eliminated (full mediation). Although past research suggests a mediational role for the informational predictors, a formal mediation analysis has not yet appeared.

Given this background, our purpose was threefold. First, we sought to replicate one more time the positive relation between building age and preference with building maintenance controlled. The practical and theoretical implications of this relation seemed to us to justify one more replication.

Second, we sought to explore how several categorical variables, including age, worked together in influencing building preference. Third, we sought to determine specifically if complexity as a measured variable qualified as a mediator or a moderator of the age-preference relation.

To accomplish these goals, we operationalized age as both a categorical and a continuous (rated) predictor. The other categorical variables explored were scale (near vs. far view of buildings), visible entrance (presence or absence of a visible entrance), and visual richness. The latter might be thought of as a categorical version of complexity. It seemed likely to us that both scale and visible entrance might contribute to visual richness, with higher richness associated with the near view (more detail visible) and the presence of a visible entrance. This would imply higher preference for near views and buildings with visible entrances. Values of the categorical variables were established by selection of settings. All other variables were continuous, based on obtained ratings. These included the dependent variable—preference—building care, and visual richness. A number of rated variables were suggested by Frewald's (1989) analysis as specific components of visual richness, a possibility that we could test empirically. They were ornament (presence of exterior decoration), curves (presence of curved lines or forms), contoured walls (variation in depth of the exterior walls), columns (prominence of), color variation, texture variation (perceived variation in the "grain" of the building's exterior surface), and fancy windows (prominence of). The remaining rated variables were included primarily for exploratory purposes. Coherence was included because its role in the age-preference relation is unclear (Frewald, 1989; Herzog & Gale, 1996). Nature (the amount of foliage or vegetation in the setting) was included so that we could control for differences associated with nature content if we so desired.

Statistical control of building maintenance allowed us to accomplish our first goal. The second goal was addressed by exploring the effects of the four categorical predictors: age, visual richness, scale, and visible entrance. By judicious selection of settings, we tried to achieve a completely balanced four-way factorial design for these variables. If successful, this would allow us to explore how these four variables worked together but would preclude a mediational role for visual richness as a categorical variable. To the extent that we achieved a perfectly balanced design, the underlying variables represented by categorical age and visual richness could not be related to each other, and thus we could not meet one of the conditions for establishing mediation. However, there was still plenty of room within the age and visual richness categories for the rated versions of the two variables to be related. Thus, the third goal of the study, determining the precise role of visual richness or complexity, was accomplished using the rated versions of all relevant variables.

METHOD

PARTICIPANTS

The sample consisted of 601 undergraduate students, 419 women and 182 men, at Grand Valley State University. The students received extra course credit for participation. Forty-five sessions consisting of 5 to 24 participants were run.

APPARATUS

The settings consisted of 64 color slides of 32 urban buildings from the Grand Rapids, Michigan, area. These buildings may be considered representative of buildings found in most large Midwestern cities and their suburbs. The sampling of buildings had to satisfy several constraints. First, each building was represented by both a near view and a more distant (far) view, which constituted the operational definition of the categorical variable scale. The near view typically included the first floor and part of the second floor of multistoried buildings. The far view included the whole building. Second, within the scale categories, three other categorical variables were also equally represented: age (older vs. modern buildings), visual richness (low vs. high, in the authors' best judgment), and visible entrance (presence or absence of a visible entrance). Each of the 32 buildings sampled retained the same status on the other three categorical variables in both its near and far versions. Thus, we ended up with 4 slides in each of the 16 cells of the four-way factorial design involving the categorized (selected) variables. Examples of settings from various cells of the design are presented in Figures 1 to 8. Third, the settings ranged broadly on the rated variables, with the exception of nature, which we tried to restrict at low levels. Building function varied widely, but buildings with clear indications of function (e.g., signs) were avoided. None of the settings contained people. All were photographed in summer or early fall, and extreme weather conditions (e.g., excessive cloudiness) were avoided. All slides were oriented horizontally.

Figure 1: Near View of Old Building Low in Visual Richness and With No Visible Entrance

Figure 2: Far View of Old Building Low in Visual Richness but With a Visible Entrance

PROCEDURE

All participants in each session rated each of the 64 settings on the same one (and only one) of 13 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 building depicted, for whatever reason." Rated *age* was defined as "How old does the building appear to be?" The instructions emphasized that "You are rating for OLDNESS. OLD buildings

Figure 3: Near View of Old Building High in Visual Richness and With a Visible Entrance

Figure 4: Far View of Old Building High in Visual Richness but With No Visible Entrance

get a high rating (5); NEW buildings get a low rating (1)." *Nature* was "How much foliage or vegetation is there in this setting?" *Building care* was "How well-cared-for does the building seem to be? Is it in good condition?" *Coherence* was "How well does the building 'hang together'? How well organized is the building? How easy is it to find some overall pattern or structure to the building?" *Visual richness* was "How much variety does this building have? That is, how much is there to look at?" The remaining rated variables

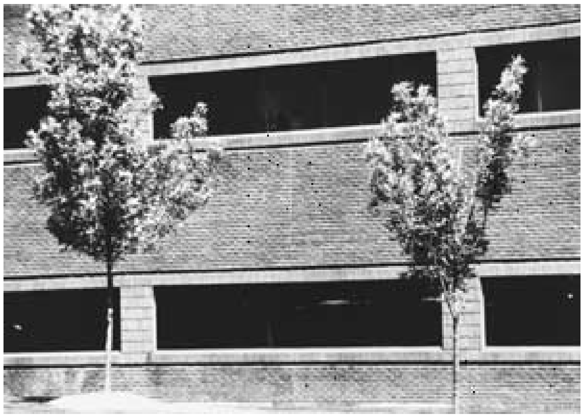

Figure 5: Near View of Modern Building Low in Visual Richness and With No Visible Entrance

Figure 6: Far View of Modern Building Low in Visual Richness but With a Visible Entrance

represented possible components of visual richness. *Ornament* was "How much does the exterior of the building emphasize decoration? Decoration might include carvings, engravings, sculpture, plaques, lighting fixtures, or anything else on the exterior of the building that you feel would qualify as ornamentation." *Curves* was "How much does the exterior of the building emphasize curved lines and forms, rounded shapes?" *Contoured walls* was "How much do the building's exterior walls vary in depth as opposed to being

Figure 7: Near View of Modern Building High in Visual Richness and With a Visible Entrance

Figure 8: Far View of Modern Building High in Visual Richness but With No Visible Entrance

perfectly flat?" *Columns* was "How much do columns, pillars, or vertical shafts seem to be prominent in this building?" *Color variation* was "How much variation is there in the color of the building's exterior?" Similarly, *texture variation* was "How much variation is there in the texture or 'grain' of the building's exterior surface?" Finally, *fancy windows* was "To what extent does this building have fancy, elaborate windows?"

Sessions proceeded as follows. First, 5 practice slides were rated to help participants get used to the task and the rating scale. The practice slides included both values of all four categorical variables to give the participants an idea of the range of variation they would encounter. Then, participants rated 68 slides, presented in two sets of 34 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. The remaining 64 slides from both sets yielded the data for analysis and included four exemplars for each cell of the four-way factorial design described previously. These 64 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 more than two consecutive trials from each of the 16 cells of the factorial design, (b) exactly two trials from each cell of the design in each half of the random order, (c) each scale (near vs. far) view of each building appeared once in one half of the random order and once in the other half, and (d) no more than three consecutive trials with either value of any of the four categorical variables. 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 other 12 variables once. The goal was to achieve the greatest stability in the aggregate results for the dependent variable, preference. Final sample sizes were 138 for preference, 44 for age, 42 for curves and texture variation, 41 for ornament and fancy windows, 40 for visual richness and contoured walls, 36 for coherence and columns, 35 for nature, 34 for color variation, and 32 for building care.

RESULTS

Analyses were based on settings as the units of analysis and setting scores as raw scores. A setting score is the mean score for each setting based on all participants who rated each variable. Thus, for each variable, every setting had a setting score. Internal consistency reliability coefficients (Cronbach's alpha), based on settings as cases and participants as "items," ranged from .94 for coherence to .99 for preference, age, ornament, and curves. Unless otherwise noted, alpha was set at .05 for all tests of inference.

We elected to treat the categorical variable scale as a between-setting variable in our analyses. This means that we treated the 64 slides as though each were a different setting although in fact there were only 32 buildings represented, with a near and far view of each one. Our reasoning was that if scale was treated as a within-settings variable, all tests of inference involving scale would be more sensitive than tests involving the other categorical variables, as is typical for within-subjects variables. We could not see any theoretical or practical advantages to more sensitive tests for one of the categorical variables. Thus, we chose to treat them all as between-setting variables.

AGE AS A CATEGORICAL VARIABLE

Validity checks. Just because the categorical variables were perfectly balanced with respect to each other, this does not necessarily mean that the underlying variables they represent were perfectly balanced. For age and visual richness, a check on the effectiveness of balancing was available because we also had rated versions of these variables. Assuming the validity of the rated versions (their reliability seems beyond reproach; see previous discussion), we should expect that an analysis with rated age as the dependent variable and the four categorical variables as the independent variables should yield a significant main effect of categorical age and no other significant effects if balancing was perfect. With rated visual richness as the dependent variable, things are a bit more complex. Because we suspected that scale and visible entrance might contribute to visual richness, we should expect a main effect of categorical visual richness, scale, and visible entrance, but no other significant effects, if balancing was perfect.

When these analyses were actually carried out, we found that with rated age as the dependent variable, the only significant main effect ($p < .001$) was for categorical age—means of 1.79 and 3.96 for the modern and old categories, respectively; $df = 1, 48$ and $MSE = .11$ for all effects in this analysis. However, three interactions were also significant, all at $p < .005$: Age × Visual Richness, Age × Visible Entrance, and Age × Visual Richness × Visible Entrance. Rather than exploring the nature of these interactions, we simply note subsequently their implications for subsequent analyses of preference. With rated visual richness as the dependent variable, the expected main effects were all significant at $p < .005$—means of 1.95 and 3.47 for the low and high visual richness categories, respectively; 2.52 and 2.90 for the near and far views, respectively, with the direction of the difference the opposite of what we had anticipated; and 2.47 and 2.95 for settings without and with visible entrances, respectively ($df = 1, 48$ and $MSE = .17$ for all effects in this analysis). In addition, the main effect of categorical age was significant at $p < .02$—means of 2.58 and 2.84 for the modern and old categories, respectively— and two interactions were significant at $p < .005$: Visual Richness × Visible Entrance and Age × Visual Richness × Visible Entrance.

These analyses have two implications for subsequent analyses of preference. First, our selection of settings for age and visual richness was successful, as indicated by the significant main effects of categorical age and visual richness on their rated counterparts. Second, our attempt to balance perfectly the underlying variables represented by the categorical variables with respect to each other was unsuccessful, as indicated by several inappropriate interactions and the unanticipated main effect of categorical age on rated visual richness. As we see it, the primary practical consequence of our imperfect balancing is that we should be wary of interpreting significant interactions among the categorical variables in subsequent analyses of preference. They may be caused by the imperfect balancing of the underlying variables represented by the categorical variables. Instead, we should concentrate our attention on significant main effects.[1]

Age and preference. An analysis was carried out with rated preference as the dependent variable and the four categorical variables as independent variables. All four main effects were significant, $p < .005$ for all except scale, in which $p < .05$; $df = 1, 48$ and $MSE = .23$ for all effects in this analysis. Modern buildings were liked better than older buildings (*M*s = 3.09 and 2.52, respectively), buildings high in visual richness were preferred over those low in visual richness (*M*s = 3.52 and 2.10, respectively), far views were preferred over near views (*M*s = 2.95 and 2.67, respectively), and buildings with a visible entrance were preferred over those with no visible entrance (*M*s = 3.02 and 2.60, respectively). There were also two significant interactions: Visual Richness × Visible Entrance ($p < .001$) and Age × Visual Richness × Visible Entrance ($p < .05$). Because the imperfect balancing of the independent variables complicates the interpretation of these interactions, we do not describe them here.

We then determined what happened to the effect of categorical age when we controlled for each of the rated variables. The answer is summarized in Table 1, which shows the adjusted preference means for modern and old buildings with each rated variable as a covariate.[2] The adjusted age effect was significant (with $\alpha = 05/12 = .004$ because there were 12 separate analyses, one for each rated variable as a covariate) for all covariates except coherence, age, building care, and fancy windows. Note the nature of the adjusted age effects. The adjusted effect was in the same direction as the unadjusted effect (modern buildings higher in preference) except in the cases of rated age,

TABLE 1
Adjusted Preference Means for Modern and Old Buildings With Each Rated Predictor as a Covariate

	Building Age	
Covariate	*Modern*	*Old*
Age	2.63	2.99
Visual richness	3.22	2.40
Building care	2.70	2.91
Coherence	2.99	2.63
Nature	3.03	2.59
Ornament	3.19	2.42
Curves	3.08	2.54
Contoured walls	3.12	2.49
Columns	3.09	2.52
Color variation	3.07	2.54
Texture variation	3.16	2.46
Fancy windows	2.75	2.87

NOTE: *Df* = 1, 47 for each covariate. *MSE* = .21, .07, .14, .21, .17, .11, .18, .22, .23, .23, .23, and .06 for Age through Fancy Windows, respectively.

building care, and fancy windows as covariates. In none of the latter three cases was the adjusted age effect significant, but the reversal of the unadjusted effect is nonetheless intriguing.

The separate analyses summarized in Table 1 do not confront the substantial redundancies among the rated predictor variables. Of the 66 correlations among the rated predictors, 46 of them were significant ($p < .05$), and 13 of them exceeded .70. To take these redundancies into account and also to check our prior predictions about the components of visual richness, we factor analyzed the correlations among the rated predictors (principle-axis factor analysis, Varimax rotation). Three factors had eigenvalues greater than 1. A factor-loading cutoff of $|.50|$ gave us the clearest reading on factor composition. The first factor consisted of visual richness, ornament, curves, contoured walls, texture variation, and fancy windows, all with positive loadings. We could have called this factor visual richness, but to keep it separate in our minds from either the categorical or rated versions of this variable, we elected to call the factor *complexity*. The second factor had positive loadings from coherence, building care, and fancy windows and negative loadings from age and texture variation. We see this as a building *maintenance* factor, with coherence, building care, and fancy windows as signs of a well-maintained building and age and texture variation often associated with neglect. The substantial association of age and maintenance is precisely the reason that maintenance must be controlled to achieve an undistorted view of the relation between building age and preference. The third factor consisted of one variable, columns. Not loading on any factor were nature (although it came close with a loading of .49 on the first factor, complexity) and color variation.

We proceeded to build simplified factor scores (equal weighting of the components) for the complexity and maintenance factors. For the latter, we omitted age from the composite (because we wanted to analyze age as a separate variable, regardless of redundancies) and flipped the remaining negative loader, texture variation, about its midpoint (effectively turning it into texture smoothness) before averaging it with the other components. After verifying that the two new composite variables, complexity and maintenance, qualified for covariance analysis (see Note 2), we separately performed analysis of covariance for each composite. In both analyses, the covariate was significant and so was the adjusted effect of categorical age ($p < .005$ in all cases). With complexity as a covariate, modern buildings were still preferred over old buildings (adjusted preference *M*s = 3.15 and 2.47, respectively; $df = 1, 47$ and $MSE = .11$), but with maintenance as a covariate, the effect reversed (adjusted preference *M*s = 2.54 and 3.08 for modern and old buildings, respectively; $df = 1, 47$ and $MSE = .10$).

AGE AS A CONTINUOUS VARIABLE

Having replicated the prior finding that older buildings are preferred when maintenance is controlled, we next sought to determine the role of complexity in the age-preference relation. As noted earlier, this cannot be done adequately using categorical visual richness and age because our balancing of the two variables, though imperfect, must attenuate any relation between the two, and such a relation is a precondition for mediation. Thus, from that point on, we used only rated versions of the relevant variables, and to minimize measurement error, we used the composite versions of complexity and maintenance. To keep things as simple as possible, we examined only age, complexity, and maintenance as predictor variables with preference as the dependent variable.

Table 2 shows the simple correlations among these four variables. Here, we see that maintenance was clearly relevant because it was strongly correlated with both preference (positively) and age (negatively). Meanwhile, the simple correlation between age and preference was negative (older buildings less preferred), not significant but in the direction indicated by prior studies. Table 3 shows what happened when maintenance was controlled (partialed out). The age-preference relation reversed (older buildings more preferred) and was now significant, whereas complexity met one of the preconditions for mediation, with significant correlations to both of the other variables.

TABLE 2
Simple Correlations Among Preference, Age, Complexity, and Maintenance for All Settings (N = 64)

Variable	*1*	*2*	*3*	*4*
1. Preference	—			
2. Age	–.22	—		
3. Complexity	.87**	.15	—	
4. Maintenance	.68**	–.75**	.34**	—

*p < .05. **p < .01.

TABLE 3
Partial Correlations Among Preference, Age, and Complexity With Maintenance Partialed Out for All Settings (N = 64)

Variable	*1*	*2*	*3*
1. Preference	—		
2. Age	.60**	—	
3. Complexity	.93**	.65**	—

*p < .05. **p < .01.

Alas, when we introduced interaction terms for the predictors (three two-way interactions and one three-way), the only significant interaction in the final model (after eliminating nonsignificant interactions in successive steps) was the two-way interaction of age and complexity, $F(1, 59) = 7.53, p < .01$. This meant that complexity was serving as a moderator variable rather than a mediator variable.

The regression equation for the final model was as follows: $P' = -.63 + .65M - .37A + .60C + .10AC$, where P' is predicted preference, M is maintenance, A is age, and C is complexity. All coefficients differed significantly from zero ($p < .025$). The coefficient of the interaction term means that the partial slope of the regression equation relating preference to either predictor—age or complexity—increases by .10 for each unit increase in the other predictor. A little algebra reveals that the partial slopes for age range from –.22 at the lowest actual complexity score to +.09 at the highest actual complexity score. The partial slope for age is zero at a complexity value of 3.7, which is slightly higher than 1 standard deviation above the mean of the complexity scores. The partial slope for complexity, on the other hand, is always positive within the range of actual age scores. It ranges from +.70 at the lowest age score to +1.09 at the highest age score.

DISCUSSION

Let us briefly review the three goals for this study. The first was to replicate the positive relation between building age and preference with building maintenance controlled. That goal was accomplished when age was analyzed as a categorical variable. However, when age was analyzed as a continuous variable, the picture became complicated. Before taking complexity into account, the results were the same as for categorical age. When the interactive influence of complexity was properly modeled, however, older buildings were slightly preferred over modern buildings only for buildings very high in complexity. Given that the partial slope of the age-preference relation was only .09 for our most complex buildings, the more cautious conclusion would be that age and preference are unrelated for buildings high in complexity. Thus, it would appear that after proper modeling of maintenance and complexity, no compelling evidence of greater preference for older buildings is found. Instead, it appears that for equally well maintained buildings high in complexity, age has no bearing on preference.[3] Assuming the validity of this finding, we explore its implications further. What can be said here is that the finding clearly needs to be replicated before its implications are taken seriously.

The second goal of the study was to explore how several categorical variables, including age, worked together in influencing building preference. This was to be accomplished by examining main and interactional effects of four categorical independent variables: age, visual richness, scale, and visible entrance. The goal was only partially realized because validity checks strongly suggested that the underlying variables represented by the categorical variables were not perfectly balanced. Thus, interactions among the categorical variables could not be interpreted clearly and generally were ignored in our analysis. However, we were able to make sense of the main effects, which, with one exception (discussed subsequently), corresponded to our expectations.

The third goal of the study was to determine specifically if complexity served as a mediator or a moderator of the age-preference relation. To get a clear reading on this issue, we had to use the continuous (rated) versions of all four relevant variables: age, preference, complexity, and maintenance. The analysis suggested that after controlling for maintenance, complexity moderates the age-preference relation. Specifically, the partial influence of age on preference was negative throughout much of the range of complexity scores, but at the higher end of the complexity range, it vanished. The partial influence of complexity, on the other hand, was always positive regardless of building age, but the effect was stronger for older buildings than for modern buildings.

Because the findings for complexity are probably the most important results of the study, let us briefly examine their implications. Theoretically, Frewald (1989) seemed to think that the Kaplans' informational model of environmental preference implied a mediating role for complexity in the age-preference relation. However, this is not necessarily the case. All that the model clearly predicts is a generally positive role for complexity in environmental preference. That role could be played with complexity as either a mediator or a moderator variable. These results suggest that complexity serves as a moderator of the age-preference relation. Perhaps it is even appropriate to suggest that the moderator label is a bit confining for this discussion. There is no clear mandate in our results for assigning the moderator role to either complexity or age. The important thing is that the two variables interacted. As far as complexity is concerned, its influence was always positive, whether considered in terms of simple or partial relations. That finding is clearly in line with the informational model.

The practical implications of the complexity-age interaction are most intriguing. Increasing complexity should increase preference for all buildings, but the effect is most pronounced for older buildings. In fact, high-complexity older buildings apparently are at least as well liked as high-complexity modern buildings. This may tell us something useful about what it is that we value and are trying to preserve in older buildings. It can also help us choose the most appropriate targets for preservationist efforts. Moreover, although we can encourage an expansion of the recent trend toward designing complexity into modern buildings, our results suggest an ironic outcome: the more complex the design of a modern building, the more it loses its preference advantage over an older building of similar complexity. The only caution suggested by the informational model is that designers take care to ensure adequate levels of coherence and legibility in their higher complexity designs. We are seeing more and more the use of curves, contoured walls, fancy windows, and other types of ornamentation in modern building design. Applied judiciously, this tendency is supported by our finding that complexity in buildings plays a vital role in enhancing preference.

This study also provides information on the components of complexity. Such information can be useful at the level of design specifics. Among the rated variables, we expected that seven of them would be components. The factor analysis supported our predictions for all but two of those variables: columns and color variation. Columns formed a single-variable factor separate from complexity, and color variation did not load on any factor. We have no ready explanation for these anomalous results. On the whole, however, there was a strong complexity factor along the lines we expected. We were somewhat surprised to find that two of the complexity components—texture variation and fancy windows—also contributed substantially to the building maintenance factor, but in opposite ways. Fancy windows enhanced perceived maintenance, but texture variation detracted from perceived maintenance. Perhaps texture variation associated with neglect (flaking, crumbling) was the more perceptually salient type in our sample of buildings. This raises the question of whether the positive kind of texture variation envisioned by Frewald (1989) can be measured successfully, an issue for future research.

Among the categorical variables, scale and visible entrance were also predicted to be components of visual richness. In our validity-check results, visible entrance behaved as expected, with higher rated visual richness when entrances were visible. Scale, on the other hand, gave us a surprise. We had thought that visual richness would be higher for the near views because more detail could be seen. In fact, the opposite occurred. We now suspect that the far views were not distant enough to cause a substantial loss of detail but did bring more of the building (and, therefore, more information) into view. If this is so, it implies that visual richness should be related to viewing distance via an inverted-U function, another prediction for future research.

In conclusion, we offer some cautionary warnings. First, our sample consisted of college students, and thus the issue of generality can be legitimately raised. As always, this issue is best resolved by further research. Second, we used slides as surrogates for actual settings, a practice that we realize makes some people uneasy. On the other hand, we like to think that the issue of the validity of visual surrogates has been largely resolved in their favor, at least for aggregate results and static visual attributes of environments (e.g., Hershberger & Cass, 1973; Hetherington, Daniel, & Brown, 1993; Hull & Stewart, 1992; Sommer, Summit, & Clements, 1993; Stamps, 1990; Trent, Neumann, & Kvashny, 1987; Zube, Simcox, & Law, 1987). Third, our predictors all involved perceived features (as determined by respondent ratings) rather than objective indicators. The latter would have been possible in principle for variables like age and complexity. However, the vast majority of previous studies involving these predictors also have used perceived measures. We agree with the underlying assumption of those studies that people react to what they perceive and that a perceptual measure is more relevant than an objective measure in the presumably rare instances in which the two might disagree. Finally, we know that reliance on covariance analysis for adjustment of means poses dangers (Pedhazur & Schmelkin, 1991), but, along with Herzog and Gale (1996), we believe that when one replicates previous findings and obtains results that make theoretical sense, the danger to valid conclusions is greatly reduced.

NOTES

1. We also factor-analyzed (principle-axis factor analysis, Varimax rotation) the raw preference ratings to see if the perceptual categories thus discovered corresponded to any combination of our categorical variables. A solution with four factors and a .40 cutoff for factor composition accommodated 52 of the 64 slides. The four factors corresponded quite well to the categories formed by all combinations of categorical age and visual richness. The best fit was for the old-low richness category, in which 15 of the 16 slides in the a priori category loaded on the factor. The worst fit was for the modern-low richness category, in which 9 of the 16 slides in the a priori category loaded on the factor. Typically, both the near and far views of the same building loaded on the same factor (true for 22 of the 32 buildings). Thus, age and visual richness were perceptually salient. Note that lack of perceptual salience does not imply that a variable will not affect mean preference ratings.

2. We first checked to see if each rated variable qualified as a covariate by not interacting with the categorical variables. With alpha set at .05/12 = .004 because there were 12 analyses (one for each rated predictor), all the rated variables passed this hurdle.

3. We have repeated the mediation-moderation analysis using the original visual richness and building care variables in place of the composite complexity and maintenance variables. The results were unchanged. The only noteworthy point was that the partial slope for age at the highest actual visual richness score was –.01. This reinforces the notion that age has no bearing on preference for equally well maintained buildings high in complexity.

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