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BUILDING IMAGERY: A COMPARATIVE STUDY OF ENVIRONMENTAL COGNITION*

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Herbert Read (1952, 1960) has suggested that art and related applied arts represent "the language of images", a universal phenomenon. Imagery is the raw material of the capacity to imagine and to symbolize. Classification, abstraction, and accommodation of such notions are frequently interwoven in the attempt to relate present cognitions to past experiences, which then aid in the acceptance of present situations for the sake of future accommodations. A collective image, or set of related meanings, also freezes cognitive experience, and so helps to preserve this experience for future reference. Meaning in architecture is seen as the communication of intrinsically-based messages or signs that convey fragments of information to the perceiver. The types of meanings are influenced by socio-cultural context and background of the individual or group in question.

1.0 BUILDING IMAGERY

Respondents' descriptive appraisals of architecture and architectural issues have in the past been either intuitively assumed by the designer or acknowledged in a subjective, overly random manner. All too often such information has been treated with a guise of casualness. This communication between architect, client, and users has often been disastrous for those involved (Zeisel, 1975). Such negative results in architecture could be attributed to an absence or partial communication breakdown between parties in initial programming phases of the design process. Increased communication in these early phases could lead to a more thoroughly understood set of criteria. Achieving a fit between behavior and environment, and as a subset, between communicated meaning and intended meaning, is a necessity if responsive design is to be achieved. The proper application of these efforts could ultimately lead to the development of design guidelines for professionals' use in daily settings.

When the architect, client, and user come from similar socio-economic strata or share the same environmental and architectural beliefs, the architect's intuition about meaning may be appropriate. On the other hand, when these parties have little in common, the problem of prediction becomes acute. Hershberger (1974) has suggested that if the architect attempts to intuit the beliefs and meanings of unfamiliar groups, error is likely to occur. The architect's personal value system could assign needs, values, and interests between architect and the non-paying client, which in fact they do not possess. This is the gap which Ziesel (1975) speaks of. Based on this, building imagery is the systemmatic study of the relation between persons' and groups' environmental cognition on the one hand and how such physical dimensions and socio-economic backgrounds of groups interrelate on the other. As such, it is a sub-topic of environmental cognition (Moore and Golledge, 1976).

1.1 High and Popular Architecture

In an historical sense, buildings which were monumental, or regarded in another manner as culturally significant in a particular space and time, were viewed as serious, or possessing "high" implications--Architecture with a capital "A". Opposing this, more commonplace, or everyday structures, are regarded as being rather "insignificant" as cultural expressions--architecture with a small "a". Some contemporary theoreticians, most notably Venturi (1966) and Venturi, Brown, and Izenour (1972) have drawn distinctions between the above. Popular architecture is viewed by certain individuals as that which is by and of the body politic--simultaneously being responsive to daily as well as long range behavioral issues within the context of a mass consumer-oriented society.

In many respects, this progressive viewpoint is analogous to the shift within the past decade to attain an architecture which is valid in humanistic-behavioral terms. We may assume that both high and popular architecture are valid cultural expressions in the present time and space, although this dualistic perspective is often seen an unorthodox, alien, and threatening to stalwart advocates of the modern movement per se.

Amidst the often singular (though slowly evaporating) past and present interest attended to high architecture (encompassing modern architecture in the Anglo-western tradition), it has become

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evident that what is hastily regarded as "low" or "other" architecture is all too often neglected by architects and historians as being insipid by nature. Gas stations, fast-food franchises, roadside bars, motels, subdivisions, the strip, etc., first come to mind when one is seeking iconographic representations of low or popular architecture.

Nine continua were derived representing a broad range of theoretical notions which were representative of high and popular architecture issues. The first six are primarily applied to discuss either high or popular architecture. The last three are interchangeable by nature, i.e., although most buildings which fit the right-hand side of the continuum can be theoretically classified as popular, it is possible to find some counter-examples, e.g., buildings which are not done by an architect but still would be classified by local communities. This method is an attempt to address some ways that buildings can be classified from a designer's perspective in order to provide an initial framework for discussing building imagery in behavioral terms.

HIGH	POPULAR
Selfconscious	Unselfconsciousness
Uniqueness	En Masse
Aesthetic	Unaesthetic
Serious Intentions	Casual Intentions
For "Acceptable Purposes"	For "Unacceptable Purposes"
Elitist	Pluralistic
REVERSIBLE CONTINUA	
Architecture "with" Architects	Architecture "without" Architects
Cognitively "known" Architecture	Cognitively "unknown" Architecture
Multivalence	Univalence

2.0 OBJECTIVES AND HYPOTHESES OF THE STUDY

2.1 Objectives

The objectives of the present study were the following:

1. To identify and compare the types and levels of building imagery of different socio-economic and lifestyle groups located within the same city.
2. To identify certain buildings and building styles which were preferred in aesthetic terms, and in particular to compare preferences for high versus popular buildings between different groups.
3. To use and informally compare techniques for eliciting "hard" data, which was more formal and closed by nature, and "soft" data, which was purposely more informal and open by nature. Of course, differing types of data required diverse types of measuring devices. Diverse data needed to be elicited in the hope of providing a broader, richer, and less restrictive picture than would otherwise be the case.
4. A final objective--only partially realized --was to develop methods to make such research findings and conclusions most accessible to practicing architects. If the prescribed cycle of research and design outlined by Ziesel (1975) and others (Moore, 1975) is viewed and properly adhered to with environmental cognition issues in mind, the designer would ideally be more cognizant of design potentialities, behavioral parameters, and what subsequent fits can be made between the two for a particular user group and building type at hand.

Underlying the design of the study were the following two essential assumptions. It is assumed that architectural meaning and imagery are identifiable through the presentation of color photographic representations of real buildings to groups of people. This assumption is based on previous research in environmental cognition which has demonstrated the potential of eliciting individuals' cognitive representations of buildings (Moore and Golledge, 1976). Various methodological techniques, including many response formats and modes of stimuli in presentation possess proven value (Hershberger, 1969; Seaton and Collins, 1972). A second assumption is that the methodologies incorporated coupled with the architectural dimensions of meaning and imagery are communicable to architects and related professionals as tools in the design process. Architects have an inherent responsibility to assimilate and accommodate users' needs, desires, and intentions and to translate such notions into physically tangible, multidimensional buildings.

2.2 Hypotheses

The study was designed to test five hypotheses:

1. That diverse architectural presentations will elicit varying sets of cognitive building imagery between distinct respondent groups (in the same city) when buildings and respondents remain constant throughout.
2. That for respondent groups remaining constant, building imagery will vary between different buildings.
3. That for these building images, when viewed in light of the nine aesthetic continua, individuals from distinct respondent groups will not draw clear distinctions between building representations according to the high as differentiated from popular dichotomy.
4. That individuals from such distinct respondent groups will possess different architectural aesthetic preferences.

5. That findings from largely informal descriptive identifications and assessments of aesthetic properties and qualities of building representations will parallel the findings from the more precise measures.

3.0 METHOD

3.1 Respondents

A comparative study was developed and executed that employed three distinct respondent groups located within the metropolitan Milwaukee area. Respondents represented an urban lower-income area (Brady Street area = Br), a suburban upper-middle to upper-income community (Shorewood = Sh), and an undergraduate group of non-architecture students (UW-Milwaukee = St). Each group consisted of 21 people.

3.2 Selection of Buildings and Presentation Format

The nine aesthetically-based architectural continua discussed above were used to provide an initial framework for discussing building imagery in a behavioral context.

Ten sets of color photographs of Chicago area buildings unfamiliar to the respondents were used for presentation. The individual buildings were theoretically placed along each continuum. Five of the buildings were thus pre-classified toward the high end of the continua while the remaining five examples were classified toward the popular end. Respondents were eliminated if they were more than remotely familiar with one or more of the buildings. Each set of photographs consisted of five views per building, moving from an overall shot to a detail (for an example see line drawings, traced over the photographs, in Figures A and B).

3.3 Response Measures

A questionaire was developed that included the following response measures:

1. Building imagery semantic differential. A seven-point semantic differential (Osgood, Tannenbaum, and Suci, 1957) was created incorporating 64 bi-polar adjective scales derived from Hershberger (1969) and Kasmar (1970) which were deemed by a panel as most salient and useful for measuring aesthetic imagery of architectural exteriors, and later reduced to 41 most salient scales.
2. Architectural preference scale. A six-point scale of preferences from extremely unappealing (1) to extremely appealing (6) was used to measure architectural preferences.
3. Free written building descriptions. A sheet having three lines per building representation was used together with instructions to describe impressions of each building in a manner most comfortable to the respondents.
4. Respondent background data. Seven questions were asked regarding individuals demographic and socio-economic status.

3.4 Pilot Study

Prior to the final study, a pilot study was conducted on a sample of 5 persons from each group. The principal goal of the pilot was to provide an initial set of semantic descriptors to respondents from all groups and then allow them to choose only those scales which they felt were most useful regarding the ten building representations presented. Criteria were developed to edit out the least appropriate scales from the original list of 64. The semantic differential technique has come under fire in recent years due to an inherent assumption by researchers that the meanings of the scales will coincide with, and be consonant with meanings possessed by the individual and groups. Modifications were in order here regarding such matters since the semantic differential still possesses many advantages over other techniques with similar intentions and applications--especially to persons involved in daily professional design settings. Other objectives of the pilot study were to pre-test the various response measures and to eliminate biases in photographic technique (e.g., different scales, backgrounds, irrelevant contextual details, and color warmth differences).

The principal objective of the analysis of pilot study data was to edit the list of semantic scales from the initial 64 scales.

3.5 Procedure of the Final Study

Subjects in the final study were individually given all ten sets of architectural representations and asked to do the following:

a) fill-out a semantic differential for each building;
b) fill-out a preference scale for each building considering all ten buildings;
c) write free descriptions for each of the ten buildings; and
d) answer the demographic and socio-economic information sought.

The ten boards of photographs were given in random order to each subject. Within each group, half the subjects received task a before task b, and half received task b before a in order to eliminate order effects of the principal tasks. All subjects were asked c and d last and in that order.

3.6 Analyses

Data obtained in the pilot was analyzed via longhand methods while the much larger amount of data collected in the final study necessitated computer-aided quantitative data analyses for the semantic differential and preference scales; while qualitative content analysis was employed for the free written descriptions. For the quantitative analyses, rotated varimax factor analysis programs with principal components procedure, series of one-way and two-way analyses of variance (ANOVA), and comparisons of means (t-tests) were employed.

The objectives of the final analyses were:

1. To identify dominant empirical dimensions of building imagery:
   a) composite results--dimensions of building imagery of all ten buildings for all groups collectively;
   b) group differences--building imagery for each group on all buildings taken as a whole; and
   c) differences between buildings--building imagery across groups for each building.
2. To identify architectural aesthetic preferences between buildings and also between groups.
3. To compare theoretical continua with empirical dimensions of building imagery for all groups and for each group independently, and in particular to compare empirical dimensions with the theoretical dichotomy between high and popular architecture.
4. To informally analyze written building descriptions from each respondent.

4.0 RESULTS

1. The original list of 64 bi-polar semantic scales was reduced to 41 scales which most discriminated between people. Those scales which drew largely neutral responses across groups suggested lower levels of discriminability and salience in relation to the particular stimuli and subject groups and were eliminated.

2. The factor analysis results yielded eight principal dimensions of building imagery across all groups and all buildings. These are listed in Table 1 in order of percent of total factor variance accounted for. These dimensions represent a wide range of notions--with references ranging from historical architectural issues like physical permanence, impressiveness and significance, and confusing and incomprehensible physical qualities, to sociable and inviting qualities and attributes of the buildings. "Cheap and Unimpressive" was the image dimension identified as the most pronounced across all groups (15.2% of the variance accounted for), followed closely by "Impressive and Significant"(12.5% of the variance) and "Sociable and Inviting" (9.9%).

3. When group data was individually factor analyzed, a higher level of within-group communality occurred than between groups, supporting the assumption that groups were more homogeneous internally with regard to building imagery than they were in comparison with other groups.

FACTORS	DESCRIPTIVE TITLE (exterior physical qualities)	ranking order: ALL RESPONDENTS (7 factors)	% of VARIANCE	THREE GROUPS (8 factors)	AVERAGE % OF VARIANCE
F1	CHEAP AND UNIMPRESSIVE	(1)	15.2	Sh(5),St(5),Br(1)[a]	9.2
F2	IMPRESSIVE AND SIGNIFICANT	(2)	12.5	Sh(1),St(1),Br(3)[a]	15.9
F3	SOCIABLE AND INVITING	(3)	9.9	Sh(2),St(2),Br(2)	11.5
F4	CONFUSING AND INCOMPREHENSIBLE	(4)	5.1	Br(4)	5.9
F5	UNIQUE AND INTERESTING	(5)	4.9	Sh(4)[b],St(3)	6.8
F6	PERMANENCE	(6)	4.6		4.6
F7	CONTEMPORARY	(7)	4.4	Sh(6),St(4)	5.1
F8	TRADITIONAL	-	---	Br(5)	5.1

[a] A factor ranked (1) indicates it accounted for the greatest proportion of total variation between subjects, (2) next most, and so on.

[b] The third factor for Shorewood when individually analyzed was "Ordered and Straightforward", but as this factor didn't appear in the analysis of all respondents, it was not listed here.

Table 1. Dimensions of Building Imagery (Factors) identified for all Respondents and for each Group

4. Sharp differences were noted, however, between groups. Table 1 also shows that the Shorewood and Student groups were most similar on the three principal dimensions, both focusing on "Impressive and Significant" and "Sociable and Inviting" more than on "Cheap and Unimpressive", while the order for the Brady Street group was reversed, focusing more on "Cheap and Unimpressive" and then "Sociable and Inviting" before "Impressive and Significant". Similar differences were seen for the other major dimensions. In general, it also appears that the upper-middle to upper-income Shorewood group focused on more "favorable" images than the lower-income Brady Street group. To the Brady Street group, the "less significant" images were most pronounced. The good, ordered, cultured, and dignified aspects of buildings highlighted the Shorewood and Student groups' cognitions, while the ordinary, everyday, sociable, and inviting aspects of buildings highlighted the Brady Street group's cognitions.

5. When the data was analyzed by building, results varied from building to building for all subjects considered together. Table 2 illustrates these findings. The dimension "Traditional" was most pronounced for two a priori hypothesized high architecture and one a priori popular building (Rockefeller Chapel, Tribune Tower, and the Granada Theater), and "Impressive and Significant" was most pronounced for the two other high buildings (the Hyatt Regency Hotel and Suburban Mansion). "Cheap and Unimpressive" qualities were paramount for only one popular building (the Hot Dog Stand), while the other popular buildings were cognitively associated with "Sociable and Inviting". In general, it appears that the more dignified, stable, and admirable architectural qualities were indeed associated with high architecture, while the more accessible, friendly, sociable, inviting, and skeptical qualities were identified with the popular architectural examples.

6. The preference analysis did not parallel the results which might have been expected following from the factor analysis dimensions of imagery. For all groups and for each of the three groups, there was a significant difference between high and popular clusters of buildings (see Table 3). But all three groups preferred high buildings over popular buildings despite the Brady Street group, who imaged most buildings in different terms from the Shorewood and Student groups (from #4 and Table 1 above). The moderate levels of significance between high and popular buildings suggests subtle gradations, not pronounced ones, between building types for these respondents and stimuli. Results from a one-way analysis of variance (not shown here) support this interpretation. In comparing grand means by building across all groups, five of the six highest means belonged to high buildings, while the lowest four preference means were buildings designated as popular.

The findings from the two-way ANOVA conducted on the preference data illustrated

high-pop	random letter	BUILDING	FACTOR 1	FACTOR 2	FACTOR 3	average percent of variance
P	A.	Granada Theater	TRADITIONAL	PERMANENCE		9.9
P	B.	New Car Showroom	SOCIABLE AND INVITING	CHEAP AND UN-IMPRESSIVE		13.1
H	C.	Hyatt Regency Hotel	IMPRESSIVE AND SIGNIFICANT			11.6
P	D.	Victoria Station Restaurant	SOCIABLE AND INVITING	CONTEMPORARY		11.3
H	E.	Suburban Mansion	IMPRESSIVE AND SIGNIFICANT	SOCIABLE AND INVITING		11.5
P	F.	Hot Dog Stand	CHEAP AND UN-IMPRESSIVE	SOCIABLE AND INVITING	CONTEMPORARY	13.1
H	G.	Suburban Village Hall	SOCIABLE AND INVITING	IMPRESSIVE AND SIGNIFICANT		9.9
H	H.	Rockefeller Chapel	TRADITIONAL	PERMANENCE		9.6
P	I.	Batteries Shop and Garage	SOCIABLE AND INVITING	UNIQUE AND INTERESTING		11.8
H	J.	Tribune Tower	TRADITIONAL	SOCIABLE AND INVITING	UNIQUE AND INTERESTING	10.7

Table 2. Summary of Dimensions of Building Imagery for each Building

that respondents did cognitively view high as different from popular irrespective of the nine theoretical aesthetic continua (which they were unaware of).

highest overall preference rank across respondent groups. As seen in the tables, "Sociable and Inviting" was found to be the most highly pronounced and preferred

GROUP	Popular		High				
	M	SD	M	SD	t	p	D
Shorewood	2.7524	1.18	5.0096	.55	2.00	<.025	1.089
Students	3.3618	.99	4.7712	.39	2.21	<.025	.828
Brady	2.9812	.98	4.5620	.36	2.34	<.025	.831
OVERALL	3.1778	1.05	4.7809	.43	2.37		.918

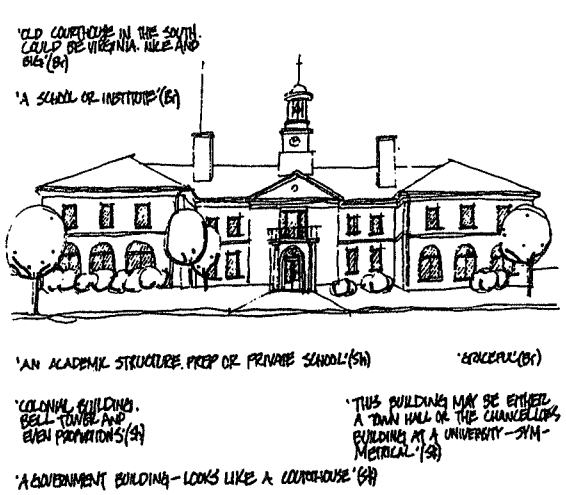
Table 3. Preferences for High and Popular Buildings for all Respondents and for each Group

7. Looking at the interaction between architectural preferences and the factored dimensions of imagery, it was possible to rank the eight principal images in terms of the mean preferences per building (see Table 4). The dimensions were ranked from most preferred to least preferred (see Table 5), with the first dimension being most preferred and prevalent across buildings and groups while also possessing the dimension of building imagery for all respondents, followed closely by "Unique and Interesting", and so on.

8. The written building description analysis yielded sets of complimentary, subjective building images. This "soft" data is shown together with an example of line drawings prepared for two of the ten displays (see Figures A and B). The descriptions focused

Building	mean ranking	Percent of Total Factor Variance	CHEAP AND UNIMPRESSIVE	IMPRESSIVE AND SIGNIFICANT	SOCIABLE AND INVITING	CONFUSING AND INCOMPREHENSIBLE	TRADITIONAL	UNIQUE AND INTERESTING	PERMANENCE	CONTEMPORARY	Number of named Factors per bldg
			15.2	12.5	9.9	5.1	5.1	4.9	4.6	4.4	
Suburban Mansion (E)	5.254			5.25 (1)	10.5 (2)						2
Suburban Village Hall (G)	5.016			10.0 (2)	5.02 (1)						2
Rockefeller Chapel (H)	4.746					9.49 (2)	4.75 (1)				2
Hyatt Regency (C)	4.524			4.52 (1)							1
Granada Theater (A)	4.381						4.38 (1)				1
Tribune Tower (J)	4.365				8.7 (2)		4.36 (1)	13.09 (3)			3
Victoria Station Restaurant (D)	4.143				4.15 (1)				8.29 (2)		2
New Car Showroom (B)	3.349		6.70 (2)		3.35 (1)						2
Batteries Shop and Garage (I)	2.032				2.03 (1)			4.06 (2)			2
Hot Dog Stand (F)	1.984		1.98 (1)		1.98 (2)					5.95 (3)	3
INTERACTION TOTALS			0.57	1.59	3.61	1.86	2.64	3.50	1.80	1.35	

Table 4. Preferences for Dimensions of Building Imagery.



1

3

'COLONIAL, NEAT. SMOOTH MASONRY. I LIKED THE ARCHED WINDOWS AND DIVIDED WINDOW PANES'(Sh)

'LOOKS TO ME LIKE AN EASTERN TYPE SCHOOL. VERY STATELY. ENCLOSED IN VINES'(Sh)

'AN OLD FASHIONED SCHOOL BUILDING'(Sh)

'A CATHOLIC SCHOOL'(Sh)

2

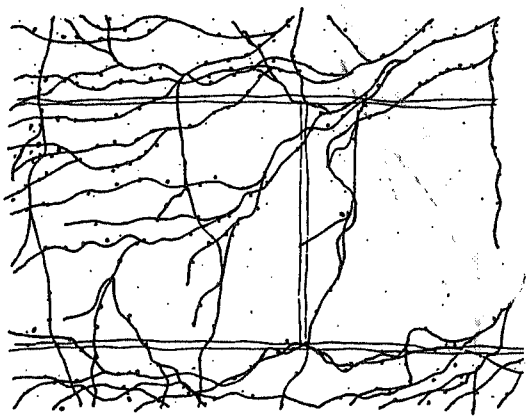
'A WELL BALANCED BUILDING WITH AN OLDER, OUT OF PLACE NEW ENGLAND BELL TOWER ADDED AS AN AFTER THOUGHT'(Sh)

'...APPEALING TYPE OF BELL AT THE TOP OF IT WITH A CROSS...'(Sh)

4

'THE WINDOWS AND THE BELL TOWER ARE MY FAVORITE PARTS OF THIS CONSERVATIVE SCHOOL'(Br)

'... VERY BUSHES ARE PILL NEXT TO THE BELL.'(Br)

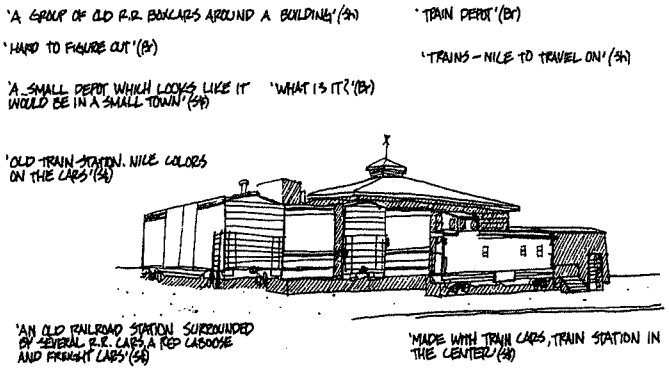


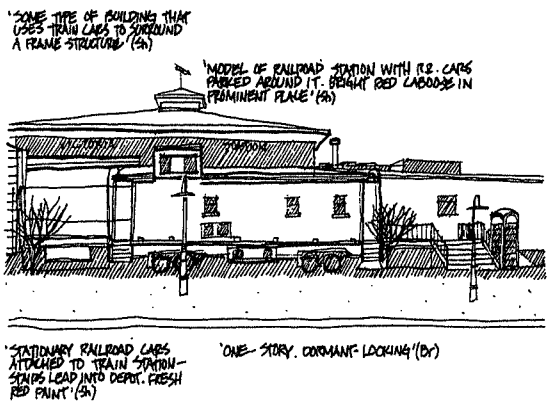
'LOTS OF VINES ON THE SIDES OF THE BUILDING. MADE OF MARBLE OR GRANITE.

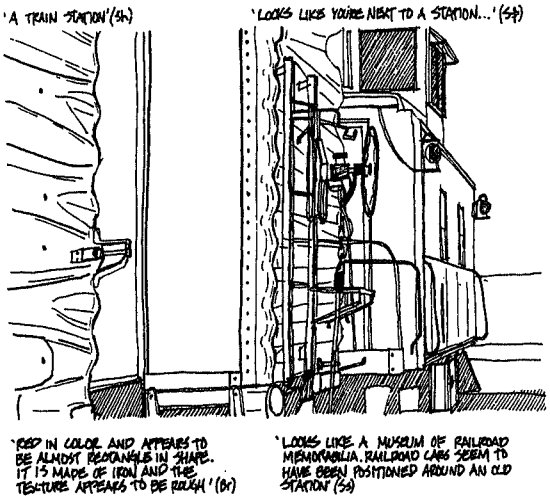
'... OLD AND CRAWLING WITH IVY...'(Sh)

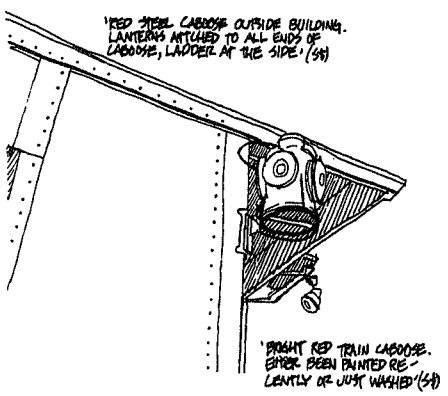
5

Figure A (1-5). Typical Example of a High Architecture Display -- a Suburban Mansion.









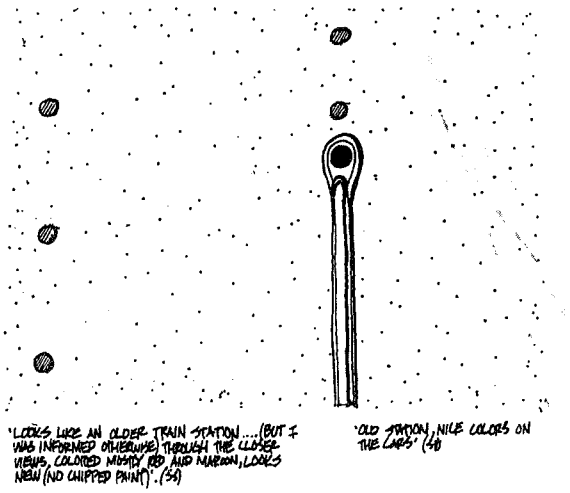


Figure B (1-5). Typical Example of a Popular Architecture Display -- Victoria Station Restaurant.

RANK	SCORE	DIMENSION
1.	3.61	SOCIABLE AND INVITING
2.	3.50	UNIQUE AND INTERESTING
3.	2.64	TRADITIONAL
4.	1.86	CONFUSING AND INCOMPREHENSIBLE
5.	1.80	PERMANENCE
6.	1.59	IMPRESSIVE AND SIGNIFICANT
7.	1.35	CONTEMPORARY
8.	0.57	CHEAP AND UNIMPRESSIVE

Table 5. Dimensions of Building Imagery Ranked According to Respondent Preferences

on physical conditions and styles of the ten buildings. Specific physical properties and levels of detail being addressed by respondents were most important when connecting specific environmental display views with this data. This technique proved useful in providing more respondent interpretation of the stimuli, while providing some suggestion of the relation between particular building cues and resultant imagery and cognition.

5.0. CONCLUSIONS

Each respondent group was clearly responding differently to the buildings throughout the tasks. Such occurrences in environmental cognition between the three socio-economic or life-style groups could be attributed to types and levels of cultural screening and conditioning processes that differ between each aggregation. Interpretation raises the issue of upper-middle income Shorewood respondents being more accustomed to, and "taught" to appreciate (and use) certain types of architecture, while for the lower-income Brady area respondents, differing sets of mores and values have a deterministic influence. All groups liked certain types of buildings (churches and mansions in particular) but they are relating these notions in different manners through a medium remaining constant.

Eight principal dimensions of building imagery became apparent from the factor analyses, with the most prominent being "Cheap and Unimpressive", "Impressive and Significant", and "Sociable and Inviting". With regard to preferences for difficult building imagery, "Sociable and Inviting" imagery was the most preferred, followed very closely by "Unique and Interesting" imagery.

The written building description task yielded largely complimentary sets of cognitive imagery. Shorewood respondents were in general quite verbose in this task when compared with Brady respondents. Is this meant to imply that educational attainment or just the stimuli's inability to trigger off Brady respondents' interest in the building is the major issue, or are both variables perpetually in consort thereby influencing response length and content? Overall, each of the groups provided distinct responses, while the essential construct framework elicited contained surprisingly high levels of communality across groups.

Previous research by others indicated that shifting representational stimuli induced shifting findings from one mode to the next when respondents remained constant. For such reasons, the media remained unaltered in both pilot and final studies. The "soft" data provided complimentary building images when observed simultaneously with "hard" data. Future efforts could attempt to identify personal constructs and develop more adequate meaning semantic scales from such data.

Meaning and imagery are both quantitatively and qualitatively measurable in architecture. All hypotheses proved salient with the notable exception of the initial assumption concerning laypersons and high versus popular architecture. Overall, persons and groups responded more positively or "favorably" to the former types of buildings.

Resultant dimensions of building imagery could be further developed to discern between specific building types and various subissues, both physical and non-physical, as well as between other aesthetically-based theoretical issues and distinctions in architecture.

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