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THE ROLE OF MYSTERY IN PERCEIVED DANGER AND ENVIRONMENTAL PREFERENCE

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ABSTRACT: Mystery has been implicated as a positive contributor to both environmental preference and perceived danger/fear. We explored the relationships among mystery, danger, and preference as well as between them and two physical features of settings, openness and pathway curvature, in urban alleys and field/forest settings containing pathways. The major finding was that mystery was a positive predictor of both danger and preference even though the latter two variables were negatively related. Mystery, in turn, was positively related to pathway curvature and negatively related to openness. Setting category (alleys versus field/forest) was also a significant predictor of both danger (greater for alleys) and preference (greater for field/forest settings). Free-response data indicated that danger was a more common reaction than mystery for alleys, but the reverse was true for field/forest settings. The results highlight the paradoxical role that variables such as mystery can play in contributing to affective response, depending on the context in which the variables operate.

One of the most firmly established findings in the environmental preference literature is that mystery is positively related to preference (e.g., Herzog, 1989, 1992; Herzog & Bosley, 1992; Herzog & Gale, 1996; Kaplan &

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Kaplan, 1989; Kaplan, Kaplan, & Brown, 1989; Kent, 1989; Strumse, 1994). Mystery refers to the promise of further information if one could penetrate more deeply into a setting. Curving pathways, partial concealment, and shadows are the kinds of features that enhance mystery (Gimblett, Itami, & Fitzgibbons, 1985; Hammitt, 1980; Ruddell, Gramann, Rudis, & Westphal, 1989). Although most of the mystery-preference research has focused on natural settings, the positive relationship between the two variables has also been found in certain urban settings as well (e.g., in shopping malls; Kent, 1989). In recent years, a serious challenge to the generally positive role of mystery has arisen from research in environmental criminology (Brantingham & Brantingham, 1993). Findings from this research suggest that some of the same features known to enhance mystery, such as vegetation and concealment, may also enhance perceived danger/fear in certain situations (e.g., Fisher & Nasar, 1992; Loewen, Steel, & Suedfeld, 1993; Nasar & Fisher, 1993; Nasar & Upton, 1997; Schroeder & Anderson, 1984; Shaffer & Anderson, 1983). Most of this research has involved urban settings, although some studies (e.g., Shaffer & Anderson, 1983) have focused on natural areas within the urban environment.

There is a fine irony in the two lines of research reviewed above. The implication is that mystery can contribute to both preference and fear of danger, diametrically opposed affective outcomes. The major purpose of this study was to explore that irony both conceptually and empirically.

Conceptually, we must acknowledge immediately that danger, defined as the perceived threat of harm, does not always result in fear or negative affect. Hebb (1972) has written eloquently about the "ambivalent nature" of humans, how their need to escape boredom and achieve an optimal level of arousal results in their attraction to dangerous settings and activities such as mountain climbing, auto racing, contact sports, and horror movies. Much of the same flavor characterizes Appleton's (1975) analysis of the symbolism of the hazard. The implication of these approaches is that humans typically are attracted to dangerous situations up to a point, but beyond that point, attraction turns into fear as the danger becomes too salient or immediate. The point of reversal varies enormously among individuals, with some people typically courting very high levels of danger. In the sensation-seeking literature, they are called "thrill seekers" (e.g., Zuckerman, 1979). Although these cases remind us that danger can be attractive in certain circumstances, there is no doubt that the dominant theme in the environmental criminology literature has been the fear of danger associated with urban settings.

If, as just implied, context is important in determining whether perceived danger will result in attraction or fear, it is no less relevant in helping us understand how mystery might contribute to both preference and fear of danger. We use the word *context* broadly to refer to the type of setting, identifiable features of the setting, and a host of nonphysical factors such as knowledge about the setting, cultural and ethnic factors, even personality. Our basic position is that attraction (preference) and fear are incompatible affective reactions, that one or the other will typically dominate in any specific situation,[1] and that context will determine which reaction will dominate. Thus, it becomes possible for mystery to contribute positively to either preference or fear of danger, depending on the context.

As environmental psychologists, we chose to concentrate on the physical components of the overall context, recognizing that these may in turn be influenced by the nonphysical components. In particular, our study focused on the type of setting, urban versus natural, and on identifiable features of the setting such as mystery, openness, and pathway curvature. As regards type of setting, it is clear that most of the research linking mystery to positive outcomes (preference) has involved natural settings, although most of the research linking mystery to fear of danger has involved urban settings. Thus, it seemed important to include both setting types within the same study. Although both natural and urban settings may contain features such as hiding places that could evoke fear, such features seem more likely to evoke fear in urban settings. Presumably, this is an example of the interaction of physical and nonphysical factors: Hiding places have acquired a more sinister generic reputation in urban settings. Because we wanted a strong contrast in this regard, we chose as our two setting categories field/forest settings and urban alleys. If the irony of mystery contributing to both preference and fear of danger were ever to manifest itself clearly, then surely it should do so with these two setting categories.

The comparisons we envisioned were attempted once previously. Herzog and Smith (1988) had separate groups of participants rate either danger, mystery, or preference for a sample of settings that encompassed four categories: urban nature, nonurban nature (field/forest), urban alleys, and narrow canyons. For the entire sample of settings, danger and mystery each predicted preference independently, danger negatively and mystery positively. Meanwhile, danger and mystery were negatively correlated. This was a nicely balanced set of relationships with no ironic role for mystery. Unfortunately, the study suffered from two shortcomings. The settings were selected intentionally to provide a restricted range of relatively high mystery values, and the analysis did not adequately compare the relationships among the rated variables across setting categories. In the present study, we sought to avoid both problems. First, we sampled settings broadly with respect to two variables (described below) expected to predict mystery, thereby avoiding the restricted range problem. Second, by restricting ourselves to just two setting categories, we were able to include almost twice as many settings within each category (18 vs. 10 in Herzog & Smith). This provided us with a much better statistical basis for cross-category comparisons.

To summarize, although danger can evoke either fear or pleasure, we felt that given the setting categories used in this study (especially the alleys), the more likely response would be fear. Because fear and pleasure (preference) are generally incompatible, we expected a negative relationship overall between danger and preference. Again, because of the setting categories used, we thought it possible that mystery might be a positive predictor of both preference and danger, even though the latter variables were expected to be negatively related to each other. This is the central irony explored by the study, the possible positive contribution of mystery to two negatively related affective outcomes. In addition, because we thought that danger/fear was a far more likely response to alleys than to field/forest settings, we expected rated danger to be greater on the average for alleys than for field/forest settings. Likewise, preference was expected to be greater for field/forest settings than for alleys.

A final prediction involving setting categories is that when fear is the dominant reaction, as we expected would be the case for alleys, it tends to dominate consciousness and render one less aware of other factors, such as mystery, that may be influencing one's reaction. On the other hand, when preference is the dominant reaction, one is more likely to become aware of factors like mystery that are influencing one's reaction. As Kaplan and Kaplan (1989) have noted, conscious awareness of factors such as mystery is limited even in the best of situations. Nevertheless, we felt that there would be a greater spontaneous awareness of mystery than of danger for field/forest settings and that the reverse pattern would appear for alleys. To assess this prediction, we measured danger and mystery several different ways: single-variable ratings (danger or mystery), double-variable ratings (danger and mystery), forced-choice responses (danger vs. mystery), and free open-ended responses. The objective methods were included to check their internal consistency, but the free-response method provided direct evidence about the issue of spontaneous reactions. Thus, the free responses were content analyzed for references to danger or mystery, and the two types of responses were compared within each setting category.

As noted earlier, type or category of setting is only one aspect of the context that determines one's affective reaction to a setting. A second aspect of context investigated in this study is identifiable features of a setting that may serve as predictors in addition to setting category. Such predictor variables are of two types. Informational predictors are relatively global variables that integrate various sources of setting-feature information into a composite that influences affective reactions such as preference and fear. This class of variables includes mystery and the rest of the variables in the Kaplans' informational model (i.e., complexity, coherence, and legibility; see Kaplan & Kaplan, 1989). In this study, the sole representative from this class of variables was mystery, and we have already discussed our predictions regarding its relationships with preference and danger.

The second class of predictors includes specific physical features such as pathway curvature, openness, smoothness of ground surface, and amount of foliage or vegetation. Kaplan et al. (1989) refer to such variables as perception-based predictors. In this study, we included two such predictors because we thought they would help us understand the pattern of relationships among mystery, danger, and preference. The two perception-based predictors were openness and pathway curvature, each rated by separate groups of participants. In each case, we had good reason (see below) to think that the perception-based predictor would influence the mystery in a setting. Whether each predictor would influence preference or danger apart from mystery was less certain, as were our predictions in that regard. Nonetheless, our analyses allowed us to discover any such direct influence of the perception-based predictors on preference or danger.

Openness, the amount of perceived open space in a setting, was expected to be a negative predictor of mystery. This should be so because settings high in openness have less potential for the screening and partial concealment that enhance mystery. Although the track record of openness and related variables such as spaciousness is inconsistent, negative relationships with mystery have been reported for waterscapes (Herzog, 1985), uneven terrain settings (mountains, canyons, deserts) (Herzog, 1987), and urban spaces (Herzog, 1992). We made certain that we sampled as broad a range of openness values as possible within both the alleys and field/forest categories. However, the naturally occurring upper limit on openness is lower for alleys than for field/forest settings.

The second perception-based variable expected to be a predictor of mystery was pathway curvature. Alleys are pathways by definition, and all field/forest settings in our sample contained visible pathways. We tried to select an equal number of settings with low (straight, no curvature), medium, and high (near 90 degrees) pathway curvature within each setting category. We expected rated curvature to be a positive predictor of mystery. This prediction follows from the conventional wisdom about mystery (e.g., Kaplan & Kaplan, 1989). Curiously, the empirical literature on this prediction is sparse. A typical approach (e.g., Hammitt, 1980) has been to examine settings rated high in preference and to note that they seem to be liberally endowed with mystery-enhancing features, including pathway curvature. We could not find a study relating empirically assessed curvature to either mystery or preference.

In summary, if the perception-based predictors behave as predicted, they may be viewed as contributing to the central irony explored by the study. That is, in some contexts they aid and abet a positive affective reaction, whereas in other contexts the very same variables help trigger a negative affective reaction. The guiding principle of the study is that affective reactions to a setting are highly context dependent.

METHOD

PARTICIPANTS

The sample consisted of 446 undergraduate students (135 males, 309 females, and 2 respondents who failed to report their gender) at Grand Valley State University. The students received extra course credit for participation. Thirty-one sessions consisting of from 4 to 22 participants were run.

STIMULI

The settings consisted of 36 color slides falling equally into two categories, urban alleys and field/forest natural settings containing visible pathways. The slides were selected from an extensive collection of research slides by the first author to span as broad a range of values as possible on openness and pathway curvature (both defined below) within each setting category. Figures 1 through 4 contain examples of settings from both categories illustrating various combinations of relatively low and high openness and pathway curvature. None of the settings contained people. All settings were photographed in summer or early fall so that foliage and vegetation were primarily green, and extreme weather conditions were avoided. All slides were oriented horizontally.

PROCEDURE

In single-variable rating sessions, participants rated each of the 36 settings on the same one of five variables. All ratings used a 5-point scale ranging from 1 (*not at all*) to 5 (*a great deal*). For preference raters, the variable was defined as "how much you like the environment depicted, for whatever reason." *Danger* was "How dangerous is this environment? How likely is it that you could be harmed in this environment?" *Mystery* was "How much do you think the environment promises more to be seen if you could walk deeper into it? Does it appear that if you entered more deeply into the environment you would learn more?" *Openness* was defined as "How wide-open is the space in this setting?" *Curvature* had this definition: "Each of the environments you will see contains a pathway. The question for you to consider is how much that pathway curves. The strongest curvature you will see will be about 90 degrees or a right-angle bend."

In danger- and mystery-rating sessions, participants received the definitions for both variables and rated each setting for both. The order in which the two variables were rated was varied haphazardly across raters. In forced-choice sessions, participants also received definitions for both danger and mystery. They were instructed to decide for each setting "which impression is stronger: that the environment has mystery or that the environment is dangerous." They responded by writing "M" for mystery or "D" for dangerous on their response sheets for each setting. In the free-response sessions, participants received response sheets with three blank spaces for each setting. They were instructed to write in the blank spaces "three words or phrases that describe your impressions or feelings about the environment." They were encouraged to fill in all three blanks for each setting, but 42 of 104 respondents left at least one blank empty.

Sessions proceeded as follows. First, five practice slides were presented to help participants get used to the task and their instructions for responding. Then participants responded to 38 slides, the first and last of which were fillers, intended to absorb any beginning- or end-of-set effects. The remaining 36 slides yielded the data for analysis, and their characteristics were described under "stimuli." These 36 slides were presented in one of three different orders. The first order was used for the first 10 sessions, the second order for the next 11 sessions, and the third order for the last 10 sessions. Within each block of sessions using a given slide order, there were three preference-rating sessions, three free-response sessions, and one session each for all other tasks. An exception occurred in the middle block of 11 sessions because the researcher inadvertently ran an extra curvature-rating session.

Other than the blocking of sessions by slide order, the order of response tasks across sessions was haphazard. One of the slide presentation orders was generated randomly with the constraints that each half of the slides contained an equal number of slides from each setting category and that no more than two consecutive slides from the same setting category were allowed. The second presentation order was the reverse of the first order, and interchanging the halves of the first order produced the third presentation order. Viewing time was 20 seconds per slide in all but the free-response sessions where it was 30 seconds per slide. Final sample sizes were 105 for preference, 104 for

Figure 1: Alley Setting With Low Openness (*M* = 1.54) and Low Pathway Curvature (*M* = 1.11)

free responses, 32 for danger only, 31 for mystery only, 43 for danger and mystery (21 with the danger-mystery order, 22 with the mystery-danger order), 49 for the forced-choice task, 37 for openness, and 45 for curvature.

SCORING

Ratings were scored using the 5-point scale described in the previous section. The forced-choice task was scored by assigning 1 to danger choices and 0 to mystery choices. This was done because we suspected that the forced-choice responses might be more closely associated with the other danger measures than with the other mystery measures. The free responses were content analyzed by the first author without knowledge of the slides corresponding to each set of responses. Each response was coded as either a danger response, a mystery response, or neither. The first author then developed a protocol of acceptable danger and mystery responses.[2] The protocol was given to a second coder, who independently repeated the content analysis, also without knowledge of the slides corresponding to each set of

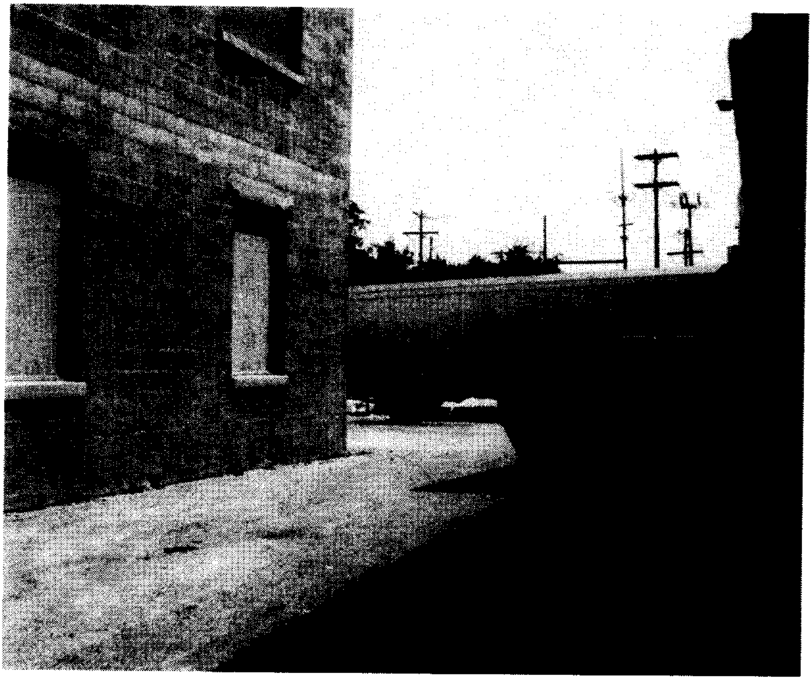

Figure 2: Alley Setting With High Openness (M = 2.78) and High Pathway Curvature (M = 4.44)

responses. With 104 respondents producing as many as three responses to each slide, the total number of disagreements between the two coders was 64, 43 involving mystery responses and 21 involving danger responses. All but 10 of the disagreements were cases where one coder missed a legitimate response included on the protocol of acceptable responses. These disagreements were automatically resolved in favor of the more vigilant coder. The remaining 10 disagreements were resolved by negotiation. In the end, each respondent had two scores for each setting, the number of danger responses and the number of mystery responses, each of which could range from 0 to 3. These variables are referred to hereafter as danger-free and mystery-free. Of course, there is some built-in tendency toward a negative correlation between the two variables, but it is slight because, in fact, spontaneous danger and mystery responses were quite rare, with a mean score per setting of .13 for danger-free and .12 for mystery-free. After adjustment for outliers (discussed below), the overall correlation between the two variables was .04, and the

Figure 3: Field/Forest Setting With Low Openness (M = 2.57) and High Pathway Curvature (M = 3.98)

within-category correlations were .39 for alleys and .40 for field/forest settings, $p > .05$ in all cases.

RESULTS

All 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 completed a given task. 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 .88 for mystery-only and mystery-free to .99 for preference and curvature.

Preliminary examination of univariate distributions revealed outliers for three of the variables: openness (2 outliers), danger-free (3 outliers), and mystery-free (2 outliers). We used the SPSS Examine procedure to discover

Figure 4: Field/Forest Setting With High Openness (*M* = 4.62) and Low Pathway Curvature (*M* = 1.89)

outliers, which are defined therein as scores located at distances greater than 1.5 times the interquartile range from the upper or lower limits of the interquartile range. All outliers were replaced with scores one unit more extreme than the nearest nonoutlier before proceeding with the analyses described below. Alpha was set at .05 for all tests of inference.

RELATIONSHIPS AMONG VARIABLES

Table 1 contains intercorrelations among the 10 measured variables of this study based on all 36 settings. Several points are noteworthy. First, preference was strongly negatively correlated with the danger measures, positively correlated with openness, and mildly positively correlated with the mystery measures. Second, openness and curvature were uncorrelated. Third, the measures of danger were strongly intercorrelated, as were the measures of mystery, but the two clusters tended to be uncorrelated with each other. The high correlations of the free-response measures with their objective counter-

TABLE 1
Intercorrelations Between Measured Variables for All Settings (N = 36)

Variables	*1*	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*	*10*
1. Preference	—	.62**	.02	–.92**	–.85**	–.71**	–.93**	.31	.32	.42*
2. Openness		—	.18	–.80**	–.71**	–.73**	–.57**	–.30	–.17	–.11
3. Curvature			—	–.07	–.03	–.13	–.10	.17	.37*	.09
4. Danger				—	.93**	.83**	.90**	–.01	–.09	–.25
5. Danger (M)					—	.82**	.88**	.04	.06	–.20
6. Danger (F)						—	.70**	.24	.15	.04
7. Danger (C)							—	–.27	–.29	–.48**
8. Mystery								—	.85**	.68**
9. Mystery (D)									—	.69**
10. Mystery (F)										—

NOTE: (C) = forced-choice; (D) = with danger; (F) = free response; (M) = with mystery.
*$p < .05$. **$p < .01$.

parts is all the more surprising given the relative infrequency of the free responses. After adjusting for outliers, the range of danger-free scores was .01 to .32 (mean = .12), and the range of mystery-free scores was .02 to .21 (mean = .10). Fourth, the forced-choice measure was clearly associated with the danger cluster rather than the mystery cluster.

Inspection of the correlation matrices for the two setting categories (not shown) revealed three noticeable departures from the overall trends in Table 1. First, openness was not correlated with preference within either category (the correlations were –.17 and –.18). Second, for alleys, the danger-free measure tended to correlate with both the danger cluster (correlations ranging from .25 to .72) and the mystery cluster (correlations ranging from .39 to .61). Third, for the field/forest settings, the danger and mystery clusters were positively correlated with each other (correlations ranging from .40 to .76, with a mean value of .60).

Given the strong clustering of the danger and mystery variables and the relative independence of the two clusters overall, it seemed reasonable to build composite measures of danger and mystery before proceeding. However, to check our intuitions, we subjected the correlations in Table 1 for the seven danger and mystery variables to both principal-axes factor analysis and hierarchical cluster analysis. Both types of analysis clearly revealed the two clusters discussed above and clearly indicated that the forced-choice measure belonged to the danger cluster. Our intent, then, was to build composites by separately averaging the four danger variables and the three mystery variables. First, however, we had to face another issue, the different ranges of both potential and actual scores for the rating, forced-choice, and free-

TABLE 2
Intercorrelations Among Composite Danger, Composite Mystery, and Other Variables for All Settings, Alleys, and Field/Forest Settings

Variable	*Preference*	*Openness*	*Curvature*	*Danger*
All settings (N = 36)				
Danger	–.91**	–.75**	–.09	—
Mystery	.39*	–.22	.23	–.10
Alleys (n = 18)				
Danger	–.70**	–.45	–.51*	—
Mystery	.36	–.79**	.09	.20
Field/forest settings (n = 18)				
Danger	–.26	–.35	.42	—
Mystery	.09	–.44	.45	.72**

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

response measures. The problem was especially acute for the free-response measures, as noted above. This meant that a composite score based on a mean of the raw scores would greatly discount the influence of the free-response measures. We decided that we wanted all measures to have equal influence in our composites. To achieve this goal, we converted all 10 of our variables to standard scores and added a constant of 3 so that the transformed variables all had a mean of 3 and a standard deviation of 1. Then, we computed composite danger and mystery scores as the unweighted means of the appropriate standardized component variables.

Correlations between the composite danger and mystery variables and the remaining standardized variables are presented in Table 2. Standardization alone does not change correlations, and so the intercorrelations among preference, openness, and curvature were unaffected and are not repeated in Table 2. The correlations involving the composites clearly show all of the trends described earlier for danger and mystery. In particular, the danger and mystery composites were uncorrelated overall and for alleys but were positively correlated for field/forest settings.

SETTING-CATEGORY EFFECTS

Table 3 shows the effects of setting category on the major variables of the study. Bear in mind that all variables are in standard-score form with grand means constrained to be 3. Thus, the category means for each variable must be symmetrically equidistant from 3. The standardization equates the grand means for each variable but does not affect the test of inference for the

TABLE 3
Mean Standardized Setting Scores as a Function of Setting Category

	Setting Category	
Variable	*Alleys*	*Field/Forest*
Preference		
M	2.06	3.94***
SD	.36	.25
Openness		
M	2.32	3.68***
SD	.79	.66
Curvature		
M	3.00	3.00
SD	1.03	1.00
Danger composite		
M	3.79	2.21***
SD	.61	.34
Danger-free		
M	3.66	2.34***
SD	.94	.50
Mystery composite		
M	2.71	3.29
SD	.96	.77
Mystery-free		
M	2.66	3.34***
SD	1.08	.81

NOTE: Each mean is based on 18 setting scores.
***$p < .001$ for the difference between the two setting-category means.

difference between setting-category means. Both the composite and free versions of the danger and mystery variables are included so that they can be compared. In addition to the significant differences between setting-category means indicated in the table, it should also be noted that the two means for composite mystery were almost significantly different ($p = .052$). Thus, we have the field/forest category higher in preference, openness, and (marginally) mystery, alleys clearly higher in danger, and the two categories identical in perceived pathway curvature.

Within-category comparisons of spontaneous danger and mystery reactions cannot be made using standardized scores because constraining all grand means to be identical causes the difference between danger-free and mystery-free means for alleys to be mirrored by an equal but opposite difference for field/forest settings. Therefore, this set of comparisons was done using the raw-score versions of both variables with outliers adjusted. For alleys, the means were .18 for danger-free and .08 for mystery-free, a significant difference favoring danger reactions, $F(1, 17) = 20.75, p < .001$. For field/forest settings, the means were .05 for danger-free and .12 for mystery-free, a significant difference favoring mystery reactions, $F(1, 17) = 36.19, p < .001$.

PREDICTING PREFERENCE, DANGER, AND MYSTERY

We tested models for predicting preference, danger, and mystery by means of step-down regression analysis (Aiken & West, 1991). For each target variable, we started with a model that included all relevant measured predictors, setting category, and the interaction of each measured predictor and setting category. The inclusion of interaction terms permits a direct statistical test of whether the predictor variables work differently for the two setting categories. We proceeded in stepwise fashion to eliminate nonsignificant interactions one at a time starting with the least significant (highest *p* value) followed by the same treatment for simple effects until we had a final *best* model in which all effects were significant. If the final model contained an interaction, separate slopes for the target-predictor regression were fitted for the two setting categories. For preference, the measured variables in the initial model were openness, curvature, composite mystery, and composite danger. For danger and mystery, the composite scores were the target variables. For danger, the initial measured predictors were openness, curvature, and composite mystery. For mystery, the initial measured predictors were the perception-based variables, openness and pathway curvature. All model testing used the standardized versions of variables.

The final models for preference, danger, and mystery are summarized in Table 4. For preference, the final model consisted of the simple effects of danger, mystery, and setting category, with danger a negative predictor and mystery a positive predictor. For danger, the final model included the simple effects of mystery (a positive predictor) and setting category plus an interaction involving curvature. Curvature was a significant negative predictor of danger for alleys but did not predict danger for field/forest settings. For mystery, the final model included the simple effect of curvature (a positive predictor) and an interaction involving openness. The relationship of mystery and openness was negative for both setting categories but greater in magnitude for alleys. The simple effect of setting category was not significant in the final model for mystery.

TABLE 4
Final Models for Predicting Preference, Danger Composite, and Mystery Composite (N = 36)

	Preference		*Danger Composite*		*Mystery Composite*	
Predictor	B	F	B	F	B	F
Openness						
Alleys					–1.14	44.11***
Field/forest					–.58	8.47***
Curvature					.39	17.12***
Alleys			–.32	10.49***		
Field/forest			.07	.47		
Mystery composite	.19	19.58***	.20	5.83*		
Danger composite	–.48	39.41***				
Setting category	—	43.75***	—	42.27***	—	.01

NOTE: *B* is the raw-score regression weight. *df* = 1, 32 for all *F* tests for Preference; *df* = 1, 31 for all *F* tests for Danger composite and Mystery composite. For the full model, R^2 = .96, $F(3, 32)$ = 262.64, $p < .001$ for Preference; R^2 = .83, $F(4, 31)$ = 37.59, $p < .001$ for Danger composite; R^2 = .69, $F(4, 31)$ = 16.91, $p < .001$ for Mystery composite. Adjusted setting-category means are 2.50 for alleys and 3.50 for field/forest settings for Preference; 3.85 for alleys and 2.15 for field/forest settings for Danger composite; 2.71 for alleys and 3.29 for field/forest settings for Mystery composite.
*$p < .05$. ***$p < .001$.

DISCUSSION

The most important finding of this study is that mystery can play an ironic and paradoxical role as a positive predictor of both preference and danger in situations where the latter two variables are negatively correlated with each other. We interpret that negative correlation to mean that danger is primarily reflecting a fear reaction in these settings. Table 4 indicates that even after adjusting for mean differences in preference or danger between the two setting categories, mystery has a positive influence on both target variables. We assume that the two affective reactions, preference and danger/fear, are generally incompatible and that one or the other will typically dominate in a given situation. Our regression analyses do not tell us which reaction will be dominant, but the free-response results suggest that the danger reaction is more likely for urban alleys and less likely for field/forest settings. Thus, the affective reaction is likely to be context dependent. Whichever reaction dominates, mystery contributes in a positive way to that reaction.

Some caveats are in order. First, although we view fear as a negative affective reaction, this does not imply that fearful situations are not fascinating. Sources of fascination compel one's attention. Given the operation of natural selection, situations of danger/fear could hardly be anything other than fascinating. Such situations threaten our very survival, and thus natural selection would favor an attraction-repulsion response. This is the ambivalent nature of humans that Hebb (1972) described. Fascination attracts us up to a point; beyond that point, fear dominates and repels us. The immediacy or saliency of the danger seems to be a key variable. It follows that danger/fear can be fascinating without being pleasant. Violence and death always compel our attention, but few look forward to personal involvement with them.

Second, we cannot emphasize too strongly the role of context in shaping our results and our interpretation. Our pattern of results is only one possible pattern. It is easy to imagine situations in which preference and danger would be positively intercorrelated with mystery contributing positively to either reaction, thus eliminating the paradoxical role for mystery found in this study. Consider, for example, a sample of settings consisting of cliffs and rock formations and a sample of respondents consisting of experienced rock climbers. This example emphasizes the scope of context in mediating the response to danger. As noted in the introduction, context includes both physical and nonphysical factors. Physical factors include the type of setting (e.g., urban vs. natural), informational predictors (mystery, legibility, visual and locomotor access), and perception-based predictors (e.g., openness, pathway curvature). Nonphysical factors include knowledge, both specific (17 muggings in THIS alley) and generic (alleys are dangerous places), culture (e.g., membership in a street gang), ethnic status (Talbot & Kaplan, 1984, found that inner-city Black residents were more fearful of wilderness areas than Whites; see Kaplan & Kaplan, 1989, chap. 3, for more examples of group differences), expertise (e.g., rock climbers), and personality (e.g., thrill seekers). Even definitions of key terms are an important part of context. Our definition of danger emphasized the possibility that YOU could be harmed, perhaps facilitating the likelihood of fear reactions. All of these context features must be considered in evaluating whether the affective reaction to a setting is likely to be positive or negative.[3]

We regard the significant interactions in our results as of lesser importance than the other findings. That openness was a stronger predictor of mystery for alleys than for field/forest settings may make sense, but the more important finding is that the relationship was negative for both setting categories, as predicted. A bit more challenging is the interactive influence of pathway curvature on perceived danger. Curvature was irrelevant for field/forest settings but yielded a counterintuitive negative relationship for alleys. That is, straight alleys were seen as more dangerous. Before much is made of this finding, it should be replicated. However, based on inspection of our slides, we suspect the influence of an artifact. The straight alleys appear perceptually to be longer than the curved alleys. Apparently a long straight alley may be intimidating. With curvature, there is at least the possibility that the alley might be short and a trip through it brief. If these impressions are sound, then alley length and curvature need to be disentangled in future research. Other explanatory variables that may be worth investigating include alley width and the perceived permeability of the alley "walls" (i.e., affordance of escape routes).

We believe that our study has important methodological implications. The results for the various objective methods of measuring danger and mystery raise two points. First, forced-choice responses appear to be dominated by one of the two constructs pitted against each other. In the current study, danger dominated over mystery. Forced-choice dominance may be yet another aspect of the participant's reaction that depends on the overall context in which the constructs are investigated. Second, the strong positive correlations among the objective measures of danger and mystery provide support for choosing the most straightforward measure available. For most researchers desiring a single measure, that would be the single-variable rating method.

A more far-reaching methodological implication stems from the correlations between the objective measures and the free-response measures. Objective methods typically define the target construct and may thus be subject to the criticism that they lack validity for situations in which no target construct has been defined, that is, typical real-world situations. Free responses do not have this problem. Our findings suggest that ratings provide a pretty good picture of what spontaneous reactions would look like and thereby support the ecological validity of ratings methods. This is good news for researchers because ratings are far easier to obtain and score than free responses. All of these optimistic comments about ratings methods should be tempered by the fact that our model-testing analyses used only composite measures of mystery and danger rather than single-variable ratings.

Finally, we would like to highlight the practical applications of our major findings. Designers and planners can directly influence the physical makeup of a setting. For them, the message is that mystery can contribute to preference or fear, depending on the broader context in which it occurs. This study and prior research on environmental preference (e.g., Kaplan & Kaplan, 1989; Ruddell et al., 1989) suggest that, at the physical level, planners should try to produce mystery in a way that also allows for legibility (to avoid the fear of getting lost), visual access (to avoid the fear of hidden danger), and locomotor access (to avoid the fear of entrapment). As a concrete example, gently curving paths with plenty of visibility in the bordering areas and a smooth ground texture throughout would satisfy most of these criteria.

In the end, however, the major message of this study is the importance of being sensitive to contextual factors. The settings included in the study have many parallels in the urban and near-urban context. The alleys, for example, are representative of pedestrian underpasses and many entryways to public transportation. Making such places appear less dangerous requires an examination of different factors than those that pertain to alleys in a shopping mall. Thus, each situation calls for a variety of solutions—design, social, and policy—and for local input that helps with the identification of the salient factors. The issue of danger/fear versus preference/pleasure must be addressed at all levels of context.

NOTES

1. Of course, traditional psychological analysis also allows for the possibility of vacillation, that is, approach-avoidance conflict, in dangerous situations where the organism is allowed to position itself freely. Freedom to choose one's position might be regarded as yet another aspect of context. By claiming that affective dominance is typical, we also do not mean to preclude the possibility that in certain situations or setting categories, vacillation may be typical.

2. The protocols were quite long. For mystery, the responses had to carry a connotation of being enticed to enter more deeply into the setting or of further information being available with a change of vantage point. For danger, the responses had to imply not just negative affect but some recognition that the respondent could be harmed. Acceptable mystery responses included *around the corner, bending trail, dark to light, enticing, going to someplace, hidden view, inviting, leads to, mysterious, reaching to pull you in, seeing through tunnel, twisting trail, unknown [or] unseen, want to see more*, and *winding*. Acceptable danger responses included *afraid, bad area [or] neighborhood [or] place, crime [or] crime scene [or] crimes probable, danger [or] dangerous, don't go in [or] there, evil, fear [or] fearful, gang area [or] infested, hostile, intimidating, menace [or] menacing, not safe [or] unsafe, rough area, stay away [or] out, threatening, violence [or] violent*, and *want to escape [or] get out*. The complete protocols are available from the first author.

3. Two further caveats involve interpretations suggested by a reviewer. First, the finding that a target variable is significantly related to a set of predictors does not imply, nor do we claim, that the target variable is equivalent to or reducible to the predictors. Thus, mystery is not the same thing as openness and pathway curvature. The latter variables are simply two of many features that contribute to mystery. For more discussion of features that enhance mystery, see the references cited in the introduction. Second, use of the word *curvature* for one of our rated variables was not meant to imply a smooth curve. Several of the high-curvature settings contained near-right-angle bends. Given our variable definition (see the Method section), this seems not to have caused a problem for our raters.

REFERENCES

Aiken, L. S., & West, S. G. (1991). *Multiple regression: Testing and interpreting interactions.* Newbury Park, CA: Sage.

Appleton, J. (1975). *The experience of landscape.* New York: John Wiley.

Brantingham, P. L., & Brantingham, P. J. (1993). Nodes, paths, and edges: Considerations on the complexity of crime and the physical environment. *Journal of Environmental Psychology, 13,* 3-28.

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.

Gimblett, H. R., Itami, R. M., & Fitzgibbons, J. E. (1985). Mystery in an information processing model of landscape preference. *Landscape Journal, 4,* 87-95.

Hammitt, W. E. (1980). Designing mystery into landscape-trail experiences. *Journal of Interpretation, 5,* 16-19.

Hebb, D. O. (1972). *Textbook of psychology* (3rd ed.). Philadelphia: W. B. Saunders.

Herzog, T. R. (1985). A cognitive analysis of preference for waterscapes. *Journal of Environmental Psychology, 5,* 225-241.

Herzog, T. R. (1987). A cognitive analysis of preference for natural environments: Mountains, canyons, deserts. *Landscape Journal, 6,* 140-152.

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., & Bosley, P. J. (1992). Tranquility and preference as affective qualities of natural environments. *Journal of Environmental Psychology, 12,* 115-127.

Herzog, T. R., & Gale, T. A. (1996). Preference for urban buildings as a function of age and nature context. *Environment and Behavior, 28,* 44-72.

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

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

Kaplan, R., Kaplan, S., & Brown, T. (1989). Environmental preference: A comparison of four domains of predictors. *Environment and Behavior, 21,* 509-530.

Kent, R. L. (1989). The role of mystery in preference for shopping malls. *Landscape Journal, 8,* 28-35.

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

Nasar, J. L., & Upton, K. (1997). Landscapes of fear and stress. *Environment and Behavior, 29,* 291-323.

Ruddell, E. J., Gramann, J. H., Rudis, V. A., & Westphal, J. M. (1989). The psychological utility of visual penetration in near-view forest scenic-beauty models. *Environment and Behavior, 21,* 393-412.

Schroeder, H. W., & Anderson, L. M. (1984). Perception of personal safety in urban recreation sites. *Journal of Leisure Research, 16,* 178-194.

Shaffer, G. S., & Anderson, L. M. (1983). Perceptions of the security and attractiveness of urban parking lots. *Journal of Environmental Psychology, 5,* 311-323.

Strumse, E. (1994). Environmental attributes and the prediction of visual preferences for agrarian landscapes in western Norway. *Journal of Environmental Psychology, 14*, 293-303.

Talbot, J. F., & Kaplan, R. (1984). Needs and fears: The response to trees and nature in the inner city. *Journal of Arboriculture, 10*, 222-228.

Zuckerman, M. (1979). *Sensation seeking: Beyond the optimal level of arousal.* Hillsdale, NJ: Lawrence Erlbaum.