THE INFLUENCE OF ARCHITECTURAL DETAILING, MASSING, AND DESIGN INTEREST ON THE EVALUATION OF HERITAGE AND HISTORIC URBAN STREETSCAPES

BY

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ABSTRACT

Research in environmental perception has illustrated that contextual compatibility and building facade ornamentation are important determiners of preference for specific architectural designs. This study extended these ideas by investigating the perceptions of contextual compatibility between two groups when assessing heritage and historic urban streetscapes in addition to testing the significance of the presence of facade detailing (specifically, quoins and a window treatment), rather than massing, in these evaluations. Participants were divided into students with and without a design interest, and then asked to assess four heritage and historic urban streetscape sketches using a unipolar adjectival rating scale arranged into seven *ad hoc* categories. A factor analysis yielded six distinct scale groups. Subsequently, multiple analyses of variance were executed, demonstrating that the results did not support the hypotheses, although several main and interaction effects were found. When all four independent variables (i.e., design interest, the two detailing variables, and massing) were included, a window treatment main effect, a window treatment by design interest interaction and a massing by quoins by window treatment interaction surfaced across the six factors. Examining the between-subjects effects, a quoins by window treatment interaction occurred on Friendliness and a window treatment by design interest interaction for Age. When the data was collapsed across design interest, a significant main effect resulted for massing among the six factors. Between-subjects effects illustrated a massing main effect on Organizational Compatibility, Aesthetic Style, Age, and Beauty. In addition, a window treatment effect occurred for Beauty and a massing by quoins by window treatment interaction effect was

found for Organizational Compatibility. Implications from this study include providing more education to the lay public concerning preservation issues and contributing behavioral scientific support to design-derived theories.

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Introduction

When we walk down a street in any urban center, we are usually flanked by a collection of old, new, or age-integrated buildings on either side of us in addition to boulevard trees, a road and sidewalk, lights, signs, poles, fences, hedges, and gardens. The view presented by this collection is usually referred to as a streetscape (Design Guidelines, 1985). The older buildings often comprising these urban streetscapes are of heritage or historic character, enhancing the diversity of the visual scene and providing a contrast to modernist-era (i.e., from the early twentieth century onwards, Brolin, 1985) architecture.

The heritage character of a building refers to the synthesis of a building's heritage values (Federal Heritage Buildings Review Board, 1996). These values may be associated with original architectural design, particular historical attributes of building additions to the site or setting, or represent a reflection of the contextual importance of a building and its influence on local development (Federal Heritage Buildings Review Board). Furthermore, heritage character incorporates anthropological, cultural (Hewison, 1989; ICOMOS Seminar, 1995), architectural, ecological, economic, and social frameworks, thus illustrating the importance of memory in recognizing cultural identity (ICOMOS Seminar).

Similarly, an historic context is a place containing a significant combination of historic features and structures that have survived in sufficient, distinguishable number or quality (Hopkins et al., 1993). These settings are identified from predominantly new places or from new structures that are placed within these contexts (Hopkins et al.).

Moreover, any group of buildings, structures, or open spaces comprising human settlement in an urban or rural setting, including human activities, events, and culture (Keune, 1984/1985) can be considered historic in context if they possess recognizable aesthetic, architectural, historic, sociocultural (Ward, 1986), archaeological, documentary, economic, emotional, political, spiritual, or symbolic values (Fielder, 1994). Historic buildings within these areas, therefore, have developed in response to tradition, which may be defined as the shared memory of the community (Hopkins et al.). In architectural terms, the practice of tradition will tend to rely on appearance, arrangement, formal decoration, materials, and so forth, allowing communities to foster cultural identity and continuity with their past (Fielder; Hopkins et al.).

In order to strengthen this connection with the past (Nasar, 1998) and retain the attached emotional and psychological meaning (Canter, 1977) associated with heritage and historic buildings, some urban centers have sought to protect these structures from the strain of development and slow decay (Design Guidelines, 1985) through the processes of preservation and conservation. According to Fielder (1994), preservation concerns the fortification of cultural property in its existing state. One form of preservation, known as enhancement, attempts to accentuate architectural details affiliated with older buildings whereas new details are included and carefully designed to contribute to a united whole (Fleming, 1982). This method of maintaining cultural property may involve removing years of additions until the desired architectural details are uncovered.

The second process of heritage and historic building protection, known as

conservation, seeks to prevent decay through direct and indirect action aimed at prolonging and enhancing the messages and values of cultural property (Fielder, 1994). These values embrace the utility (e.g., economic, political), emotional (e.g., symbolism, continuity), and cultural (e.g., aesthetics, science) beliefs that communities collectively share in their day-to-day lives (Fielder). Consolidation is one direct conservation procedure that involves the physical application or addition of adhesive or supportive materials into the actual fabric of cultural property to prevent deterioration (Fielder). Indirectly, government officials can promote long-range protection by introducing legislation, zoning, or providing economic incentives (Kalman, 1980) in order to amplify the character and appearance of elements of the built environment perceived to be valuable in historic and architectural terms (Richards, 1994).

One aspect of heritage and historic buildings that conveys utility, emotional, and cultural beliefs or character and, therefore, augments the necessity for preservation and conservation, is the ornamentation embellishing these structures. Brolin (1982) stated that a precise definition of ornament is difficult to achieve because of the term's close association with history. The author believed that modernists, in particular, need to expand their definition of what constitutes acceptable ornament, and recognize the familiarity, inspiration (Brolin, 1985), grace, and beauty that traditional ornament has to offer. Although there exists annotative complication with the term and the need for its expansion, a suitable definition may be generated from architectural dictionaries and encyclopaedias.

According to Bucher (1996), ornamentation refers to an object, or series of

objects, added to a rudimentary structure for the purpose of enhancement of visual appearance. The objects may be, but are not limited to, sculptured forms that are carved, incised, molded, shaped, colored, or applied in order to enrich the architecture of a building (Curl, 1993). Examples of these sculptured forms include anthemions (a stylized palm leaf or honeysuckle decoration used in classical architecture, Bucher), window shields (ornamental exterior wood trim at the top interior corners of a window, typically in the form of a quarter circle or triangle, Bucher), gargoyles (a projecting stone waterspout, frequently carved in the form of a monster or grotesque, Bucher) relief (a sculptured design slightly elevated or recessed from the surface, Bucher), quoins (stone or brick used to decoratively accentuate the external corners of buildings, Identifying Architectural Styles, 1991) and chevrons (a V-shaped design typically utilized in a continuous band similar to a molding, Identifying Architectural Styles). In agreement with the above definition of ornament, and Wilkes and Packard (1988), the project employed this definition in addition to utilizing the word "detail" as a synonym.

Therefore, as we walk down streets in urban centers, we are usually provided with a visual array of building masses, orientations, and styles -- some of which are heritage or historic in character replete with ornamentation and facade detail -- that must all be perceived and processed within seconds. During this ongoing cognitive process, we will perceive the streetscape and at least implicitly decide whether or not we prefer the buildings comprising that urban scene. Groat (1983a) suggested that we might be influenced by the concept of contextual compatibility, or the fitting of new entities into existing surroundings, when assessing urban streetscapes. In addition, Groat and Brolin

(1976, 1980, 1985), maintained that facade design, or ornamentation, will be the most significant feature of buildings that we examine when evaluating whether or not an urban scene is contextually compatible.

Indeed, in the research below, the idea that contextual compatibility is universally-perceived when streetscapes are evaluated was investigated. Rather than analyzing the fitting of *new* structures into established environments, however, this project explored the compatibility of established urban street scenes and *old* buildings (operationally defined as heritage or historic by Manitoba standards). Specifically, it was hypothesized that the presence of a design interest, possessed by certain individuals, would affect the scaling responses regarding contextual compatibility when cognitively evaluating heritage and historic urban streetscape sketches. However, contextualism in this project was not manipulated directly; instead, individuals assessed streetscapes that varied according to alterations in massing (operationally defined by a structures height-to-width ratio where 1:1 implies a 1-storey building that is square and 2:1 indicates a 2-storey structure that is rectangular) and two detail variables (operationally defined as eight quoins per storey, and each window possessing a segmental-arch with one keystone, respectively) using adjective scales that measure compatibility.

The other objective of this project was to test the suggested notion that ornamentation is an important factor in the assessment of heritage and historic urban environments. It was hypothesized that facade detail would have an effect independent of design interest. Essentially, the presence of heritage and historic detail (specifically, quoins and window treatments) would affect individuals' evaluations of the urban

streetscape on the entire set of appropriate adjectives and adjectival phrases – not only on scales involving contextual compatibility -- more than a structures' massing. Regarding the results, a factor analysis was first performed on the 21 adjectives and adjectival phrases in order to discover whether or not the scales clustered together in *ad hoc* categories. Utilizing the results of this analysis, two MANOVAs were computed for the purpose of directly testing the above hypotheses. Overall, this line of research could be valuable to urban planners, architects, and design professionals alike because the project illustrates how the behavioral sciences can provide empirical assessment for design-generated theories and ideas, including issues concerning the importance of building ornamentation, and the preservation and conservation of historic and heritage buildings.

In order to achieve the purposes set forth in the current project, some topics and issues relevant to environmental perception, contextual compatibility, and facade detail will be reviewed. Therefore, the outline for this project will be as follows: environmental psychology will be defined and a discussion of the discipline's history will ensue. Subsequently, the concepts of environmental perception and evaluation will be denoted, examining Ittelson's (1978) four segments of environmental perception, and the specific language, research instruments, and simulation devices utilized in experimental evaluation research. Next, the topic of heritage and historic guidelines and standards will be introduced and examples of how these standards and guidelines have been successfully implemented in several North American cities will be illustrated. Thereafter, the notion of contextual compatibility will be delineated and the importance of facade detail in issues of environmental preference will be expounded. Cautions regarding the applicability of

design-related theories will then be explicated and the need for empiricism will be discoursed. Finally, there will be a presentation of the experiment, including the hypotheses, a description of the participants, the method, procedure, and results.

What is Environmental Psychology?

Environmental psychology is the study of the interaction between human behavior and natural or built surroundings. Through this interaction, human behavior and the natural and built environments affect each other and alter subsequent exchanges. Often times these adjustments are deleterious (e.g., stress due to natural disasters, deforestation); at other times they are enhancing (e.g., cultivation of various food products depending on the geographic region, urban renewal). Therefore, one of the roles of an environmental psychologist is to attempt the theoretical understanding of the intimate transactions between the environment and human behavior, and apply this knowledge in the amelioration of a variety of real-world problems (Altman & Rogoff, 1987; Bell, Fisher, Baum, & Greene, 1996; Gifford, 1997).

A Brief History of Environmental Psychology

The roots of modern day environmental psychology began in the 1960s as a result of scientific and societal concerns over human being's treatment of the physical environment (Altman & Rogoff, 1987). The social sciences, including psychology, were encouraged to contribute new theoretical approaches to the developing area. In addition, the flourishing of the worldwide ecological movement, coupled with a concern for a more interdisciplinary approach to the study of the environment, meant that new advances were eminent (Altman & Rogoff). Synchronous with this request, however, was the overt

criticism of laboratory methods and naturalistic research; traditional psychologists had concentrated on microlevel processes, including cognition and interpersonal processes (Stokols & Altman, 1987) which meant that research in the macrolevel environment was being neglected. If environmental psychology was to survive into the late twentieth century and beyond, a more global examination of concepts was required. Furthermore, environmental psychologists would have to bridge the gap between the orthodox philosophy of rigorous, scientific research and the unconventional style of theoretical translation and application (Altman & Rogoff, 1987). Indeed, this issue of amalgamation between old and new is still being examined today as researchers and scientists struggle with a growing field and more complex questions that necessitate clarification.

Theory

Researchers interested in the study of person-environment interaction were often immersed in other areas within the field of psychology before they began to concentrate on the observation of this exchange. Likewise, many theories encompassing environmental psychology were derived from the accepted world views incorporated within the global examination of human behavior (Altman & Rogoff, 1987). The authors presented four prevailing world views that, in their opinion, have aided environmental psychology in its quest to explain the nature and complexity of the above-mentioned interaction. These four world views included trait theories, the interactional approach, transactionism, and organismic perspective (Altman & Rogoff).

The trait theories, including theories of intelligence, aptitude, and instinct, embrace as their fundamental units of analysis psychological processes, cognitive

capabilities, and personality characteristics (Altman & Rogoff, 1987). These features are regarded as essential determinants of psychological functioning and are unconstrained by social and physical contexts. Indeed, trait theorists believe that the environment exerts a minimal force upon personality generation in addition to the assumption that traits are believed to be either stable in nature or part of an internal, predetermined pattern of development (Altman & Rogoff). Hence, trait theory relegates the environment to a secondary consideration in the development of human behavior. In response, an alternative world view of psychology emerged, that of the interactional approach.

The interactional approach advocates the interpretation of psychological processes, contextual factors, and the physical environment as orthogonal entities, yet concepts that are capable of exchange and manipulation (Altman & Rogoff, 1987). The approach defines psychology "as a field that studies the prediction and control of behavior and psychological processes" (Altman & Rogoff, p. 15). This ardent focus on prediction and control indicates that antecedent factors impact or invoke alterations in psychological processes; thus, these processes are regarded as dependent variables (DVs) and environmental factors are treated as predictors of human behavior functioning (Altman & Rogoff).

Furthermore, the interactional approach emphasizes the multiple correlation of both situational and personal characteristics with psychological actuation, and the precision of rigorous empirical testing and replicability. Researchers adopting this world view in environmental psychology have examined aspects of crowding (Baum & Epstein, 1978, as cited in Altman & Rogoff, 1987; Baum & Paulus, 1987), environmental

perception and cognition of large-scale built and natural settings (Golledge, 1987; Knopf, 1987; Wohlwill & Heft, 1987), and the application of operant learning to environmental phenomena by manipulating various extra-individual factors and assessing their psychological outcomes (Cone & Hayes, 1980, as cited in Altman & Rogoff; Everett & Watson, 1987; Geller, 1987; Geller, Winett, & Everett, 1982, as cited in Altman & Rogoff). Nonetheless, the orthogonal distinction made via this approach between independent and dependent factors often leads to hypotheses of a unidirectional nature and, therefore, does not endorse a truly interactional stance. Theories that endeavor to build upon the established assumptions addressed in the interactional world view need to examine the intimate connection between person and environment, and consider their affiliation rather than alleging their separate constitution.

Another set of world views, termed the organismic perspective, attempts to recognize the problems of the interactional approach and explores the nuances of a Gestaltist conception (Bell et al., 1996) of person-environment study (Altman & Rogoff, 1987). This perspective investigates the holistic system, an organic method of exhaustively relating individual and environmental elements, and their dynamic exchange (Altman & Rogoff; Wapner, 1981). Research encompassing this world view incorporates general systems frameworks to various environmental settings (Moos & Lemke, 1984, as cited in Altman & Rogoff), a perspective of crowding that embraces both antecedent components (e.g., interpersonal and personal factors) and physical factors (e.g., density) (Bell, Fisher, & Loomis, 1978, Sundstrom, 1978), and psychological aspects of transportation involving a variety of elements including mode of travel, travel aims and

goals, and travel stressors (Stokols & Novaco, 1981). However, the organismic perspective, like the interactional approach, conceives of parts as separate entities comprising the whole and, therefore, does not recognize the evident association between behavior and the built or natural surroundings (Altman & Rogoff; Gifford, 1997). In contrast to the interactional approach, which analyzes the additive properties of elements incorporating the whole, the organismic perspective demands the cognizance of how parts within the whole assemble together in terms of a system-wide knowledge of organization (Altman & Rogoff). In addition, the organismic perspective does not designate personal and environmental factors as dependent and independent variables (IVs), respectively, and is, therefore, capable of emphasizing the multidirectional nature of relationships between person and environment. Finally, Altman and Rogoff asserted that modifications in one element within the whole might prompt complex responses to that modification which, in turn, may affect the direction and nature of the situation.

The fourth theoretical world view of psychology that may be contemplated within environmental psychology, according to Altman and Rogoff (1987), is transactionism. Transactionism accentuates the intertwining of human behavior and the environment such that these factors are reliant on one another for their explanation and presence (Altman & Rogoff). Moreover, parts comprising the whole cannot be separated from each other without losing information, and the temporal dimension of incorporating other aspects concurrently into an experienced setting is fundamentally important to the definition of an environmental event (Bell et al., 1996). Hence, there is a repudiation concerning the isolation of person and environment in addition to statements reflected in linear models of

causation. As a result, a shift towards describing transformation processes involved in the ongoing modifications inherent in the collective system known as person-environment is evident (Altman & Rogoff). Studies from a transactionism standpoint have examined the purported continual flow of association between psychological processes in varying environmental surroundings and the physical and social environment (Barker, 1987; Wicker, 1987), and the belief that there exists a life history of behavior settings; that is, these environments proceed from formative phases through to dissolution phases (Wicker).

Overall, Altman and Rogoff (1987) asserted that these four prevailing theories have provided the field of environmental psychology with some of the properties and suppositions incorporated into the general area of human behavior. Nonetheless, the world views also appear to be domain-specific; that is, they are relevant to some environmental issues, but cannot be employed to fully explain other areas. For example, the project below examined the evaluation of heritage or historic urban streetscapes. Although this study utilized components of the interactional approach (i.e., the scaling responses of individuals with and without a design interest in urban streetscapes was treated as a dependent variable whereas the manipulation of building ornamentation -- via two specific facade details -- and massing within sketches was specified as the IV), the psychological process of evaluation cannot be readily explicated by any one of the four theories. If evaluation is a concept that does not adequately fit into Altman and Rogoff's world views, then additional psychological processes may also have trouble conforming to these theoretical categories. Therefore, the authors' claims that the views are prevailing

in scope are not fully substantiated within environmental psychology, and the study of diverse phenomena within the person-environment interaction, including environmental perception, needs to be considered more closely.

Environmental Perception

Environmental perception involves the nascent gathering of information in order to construct an internal representation of the environment (Gifford, 1997; Ward & Russell, 1981a). Essentially, it is an elaborate process whereby individuals attempt to simplify complex stimuli encountered in everyday life (Bell et al., 1996; Bosselmann & Craik, 1987) and evaluate their surroundings (Gifford). Ittelson, one of the pioneers in the field, indicated that environmental perception is a critical ingredient in person-environment interaction, providing the necessary connection between the physical context and the cognitive, affective, interpretive, and evaluative segments of environmental perception (Bell et al.; Feimer, 1984; Ittelson, 1978; Ward & Russell, 1981a). As we experience an event, these four segments of environmental perception may be encountered in order to simplify the myriad of information that is thrust upon us and allows for situational appraisal to occur.

Our cognitive processes help us to imagine what is actively possible in the surrounding (Bell et al., 1996). We may employ our senses of touch, taste, sight, smell, or hearing in order to detect and categorize the information that is gathered about a particular environment. In addition, we may compare this surrounding with other settings that we have read about, encountered in the past (Bell et al.), or imagined in our minds. When we attach emotion to the surrounding that we have experienced, or when the

setting evokes a particular emotion within us, we are investigating Ittelson's (1978) second segment of environmental perception: the affective component (Bell et al.). This affectivity, and the beliefs that underscore them, constitutes the essence of our attitudes that we reserve towards the environment. For example, one person may view a crowded shopping mall during the holiday season as a sign of economic prosperity whereas another person may feel that same crowded shopping mall is filled with unhappy men, women, and children forced into buying presents for unworthy people.

The third segment of environmental perception, according to Ittelson (1978), is interpretive, which embodies a process of selective attention of information (Bell et al., 1996). When perceiving a setting, individuals are often inundated with sensory information that must be categorized, stereotyped, and simplified in order for sense-making to occur and adaptation to potential novel circumstances to ensue (Gifford, 1997). The organization of data, facts, and so forth, is inherently biased because it is influenced by our knowledge and understanding of the surrounding in addition to our reasons for using the surrounding, our goals, and our personal plans (Evans & Garling, 1991). This aspect of environmental perception, therefore, is important because it illustrates the impact of individual differences within the entire perceptual process.

The final segment, evaluation, involves an individual's response to built or natural environments. The settings to be evaluated may be an actual space; a three-dimensional representation of a space in photographic, line drawing, or alternative form; or the environment may be imagined (e.g., Lowenthal & Riel, 1972). Furthermore, the responses to these settings may be preferential (e.g., like or dislike) or descriptive (e.g.,

beautiful, spacious). Research has been guided towards establishing the appropriate range and types of responses, and the physical and organismic contributions to these responses.

Environmental Evaluation

Environmental Descriptors

Kasmar (1970) suggested, although in the absence of supportive data, that individuals are sensitive to perceptual cues embedded within the environment and respond to these stimuli accordingly. These cues may provide individuals with a better sense of the possible function of a setting, the potential correct behavior for that surrounding, and the type of people that could occupy the space more so than if these indicators were missing. In order for individuals to elicit their impressions and evoke a descriptive reaction to their environmental perceptions, however, they require a convenient and appropriate language that can effectively distinguish between environmental spaces.

In response to the need for a descriptive language, researchers have tapped into a rich vocabulary of adjectives that can be utilized not only by architects and those involved in the design profession, but also by nonarchitects and lay people. Attempts have been made to arrive at a lexicon of environmental descriptors by Hershberger and Cass (1988) and Kasmar (1970). These authors have suggested that this lexicon would represent a valuable stepping stone in the development of a standardized descriptive scale, an instrument that could be employed to augment effective communication between a client's conceptualizations and an architect's reality. Finally, via the implementation of a descriptive scale, researchers interested in environmental evaluation

of architectural spaces could begin to analyze cross-cultural differences, individual differences, developmental transitions (Kasmar), and so forth.

The development of environmental descriptors, however, does possess shortcomings. First, researchers' endeavors to create a standardized descriptive scale have been met with criticism because their scales have not been suitably psychometrically assessed concerning issues of ecological validity and reliability. Further assessment of these scales is required in order for standardization to occur. Second, the samples used in studies that have attempted to generate evaluative adjectives were often not representative of the population-at-large and, therefore, problems associated with adjective comprehension may have surfaced (Kasmar, 1970). Third, the environmental descriptors in the established lexicon may not be an all-encompassing index of adjectives with regard to specific settings (Kasmar). Once again, more testing is necessary for the construction of additional descriptors that are suited for distinct environments. Overall, however, the descriptive language set forth by Hershberger and Cass (1988), Kasmar, and others have contributed to the area of environmental evaluation, and have allowed individuals to elicit impressions of their perceptual cues. The present project utilized unipolar scales that were constructed on an ad hoc basis in order to evaluate heritage and historic urban streetscapes. There was an attempt, therefore, to employ environmental descriptors, comprising factor dimensions, from previous work (e.g., Hershberger & Cass; Kasmar; Oostendorp & Berlyne, 1978) that have been found to be applicable in evaluation research. In addition, adjectives that have been generated without reference to prior research and were believed to be relevant to the project were included (see Appendix A

for environmental descriptors). The dimensions that this project endeavored to measure included aesthetics, friendliness, organization, adequacy of space, age, style, and contextual compatibility.

Environmental Instruments

The individual stimuli that determine an environmental evaluation may be presented in a number of different methods. These instruments encompass the use of adjective checklists, multiple sort tasks, bipolar scales, and unipolar scales. The adjective checklist seeks to describe the physical environment such that individual impressions are elicited and responses to perceptual cues of architectural environments are unearthed (Kasmar, 1970). Here, participants are given adjectives (Taylor, Zube, & Sell, 1987) or adjective pairs (e.g., large-small) (Kasmar) that are potentially appropriate for describing an object or environment. Respondents are then asked to check all the adjectives or adjective pairs that are applicable to the specific object or environment under examination (Kasmar; Taylor, Zube, & Sell). One principal aim of adjective checklists, aside from correctly assessing physical surroundings, is the generation of understandable adjective pairs that can be employed by both architects and nonarchitects in the evaluation of objects or environments (Kasmar).

Although the objective of adjective checklists is acceptable, there is a paucity of research associated with the production of meaningful words or phrases to be used in environmental perception experimentation. Therefore, experimenters must utilize existing checklists that may not be as empirically reliable and valid as an instrument that is constantly evolving or an instrument that has been psychometrically established within

the research community. More research regarding the creation of adjective checklists is necessary if experimenters are to employ this research instrument in future experiments. In addition, shortcomings connected with verbal stereotyping and the overabstractness of the checklists' verbal components (i.e., some researchers believe that verbal elements are merely speculations of the direct, specific responses to a particular environment) have attenuated the prominence of the instrument in the environmental psychology literature (Bechtel, 1987).

A second research tool that may be used when relating individual perceptions into meaningful analysis is the multiple sort task. Here, participants are asked to make discrete categorizations of a set of elements based upon considerations of the perceived similarities among the elements (Groat, 1982). According to Groat, free category sorts, Q-sorts, and other multiple sorting procedures may be administered such that respondents' judgements are uncontaminated by preformulated ideas and, therefore, reflect the preconceptions of the researchers. Furthermore, this research instrument has the added advantage of consuming less experimental time than pairwise similarity judgements (i.e., bipolar scales), the procedure eliminates the necessity to depend upon a priori rating scales, and multiple-attribute domains may be assessed using either a verbal or nonverbal sorting task measure (Groat).

Nevertheless, the multiple sorting task does possess disadvantages that should be outlined if future implementation is to occur with this instrument. First, multiple sorting procedures, unless otherwise stated, do not explicitly encourage participants to verbally label the dimensions created when making meaningful judgements on environmental

evaluation tasks (Ward & Russell, 1981b). Without some recognition on the part of the participants as to why they have categorized stimuli into certain groupings, researchers can only make educated guesses concerning participants' perceptions and evaluation methods. These conjectures cannot provide experimenters with sound, empirical evidence to support their hypotheses and, therefore, limit the applicability of the research tool.

Second, the use of multiple sorting procedures in investigations where new or modified models or theories are proposed may restrict the number of interpretable dimensions sought to be discovered (Ward & Russell, 1981a). Asking participants to sort photographs, for example, of urban scenes in an examination of the meaning of modern and postmodern buildings (Groat, 1982) may only elicit a few translatable dimensions; however, these dimensions may not be independent of one another, nor may they capture the spectrum of the participant's perceptions of these scenes. Third, multiple sorting techniques used in conjunction with multidimensional scaling, a statistical procedure that utilizes individuals' estimates of the distances between structures within a large-scale environment (Bell et al., 1996), may yield a rotation of structures that are arbitrary and unreliable (Ward & Russell, 1981b). As a result, further statistical analysis will be skewed and experimental outcomes will be distorted.

Another research instrument that experimenters have continued to use in environmental evaluation studies has been the bipolar scale. One type of bipolar scale, the semantic differential, was first established by Osgood (Osgood, Suci, and Tannenbaum, 1957) and employed to assess connotative meanings of language. The device uses a series of bipolar adjective pairs with seven spaces -- each assigned a number – in between the

adjectives. An individual is asked to evaluate an object or environment and then place a check in the space indicative of how close that object or environment is to either adjective (Bechtel, 1987; Hershberger, 1988). Once an individual has completed the semantic differential, the chosen numbers associated with each space are added and then averaged in order to obtain a mean score concerning how he or she evaluated the object or environment.

Although the semantic differential technique has been widely utilized in environmental psychology research (e.g., Craik, 1968; Hershberger, 1969, 1972; Hershberger & Cass, 1988; Kasmar, 1970; Oostendorp, & Berlyne, 1978), opponents of this method believe that problems have surfaced regarding unintended applications of the instrument. For example, when experimental participants are presented with a stimulus, researchers often assume that the participant will respond to the whole stimulus rather than a component part (Bechtel, 1987). This may lead to confusion on the part of researchers because they may be investigating one phenomenon while their participants are attending to another stimulus. A second example pertains to the difficulty associated with obtaining a representative, standardized sample of architectural environments (Bechtel). Most researchers have taken an ideographic approach to achieving representativeness and are, therefore, deferring any attempts to develop standardized samples until more data accumulation is completed (Bechtel). Without a comprehensive catalog of settings, however, researchers will not be capable of applying the semantic differential to an extensive range of architectural surroundings.

Third, bipolar scales, in general, utilize adjectives that are not diametric to each

other, thereby creating discord on the part of the experimental participant. In the semantic scales developed by Hershberger and Cass (1988), for example, the authors used the adjectives "rugged" and "delicate" to convey bipolar meanings in their primary scale. However, alternative antonyms for rugged (e.g., level, polished, refined, slippery, and smooth, New Illustrated Webster's Dictionary of the English Language, 1992) do not, necessarily, connote delicateness. As a consequence of a difference in adjectival connotation, individuals evaluating objects or environments using these scales may misinterpret researcher-intended meanings and inadvertently provide experimental effects that would otherwise be absent. Fourth, many researchers who have employed the semantic differential in their studies (e.g., Hershberger & Cass; Locasso, 1988; Talbot, 1988) have only provided semantic profiles, or mean ratings of the semantic differential scales, rather than supplying readers with statistics of an inferential nature (e.g., multiple regression analysis, factor analysis). Although descriptive statistics are important for discovering initial trends in the data, inferential statistics will often confirm these trends and uncover additional results that cannot be found from simply computing means and standard deviations.

Fifth, although the popularity of bipolar scales has meant refinement of the research instrument over the years, there have not been many studies conducted that examine the scales' psychometric properties. Indeed, more research is needed concerning the convergent, discriminant, and ecological validity (Hershberger & Cass, 1988), and reliability of bipolar scales in order for this tool to gain acceptance as a meaningful assessment device. Finally, Danford and Willems (1975) asserted that all scaling

instruments did not adequately capture differences in presentation mode (i.e., simulation vs. real environment vs. imagination) nor did the instruments measure what they were purporting to assess, and were, therefore, ineffective for application purposes. However, without new forms of stimuli evaluation that are empirically merited and widely accessible, experimenters will continue to employ established research instruments and attempt to refine the scales, checklists, and so forth, in an effort to achieve higher validity and reliability values.

A similar research tool that assists the study of the connotative meaning of adjectives is the unipolar scale. This instrument utilizes one adjective or a phrase instead of two, opposite adjectives, and a varying rating scale depending on the type of experiment. Individuals are simply asked to evaluate an object or environment according to the adjectives provided, and then respond using the accompanying rating scale. In the case of phrases, researchers may employ several words (e.g., invokes a peaceful feeling) in order to accord experimental participants with a greater scope of judgmental attributes when evaluating an environmental stimulus. In this study, a 5-point, unipolar rating scale was employed with adjectives comprising seven distinctive dimensions. Although studies assessing the effectiveness of unipolar scales have been sparse (e.g., Alp, 1993; Cherulnik & Wilderman, 1986; Kaye, unpublished), these scales do not possess the connotative problems that beset bipolar scales (e.g., confusion resulting from antonym ambiguity, Alp) and are, therefore, a better choice for this proposed project.

Representation of Environmental Space

In addition to issues concerning environmental instruments utilized in eliciting

evaluative responses, researchers must also be cognizant of the various simulation forms of delineating a space. McKechnie (1977) has created a typology based upon a static-dynamic and conceptual-perceptual dimension that has aided in the categorization of most simulation techniques. Static conceptual simulation examines abstract forms of environmental information using maps, floor plans (Bosselmann & Craik, 1987), and even holograms (Canter, Benyon, & West, 1973), whereas dynamic conceptual simulation conveys the abstractness via computer modeling programs (Bosselmann & Craik) such as CADD, or computer-aided design and drafting. CADD enables architects and designers to produce three-dimensional or perspective views of projects from plans and elevations, or to draw a project from the beginning with easy adaptability with respect to potential alterations in design (Sheppard, 1989). Additional computer programs can simulate environments through the use of high-resolution color graphics that may be developed with fractal imagery or laser-tracing, or via texture mapping -- a combination of solid-modeling with video-capture of real-world surface textures (Sheppard). At this point in time, however, these simulation packages remain expensive and are not equipped, at the personal computer level, with the same precision as larger programs (e.g., the Berkeley Environmental Simulation Laboratory) (Sheppard).

Static perceptual simulation replicates specific physical settings through drawings, sketches, and photographs, whereas dynamic perceptual simulation involves filmed tours of scale models of places (Bosselmann & Craik, 1987). Regarding the latter, studies by Alp (1993) and Baird, Cassidy, and Kurr (1978) have both utilized models of rooms in order to assess aesthetic-emotional effects and room preferences, respectively. In

addition, Nasar and Arias (1982) employed color videotape simulation -- a medium of presentation that is capable of digitizing photographic slides or video frames and altering or superimposing objects on a computer screen (Sheppard, 1989) -- in their study regarding differences in environmental preference and cognition between American and Japanese students. Furthermore, attempts have been made to assess individual performance using simulation via navigational training. For example, Edwards, Hahn, and Fleishman (1977) evaluated the relationship between the street performance of taxi drivers and drivers' performance on two standard auto driver simulators. Results in this study failed to establish any significant association between on-road performance indices and simulation scores (Edwards et al.).

Finally, dynamic perceptual simulations can be illustrated by the use of films, movies, and television (Bosselmann & Craik, 1987). Here, real-world settings or events -- or mock-ups of these settings or events -- may be employed, for example, in public hearings where environmental designers and planners are proposing to alter or add to a physical surrounding or structure. Individuals can view a film, movie, or television program, evaluate what is being proposed, and then decide upon a course of action. The present research project utilized high-quality, black-and-white sketches to visually represent the space; therefore, a discussion of McKechnie's (1977) static perceptual dimension is appropriate in this instance.

According to Sheppard (1982), sketches, line drawings, and photomontages have predominated in simulation projects directed at large-scale impacts (e.g., Canter, 1969; Garling, 1970; Nasar, 1988b; Seaton & Collins, 1972). Moreover, the use of photography,

in the form of color or black-and-white prints and color slides, has been implemented in many studies. This research ranges from analyzing environmental inferences regarding places to eat based on restaurant facades (Cherulnik, 1991), creating a taxonomy of psychological reactions to the built environment (Oostendorp, McMaster, Rosen, & Waind, 1978), and examining how individuals respond to design strategies respecting the fit of a new building into an historic district based on the theory of place meaning (Day, 1992). This type of static-perceptual representation of an environment is highly controlled by the researcher (Bosselmann & Craik, 1987; Nasar, 1988a) because he or she is capable of selecting the perspective, viewpoint, and focus of view (Bosselmann & Craik). In addition, the producer of these simulations can alter the texture, color, shadow, light, and usage of various environmental features in order to emphasize or distort their presence or absence (Bosselmann & Craik).

Despite the advantages of using static-perceptual simulation techniques, there are some limitations. First, photographs, sketches, and line drawings only permit a single, unchanging view of the real or imagined environment that cannot be transformed to illustrate the perceptual transactions among the various elements comprising the setting (Bernaldez, Ruiz, Benayas, & Abello, 1988; McKechnie, 1977). Second, studies regarding the effectiveness of sketches of environmental settings can only be derived from limited, empirical research (Craik & Feimer, 1987). For example, Schomaker (1978) and Kileen and Buhyoff (1983) have both discovered high correlations between sketches and slides in their research concerning scenic beauty ratings and landscapes, respectively. However, these studies did not compare the effectiveness of simulations

with on-site experiences, nor were any psychometric properties expounded. Further empirical testing is needed in order to substantiate the reliability and validity of utilizing sketches in experimentation. Third, researchers using photographs in their environmental evaluation studies must acknowledge the plethora of variables that could account for the variation in preference from one photograph to another (Kreimer, 1977). The author lists variables including the type of camera lens utilized when taking a photograph, the depth of focus in the photograph, the scale of different elements within the landscape, the time of day, and the season, all of which could contribute to incongruous preferences on the part of the participant.

Fourth, akin to the paucity of quantitative analysis with sketches, experimentation employing photographs should be assessed for reliability and validity. For example, in Coeterier's (1983) study, participants evaluated five photographs of fields and then visited the places in-person judging both on spaciousness, intensity of people use, historical character, and so forth. Results from a post-experimental discussion group indicated that photographs only showed part of the landscape, they possessed poor depth and less detail than the real-world, they did not adequately show microrelief (e.g., the slope of a hill), and the five senses were more limited when assessing photographs in comparison to real-life settings (Coeterier). Although the participants' opinions appeared valid, they were generated informally and are, therefore, not empirically acceptable. The author should have recorded these words and phrases and attempted to accord empirical significance to the comments in a follow-up study employing a similar experimental design. Fifth, the utilization of black-and-white photographs do not transcribe a true sense of the

environment that has been photographed (Kreimer, 1977). Instead, the photograph reproduces gradations of a greyish tone that do not correspond to our "reality" (Kreimer).

Overall, however, simulation of space is an important technique in environmental assessment and evaluation. Bosselmann and Craik (1987) asserted that applications of perceptual representations can assist researchers not only with preconstruction evaluations of proposed changes to an environment, these simulations can also facilitate public participation (e.g., Appleyard, Bosselmann, Klock, & Schmidt, 1979), help to advance environmental education (e.g., Bosselmann & O'Hare, 1983), illustrate basic planning issues, and foster ongoing research in environmental psychology (e.g., Groat, 1983b). However, issues of ecological validity, referring to the applicability of laboratory results to real-world settings, must be contemplated whenever simulations of a real or imagined environment are to be employed in research. Fortunately, as Kaplan (1993) points out in a discussion of theoretical and methodological issues regarding environmental simulation, research by Hunt (1985), Kaplan, Kaplan, and Deardourff (1974), and Seaton and Collins (1972) (see also Law & Zube, 1983) has illustrated that more detailed models do not necessarily result in more utility because individuals' cognitive structures are not as descriptive as complex, high-detail, dynamic conceptual or perceptual models.

Guidelines and Standards

The decision making process concerning the perpetuation and maintenance or destruction of heritage and historic buildings may be influenced by the creation and introduction of criteria or guidelines. These standards are often used in the designation of

particular buildings, districts, or cities, where certain design attributes are sought for protection purposes. In the United States, the Department of the Interior has established a set of standards for the preservation and rehabilitation of historic properties listed in the National Register of Historic Places (U.S. Department of Housing and Urban Development, 1977; Hume & Weeks, 1983; Morton & Hume, 1979). These standards are meant to be general in nature because each property on the National Register possesses unique characteristics respecting site and district location, architectural style, local and cultural significance, and so forth.

According to the guidelines, every reasonable effort is made to utilize properties for their originally intended purpose or to provide a compatible use for properties requiring minimal alteration (Hume & Weeks, 1983; Morton & Hume, 1979). In addition, preservation and rehabilitation work should not destroy distinguishing features or character of buildings, structures, or sites, nor should removal occur of any historic materials or distinctive architectural features. In fact, all properties should be acknowledged as products of their own time period, and distinctive stylistic features that characterize buildings, structures, or sites should be treated with sensitivity. Alterations that have taken place over time should be recognized as part of the history and development of these properties, and deterioration of architectural features should be repaired rather than substituted with incongruous materials or designs (U.S. Department of Housing and Urban Development; Hume & Weeks, 1983; Morton & Hume). Furthermore, the Department of the Interior recommends that cleaning of surface elements should proceed under the gentlest of care; an adequate effort should be made to

protect and preserve archaeological resources impacted by historic preservation or rehabilitation projects; and, contemporary design for alterations or additions to existing buildings, structures, or sites should be encouraged when such design does not destroy significant historical, cultural, or architectural material, and the design is compatible in size, scale, color, material, and character to the properties, neighborhood, or environment (U.S. Department of Housing and Urban Development; Hume & Weeks; Morton & Hume). Finally, if alterations or additions were to be removed in the future, the essential form and integrity of the original properties would be unencumbered (U.S. Department of Housing and Urban Development; Hume & Weeks; Morton & Hume).

There are many examples of buildings, sites, and districts in the United States that have benefitted from the implementation of these historic guidelines, either via direct involvement with the federal initiative or via the adoption of state and municipal standards that possess similar regulation characteristics. For example, in Beacon Hill, an historic area in Boston, Massachusetts, specific standards have been invoked in order to preserve the sense of architectural unity and feeling of history (Beacon Hill Civic Association, 1983) that surrounds Boston's past. Sign design for structures are to be limited to a single sign with trademarks restricted to 25% of the sign area. Signs should also be integrated architecturally with the building, not eclipse any architectural detailing of the building facade, and use as few colors as possible (Beacon Hill Civic Association). Doorways should be preserved to their original design, allowing for a short flight of stairs running up to the recessed main door of a house and the maintenance of sidelights and transoms. Windows, which are always constructed as double-hung sash (a window with

two frameworks that hold pieces of glass together, arranged vertically, and open either by sliding the upper sash down or the lower sash up, Identifying architectural styles, 1991) should be open and large, repeating at regular intervals. Bay windows and oriels (a bay window located on an upper storey, Identifying architectural styles) should also accent the building facade (Beacon Hill Civic Association). Young trees lining the residential streets must be protected from automobiles and dogs via a sturdy, 7.62 cm pipe driven into the ground at the curb line and a low fence (Beacon Hill Civic Association). Finally, television antennas, cables, and air conditioners, should be installed in rear windows or kept underground, or, if appearing in storefront windows, must not project beyond the building facade and must be painted to match the window trim (Beacon Hill Civic Association).

Another example of the adoption of standards in an historic community or district in order to preserve and protect the past comes from Savannah, Georgia (Beasley, 1980; Lu, 1980). According to Beasley and Lu, Savannah's guidelines were among the first in the United States to generate definitive statements regarding the preferred design relationship between old and new via the addition of infill structures. Infill may be defined as the insertion of a new building into an existing urban setting (Ray, 1980). Infill structure design is often based on abstractions, buildings created from urban design, background buildings, structures that become a focal point in a community or neighborhood, or reproductions from the past (Ray). In the case of Savannah, the latter approach to infill was adopted and an ordinance was drafted to ensure that these new reproductions would not disturb the already identifiable historical and architectural merit

of the surrounding area (Beasley). Essentially, ordinances are documents outlining both regulations and procedures relating to an area that are reviewed by an administration board (Beasley). The board members must provide a compendium of new construction sites in addition to whether or not they have approved or disapproved of the proposed construction. Most ordinances do not elaborate on the requirements for new construction; however, the Savannah ordinance is quite detailed, listing general design elements that are to be recommended in both new construction and alterations to existing structures (Beasley).

The Savannah guidelines examined 16 issues relating to height (e.g., new buildings must be within 10 percent of the average height of adjacent buildings), proportion of front building facades (i.e., relation between width and height), proportion of openings (i.e., height-to-width relation of doors and windows), rhythm of solids to openings in facades (i.e., sequence of strong and weak elements), rhythm of spacing on street (i.e., sequence of building masses and spaces), rhythm of porch projections and other entranceways (i.e., relation of entrances to sidewalks), materials (i.e., the area's prominent materials), textures (i.e., prominent texture may be smooth or rough), color (i.e., prominent color may be natural or painted), architectural details (e.g., prevalence of cornices, arches, quoins, wrought iron, chimneys), roof shapes (i.e., a majority of one roof type), walls of continuity (i.e., walls, fences, landscaping, building facades or combinations of the above must form cohesive enclosures on the street), landscaping (i.e., mass and continuity of quality and quantity of landscaping), ground cover (e.g., brickpavers, cobblestone, granite blocks may predominate), scale (i.e., size of nits and

detail in relation to people; relation of building mass to open space), and directional expression of front (i.e., shape, placement of openings, and detail provide a prominent vertical, horizontal, or nondirectional character) (Lu, 1980). Of these 16 guidelines in the ordinance, only the height requirement is mandatory. As a result, some flexibility is allowed when new buildings are to be constructed in the historic Savannah area. Nevertheless, the ordinance administration board must approve these new infill structures, and the construction must fulfill all the requirements that the guidelines propose to accomplish.

A third example of standards establishment is found in the surrounding townscape of Plaza/San Francisco in Sante Fe, New Mexico (Moul, 1994). Here, the city has applied a design review, or the public examination of private development proposals (Scheer & Preiser, 1994), in order to promote general harmony between structures in the historical districts and those areas of more recent construction outside the historical districts (Moul). These standards were influenced by the precipitous ingress of franchises and franchise architecture in the 1970s (Moul). In response to this architectural style, many concerned citizens endeavored to enact some form of design control over new construction. In 1988, an ordinance was passed, comprising of a point system based on the characteristics of Sante Fe architecture, including massing, roof shape, materials, textures, and colors (Moul).

The design objectives of the ordinance specified that narrow streets and continuous street facades were to be maintained; additional portals, or the pedestrian openings on porches, were to be encouraged in order to provide continuity of building

mass and enhanced pedestrian use; and building heights were to be limited to the heights of existing structures. Moreover, the ordinance identified that high walls were to be advocated to separate open or vacant areas to contribute to continuity of street facades, landscaping was to be confined to walled courtyards, and the verticality of facades on San Francisco street were to be emphasized (Moul, 1994). In addition, other sections within the ordinance examined issues of building type (e.g., primarily two storeys on narrow, deep lots), architectural style (e.g., Pueblo Spanish, Territorial), building height (e.g., maximum 129.60 m), wall height (e.g., must be stuccoed masonry between 2.16 m and 2.88 m), building placement and setback (buildings set back from the front property line must have a solid wall at the front property line or the front yard shall be 80% paved and designated for public use), and placement of parking (e.g., parking shall be located off-site or in a rear yard) (Moul). Overall, the ordinance governing this area has gained acceptance within the community due to its flexibility with design elements and its unrestrictiveness regarding any particular architectural style (Moul).

A related example of successful guideline implementation due to design review can be found in Phoenix, Arizona. The city has enacted a design review in order to actuate favorable, rather than slower, development, and to establish potential cooperation between neighborhood and urban planning interests (Gammage, 1994). A design review standards committee, composed of design professionals, neighborhood advocates, and attorneys, was assembled and it was decided that the enforcement of a city-wide artificial style or theme was undesirable for Phoenix (Gammage). Rather, the committee felt that the development and design process should focus on design quality, addressing issues of

amenity and comfort (e.g., responsiveness to climate), visual interest (e.g., promotion of a variety of architectural styles), views (e.g., protection of major vistas such as mountains or natural landmarks), cultural history (e.g., enhancement of historical and cultural qualities that are distinctive to the area), and contextualism (e.g., relation of size, character, and setting of projects to their specific contexts and functions within the immediate environment) (Gammage). According to the article, the design review process has been effective in structuring an exchange within the community and fostering the establishment of a design language that can be employed in other settings. However, in the case of Phoenix, the standards invoked were not used in the protection of a particular architectural style or heritage, but were implemented in order to reflect quality design elements that incorporated various styles (Gammage).

A more nationally relevant example of standards that may be applied to heritage and historic areas is found in Brandon, Manitoba, where design guidelines have been voluntarily instituted to assist homeowners and governments in the city's central district (Design Guidelines, 1985). Here, individuals owning historic houses (i.e., pre-1920s Victorian, Design Guidelines), designated by Brandon as possessing historical character, may utilize the guidelines to renovate and maintain residential building exteriors. Governments, on the other hand, may facilitate the direction of historic district character through the use of these standards. Overall, Brandon's historic guidelines are very detailed, encompassing aspects of street space (e.g., scale, edges, paving, trees), building types (e.g., small, 1- and 2-storey houses; mansion; bungalows), building features (e.g., roofs and dormers, porches, windows and doors), and colors (Design Guidelines).

Nonetheless, the specificity within the guidelines should, according to its authors, benefit the population as a whole in terms of increasing economic activity within the area, augmenting tourism, and bolstering community pride (Design Guidelines).

Another important issue regarding standards and guidelines includes the proposal of new buildings or additions to existing buildings within an area. The latter instance may involve notions of fit or harmony between a building and its addition. The Federal Heritage Buildings Review Office in Canada (1996), in their code of practice for preserving and conserving heritage buildings, has defined fit as a concern for compatibility of the parts and the whole in order to re-constitute harmonious relations between a building and its site. In the case of maintaining physical values, the Federal Heritage Buildings Review Office asserts that preserving significant relationships between building elements and the whole is of primary emphasis. In the present project, notions of fit, harmony, and compatibility were synonymous.

In addition to the definition provided by the Federal Heritage Buildings Review Office (1996), perceptions of fit may be described in terms of various architectural features, including massing, site location, facade, ornamentation, and so forth. According to Groat (1988), massing is the volumetric composition defined in terms of design attributes incorporating height, shape, and complexity of overall form. Site organization may be explained as the basic spatial pattern that a building imposes on the setting defined in terms of setback distances, landscaping patterns, and circulation pathways (Groat). Facades concern the surface treatment of the planes that define the shell of the building (Design Guidelines, 1985; Groat; Identifying Architectural Styles, 1991).

Finally, ornamentation, already defined by Bucher (1996), can be interpreted as an object, or series of objects, added to a rudimentary structure for the purpose of enhancement of visual appearance. These descriptions of various architectural features can assist in arriving at a more encompassing definition of compatibility that can be operationalized and employed in future research. The present project manipulated massing -- defined in terms of a height-to-width ratio -- and architectural detailing -- delineated by the presence or absence of eight quoins and window treatments -- in order to discover whether or not these elements contributed to perceptions of fit and overall preferences for heritage and historic urban streetscapes.

Contextual Compatibility

As already defined by Groat (1983a), contextual fit refers to the perceived compatibility between new, physical entities and the insertion of these entities into an existing setting. In this project, however, there was an examination of heritage and historic buildings (i.e., old structures) within already developed surroundings. This notion of compatibility, and indeed the perceptual processes involved with responses of preference to heritage and historic urban street scenes, is the result of one aspect of a categorization of physical and abstract properties (Nasar, 1989) that can help guide behavior, foster the development and use of cognitive maps, and encourage learning (Kuller, 1991).

Contextualism has not only pervaded the molar environment, such as urban centers, but has expanded to include the macro environment of towns and larger cities. Indeed, Richards (1994) has argued, in the absence of empirical evidence, that townscape

evaluation focuses on the fundamental character and quality of groups of buildings and the spaces defined by these buildings rather than how individual structures appear in terms of architectural style, age, and materials. In the case of entire urban environments, the facades encountered are often the result of an assortment of various styles that may increase the character of a district (Fleming, 1982; Nasar, 1998); however, this stylistic mixture may also create unfavorable reactions due to inconsistencies regarding massing, location, and the presence or absence of facade detail. Therefore, reconciling issues of congruity and modification -- particularly in urban centers where heritage and historic buildings are present -- are essential to the continuity and variety of urban scenes (Hopkins et al., 1993).

One way to mollify these contextual problems is through the concept of change management. According to Biddle (1980), change management "attempts to control and measure the rational modification, and occasionally even the removal, of the old and the introduction of the new" (p. 11). However, if this concept is to be implemented properly such that new and old are juxtaposed within an heritage or historic area -- or even for older building styles to achieve harmony with each other -- the techniques of urban design, rather than merely the design of one building, should be the focus (Overby, 1980).

The Importance of Facade Detail in Contextual Compatibility

Groat (1983a, 1983b, 1984, 1988, 1994) has written about the notion of contextual fit in urban settings and has attempted to answer questions concerning the potential for identifiable guidelines, criteria, and constructs used in the assessment of contextualism.

Issues of massing and location have been discussed, but the underlying theme in much of Groat's research has been the significance of ornamentation, or facade detail. In one study, Groat (1984) interviewed 73 nonarchitects and asked them to rank order 25 color photographs of urban scenes according to participants' preferences for contextual compatibility. Four years later, Groat (1988) extended this study by interviewing 24 individuals considered to be experts in the design field and having them establish a rank order of the same color photographs based on the extent of their like or dislike of the relationship between an infill building and the surrounding environment. The author also inquired as to what specific features of those buildings connected them to each other. Groat found in both studies that the physical features most associated with the notion of compatibility was facade detail as opposed to massing or site location, and that architects and nonarchitects preferred a high degree of replication in the composition of facades.

Extrapolating from these results, Groat (1984, 1988) concluded that architects must be willing to embrace an evolutionary perspective toward design rather than a revolutionary position, thereby consolidating both new and old design elements in order to achieve harmony between contrast and replication. This architectural compatibility can involve the re-interpretation of traditional facades that still express novelty and character to individuals and the exploration of new strategies for obtaining and retaining the palatial ornamentation representative of older buildings (Groat). Although Groat's work does support the emphasis of facade detail in streetscape evaluation, questions regarding the demographics of the architects and nonarchitects in the study, the survey instrument, the complexity of the statistical procedures used in data analysis, and the theoretical

conclusions and implications limit the scope of applicability of results.

With respect to the demographics of Groat's (1984, 1988) participants, the author stated that the architects and nonarchitects were representative of the upper Midwest and metro-Milwaukee area. This representation, however, only exhausts one geographic region of the United States, calling into question the generalizability of the study. Replication of Groat's work in other locations (e.g., the United States west coast, the southern region in America) would be beneficial in order to examine the relevance of the outcomes. In addition, the author did not provide a demographic composition of the nonarchitects, communicating only that the "nonexpert groups were actually users and residents or neighbors at the sites of three of the simulated urban areas" (Groat, 1988, p. 236). If a further breakdown of participants' age, race, socioeconomic and marriage status, and education level were reported, then subgroup differences might have emerged that could have been partialed out of the analysis and stronger, more statistically significant results could have been produced.

The survey instrument used in Groat's (1984, 1988) studies was a face-to-face interview, the most widely used data-gathering technique in surveys (Marans, 1987). Even though interviews offer researchers the capability of obtaining large amounts of information in a relatively short period of time, the interviewers, themselves, generally require a high level of training, and the possibility of social desirability on the part of the respondents is magnified (Marans). In the case of Groat's studies, there was no indication that any kind of standardized interview technique had been used during the interview process (see Rubin & Rubin, 1995). Without further description of the details of the

interview, replication of the study is hindered and the empirical validity of the research is called into question.

Finally, the statistical procedures employed by Groat (1984, 1988) in order to obtain the results concerning contextual compatibility were not rigorous enough in terms of certifying the conclusions and implications that were evoked. The author made use of mean rank order scores, correlation coefficients, and scalogram analyses, all of which "demonstrate" -- in Groat's (1988) words -- that replication was the most preferred design strategy, that architects and nonarchitects possessed similar preference judgements, and that architects should adopt an evolutionary disposition toward urban design. However, correlational research and the use of descriptive statistics, such as the computation of mean scores, does not allow for a cause-and-effect explanation to occur; rather, this research can only suggest that results *might* indicate patterns of judgements or evaluations of contextual compatibility. More complex statistical procedures, including ANOVAs and factor analysis, involving the manipulation of the urban scenes could have justified Groat's results and furnished the design community with empirical evidence for the notion of contextual design.

Other researchers have also acknowledged the importance of ornamentation in evaluation of urban streetscape contextual compatibility. For example, Oostendorp, McMaster, Rosen, and Waind (1978) found that traditionally designed buildings possessed more detail, particularly curves and ornaments, and that building entrances containing these design features were rated as more interesting, vivid, and unusual. In addition, Oostendorp and Berlyne (1978) discovered that attributes, including curves,

shapes, angles, colors, and ornamentation, pertaining to the aesthetic and technical organization of architectural styles were salient characteristics in determining similarity judgements and subjective perceptions of buildings. Furthermore, based upon the results of his study respecting participants' responses to facades, Krampen (1979) ascertained that ornamental detail was important in the generation of a set of connotative meanings specific to certain architectural styles. The author compared the reactions of observers to a grouping of pre-1900 facades with high-level detail and a selection of post-1945 facades without detailing. Results revealed that the former buildings were correlated more with positively-valued adjectives whereas the latter buildings were correlated more with negatively-valued adjectives. This finding illustrates Krampen's point that facade design may effect personal semiotic structure, or how individuals analyze the mechanics of signs operating in and beyond human communication.

Richards (1994), another writer who recognizes the significance of facade detail in townscape evaluation, believed that

> The facades of buildings are powerful elements in displaying the fabric of settlements, including color, texture, grain, age, scale, style, character, history, and uniqueness....[S]treet frontages...create local identity. Historic facades bring the pattern of age, which is irreplaceable (p.64).

Richards (1994), like Krampen (1979), attached connotative meaning to structures and maintains that facadism, or the practice of constructing new buildings behind preserved historic facades or replicas, is one method of protecting the ornamental detail of older buildings. Ray (1980) also believed that facade detail is important because

decoration benefits original buildings that are seeking additions. By using abstractions of these structures that are not entirely historic or contemporary, harmony between the old and the new can be fulfilled and the essence of the original building can be replicated without decidedly reproducing the structure (Ray). One disadvantage of this concept, however, is that the structure's massing, rather than its facade detail, is highlighted. As a result, this apparent "loss of ornamentation" (Ray, p. 65) can unremittingly change the scale of the existing building. Finally, Brolin (1976, 1980, 1985) has asserted that facade detail is a key design feature in the evaluation of contextual compatibility. By infusing urban street scenes that are incongruous in terms of height, materials, and proportions with a consistency of small scale detail, the author believes that a contextual fit will be achieved. However, Richards', Ray's, and Brolin's statements suffer from a paucity of empirical evidence suggesting that these intuitive assumptions may not be valid. Future experimental testing is needed if confirmation of these author's perspectives are to be confirmed.

Cautions Concerning Design Theories

The above examples have been derived from guidelines and standards, writing on contextual compatibility, individuals or groups comprising the design professions, neighborhood interest groups, developers, and government, researchers. All of these constituencies have attempted to establish design criteria for various buildings, districts, and cities within an area (see also Brolin, 1980; Federal Heritage Buildings Review Office, 1996; Groat, 1983, 1994; Kalman, 1980; Nasar, 1994; Radford, 1994; Ward, 1986). Although these endeavors are admirable, most of the standards, guidelines, and

applications represent the opinions and speculations of what *should* be enacted based upon a select few, and are, therefore, largely untested from an empirical standpoint. In fact, the design professions, as a whole, possess a limited empirical tradition with respect to aesthetics, contextual compatibility, the importance of facade detail, and other environmental issues, thereby relegating many of their theories to the domain of well-intentioned conjecture. Fortunately, the behavioral sciences, in particular environmental psychology, possess the sufficient, quantifiable knowledge that can assist the design professions in providing an experimental basis to many of their assumptions. Indeed, the present project examined two of these empirically untested theories and attempted to quantify them in the broader environmental and design domain; one theory concerned the question of who perceives contextual compatibility in environmental evaluation and the other theory involved the significance of building facade detail in the assessment process. This research utilized unipolar rating scales, specific manipulation of architectural features, and complete, rigorous control of extraneous variables in order to achieve these objectives.

Although the research is sparse, there are some studies that seek to quantify many of the design professions' theories and utilize these results as evidence for the presence or absence of actual effects. One theory that the design profession has attempted to develop is the possible variance between designers and nondesigners with respect to environmental preference. For example, Espe (1981) discovered that German and Swiss architects and nonarchitects differentiated between Nazi style architecture and its model, the classicist style, in terms of the former buildings' attributes. Looking at black-and-

white slides, participants isolated Nazi style structures in terms of their simplicity (e.g., absence of decoration), uniformity (e.g., replication of windows and doors), intimidation and brutality (e.g., exaggeration of dimensions), and solidity and eternity (e.g., heavy building blocks) (Espe). Alp (1993) also attempted to unearth differences between two groups of participants -- design-oriented and nondesign-oriented -- in his within-subjects designed study concerning the aesthetic and emotional effects of systematically manipulated architectural spaces. Using undergraduate and graduate university chemistry and architecture students, the author asked participants to rate 3-dimensional models of rooms comprising either a square, circular, or triangular configuration utilizing unipolar rating scales. Results illustrated a within-group effect for the chemistry students (i.e., they preferred the circular layout to the triangular layout) but no between-group effect emerged (Alp).

A third example of empirical research related to the differences between designers and nondesigners can be found in the work of Hubbard (1996). Hubbard was interested in examining the environmental preference patterns between planners and the lay public, conjecturing that the social representations of both groups would correspond because of the contingent interdependence of such representations. The participants were shown 15 color photos of urban scenes, and immediate surroundings, and were asked to categorize the photos using a multiple sort technique. Contrary to the hypothesis, the results indicated that the groups' environmental preferences were different. Hubbard suggested that these preferences, and the social representations of the planners and lay public, were shaped by individuals' insertion and exchange with specific sets of social relations.

Individual variation, therefore, did not manifest because of discrepancies in cognitive competence; instead, this variation was caused by social regulations intervening in shared knowledge structures (Hubbard). Hershberger (1972) and Canter and Wools (1970) have also compared a variety of groups, ranging from nonarchitects, prearchitects, architects, and homemakers, and have empirically confirmed that distinctions exist between these groups regarding the comprehension of architectural surroundings and the importance of seating arrangement and room shape on perceived friendliness of a room, respectively.

Another example of researchers' attempts to empirically test design profession theory is Herzog, Kaplan, and Kaplan's (1976) study concerning the preference for, and familiarity of, urban places. Here, the authors found that college students were more familiar with older buildings than newer buildings. Herzog et al. implied from their results that this familiarity could evoke individual feelings of authenticity and "old-ness," and thereby promote the preservation movement. Finally, Herzog and Gale (1996) have ascertained that the strength of building preference is moderated by building maintenance and a nature context. Results revealed that contemporary buildings were preferred to older buildings when poor maintenance was a contributing factor; however, when maintenance was treated statistically, the reverse occurred (Herzog & Gale). In addition, the authors found that a positive relationship existed between nature care and preference for older buildings surrounded by tended nature. Practical implications from this study provide support for both the preservation movement and the return of visual-richness features in architecture, including curves, columns, and varied textures and colors (Herzog & Gale).

The above research indicates that experimental methodologies can be implemented in order to acquire understanding about how individuals perceive and evaluate architectural spaces, particularly older, heritage, or historic buildings. However, in the context of preservation standards, there are substantial gaps in our knowledge that need to be filled. First, design professionals need to understand the role of discrete design elements in evaluative responses. Individuals can quickly assess objects or environments on a unipolar scale (e.g., beautiful) and supply a response that is a gradation of that scale (e.g., somewhat beautiful). However, they may not be able to respond to an object or environment using design-generated, enigmatic adjectives (e.g., phlegmatic). The behavioral sciences have assisted in this area by attempting to develop empirically-validated lexicons of appropriate descriptors for objects and environments that can be employed by architects and non-architects alike. In essence, the more the vocabulary is psychometrically assessed, the possibility for refinement of terms will increase in addition to the instruments' applicability.

Second, there must be an empirical acknowledgment of the variables that affect the heritage and historic character of urban streetscapes. These variables encompass the anthropological, cultural, economic, environmental, legal, social, and so forth, nature of society, all of which contribute to individual and group evaluation. Researchers should seek to empirically test these aspects of society in order to better understand why individuals feel the way they do about heritage and historic structures within their urban centers. Results from studies undertaken in this manner are invaluable because they can provide urban planners, developers, and architects with an educational tool to assist lay

people in the comprehension of issues regarding preservation and conservation, and the importance of retaining associations with the past.

The above weaknesses have pointed out, once again, that theories within the design field are limited with respect to their utility in the scientific community. Notions of contextual compatibility and the significance of facade detail, while containing interesting hypotheses, are not substantiated within the empirical literature. The present project assessed these claims and fostered a connection between behavioral scientists and design professionals, thereby filling a much-needed gap in the environmental evaluation research.

Overview of the Proposed Study

Essentially, as individuals perceive information from their environment, they will evaluate the setting, develop categorizations of dimensions, and apply emotional, behavioral, and cognitive responses to this information. One such aspect of the environment that has been argued to actuate evaluation and garner preference responses on the part of individuals is the urban streetscape and the compatibility of buildings within that streetscape. Groat's (1983a) definition of contextual compatibility was employed in this project with a slight modification (i.e., old buildings within an existing setting will be examined, not new structures within the same environment) in order to better represent the scope of the research.

Although this definition appears reasonable, there is no empirical evidence to suggest that Groat's (1983a) term has been objectively delineated or manipulated in any research studies. Therefore, this project attempted to provide quantifiable confirmation

for the modified definition. In addition, this research challenged who, indeed, is affected by the concept of contextual fit when evaluating heritage or historic urban scenes. Contextual compatibility is an architectural, design-derived term; that is, architects and other design professionals formulated the concept. Therefore, it was hypothesized that individuals with some design interest -- operationalized as someone who has taken at least one design-related college or university course, or who was planning to enrol in a design-related field following first year university -- would be more affected by this idea of compatibility. In contrast, the responses of individuals without an interest in the design field on these same scales would be less extreme on the 5-point adjectival rating scales; the participants may have, for example, evaluated heritage and historic urban streetscapes as a collection of individual buildings and, therefore, may not have assessed the streetscape in a fit/lack of fit context.

Hypothesis 1: Evaluation responses to heritage and historic urban streetscapes on the adjectival scales pertaining to contextual compatibility will be influenced more by design interest than by detail or massing.

In addition to this hypothesis, it was proposed, as previous research has suggested (e.g., Brolin, 1976, 1980, 1985; Groat, 1984; Krampen, 1979; Richards, 1994), that ornamentation, or facade detail, is one of the most important contributors to the perception of compatibility more so than massing. Even if the collection of buildings on a heritage or historic urban streetscape is a hodgepodge of rooflines and general shapes (i.e., different structural massing), it was hypothesized that facade detail among the streetscape structures affected individuals' perceptions for that scene regardless of design

training. Furthermore, it was conjectured that this facade detail concept was not a distinctive characteristic of design professionals or others who were acquainted with design theories and applications. Rather, independent of design interest, detail will affect evaluative responses more than massing.

Hypothesis 2: The scaling responses of individuals on the entire set of scales, regardless of design interest, to heritage and historic urban streetscapes will be influenced more by detail than by massing.

Method

Participants

Two hundred seventy-three students served as voluntary participants and received course credit for their participation. Of this larger group, 254 students had not taken design courses or would not enrol in design courses following first-year university, and 19 students had enrolled in design courses or planned to take design courses following first-year university. The ages of the students (95 male, 141 female) who had given demographic information (N= 266) on the postexperimental questionnaire ranged from 17 to 48 (M = 19.76, SD = 3.71). In terms of design students (7 male, 12 female), the ages ranged from 17 to 48 (M = 20.42, SD = 6.92); nondesign students' (88 male, 159 female) ages ranged from 17 to 39 (M = 19.71, SD = 3.35).

Materials

Adjective scale. This unipolar scale, adapted both from previous research on the generation of environmental descriptors (e.g., Hershberger, 1969; Hershberger & Cass, 1988; Kasmar, 1970) and freely generated, contained adjectives (e.g., "Beautiful,"

"Unadorned") used in the description of heritage or historic urban streetscapes. Scales were chosen based on their maximum suitability to the specific environment under study, which accounts for the development of adjectives not found in prior experimentation. Participants were required to evaluate the streetscape on each of the adjectives utilizing a 5-point scale ranging from 1 (Not at all) to 5 (Extremely) (see Appendix A). The adjectives were sectioned into several *ad hoc* categories comprising aesthetics, friendliness, organization, adequacy of space, age, style, and contextual compatibility. classifications

Many studies (e.g., Hershberger, 1969; Hershberger & Cass, 1988; Kasmar, 1970; Nasar, 1988b; Oostendorp & Berlyne, 1978; Seaton & Collins, 1972) have discovered that certain items load highly on an aesthetic dimension, which encompasses an individuals' affective reactions to environments. Bipolar adjectives that have been used include beautiful-ugly (Hershberger; Kasmar; Nasar; Oostendorp & Berlyne; Oostendorp et al., 1978; Seaton & Collins), interesting-boring (Hershberger; Hershberger & Cass; Nasar; Oostendorp & Berlyne; Oostendorp et al.), good-bad, unique-common (Hershberger; Hershberger & Cass), attractive-unattractive (Kasmar; Nasar), appealing-unappealing, and distinctive-ordinary (Kasmar). For the present project, the adjectives used were beautiful, interesting, and ordinary.

Related to aesthetics is another dimension that can be utilized to communicate feelings of conventionality (Oostendorp & Berlyne, 1978), repulsion (Oostendorp et al., 1978), utility evaluation (Hershberger & Cass, 1988), or spatial evaluation (Hershberger, 1969). The common thread uniting these factor headings is a sense of social norms or

friendliness and how societal beliefs and values are characterized (Oostendorp & Berlyne) by certain structures and spaces. Researchers have employed bipolar adjectives including welcoming-unwelcoming (Hershberger; Oostendorp et al.), friendly-hostile (Hershberger & Cass; Oostendorp et al.), and inviting-repelling (Kasmar, 1970; Nasar, 1988b). The present project employed unwelcoming, friendly, and inviting in the expectation that these words will specifically load in a factor analysis under the heading friendliness.

Organization, also known as coherence (Canter, 1969, Nasar, 1989), order (Nasar, 1988b; Oostendorp & Berlyne, 1978), unity (Kuller, 1972; Nasar, 1989), and clarity (Nasar, 1989), is another dimension that has been constructed in order to describe scales that provide structure and reduce incertitude (Nasar, 1989). Studies have found that adjective pairs such as orderly-chaotic (Hershberger, 1969; Hershberger & Cass, 1988; Kasmar, 1970; Oostendorp & Berlyne; Oostendorp et al., 1978), balanced-unbalanced (Kasmar, 1970; Oostendorp & Berlyne), clear-ambiguous (Hershberger & Cass, 1969), well organized-poorly organized (Kasmar, 1970), and formal-casual (Hershberger, 1988) have clustered around the organization factor and have helped in better defining the dimension. In the present project, orderly, balanced, and well organized were used in scale form as a potential descriptor of heritage and historic urban streetscapes.

The fourth dimension, adequacy of space, refers to whether or not an environment is perceived as capacious or dense (Nasar, 1989). Bipolar adjectives that have loaded highly on this factor or have been reached consensually in previous research have included spacious-confined (Hershberger, 1988; Hershberger & Cass, 1969; Oostendorp

et al., 1978), free space-restricted space, adequate size-inadequate size (Kasmar, 1970), large-small, cozy-roomy (Hershberger), and open-closed (Nasar, 1988c). The present project utilized spread out group of buildings, crowded group of buildings, and disproportional scales because these adjectives better refer to exterior spaces (some of the words utilized in earlier studies, such as cozy-roomy, allude to building interiors only, which eliminate manipulations in openness [Nasar, 1989], or natural landscapes).

Age, the fifth dimension, may be loosely defined in this context as the approximate period in history when a structure was built. Adjective pairs that have been employed in studies in order to reveal a potential association with the general term of age include old-new (Hershberger & Cass, 1988; Kasmar, 1970), modern-old fashioned, and contemporary-traditional (Kasmar). For the present project, old, modern, and historic in character were utilized as scales.

The sixth dimension that the present project sought to discover using factor analysis was style. Here, style connotes qualities or characteristics that structures possess within the diversity of architectural history. Researchers have utilized bipolar adjectives such as complex-simple or diverse-simple (Hershberger & Cass, 1988; Nasar, 1988c; Oostendorp & Berlyne, 1978; Ward & Russell, 1981b), functional-nonfunctional (Kasmar, 1970; Oostendorp & Berlyne), ornate-plain (Kasmar; Nasar), colorful-dull (Nasar; Oostendorp & Berlyne), curves-no curves, ornament-no ornament (Oostendorp et al.), stylish-unstylish, good lines-bad lines, and elegant-unadorned (Kasmar) in hopes that these terms will cluster together and form a style dimension. The present project used simple, plain, and unadorned as the scales representing synonyms of style.

The final dimension, contextual compatibility, has already been discussed and does not need to be further delineated. Although researchers do not possess any empirical evidence for the loading of adjectives on such a factor dimension, bipolar adjectives including balanced-unbalanced (Oostendorp & Berlyne, 1978) and harmonious-dissonant (Oostendorp et al., 1978) or harmonious-discordant (Kasmar, 1970) have been utilized in studies in order to discover whether or not individuals perceive structures, districts, areas, and so forth, as compatible with the environmental setting. For the present project, the following adjectives were employed to convey a sense of contextual compatibility: harmonious, lack of fit, and consistent.

Postexperimental questionnaire. The postexperimental questionnaire included items of a demographic nature (e.g., age, sex, design background) in addition to two items regarding what participants believed was the purpose of the experiment. All participants were required to fill out the postexperimental questionnaire following completion of the experiment (see Appendix B).

Sketches. Eleven high-quality, black-and-white sketches of heritage or historic urban streetscapes were used in participant evaluation (see Appendix C). Each sketch, created by a person familiar with drawing streetscapes and buildings, contained four commercial buildings that are two storeys in height and are equal in width, thus forming a 1:1 ratio, with the exception of the experimental building (i.e., this structure's height-to-width ratio varied from either 1:1 or 2:1 depending on the experimental condition). Each building contained between six and eleven architectural elements of an heritage or historic nature that have been generated from a list of 41 architectural details (see

Appendix D).

An heritage or historic designation is determined by the date in which buildings have been constructed, and this designation is considered heritage or historic by Manitoba standards (i.e., from the 1820s to the 1930s; styles include Georgian, Gothic Revival, Romanesque Revival, Classic Revival, the Chicago School, and Georgian Revival). The extant literature -- with perhaps the exception of Krampen (1979) and Oostendorp and Berlyne (1978) -- concerning issues of building age and preference is rather vague with respect to definite periods of building construction; most research has simply categorized structures into "older" and "contemporary" rather than defining specific architectural periods or styles (e.g., Herzog & Gale, 1996; Herzog, Kaplan, & Kaplan, 1976; Stamps, 1994). Therefore, the present project operationalized "heritage" and "historic," and "contemporary" via the modernist movement; that is, structures built before modernism were classified as "older" and, therefore, possessed relevance to this project, whereas structures built after the modernist movement were classified as "contemporary."

Participants assessed each scene from a "head-on" position akin to looking at a collection of buildings from across the street. Alternative stimuli, such as foliage, people, and cars, were controlled so that such stimuli do not suppress the surrounding structures. Finally, the experimental building (i.e., the building that was manipulated) within the last sketch (i.e., the experimental stimulus) was always positioned third from the left in the streetscape scene.

Each participant assessed four, 8 x 10 sketches at a desk in an experimental laboratory. The first three sketches were fillers (i.e., no manipulation of the streetscape

rendering) comprised of four buildings that are considered to be of an heritage or historic architectural style, whereas the last sketch contained four buildings with one building that varied according to two detail variables (quoins and window treatments) and massing (operationally defined by a height-to-width ratio) depending on a particular condition (e.g., participants in group 1, after evaluating the three filler sketches, viewed the experimental stimulus comprised of an experimental building with a height-to-width ratio of 2:1 and that possessed no quoins and no window treatments) (see Appendix E).

Detail, like age, has not been consistently operationally defined in the existing literature. The only architectural feature relating to detail, specified in past work as having an influence on individual perception, is window detailing, or fenestration (Day, 1992; Groat, 1984; Krampen, 1979). Most research has chosen not to elaborate on precise ornamental detail but has opted to employ a blanket term referring to detail in general (e.g., Devlin, 1990; Groat, 1988; Espe, 1981; Herzog & Gale, 1996; Oostendorp, 1978; Oostendorp & Berlyne, 1978; Oostendorp et al., 1978).

Therefore, in the present project, design- and nondesign-interested participants evaluated heritage and historic urban streetscapes that contained manipulations in window treatment, quoins, and massing using a 21-item unipolar adjective rating scale (design interest, window treatment, quoins, and massing were the IVs). Participants' evaluations from the rating scale comprised the dependent variable.

Procedure

At the beginning of each session, groups of approximately 15 participants entered an experimental laboratory, sat at designated desks containing information regarding the

study, and were given instructions concerning the procedure of the experiment (see Appendix F). Participants were not told that they were evaluating the contextual compatibility of heritage or historic urban streetscapes, nor were they informed that detail and massing was manipulated. Upon reading the experimental instructions, participants were shown four sketches -- one at a time -- of heritage or historic urban streetscapes and told to evaluate the scenes using the 21 adjectives listed in the adjectival rating scale. The order of both the nonexperimental stimuli and the experimental building within the experimental stimulus remained constant (i.e., the experimental building was always be positioned third from the left). Finally, participants were asked to fill out the postexperimental questionnaire containing demographic information and two questions regarding participants' assumptions of the proposed experimental objectives.

Results

Subsequent to data collection, individuals' scaling responses to the evaluation of heritage and historic urban streetscapes were subjected to a factor analysis. Here, the seven *ad hoc* categories, speculated to cluster together, were tested to determine the cohesion of the scales within these categories. Utilizing the details of this analysis (i.e., the factors became the dependent variables in the next analysis), two MANOVAs were conducted, one with and one without the design interest variable. Ideally, the first MANOVA would have tested the first hypothesis concerning contextual compatibility and design interest whereas the second MANOVA examined the second hypothesis pertaining to the importance of detailing. Unfortunately, the scales involved in the *ad hoc* contextual compatibility factor did not cluster into a singular grouping nor was the design

interest variable proportional in terms of equal numbers of design- and nondesign-interested participants. Therefore, the first hypothesis could not adequately be assessed. Fortunately, the second hypothesis could be examined collapsing across design interest and using a MANOVA and the six clusters produced in the factor analysis.

During the research sessions, there were 11 participants (29 responses were left blank) who did not understand the definition of the scale "unadorned" and asked the experimenter for assistance. In addition, four students (eight responses were omitted) did not comprehend the unipolar scale "lack of fit." In all instances, students were individually instructed that the experimenter could not aid in delineating the adjective, that the participant could attempt to think of a definition for the word on his or her own and evaluate the stimuli, or he or she could leave the response blank. Furthermore, 14 participants failed to enter ratings on the last scale, "balanced." These omissions might have occurred due to the composition of the IBM sheets. Each sheet contained blocks of 10 multiple choice fill-in answers and the scaling instrument contained 21 unipolar adjectives and adjective pairs. Therefore, students might simply have missed "balanced" because the adjective would have started in a new block.

As a result of the overall loss of data, a missing value analysis (MVA) was conducted on the data set in order to discover whether or not the pattern of the null data was random. In addition, an MVA, in general, helps to estimate the means, standard deviations, covariances, and correlations employing a variety of methods (e.g., regression), and imputes missing values with estimated values (SPSS missing value analysis 7.5. 1997). According to the MVA, the absent values in the data set were not

missing completely at random [X^2 (2797) = 3040.58, $p < .001$]. In order to fill in the missing data most accurately and, therefore, yield maximum likelihood estimates, the method chosen to impute values into the present data set was the expectation-maximization (EM) procedure.

The EM method utilizes a specific distribution that is assumed for the partially missing data, and inferences are based on the likelihood under that distribution (SPSS missing value analysis 7.5, 1997). The first step consists of searching for the conditional expectation of the missing data, given the observed values and the parametric estimates. The expectations are then substituted for these missing data (in this instance, the missing data are not directly filled in; rather, functions of the data are employed in the log-likelihood). The next step requires that maximum likelihood estimates of the parameters be computed as though the missing data had not been absent values (SPSS missing value analysis 7.5).

Following the implementation of the EM procedure, evaluation scores on the 21 scales were factor analyzed and each scale was correlated with each other. A principle components factors analysis with varimax rotation was utilized in order to better recognize high or low factor loadings, rather than a congregation of medium-sized loadings that would not aid in the establishment of recognizable factor dimensions. The rotated factor loadings are presented in Table 1. The criteria used for determining the dimensions are based on Tabachnick and Fidell's (1996) guidelines for factor analysis, stating that empirically valid analyses should have a KMO statistic greater than .70, a significance level greater than .05 on the Bartlett test of sphericity, communalities that are

greater than .30, eigenvalues greater than 1.10, a percentage of variance greater than 5 percent, and a cumulative percentage of variance greater than 60 percent. Results indicated six distinguishable factors with a KMO statistic = .83, a significant Bartlett test of sphericity [X^2 (210) = 7885.32, $p < .001$], no communalities less than .30 (scales loading onto factors less than .40 were excluded from the factor), eigenvalues greater than 1.07, variance percentages ranging from 5.09 to 22.95, and a total variance of 64.35 percent. This percentage of total variance confirmed that the six dimensions included a worthwhile proportion of the variance produced by the 21 scales and thus are likely to give an insight into the way in which design- and nondesign-interested students evaluate of heritage and historic urban streetscapes.

The first dimension accounted for 22.95 percent of the total variance. All scales pertaining to contextual compatibility, namely, "consistent," "harmonious," and "lack of fit", loaded highly on this factor in addition to the ad hoc organization scales -- "balanced," "orderly," and "well organized." One further scale, "disproportional", also loaded on this factor. In terms of the ad hoc categories that led to the scale set used, the factor seems to capture an evaluation of how well the buildings within the streetscape are arranged in terms of regularity and congruence. Due to this representation of consonance, the factor has been labeled *Organizational Compatibility*. This type of component repeatedly occurs in discourses concerning architecture (Canter, 1969).

Accounting for 14.33 percent of the total variance, this next factor was very distinct in character. The adjectives that most highly loaded on to this dimension included the three style components -- "plain," "simple," and "unadorned" -- and two aesthetics

scales -- "interesting" and "ordinary." Considering the synonymous constitution of the adjectives within these classifications, a logical appellation for this factor would be *Aesthetic Style*.

The third dimension accounted for 10.05 percent of the variance. All three adjectives proposed to fit into the ad hoc friendliness category, namely, "friendly," "inviting," and "unwelcoming" loaded highly on it. This clustering of scales, labeled *Friendliness* in this project, can be most easily identified with Oostendorp et al.'s (1978) Repulsion factor and its complement, Canter's (1969) Friendliness dimension.

The three scales, "Historic in character," "modern," and "old," all loaded highly onto the fourth dimension, which accounted for 6.12 percent of the total variance. Once again, these scales were expected to cluster together on to an ad hoc category. Fittingly, the factor is identified as *Age*. The fifth factor, accounting for 5.80 percent of the variance comprised of the "crowded group of buildings" and "spread out group of buildings" adjectival phrases loading highly onto this dimensions. Both of these scales pertain to the notion of space and were predicted to load onto an adequacy of space dimension; therefore, *Adequacy of Space* is a suitable label. The final dimension consisted of only one unipolar adjective: "beautiful." Accounting for 5.09 percent of variance, this factor may be labeled *Beauty*.

Subsequent to the factor analysis, an overall MANOVA (i.e., 2 [design interest] x 2 [quoins] x 2 [window treatment] x 2 [massing]) was conducted on the data in order to determine if the IV's incorporated into the sketches had any affect on the scales representing the six extracted factors (i.e., the DV). Pillai's trace was utilized to assess the

significance of the MANOVA because this technique is the most robust to heterogeneity of variance. The results indicated that there was a significant window treatment main effect across the six factors [F (6, 252) = 2.16, p = .047] (see Table 2). In particular, heritage and historic urban streetscapes with the experimental stimulus containing the window treatment were evaluated more favorably on Aesthetic Style, Friendliness, and Beauty; less favorably on Organizational Compatibility; and older and less spread out on the Age and Adequacy of Space factors, respectively, than were scenes with an absence of the window treatment.

In addition, a significant window treatment by design interest interaction surfaced across the six factors [F (6, 252) = 2.17, p = .047] (see Table 3). That is, design-interested students looking at sketches with the experimental stimulus comprising the window treatment assessed the scenes more positively than did their nondesign-interested peers. However, both groups rated sketches with the presence of a window treatment in the experimental stimulus similarly. Finally, results revealed a significant massing by quoins by window treatment interaction across the six dimensions [F (6, 252) = 2.72, p = .014]. The next set of analyses illustrate results from the overall MANOVA that are separated by factor dimension.

Examining the tests of between-subjects effects, a quoins by window treatment interaction surfaced for the Friendliness dimension [F (1, 15) = 5.58, p = .019] (see Table 4). Specifically, heritage and historic urban streetscapes with the experimental stimulus possessing no quoins were evaluated as more friendly, inviting, and less unwelcoming when there was a presence of window treatment on the manipulated building than similar

scenes containing no window treatments. Furthermore, sketches with a manipulated building containing no quoins were rated similarly on the Friendliness scales when the window treatment was either added or did not exist.

In addition, another significant two-way interaction appeared from the overall MANOVA: a window treatment by design interest effect for the Age factor [F (1, 15) =3.87, $p = .050$] (see Table 4). In particular, design-interested participants viewing sketches with an experimental stimulus containing the window treatment evaluated the scenes as older, more historic in character, and less modern than similar streetscapes without the window treatment. Nondesign-interested student responses, in contrast, did not alter depending on the presence or absence of the window treatment.

Because of the unequal sample sizes of the design (n = 19) and nondesign (n = 254) students, this disproportionality would have negatively affected tests of homogeneity, thus influencing the alpha level and yielding liberal MANOVA results (Glass & Hopkins, 1996). Accordingly, a separate 2 x 2 x 2 MANOVA was conducted collapsing across the design interest variable. Results revealed a highly significant main effect for massing across the six dimensions yielded from the factor analysis [F (6, 260) = 5.62, $p < .001$] (see Table 6); that is, participants more favorably assessed streetscapes on the Organizational Compatibility, Aesthetic Style, Friendliness, and Beauty factors -- and rated the structures as older and more crowded on the Age and Adequacy of Space dimensions -- with an experimental stimulus that had a height-to-width ratio of 1:1 than similar scenes with a 2:1 height-to-width ratio. The following analyses indicate significant results from the specific factors within the 2 X 2 X 2 MANOVA.

Tests of between-subjects effects, organized for the purposes of discovering their individual relationship to participants' scaling responses, produced significant differences for the massing variable pertaining to Organizational Compatibility [$F(1, 7) = 20.42$, $p < .001$], Aesthetic Style [$F(1, 7) = 9.45$, $p = .002$], Age [$F(1, 7) = 4.48$, $p = .035$], and Beauty [$F(1, 7) = 12.56$, $p < .001$] (for all main effects, see Table 5). In all instances, the streetscapes including experimental stimuli with a height-to-width ratio of 1:1 were rated as more organizationally compatible, possessed more aesthetic style, appeared older in age, and were evaluated as more beautiful than similar scenes containing experimental stimuli with a 2:1 height-to-width ratio. Moreover, significant main effects appeared for quoins on the Aesthetic Style [$F(1, 7) = 5.67$, $p = .018$] and Beauty [$F(1, 7) = 6.55$, $p = .011$] (see Table 7) factors. That is, heritage and historic urban streetscapes involving experimental stimuli with quoins were evaluated as maintaining more aesthetic style and beauty than similar scenes containing no quoins. Correspondingly, a window treatment main effect was discovered for the Beauty dimension [$F(1, 7) = 3.93$, $p = .048$] (see Table 8). Once again, sketches embodying manipulated stimuli with the window treatment were assessed as more beautiful than the same streetscapes without the window treatment. Finally, a massing by quoins by window treatment interaction effect was found referring to organizational compatibility [$F(1, 7) = 5.06$, $p = .025$].

Discussion

The present study was designed in order to address two issues involved in environmental assessment and design research. First, does evaluative variability exist between design-oriented individuals and the lay public when appraising heritage and

historic urban streetscapes, and second, is facade detail more important from an evaluation standpoint than is structural massing? These notions were tested using inferential statistics (i.e., factor analysis and MANOVAs) in order to provide quantification for design-derived theories and to promote awareness of heritage and historic preservation and conservation.

Factor Analysis

For the most part, the results confirmed conjecture and yielded few surprises pertaining to the ad hoc categories generated for this project. In three of seven factor analytic dimensions generated, at least two of the three scales from the ad hoc groupings loaded onto expected factors. For example, the adjectives within the ad hoc Friendliness dimension clustered into a category by itself containing high intercorrelations among the scales. The factor may represent the degree to which heritage and historic urban streetscapes enable individuals to relate to the scene (Canter, 1969), and the degree to which individuals feel congenial toward the streetscapes. As purported, individuals who evaluated heritage and historic urban streetscapes as more inviting and friendly also assessed the scenes as less unwelcoming.

In addition, the Organizational Compatibility and Aesthetic Style factors were comprised of amalgams of ad hoc categories that clustered together during factor analysis. Regarding the former, scales that reflected an organization of space within the environment -- most closely linked with the organization factor in the research of Vilhauer (1965) and Brittell (1969, unpublished thesis, as cited in Hershberger, 1972) -- also tended to load highly with adjectives of a contextual compatibility nature. This result

implies that individuals, when assessing heritage and historic urban streetscapes, believe that a more balanced street scene in terms of the arrangement of buildings is also more consistent and harmonious.

Respecting the latter dimension, adjectives involving aesthetics were more inclined to cluster with scales pertaining to style than other scales. Although the two ad hoc factors were somewhat concordant in terms of connotative meaning, previous research has traditionally divided these types of adjectives into two, separate categories: aesthetic and ornate (Collins, unpublished dissertation, as cited in Hershberger, 1972; Craik, 1968; Hershberger, unpublished dissertation, 1971, as cited in Hershberger). However, moderately high intercorrelations within this factor (in three of the five scales, correlations were greater than .800) indicate that the dimension was aptly devised. The relatively moderate correlation of unadorned r = .401) with the rest of these scales may be explained by the 11 nondesign-interested participants (29 responses in total) who had difficulty interpreting the unipolar adjective. Unaware of how participants would interpret a particular word in the evaluation process, these students, although in the absence of supportive evidence, may have cognized that "unadorned" was defined in spatial or beauty terms, thereby accounting for the moderately low associations within the last two factor analytic dimensions r = .241 and r = .255, respectively). In addition, the number of participants actually inquiring about the definition of "unadorned" might have only represented a small proportion of individuals who did not comprehend the delineation of the word. Thus, there might have been many more students who did not understand the adjective's meaning, yet social desirability might prevented their asking for assistance.

The last factor, Beauty, interestingly contained only the scale beautiful. Prior studies have discovered that this adjective tended to cluster with aesthetic-type scales, including attractive, appealing (Vilhauer, 1965), interesting, and impressive (Hershberger, 1972). Indeed, in the present project, the unipolar adjective interesting (and modern) also loaded into the Beauty dimension r = .430 and r = .553, respectively). Furthermore, "beautiful" loaded moderately onto the Friendliness r = .402) and Organizational Compatibility r = .354) factors. These results imply that the "beautiful" scale may have been interpreted in various ways, reflecting not only an aesthetic component independent of style but a scale that resonates in individuals' perceptions in terms of age, sense of invitation, orderliness, proportionality, and so forth. Even though this scale is widely-utilized in environmental assessment research, future experimentation should examine alternate adjectives that are less general in the description of aesthetics and more specific to the milieu that the researcher is studying. Nonetheless, the distinguishable dimensions produced from the analysis suggest that the utilization of unipolar scales be employed in future endeavors to elucidate the evaluation of heritage and historic urban streetscapes.

MANOVAs

Hypothesis 1.

Utilizing the dimensions from the factor analysis, two MANOVAs were conducted for the purpose of testing the hypotheses presented in this project. The first, an overall MANOVA, examined the notion that disparities existed between design- and nondesign-interested participants' evaluations of heritage and historic urban streetscapes

on the scales pertaining to contextual compatibility. However, problems associated with a large difference in sample sizes could have meant that the multivariate test did not produce significant results, thus potentially rendering this hypothesis unconfirmed. In addition, the scales comprising the *ad hoc* contextual compatibility dimension grouped with other scales; therefore, an adequate analysis involving the first hypothesis could not have been accomplished without a loss of power to the overall statistical design of the experiment. Nonetheless, upon examination of the multivariate effects, a significant window treatment by design interest interaction surfaced on the overall MANOVA, indicating that the design variable exerted some influence on the MANOVA model. However, only the Age dimension proved significant for the interaction when the between-subjects effects were analyzed (see Table 3), thus implying that most of the variance in the interaction was attributed to this factor. Therefore, discussion of the interaction should be limited to the effects of age on window treatment by design interest.

Essentially, the above outcome reveals that individuals who possess at least an interest in design are more apt to perceive streetscapes as older, more historic in character, and less modern than are nondesign-interested individuals. Not surprisingly, this result could be due to the training that some of the participants have had in the design fields, or to a selective attention to architectural detail on the part of participants who have not enrolled in design course but who were endeavoring to do so in the future. From a preservation point of view, therefore, it would appear that simple exposure for nondesigners (i.e., the lay people) to information regarding the age of buildings, streetscapes, and districts, centered around design features such as window treatment,

would be beneficial in terms of creating an awareness of the importance of retaining these structures. Furthermore, with the addition of more balanced sample sizes, a greater number of significant effects might have occurred, thus supplying preservationists and conservationists with more empirical evidence for supporting restoration efforts.

Although not directly connected with the first hypothesis, the overall MANOVA exhibited a main effect for window treatment. Here, participants' assessments of scenes comprising the experimental stimulus with the window treatment were more positive in terms of Aesthetic Style, Friendliness, and Beauty. In addition, ratings were less positive in terms of Organizational Compatibility (the difference between the presence and absence of the window treatment is negligible, however [20.00 vs. 20.02, respectively]), older in terms of Age, and more crowded in terms of Adequacy of Space. In accordance with Oostendorp (1978) and Oostendorp et al. (1978), the presence of detail – in this instance, window treatment -- allows for buildings, and their entrances, to be rated as more salient in determining subjective perceptions of buildings and interest, respectively. Therefore, architects, planners, and designers should recognize that attention must be paid to small-scale detail if preservation efforts are to be maximized.

Another significant, between-subjects interaction effect occurred: a quoins by window treatment interaction on the Friendliness dimension. In this instance, when the experimental stimuli possessed no quoins, Friendliness ratings varied depending on the presence (higher assessments) or absence (lower assessments) of the window treatment. In contrast, regardless of whether or not the window treatment was present or absent, participant evaluations were similar and approbatory on the Friendliness dimension when

quoins were added to the manipulated building.

One explanation for the above outcome could be that the absence, versus the presence, of quoins indicates a discordant use of materials (e.g., brick and stucco), rather than a congruence of building materials (i.e., brick), with the adjoining structures on the streetscape (Brolin, 1980; Groat, 1984), thus creating an inconsistent visual image. The structures that do not contain quoins could, therefore, appear stark, sterile, and unapproachable in comparison to the surrounding buildings and, therefore, would have been rated as less friendly, inviting, and more unwelcoming. Even though the window treatment is an heritage and historic architectural detail, the windows are situated in the middle of the building. Quoins, however, are located on the periphery of the structure and may be perceived as a detail utilized to enhance the visual fit and friendliness of buildings. Therefore, the use of more historic or modern window treatments would not influence participants' evaluations as much on Friendliness as would quoins. Nevertheless, these results verify that design and nondesign individuals, when evaluating urban streetscapes, are attending to architectural facades involving at least one form of heritage or historic detailing and recognizing that these structures possess a component of friendliness. Utilizing this outcome, therefore, architects, planners, and developers attempting to build infill structures within heritage or historic urban streetscapes should acknowledge the facade detail of the surrounding buildings and attempt to replicate some of the detailing, particularly if quoins or window treatments are present.

Hypothesis 2.

In order to assess the second hypothesis -- responses on all scales, independent of

design interest, would be influenced more by detailing than by massing -- another MANOVA was conducted collapsing across the design variable. Here, a main effect was detected for massing; that is, the experimental stimulus within the last sketch that retained the same shape as the surrounding buildings in the streetscape, was evaluated more favorably, older, and more crowded than the manipulated building in the streetscape that was taller. Although, this hypothesis was not proven correct, the significance of this main effect suggests that individuals are cognizant of the height and weight of structures within heritage and historic urban streetscapes. Again, those in the design profession can utilize this empirical evidence when developing design guidelines for the preservation of heritage and historic areas in which infill is desired. Emphasizing the spatial aspect of structures architects, planners, and developers can help to maintain the anthropological, architectural, ecological, economic, and social frameworks linking citizens with their cultural identity.

Examining the between-subjects effects for this MANOVA, seven main effects were discovered that support the above finding concerning the significance of both massing and the two detailing variables in the evaluation of heritage and historic urban streetscapes. Although no explicit conjectures were developed regarding the direction of these individual variable tests, all outcomes revealed that the presence of detailing, or a height-to-width ratio in the experimental stimuli that was complementary to the adjoining buildings in the streetscape, were evaluated approvingly (and older and more organizationally compatible in the case of massing). These results featured particularly prominently on factor dimensions pertaining to Aesthetic Style and Beauty, thus

illustrating participants' attention to the facades of the structures and the complexity and visual richness of heritage and historic buildings. Participants may have assessed the experimental stimuli within the last sketch possessing quoins, window treatments, or 1:1 ratio buildings as less simple, plain, and more beautiful because the manipulated building looked more compatible with the surrounding buildings than the experimental stimuli that did not have quoins, window treatments, or a 2:1 height-to-width ratio. With the loss of one of the facade details or the addition of one storey to the manipulated building, the streetscape may have appeared more modern in architectural style and, therefore, evaluated less propitiously (Brolin, 1976).

In addition, the Age and Organizational Compatibility factors were also substantial indicators in individuals' perceptions of massing. That is, the overall size of the buildings within heritage and historic urban streetscapes appears to have been a determining factor in the assessment of whether or not structures are old or new and whether or not they fit in, contextually, with the organization of the surrounding built environment. The above outcome may be due to the lay public's perception that buildings comprising heritage and historic urban streetscapes were built in the same architectural style and are, therefore, more contextually and organizationally compatible than streetscapes containing a melange of historic and modern structures. Also, manipulated buildings that were taller did not share the same roofline – an indicator of contextual fit (Groat, 1984) -- and, therefore, might not have been perceived as compatible as buildings with similar rooflines. Moreover, any building that is not considered modern may be perceived by individuals as older and historic in nature, thus accounting for the main

effect for massing on age. In general, issues regarding the height-to-width ratio of structural massing should be fully expounded prior to the commencement of preservation or infill projects. Design professionals should be aware of the lay public's perceptions of harmony, age, and beauty, and attempt to incorporate these ideas into the design of new or old buildings within heritage and historic areas.

Future directions

In the future, this project could be expanded to encompass a more cross-cultural focus (i.e., replicating the study in North America, Europe, Asia, etc.), thereby validating the statement that design review guidelines are, indeed, "extremely general and transferable from one place to another" (Scheer, 1994, p. 8). If future research were to illustrate the above point, then cities anywhere in the world that do not possess the sufficient resources to develop individual design standards, yet are interested in promoting heritage and historic design characteristics, could adopt and implement a set of comprehensive guidelines with the knowledge that these standards have been empirically tested.

In addition, there should be an attempt to generate a more inclusive set of dimensions of heritage and historic qualities, expanded to reflect additional aspects of older structures, districts, and areas. For example, adjectives that describe the massing and detailing of exteriors as well as interiors of heritage and historic buildings could be added to this list and experimentally manipulated in research. The end product would be an empirically valid lexicon of descriptors that could be employed by architects, urban planners, and developers to discover whether or not individuals believe that city centres

with heritage and historic structures should be candidates for preservation and conservation programs. Furthermore, the basic stimuli utilized (i.e., the streetscape sketches) in the present project could be extended to represent a wider variety of heritage and historic structures, including residential districts and mixed-use developments. These stimuli could also incorporate different heritage and historic architectural details (e.g., rustication, pediments). The employment of alternative building types in such a project in addition to using other facade details could amplify the generalization of the scales and augment the external validity of the research.

A final direction for future research would be to replicate the experiment with different groups of individuals, including architects, urban planners, and lay people, in order to discover if convergent or divergent evaluative responses emerge between these groups (although the testing of this hypothesis was one of the proposed objectives, a paucity of design-interested participants did not provide statistically equivalent sample sizes and could, therefore, not be sufficiently analyzed). Furthermore, a recognition of the age of participants could aid in discovering disparities or similarities between professionals and nonprofessionals of all ages, not just students (e.g., conduct the study using young, middle-aged, and elderly professionals and nonprofessionals). As a result of this manipulation, behavioral scientific support could be garnered for -- or used to refute -- nonempirical discoveries, such as Groat's (1984, 1988), that architects and nonarchitects both prefer a high degree of facade detail replication and that ornamentation is associated more with the notion of compatibility than is massing or site location. As already pointed out, the establishment of such substantiated conjectures, materialized within the design

community, can assist in bridging the gap between the behavioral sciences and the design discipline in the field of environmental evaluation.

In conclusion, the results of this project, although not confirming the proposed hypotheses, reveal support for the notion that variation exists between designers and nondesigners on scales relating to Age. Furthermore, analyses illustrated that both heritage and historic facade detailing and structural massing are important from an evaluation standpoint. Not only is the height-to-width ratio of buildings a significant factor in assessing older streetscapes, participants' responses also echoed Groat's (1994) and Brolin's (1980) sentiments that replication of small-scale ornamental detail -- particularly quoins and window treatments -- may aid in achieving an apparent visual continuity within heritage and historic areas in terms of Organizational Compatibility, Aesthetic Style, Age, and Beauty. With respect to design guidelines and standards, therefore, an impetus should be placed on the part of architects, urban planners and developers to promote both of these aspects of buildings in areas in which the goal of preservation is prominent. In addition, more education is needed in order to aid the lay public in distinguishing between older and newer buildings and to appreciate the architectural connections with the past. The next step is to conduct more research concerning the environmental evaluation of heritage and historic urban streetscapes and attempt to reach empirically-based conclusions that narrow the gap between the design professions and the behavioral sciences.

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Appendix A

A List of Environmental Descriptors

The following is a list of 21 unipolar adjectives, either generated freely or taken from previous studies that have employed environmental descriptors, that will be used in the rating of heritage and historic urban streetscapes:

Balanced	Modern
Beautiful	Old
*Consistent	Orderly
*Crowded group of buildings	Ordinary
*Disproportional	Plain
Friendly	Simple
Harmonious	*Spread out group of buildings
*Historic in character	Unadorned
Interesting	Unwelcoming
Inviting	Well organized
*Lack of fit	

Note. Adjectives and adjectival phrases with an asterisk (*) denote scales that were freely generated (i.e., without reference to prior research).

Appendix B

Postexperimental Questionnaire

1. Age: ___

2. Sex: M___ F___

3. Ethnic Background: _____

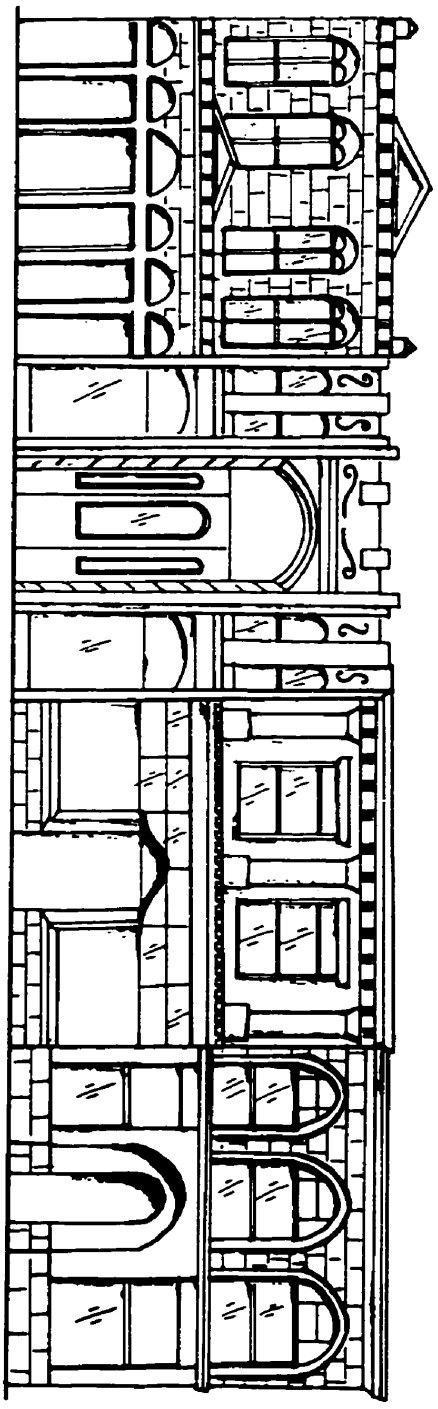
4. Faculty of Registration: _____

5. What did you think the experiment was about?

6. What did you think was expected of you in the experiment?

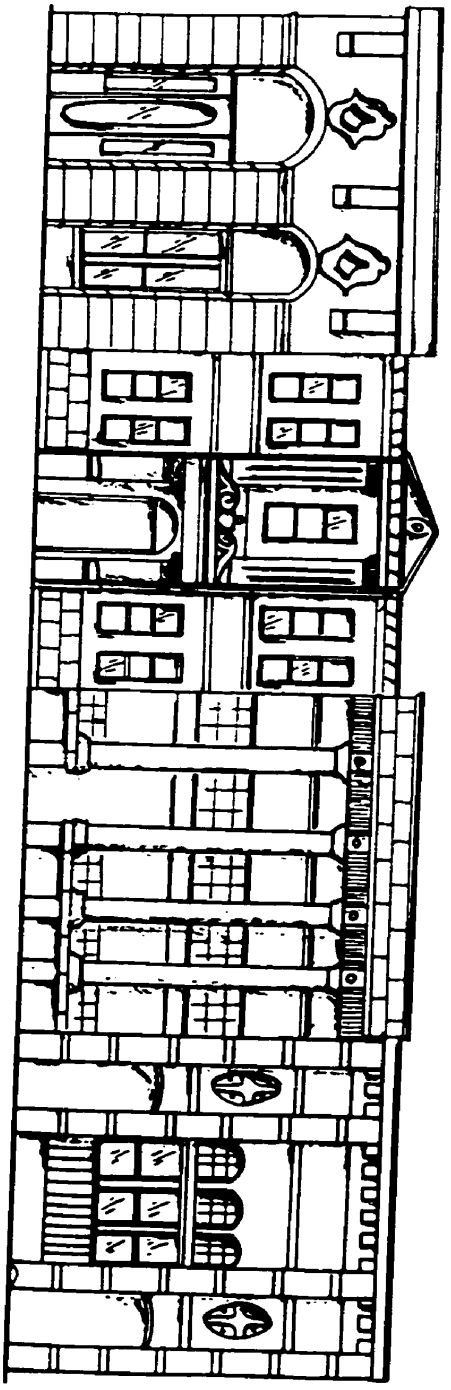
Appendix C

Sketch 1



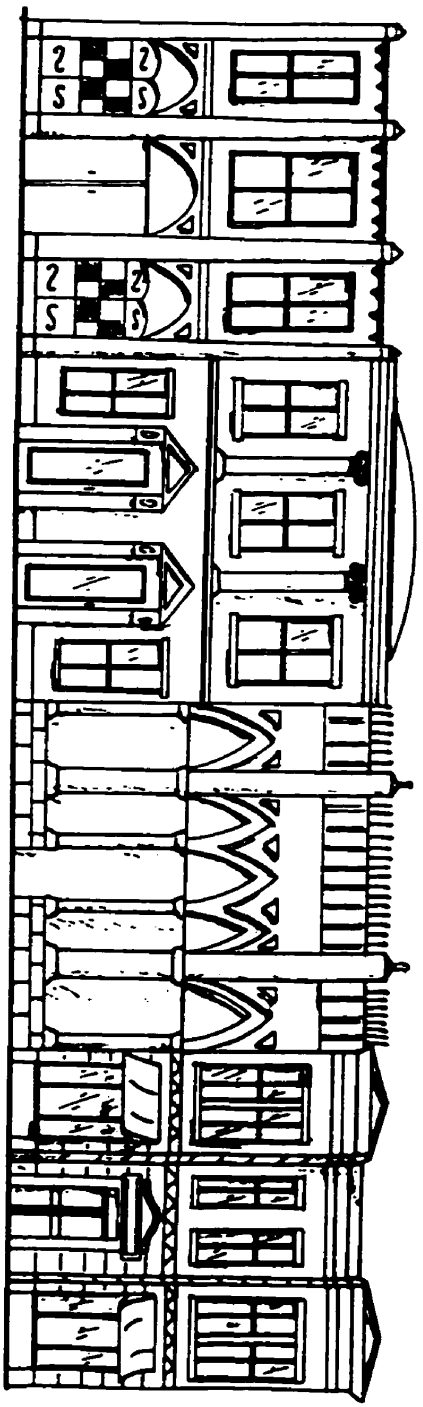
Appendix C

Sketch 2



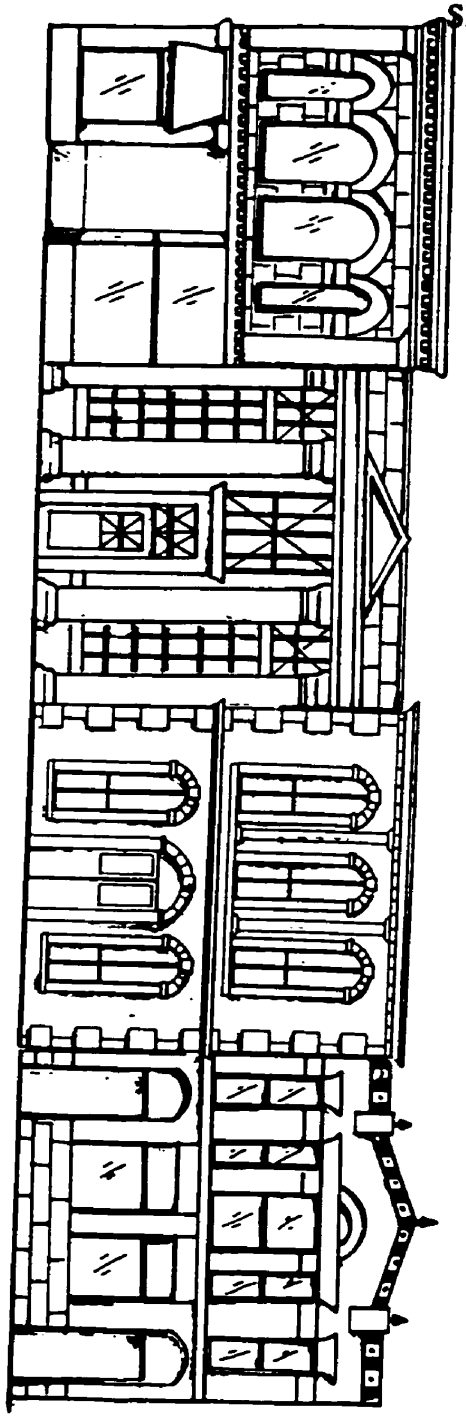
Appendix C

Sketch 3



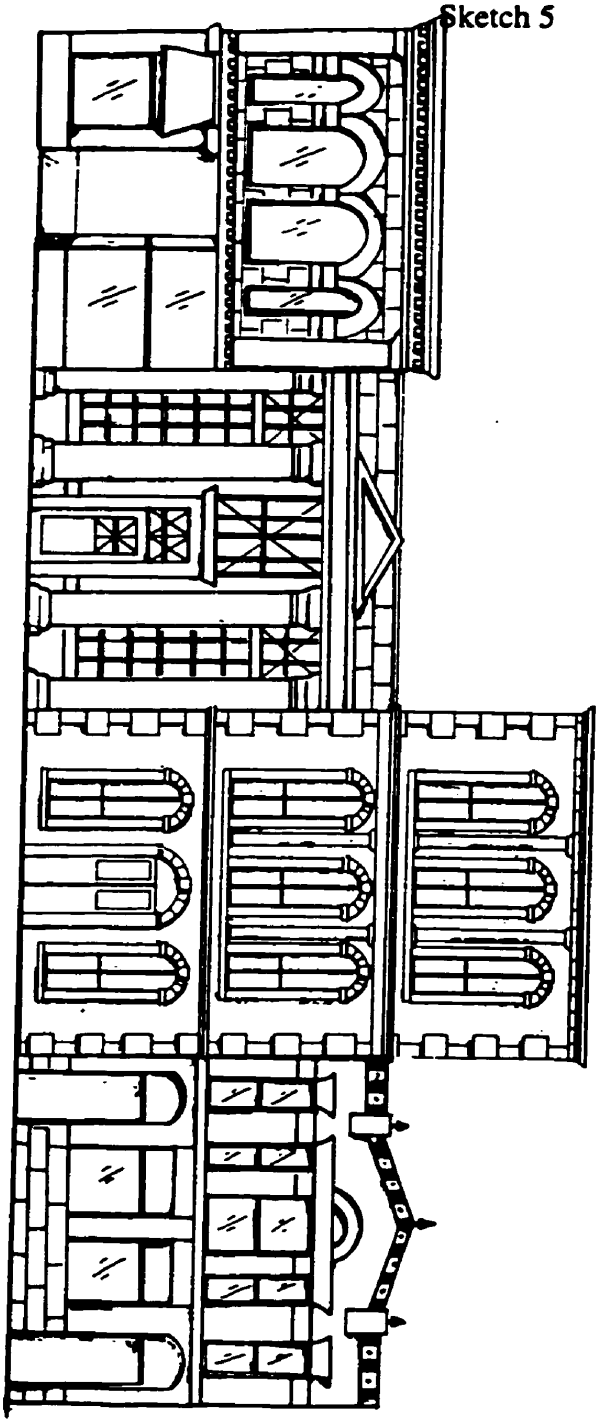
Appendix C

Sketch 4



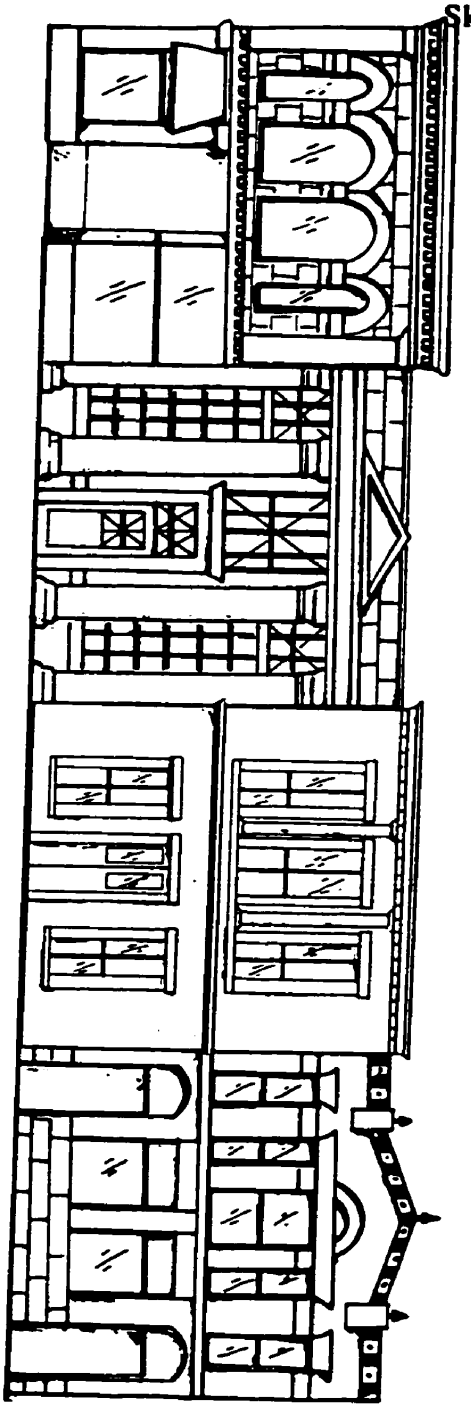
Appendix C

Sketch 5



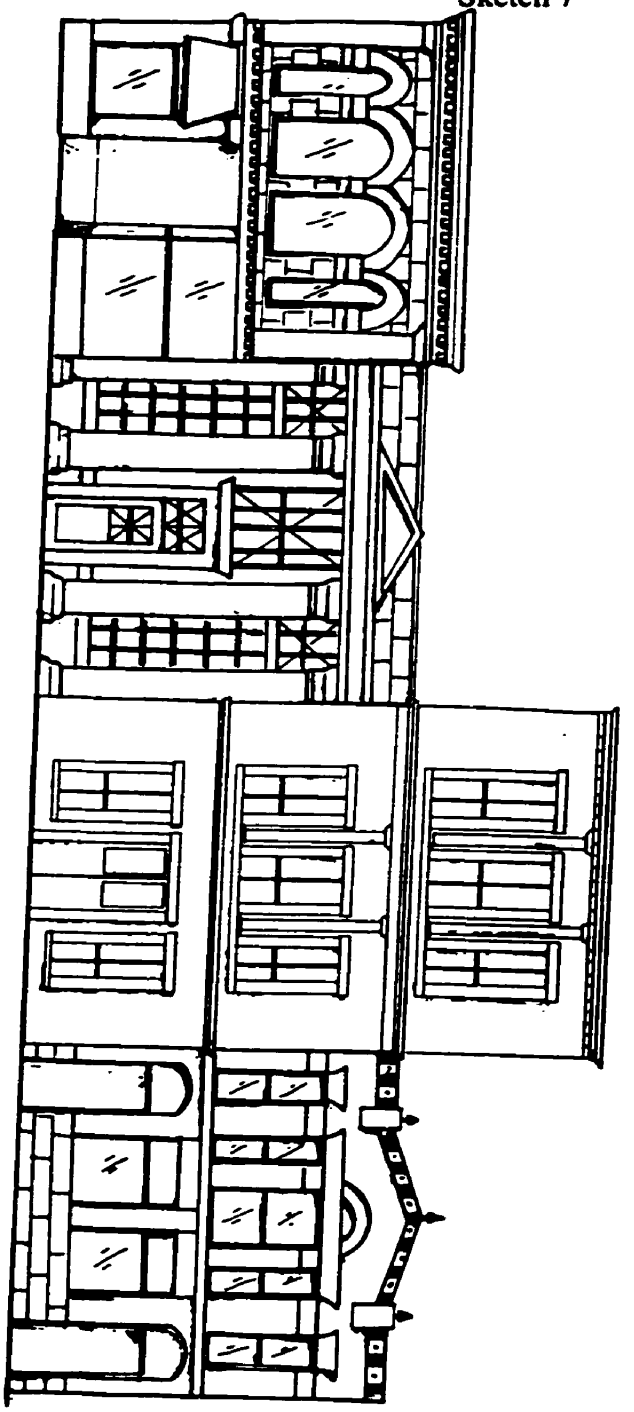
Appendix C

Sketch 6



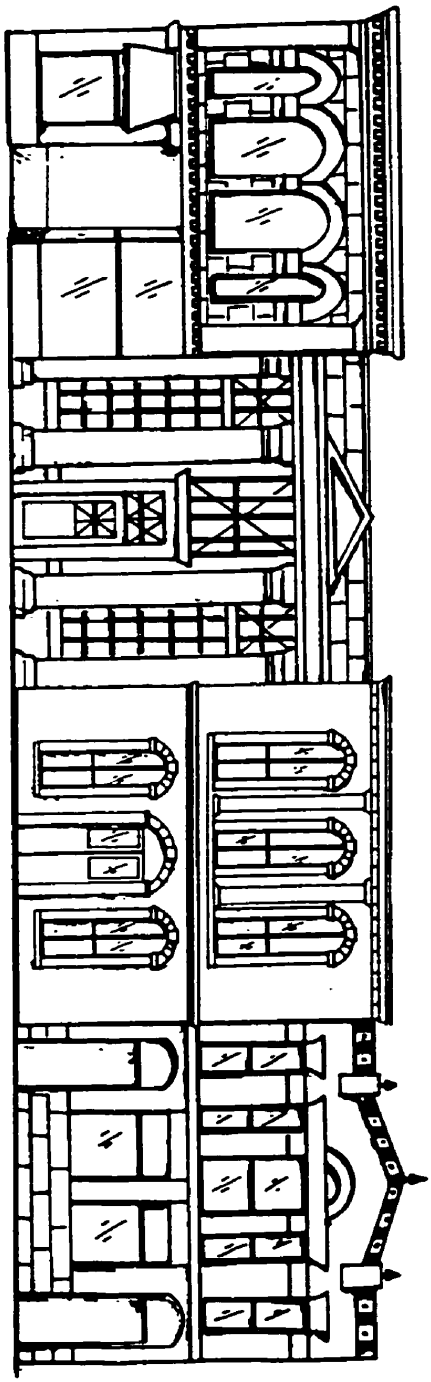
Appendix C

Sketch 7



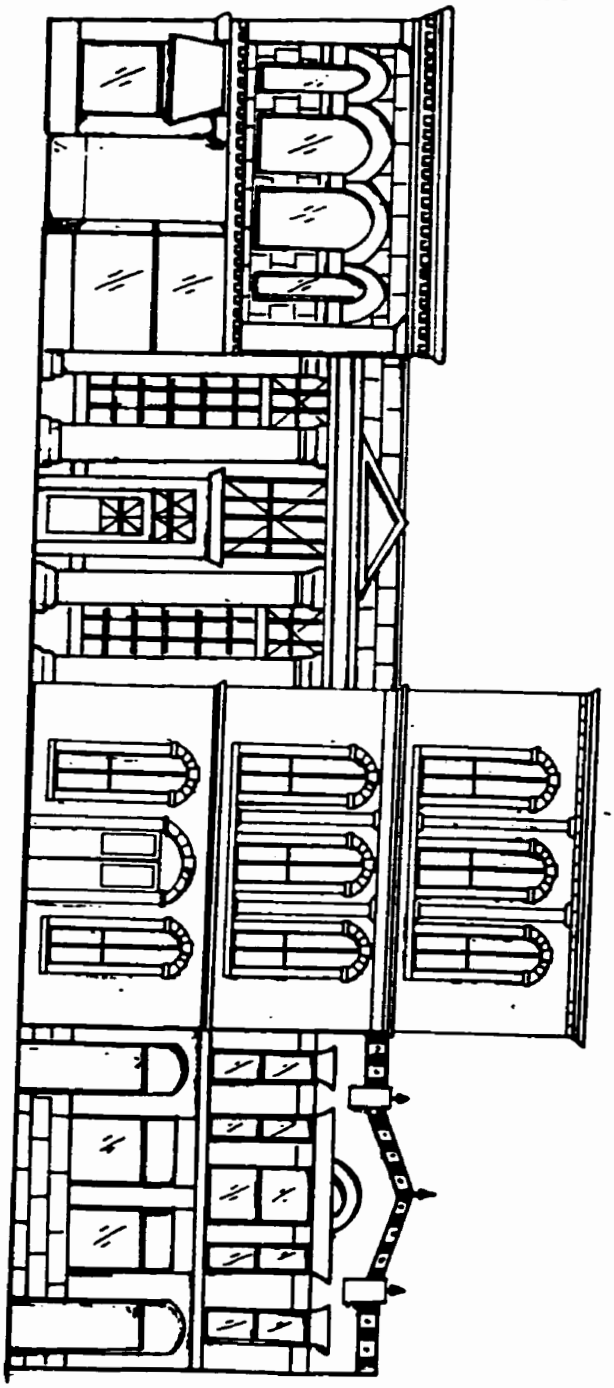
Appendix C

Sketch 8



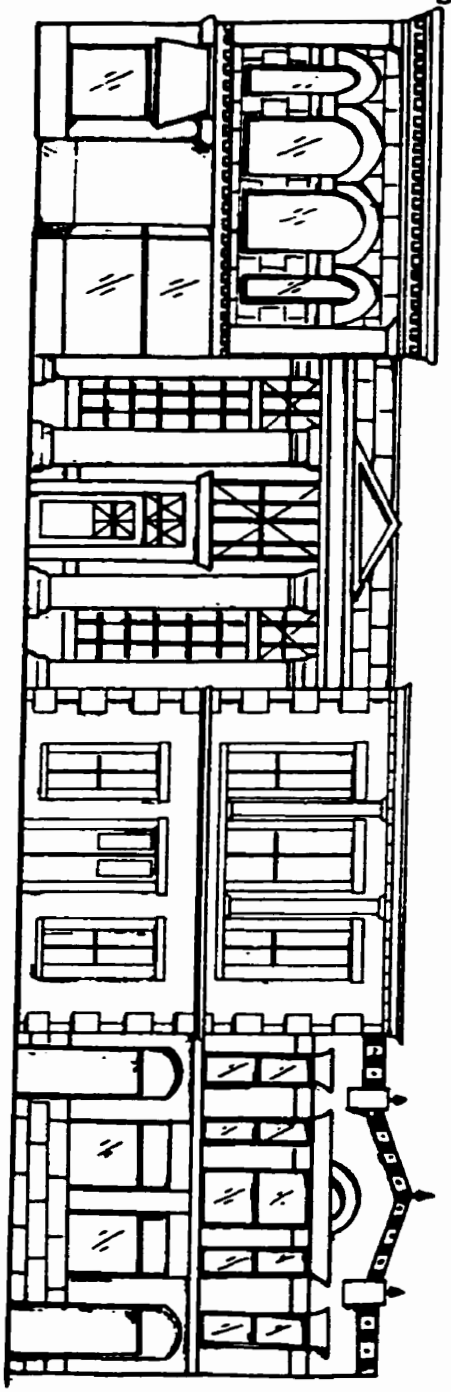
Appendix C

Sketch 9



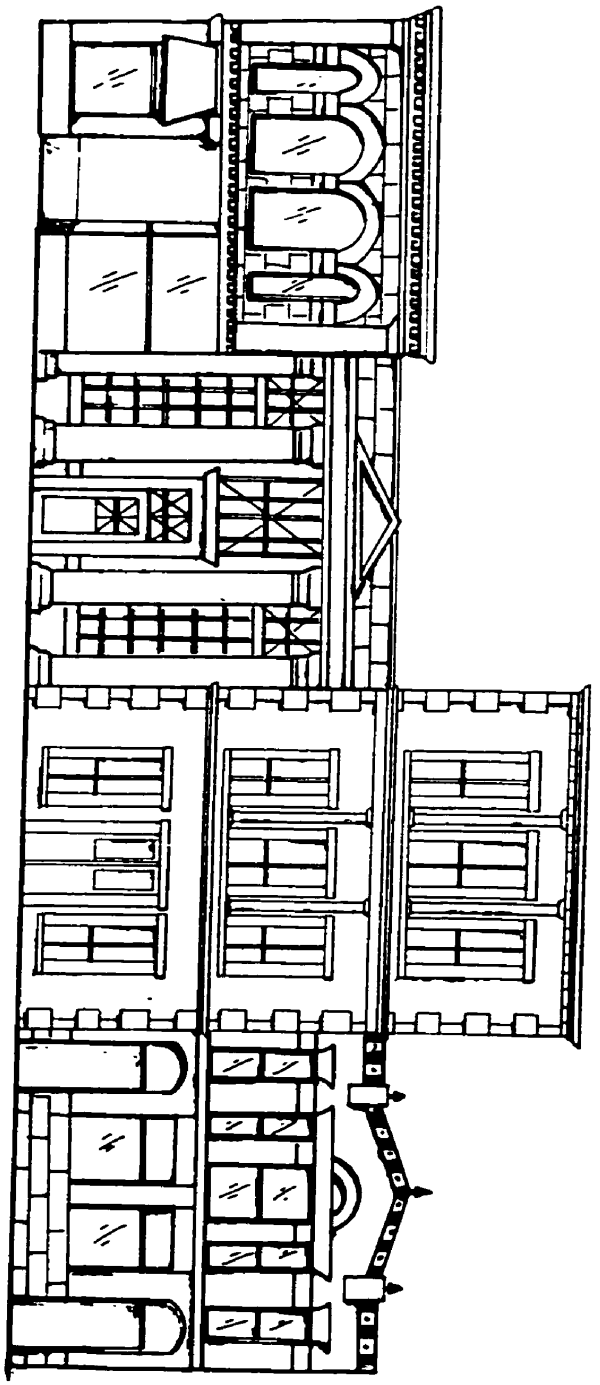
Appendix C

Sketch 10



Appendix C

Sketch 11



Appendix D

List of Heritage and Historic Architectural Details

ashlar	balusters
bays	belt courses
brackets	capitals
cartouches	chevrons
clerestory windows	columns
corbel tables	cornices
crenellations	dentils
elliptical-shaped roofs	entablatures
eyebrow windows	keystones
lintels	mullions
large display windows	muntins
Palladian windows	parapet roofs
pavilion	pediments
piers	pilasters
pinnacles	quoins
pointed-arched windows and doors	relief
round-arched windows and doors	rustication
segmentally-arched windows	sashes
sidelights	spandrels
stained glass	surrounds

transom windows

Appendix E

Experimental Building within Experimental Stimulus Manipulation

Streetscape Sketch		Detail				Massing	
		Q	W	NQ	NW	1:1	2:1
1	No manipulation						
2	No manipulation						
3	No manipulation						
4		*	*			*	
5		*	*				*
6				*	*	*	
7				*	*		*
8			*	*		*	
9			*	*			*
10		*			*	*	
11		*			*		*

Note. Q and W refer to presence of quoins and window treatments, respectively. NQ and NW refer to absence of quoins and window treatments, respectively. One-to-one and 2:1 refer to equal height-to-width ratio (square-shaped) and unequal height-to-width ratio (rectangular-shaped), respectively. The order of the streetscape sketches correspond to the

order of sketches in Appendix C.

Appendix F

Instructions to Participants

In this experiment, we are interested in how people perceive and evaluate architectural spaces. In particular, we are interested in exterior spaces, and we also want to find out what types of words are good for this purpose.

We will take you in small groups to a room that has desks in it with partitions surrounding the desks. Each of you will sit at one of the desks. In front of you will be a multiple choice answer sheet, a set of 21 scales, and four sketches of streets.

Each time you see a sketch of a street, you will be asked to evaluate it on 21 different scales . The 21 scales are on a sheet that you will have beside you on your desk. Each scale has five possible responses. They are Not at all, Somewhat, Moderately, Quite, and Extremely. So if you were rating a street on a scale such as "clean" and you felt that the street was not a clean one or that the scale does not apply to that particular street, then you would choose Not at all. On the other hand, if you felt the street that a bit clean, then you might choose Somewhat or Moderately.

Please pay attention to the fact that some of the scales have positive words such as "cheerful" whereas other scales may have negative words such as "gloomy."

Do not be concerned with how you rated a previous street. It is your impression of **each** street that we are interested in. Also, there are no right or wrong answers. We are only interested in how you feel about each room.

You will enter your ratings on a multiple choice answer sheet. The same scales will be used for each street sketch that you will be evaluating. In the first sketch, please

use the multiple choice numbers from 1 to 21. Then, in the second street sketch, use the multiple choice numbers from 22 to 41. The third sketch will be assessed using multiple choice numbers from 42 to 61. Finally, the last sketch will use answers from 62 to 81.

Your attention should be directed to the job of rating the sketches -- please DO NOT TALK DURING THE EXPERIMENT.

If you have any questions, please ask them now before the experiment begins. If there are no questions, we can begin by looking at the first sketch.

Table 1

Varimax Rotated Factor Loadings of Participant Responses to Heritage and Historic Urban Streetscape Sketches

Factor Loadings	I	II	III	IV	V	VI
Balanced	.82	.09	.09	.03	.01	.14
Orderly	.75	.03	.12	.06	.05	.08
Well Organized	.75	.01	.22	.01	-.01	.18
Consistent	.73	.17	-.52	.04	.02	.05
Disproportional	-.70	.07	-.10	.36	.00	.30
Lack of Fit	-.57	.11	-.19	.06	-.11	.34
Harmonious	.54	-.03	.28	.04	.09	.24
Ordinary	.06	.83	-.55	.29	.00	-.10
Plain	.06	.81	-.19	-.07	-.06	.00
Simple	.08	.80	.04	-.04	.02	.03
Interesting	.17	-.56	.34	.14	.03	.43
Unadorned	.02	.40	-.16	.11	.24	.26
Inviting	.19	-.12	.82	-.02	.09	.09
Friendly	.16	-.03	.80	.01	.08	.11
Unwelcoming	-.16	.17	-.77	.09	-.02	.14
Old	.03	.08	-.07	.86	-.09	-.07

Historic in Character	.13	-.18	.05	.77	-.06	.23
Modern	.14	-.02	.10	-.61	.13	.55
Spread Out Group of Buildings	.03	.07	.05	-.38	.86	.16
Crowded Group of Buildings	-.11	.06	-.14	.18	-.83	.13
Beautiful	.35	-.35	.40	.09	.01	.45
Eigenvalue	4.82	3.01	2.11	1.29	1.22	1.07
Percent of common variance	22.95	14.33	10.05	6.12	5.80	5.09

Table 2

Overall MANOVA Mean Scores for Window Treatment

Factors	M	SD	n
Organizational Compatibility[a]			
Presence of Window Treatment	20.00	6.35	138
Absence of Window Treatment	20.02	5.99	135
Aesthetic Style[a]			
Presence of Window Treatment	17.07	2.51	138
Absence of Window Treatment	16.61	2.45	135
Friendliness[a]			
Presence of Window Treatment	10.44	2.80	138
Absence of Window Treatment	9.88	2.80	135
Age[a]			
Presence of Window Treatment	9.31	2.46	138
Absence of Window Treatment	9.22	2.64	135
Adequacy of Space[a]			
Presence of Window Treatment	5.26	2.25	138
Absence of Window Treatment	5.35	2.32	135
Beauty[a]			

Presence of Window Treatment	3.28	1.19	138
Absence of Window Treatment	3.02	1.14	135

Note. High scores on Organizational Compatibility indicate that participants evaluated the scenes as more balanced and harmonious, and less disproportional. High scores on the Aesthetic Style factor indicate that participants evaluated the scenes as less plain and simple, and more interesting. High scores on the Friendliness factor indicate that participants evaluated the scenes as more friendly and inviting, and less unwelcoming. High scores on the Age factor indicate that participants evaluated the scenes as older and less modern. High scores on the Adequacy of Space factor indicate that participants evaluated the scenes as a more spread out group of buildings and less crowded. High scores on the Beauty dimension indicate that participants evaluated the scenes as more beautiful.

·Maximum score = 35.00. ·Maximum score = 25.00. ·Maximum score = 15.00. ·Maximum score = 10.00. ·Maximum score = 5.00.

Table 3

Overall MANOVA Mean scores for Design Interest by Window Treatment

	M	SD	n
Organizational Compatibility			
Presence of Window Treatment			
Design-Interested	20.00	7.62	6
Nondesign Interested	20.00	6.32	132
Absence of Window Treatment			
Design-Interested	22.88	5.74	13
Nondesign Interested	19.71	5.96	122
Aesthetic Style			
Presence of Window Treatment			
Design-Interested	16.00	2.36	6
Nondesign Interested	17.11	2.46	132
Absence of Window Treatment			
Design-Interested	17.30	2.45	13
Nondesign Interested	16.53	2.50	122
Friendliness			
Presence of Window Treatment			
Design-Interested	10.17	2.71	6

Nondesign Interested	10.46	2.82	132
Absence of Window Treatment			
Design-Interested	10.77	1.96	13
Nondesign Interested	9.90	2.86	122
Age			
Presence of Window Treatment			
Design-Interested	11.67	2.42	6
Nondesign Interested	9.21	2.41	132
Absence of Window Treatment			
Design-Interested	8.85	2.44	13
Nondesign Interested	9.26	2.67	122
Adequacy of Space			
Presence of Window Treatment			
Design-Interested	4.67	2.50	6
Nondesign Interested	5.29	2.25	132
Absence of Window Treatment			
Design-Interested	6.00	1.58	13
Nondesign Interested	5.28	2.38	122
Beauty			
Presence of Window Treatment			
Design-Interested	3.67	1.21	6
Nondesign Interested	3.26	1.19	132

Absence of Window Treatment			
Design-Interested	3.23	1.01	13
Nondesign Interested	3.00	1.15	122

Note. High scores on Organizational Compatibility indicate that participants evaluated the scenes as more balanced and harmonious, and less disproportional. High scores on the Aesthetic Style factor indicate that participants evaluated the scenes as less plain and simple, and more interesting. High scores on the Friendliness factor indicate that participants evaluated the scenes as more friendly and inviting, and less unwelcoming. High scores on the Age factor indicate that participants evaluated the scenes as older and less modern. High scores on the Adequacy of Space factor indicate that participants evaluated the scenes as a more spread out group of buildings and less crowded. High scores on the Beauty dimension indicate that participants evaluated the scenes as more beautiful.

[a]Maximum score = 35.00. [b]Maximum score = 25.00. [c]Maximum score = 15.00. [d]Maximum score = 10.00. [e]Maximum score = 5.00.

Table 4

Overall MANOVA Mean Friendliness· Scores for Quoins by Window Treatment

	M	SD	n
Presence of Quoins			
Presence of Window Treatment	10.36	2.93	68
Absence of Window Treatment	10.39	2.64	68
Absence of Quoins			
Presence of Window Treatment	10.52	2.69	70
Absence of Window Treatment	9.39	2.89	67

Note. Maximum score = 15.00.

·High scores on the Friendliness scales indicate that a participant evaluated scenes as more friendly, inviting, and less unwelcoming.

Table 5

2 X 2 X 2 MANOVA Mean Scores for Massing

Factors	M	SD	n
Organizational Compatibility[a]			
1:1 Height-to-Width Ratio	21.66	6.11	136
2:1 Height-to-Width Ratio	18.37	5.79	137
Aesthetic Style[a]			
1:1 Height-to-Width Ratio	17.29	2.41	136
2:1 Height-to-Width Ratio	16.39	2.49	137
Friendliness[a]			
1:1 Height-to-Width Ratio	10.35	2.91	136
2:1 Height-to-Width Ratio	9.99	2.70	137
Age[a]			
1:1 Height-to-Width Ratio	9.60	2.63	136
2:1 Height-to-Width Ratio	8.942	2.425	137
Adequacy of Space[a]			
1:1 Height-to-Width Ratio	5.23	2.40	136
2:1 Height-to-Width Ratio	5.38	2.17	137
Beauty[a]			

1:1 Height-to-Width Ratio	3.40	1.11	136
2:1 Height-to-Width Ratio	2.91	1.17	137

Note. High scores on Organizational Compatibility indicate that participants evaluated the scenes as more balanced and harmonious, and less disproportional. High scores on the Aesthetic Style factor indicate that participants evaluated the scenes as less plain and simple, and more interesting. High scores on the Friendliness factor indicate that participants evaluated the scenes as more friendly and inviting, and less unwelcoming. High scores on the Age factor indicate that participants evaluated the scenes as older and less modern. High scores on the Adequacy of Space factor indicate that participants evaluated the scenes as a more spread out group of buildings and less crowded. High scores on the Beauty dimension indicate that participants evaluated the scenes as more beautiful.

[a]Maximum score = 35.00. [b]Maximum score = 25.00. [c]Maximum score = 15.00. [d]Maximum score = 10.00. [e]Maximum score = 5.00.

Table 6

2 X 2 X 2 MANOVA Mean Aesthetic Style· Scores for Quoins

Aesthetic Style	M	SD	n
Presence of Quoins	17.19	2.61	136
Absence of Quoins	16.49	2.32	137

Note. High scores on the Aesthetic Style scales indicate that participants evaluated scenes as less ordinary, plain, simple, unadorned, and more interesting.

·Maximum score: 25.00.

Table 7

2 X 2 X 2 MANOVA Mean Beauty· Scores for Quoins

Beauty	M	SD	n
Presence of Quoins	3.33	1.14	136
Absence of Quoins	2.97	1.17	137

Note. High scores on the Beauty factor indicate that participants evaluated scenes as more beautiful.

·Maximum score: 5.00.

Table 8

2 X 2 X 2 MANOVA Mean Beauty· Scores for Window Treatment

Beauty	M	SD	n
Presence of Window Treatment	3.28	1.19	138
Absence of Window Treatment	3.02	1.14	135

Note. High scores on the Beauty factor indicate that participants evaluated scenes as more beautiful.

·Maximum score: 5.00.