FACTORS INFLUENCING THE USE OF BEHAVIORAL RESEARCH IN DESIGN

by

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TABLE OF CONTENTS

LIST OF TABLES AND FIGURES

Tables

Figures

CHAPTER I

INTRODUCTION

Improving the Behavioral Basis of Environmental Design

Environmental designers are required to make numerous decisions that affect the way people live.[1] Whether they are designing a speculative office tower, a neighborhood park, or any other project, they continually make decisions about the human needs that must be considered and predictions of the human response to their design. Once these decisions are made, they are literally set in concrete; users will have to live with the consequences for years to come. It is, consequently, important that the correct decisions be made. To do this, designers need accurate information about human behavior and attitudes. Traditionally, such information could be obtained directly from users on an individual basis. Today, as will be explained later, the task of obtaining information on human requirements has become much more difficult as well as more critical.

In recent years, a new field of research has emerged which is directly concerned with the relation between human social and psychological needs and elements of the natural and built environment. This field will be referred to here as Environment Behavior Research (EBR).

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[1] Alvin Schorr, "Housing and Its Effects," in Environmental Psychology: Man and His Physical Setting, eds: Harold M. Proshansky, William H. Ittelson and Leanne G. Rivlin (New York: Holt, Rinehart and Winston, 1970), p. 120.

There appear to be two different ways in which EBR can assist designers. The first way is through enhancing direct user participation. Researchers can develop mechanisms through which users are better able to assess and express their environmental needs. Researchers can also help designers to develop effective techniques for securing accurate and meaningful input from users.

The second way in which EBR can assist designers is as a complement to participation. Researchers can do this both by observing and questioning potential users, and by searching out existing research information pertinent to a given project. With this information, researchers can then provide designers with a broader understanding of the human implications of the project, and can call important issues to the attention of designers. Unfortunately, designers have generally not taken advantage of the assistance available from EBR.

Development of the Study

This dissertation documents an exploration of the reasons for the underutilization of EBR in design. As with most exploration, some paths were followed and others were not. The reasons for most of the choices will be discussed at appropriate points in the text. Some of the choices themselves are mentioned here to aid the reader in understanding the scope and direction of the information that follows.

The research will consider, primarily, the role of the environment behavior researcher as a collector and interpreter of data about human requirements, rather than as a facilitator of user participation. This choice was made because the first role was better defined at the time when the study was initiated.

There are a number of logical places to begin searching for the reason EBR is not used in design. One could look at the quality of the research product, the concerns and priorities of researchers, or the cost of research, among other things. In this study, the focus will be on the designer's role in the problem. The intention is to identify

factors affecting the designer's demand for information. The study will also consider how designers interpret their responsibility toward users and what type of information about behavior they want. In short, the study will explore those aspects of designer thinking that can be expected to affect demand for EBR.

One reason for focusing on the designer's role in the problem is that researchers frequently lay responsibility for the problem at his feet. It seems important for the researcher to understand the designer's perspective on the situation. With such information in hand, researchers and other interested parties should be in a stronger position to initiate effective action to increase the role of EBR in design.

This study looks, specifically, at the problem of integrating EBR into architectural design. However, it is expected that the findings will pertain to other design professions as well. Consequently, the more inclusive terms designer, design practitioner, and environmental designer, will be used as well as architect.

A number of different methods were employed to gather information about designer thinking with respect to EBR. An initial literature review uncovered little more than anecdotal material directly pertinent to the problem. Consequently, the search was expanded to include the generic problems of the utilization of new information and the application of research-based information in decision making.

It appeared from this expanded search that many times, when there is difficulty integrating information into the decision process, it is because the researchers generating the information do not take into consideration the problems decision makers face in using information.

During this phase of the project, the Director of Research Programs of the American Institute of Architects (AIA) invited the author to analyze for him data he had gathered on the research needs of AIA members. One of the findings of this analysis was contrary to what

the author had expected. There was a strong desire among the architects sampled for research information, and they were most eager for behavioral research information.[1] This finding seemed to increase the likelihood that EBR was not being used because, in one way or another, the EBR that was available did not match designer needs or, for some reason, was not part of the designer's knowledge base.

Since information was not available concerning the nature of designer needs for behavioral information, a survey of a sample of designers was undertaken to obtain such information.

While the survey was in process, the literature review continued. The importance of the problem had, by this time, led other researchers to become interested. The stimulation of their work, together with the author's continued immersion in the problem, contributed as much to the study as did the survey.

Plan of the Report

Chapters Two and Three present the findings of the literature search and analysis component of the study. Chapter Two describes the context of the problem. It includes a discussion of the designer's need for better information on human requirements and the difficulties he faces in obtaining it. It also provides some information on the nature of EBR and concludes by documenting the existence of an application gap separating EBR from use in design practice. Chapter Three explores possible sources of the application gap. It concludes with a list of propositions about the nature of designer information needs.

Chapter Four describes the development of the survey. Chapter Five is a selective analysis of data obtained from the survey. A summary of the conclusions of the literature analysis and the survey

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[1] John Merrill, "An Analysis of Recent AIA Data on Research Needs and Research Communication," University of Michigan, February 1973 (Typewritten).

is presented in Chapter Six. Suggestions for extending the study and some general recommendations for increasing the utilization of EBR by designers are also included in Chapter Six.

CHAPTER II

BEHAVIORAL RESEARCH AND ENVIRONMENTAL DESIGN: POTENTIAL COMMON GROUND

Overview

This chapter begins by documenting the emphasis environmental designers place on the human aspects of their work. Their need for better information with which to address these aspects of design is discussed next. Environment Behavior Research is then described as a potential source of this needed information. The chapter concludes with the presentation of evidence indicating that designers are not availing themselves of the assistance EBR may be able to provide.

The Role of Human Requirements in Environmental Design

Design Is for People

Nearly 400 years ago, Francis Bacon pointed out that "houses are made to live in not only to look on."[1] Flaubert, in his nineteenth century Dictionary of Platitudes, said of "architects: all imbeciles, always forgetting the staircases to the houses."[2]

Through the years, designers have continued to be subjected to criticism for buildings that apparently ignore the occasion for their

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[1] Terrance Lee, "Psychology and Architectural Determinism (Part 1)," The Architects' Journal, August 4, 1971, p. 254.

[2] John Rae, "Are Architects Imbeciles," RIBA Journal (London) March 1971, p. 110.

existence. Among recent critics is psychologist Robert Sommer who has stated the case as follows: "Architecture may be beautiful, but it should be more than that; it must enclose space in which certain activities can take place comfortably and efficiently."[1] Sommer continues by asking the reader to imagine that the situation were different, and that "architects were primarily artists given free rein to enclose certain spaces beautifully. Someone else would be charged with the task of finding uses for the hollows within the sculpture."[2] It is not intended to imply here that architects do not have aesthetic functions, but only that these aesthetic functions are instrumental to the function of sheltering human activity. The currently popular synonym for architecture, environmental design, emphasizes this. Inherent in the concept of environmental design is the notion of designing surroundings. In designing surroundings or environments for wild animals; e.g., the design of zoos, meticulous attention is given to suiting the surroundings to the animal. The human animal would seem to deserve equal consideration.[3]

Designers Believe What They Do Affects People

It may appear from the nature of this criticism that architects are unaware of the human implications of their work or are not concerned about these implications. This is not the case. There is considerable evidence that designers believe that their work has important social implications. Alan Lipman, who is himself an architect, has been studying the value structures of British architects. He argues that

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[1] Robert Sommer, Personal Space: The Behavioral Basis of Design, (Englewood Cliffs, N.J.: Prentice-Hall, 1969), pp. 4 & 5.

[2] Ibid, p. 5.

[3] Rene Dubos, So Human an Animal (New York: Charles Scribner & Sons, 1968), p. 233.

architects believe strongly that their work affects social relations.[1] In fact, sociologist Robert Gutman has observed that "no architect can talk about his medium or his schemes without reference to how they will be used by people."[2] Some social scientists have even expressed concern that designers give the designed environment more credit for influencing behavior than it deserves.[3]

Not only do designers believe that what they do has an effect on behavior, but they are eager to use this power to improve society. As architect C. M. Deasy noted, "One of the fondest hopes of architects and planners is that the practice of their art will lead to a better life for mankind."[4] This is echoed by others as well. For example, Broady has labeled designers "social consciences."[5] Gutman suggests that "architecture is one of the few fields that keeps alive the utopian tradition of social thought."[6] In a study of the values of students in various disciplines at the University of British Columbia, 73 percent of the architecture students questioned indicated that it was "very important" for them "to bring about change." Architecture students were among those most positive in responding to this question.[7]

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[1] Alan Lipman, "The Architectural Belief System and Social Behavior," The British Journal of Sociology, June 1969, p. 191.

[2] Robert Gutman, "The Questions Architects Ask," in People and Buildings, ed: Robert Gutman (New York: Basic Books, 1972), p.340.

[3] Maurice Broady, "Social Theory in Architectural Design," in People and Buildings, ed: Robert Gutman (New York: Basic Books, 1972), p. 174.

[4] C. M. Deasy, "People Patterns in the Blueprints," Human Behavior, August 1973, p.8.

[5] Broady, p. 171.

[6] Gutman, p. 346.

[7] Marjorie Goodwin, "Correlates of Career Choice," (Vancouver, B. C.: Dept. of Health and Welfare and the University of British Columbia, August 1972), p. 149.

Several studies have provided support for the view that practicing designers are concerned with designing for people. A study commissioned by the American Institute of Architects concluded that the professions of landscape architecture and architecture share a common concern "for the human use of space, for the analysis of human needs and for design syntheses for these needs."[1]

Sociologist Howard Boughey reported that for 46 out of 50 architects he interviewed "an important, even central part of the design process is manipulating design elements as a means to achieve certain behavioral goals."[2] Even the four architects who disclaimed interest in human behavior frequently made behavioral predictions while discussing design schemes.[3] Reizenstein and Conway also have reported concern on the part of designers for the behavioral consequences of their work.[4]

Adequately Designing for People Can Be Difficult

If the work of designers frequently does not satisfy various human requirements, it does not appear to be because designers are unaware that their work has impact on its users. It is also not because they

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[1]Gerald M. McCue, William Ewald Jr. and The Mid-West Research Institute, Creating the Human Environment (Urbana: University of Illinois Press, 1970), p. 282.

[2]Howard N. Boughey, Jr., "Blueprints for Behavior: The Intentions of Architects to Influence Social Action through Design," (PhD dissertation, Princeton University, 1968), p. 79.

[3]Ibid

[4]Janet E. Reizenstein, "Linking Social Research and Design," Department of City and Regional Planning, Graduate School of Design, Harvard University, 1974 (typewritten), p.5; Donald Conway, ed., Social Science and Design (Washington, D.C.: American Institute of Architects, 1974), p. I-3.

are unconcerned about this impact. One explanation may be that designers are not able to satisfy human requirements because they do not have adequate information on what these requirements are. In recent years, a number of developments have made understanding human design requirements quite difficult.

Isolation from the user. One such development is the increasing social and administrative distance between designers and the actual users of the design product. In the past, the architect usually designed for an individual client. This was comparable to the contemporary situation of designing the private single-family home. In such a case, it is possible for the designer to work closely with the client and his family who will also be the principal users of the home. With this close collaboration, it is possible for the designer to directly obtain an understanding of the user's needs. In many cases, the process of understanding these needs is made easier because the designer and the client share a common culture and common notions of what a house should be.

Today the situation is changing. Design work is generally at a much larger scale. It includes schools, multi-family housing, and office buildings. In these cases, the client with whom the designer works is a private or public corporate body. While this body is responsible for financing and overseeing the development of the project, it will seldom be the primary user. Such clients are often as far removed from the users as is the designer.

It is often difficult to identify who the actual users will be. The problem is complicated because, in most cases, the project will be used directly by a variety of user groups. In the case of a school, these might include students, teachers, administrative staff, and custodial staff. Each group has somewhat different requirements. In addition to these direct users, there are other indirect users. These are people who are affected by the building though they may never enter

it. In the case of a school, these indirect users include parents and adjacent property owners. Many of the users will be from cultural groups with which the designer has little personal experience.

These changes mean that one of the problems architects face in satisfying human requirements is establishing close contact with actual building users.

Users are often unable to indicate what they need. A second problem concerns the difficulty users frequently experience in expressing their environmental desires and needs. This is, in part, because the physical environment often appears fixed and its influences are subtle. As an example, anthropologist Edward Hall tells the story of an architect who improved the performance of a committee by making some changes in the room in which the committee met.

> There had been so many complaints about the inadequacy of the chairman that a replacement was about to be requested. The architect had reason to believe that there was more in the environment than in the chairman to explain the difficulties. Without telling his subjects what he was doing, the architect managed to retain the chairman while he corrected environmental faults. The meeting room was next to a busy street whose traffic noises were intensified by reverberations from the hard walls and rugless floors inside. When reduction of the auditory interference made it possible to conduct the meeting without undue strain, complaints about the chairman ceased.[1]

Not only are many environmental needs beneath the level of awareness for the average person, but human beings exhibit a remarkable ability to adapt to their environment. Biologist Rene Dubos has observed that human beings can adapt to and even thrive in conditions of extreme environmental pollution and in monotonous and ugly surroundings.[2] As an example, residents living near a wood pulp mill

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[1] Edward T. Hall, The Hidden Dimension (Garden City, N.Y.: Doubleday & Co., 1966), p. 44.

[2] Dubos, p. 146.

"which subjected them to reduced visibility, tarnished house paint, unpleasant odors and possible health-related conditions" indicated that they considered their town to be an excellent place to live. They did so even though they were aware of the pollution problem.[1]

Reliance on personal values. Faced with these problems frustrating their desire to create environments that meet human requirements, designers frequently resort to their own values as a basis for deciding what is needed.[2] However, there is a serious problem with this approach. The values of designers and planners have been shown to differ greatly from those of non-designers. A number of studies have dealt with the nature of these differences. Cantor, Hershberger and Kaplan have each asked architecture students and non-architecture students to evaluate environmental displays on various dimensions. In all cases, there were substantial differences between the two groups.[3] Other studies have attempted to correlate planners' evaluations of neighborhood quality with the evaluations made by residents of the

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[1] Robert Sommer, Design Awareness, (San Francisco: Rinehart Press, 1972), pp. 28-29.

[2] McCue, p. 282.

[3] David V. Cantor, "An Intergroup Comparison of Connotative Dimensions in Architecture," Environment and Behavior (June, 1969); Robert Hershberger, "A Study of Meaning in Architecture," in EDRA 1, eds: Henry Sanoff and Sidney Cohn (Raleigh, N. C.: Environmental Design Research Association, 1970); Rachel Kaplan, "Predictors of Environmental Preference: Designers and Clients," in Environmental Design Research, Vol. 1, ed: Wolfgang F. E. Preiser (Stroudsburg, Pa.: Dowden, Hutchinson and Ross, 1973).

neighborhood. The results showed a clear difference in the two value systems.[1]

An illustration of the problems that occur when designers depend primarily on their own values to satisfy their responsibilities to users is offered by a British architect. He recounts a confrontation between the architect of a high-rise housing project and a tenant of the project. The architect appeared convinced that the use of a high-rise configuration was justified by the view it afforded. He likened the view to the works of a prominent artist. The tenant was not impressed. She was more concerned with the fact that she had to keep her windows locked to prevent her children from falling out, and that there were only two elevators for the entire building.[2]

In a discussion of political opposition to master plans, Gans reaches a similar conclusion.

> Planners did not realize that most city residents place less value on open space than they do; that they do not live their life around the elementary school; and, that they are not interested in rearranging the land-use pattern at great expense to achieve an order that is most visible on a map.[3]

As architect Jon Lang suggests, "if architecture is to have external validity, it is essential that design goals stem from the needs, desires and values of those who are affected by the buildings rather than simply from those who believe that they know what is good for the rest.[4]

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[1] John B. Lansing and Robert W. Marans, "Evaluation of Neighborhood Quality," Journal of the American Institute of Planners, May 1969. Edward J. Kaiser, et al, "Neighborhood Environment and Residential Satisfaction," Chapel Hill: University of North Carolina, October 1970. (Mimeo)

[2] Rae, p. 110.

[3] Herbert Gans, People and Plans (New York: Basic Books, 1968), p. 63.

[4] Jon Lang, "Architecture for Human Behavior: The Nature of the Problem," in Architecture for Human Behavior, ed: Charles Burnette (Philadelphia: Philadelphia Chapter of the American Institute of Architects, 1971). p. 10.

The Increasing Need to Consider User Requirements

The need for designers to accurately assess user requirements is increasing as human dependence on artificial environments increases. When building decisions are made on a small scale, the consequences of one series of decisions affect only a few people. However, with the scale at which planning and design occurs today, thousands of people can be affected. Not only are more people affected by a single series of decisions, but the effects are often more powerful. This is a consequence of the greater proportion of time spent in artificial (designed) environments. Persons are subjected to a particular environment night and day, week after week. If this environment does not match the requirements of the user, it can have dire consequences for the users as well as for the environment. The scale of the disaster that is Pruitt-Igoe bears witness to this.

These changes in the scale and criticality of design decisions are in part responsible for external pressures on the design professions to be more sensitive to user requirements in their work. Appleyard suggests three such pressures. The first is the dethroning of the expert. Users are demanding to participate in the decision process. As a result, designers are being forced to shift roles from "leader-educators" to "servant-technicians." There is also increasing pressure to consider the environmental ramifications of design and planning decisions. This pressure has manifested itself in the requirements for environmental-impact statements. The final pressure grows from the realization that environmental resources are limited and must be conserved. This realization has led to concern for environmental management and long-term, cost-benefit considerations.[1]

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[1] Donald Appleyard, "Environmental Planning and Social Science," Working Paper No. 217, (Berkeley: Institute of Urban and Regional Development, University of California, 1973), p. 3.

In conclusion, while designers acknowledge that an essential element of their work is designing for people, discharging their obligation to users is becoming ever more complex at the very time that it is increasing in importance.

The Nature of Environment Behavior Research

The Recent Emergence of Interest in EBR

In the case of zoo design, mentioned earlier, an array of specialists who had researched the environmental needs of various animal species could be called upon for assistance.[1] While the need for similar information on the human species has long been recognized, until the mid-sixties little such information was available. The McCue study, cited earlier, which indicated the concern of designers for the human use of space, also indicated that, because pertinent scientific evidence was not available, designers had been forced to make decisions about human use on a subjective basis.[2] Behavioral and social scientists had largely ignored the interaction between spatial and physical factors and human behavior.[3] However, since the mid-sixties, the growth of interest in research related to this area has been rapid. School Environments Research, Publication Number 1, (SER 1), which appeared in 1965, was one of the first published attempts to bring together studies dealing with the relationship of the environment to human behavior and make them available to designers.[4]

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[1] Dubos, p. 233.

[2] McCue, p. 282.

[3] Robert Sommer, "Whatever Became of the Environment," Contemporary Psychology, Vol. 17, No. 3 (1972) p. 115; Sammuel Z. Klausner, On Man in His Environment (San Francisco: Jossey-Bass, 1971), p. 20; and Dubos, p. 217.

[4] Architectural Research Laboratory, School Environments Research, Publication Number 1 (Ann Arbor: University of Michigan, 1965).

A sequel to this publication was prepared in 1970. Over 1,200 separate pieces of research appearing after the publication of SER 1 were located. The publication that resulted, Man Environment Reference 1, (MER), included a system of cross references to make it more useful to designers. The 400 studies that were eventually abstracted in MER came from over 200 separate sources.[1]

A distinct field began to emerge with the development of graduate studies programs with such titles as Architectural Psychology, Environmental Psychology, and Man-Environment Studies. In 1968, the Environmental Design Research Association (EDRA) was established to provide a forum in which the exchange of ideas related to environmental design and behavior could occur.[2] About the same time a newsletter, Man-Environment Systems, and a journal, Environment and Behavior, began publication.[3] These were augmented by several collections of readings.[4] In 1973 another benchmark was achieved when the American Psychological Association recognized the importance of environment-related research by creating a task force on Environment and Behavior.[5]

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[1] Architectural Research Laboratory, Man Environment Reference: Environmental Abstracts (Ann Arbor: University of Michigan, 1974).

[2] Henry Sanoff, "Our EDRA Purpose," Design Research News, December 1974, p. 3.

[3] Environment and Behavior, Beverly Hills, California: Sage Publications; Man-Environment Systems, (Orangeburg, N.Y.) Association for the Study of Man-Environment Relations, Inc.

[4] Harold M. Proshansky, William H. Ittelson and Leanne G. Rivlin, eds., Environmental Psychology: Man and His Physical Setting (New York: Holt, Rinehart and Winston, 1970); Leon A. Pastalan and Daniel H. Carson, eds., Spatial Behavior of Older People (Ann Arbor: University of Michigan Press, 1970).

[5] Task Force on Environment and Behavior Newsletter, American Psychological Association, Washington, D. C., April 1974.

While there are numerous factors that help to account for the growth of interest in EBR, many of them can be grouped around three basic changes. The first of these changes was mentioned earlier. It concerns changes in the nature of the built environment. In 1951, Selvin provided an early description of some of these changes, specifically in the field of housing. He also indicated how they have spurred interest in social research.

> Growing interest in social research may result from changes in institutional patterns of housing that have highlighted the sociological and psychological assumptions involved in housing practices. Large-scale housing, in contrast to the construction of a custom-built house or of a few houses, involves a relatively centralized body of decisions, with compact and highly visible results. Because they are typically built for rental rather than for sale, these projects require continuous management-and continual decisions. Because they are often publicly subsidized in whole or in part, there is public concern with the decisions on tenant selection, location, design, and management policies. Because they are long term investments, whether built for profit or not, housing administrators are constrained to seek a high level of tenant satisfaction (and therefore lower turnover) in the long run. And because this public or semi-public housing, by virtue of mass-production techniques and favorable concessions by government agencies, usually provides more housing for the consumer's dollar than is available elsewhere, defects in design or construction are less important to the consumer than they would be in the higher-priced private dwelling; the market for large-scale housing is thus less sensitive to consumer needs or to changes in consumer preferences.[1]

These changes increased the recognition of the need for behavioral research. Unable to find the information they wanted, individuals with design and planning backgrounds began to do their own research. These early designer-researchers include Kevin Lynch, Donald Appleyard, Christopher Alexander, and Henry Sanoff. In fact EDRA was started

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[1] Hanan C. Selvin, "The Interplay of Social Research and Social Policy in Housing," Journal of Social Issues, Vol. 7, Nos. 1 & 2 (1951) p. 174.

primarily by such designer-researchers. Even today, a majority of the persons listed in the International Directory of Behavior and Design Research have design or planning backgrounds.[1]

There have also been changes within the social and behavioral sciences which have spurred the growth of EBR. The first of these shifts is the increased desire on the part of many social scientists to do research that relates to pressing social problems.[2] For Environment Behavior Research this often springs from a recognition of the declining quality of the human environment. The environmental movement of the late sixties seemed to crystallize this concern. One environmental psychologist has pointed to the rapid changes in the physical environment and has suggested that the second half of the twentieth century "may be known as the age of the physical environment."[3] From the perspective of the behavioral scientist, man is a prime cause of these changes, and consequently, a better understanding of man's role in environmental change could aid in controlling the direction and extent of change.[4]

The second shift involves the increasing interest among behavioral scientists in the study of behavior as it naturally occurs. This is a

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[1]This statement is based on a tabulation of the educational backgrounds of the persons listed in the directory. The directory was edited by Ronald Beckman and others and published by the Association for the Study of Man-Environment Relations, Inc., Orangeburg, N.Y., 1974.

[2]Max Millikan, "Inquiry and Policy: The Relation of Knowledge to Action" in The Human Meaning of the Social Sciences, ed: Daniel Lerner (New York: Meridian Books, 1959), p. 159; Robert Lynd, Knowledge of What (Princeton, N.J.: Princeton University Press, 1939), p. 2.

[3]Craik, 1970, p. 4.

[4]Joachim F. Wohlwill and Daniel H. Carson, eds., Environment and the Social Sciences: Perspectives and Applications (Washington, D.C.: American Psychological Association, 1972), p. ix.

departure from the reductionist approach which has been in common use. Reductionist research attempts to isolate units of behavior and to study these units under carefully controlled conditions. While this research has yielded important insights concerning human behavior, work based on other approaches has demonstrated that behavior cannot always be explained in terms of such isolated units. These other research approaches, which include ethology and ecological psychology as well as the work by such designer-researchers as Kevin Lynch, have emphasized the interdependence between an organism and its environment.[1] The value of looking at behavior in its environmental context has also been supported by the recent ecology movement which has kindled a "renewed awareness that man is bound by his physical environment."[2]

The Current State of Environment Behavior Research

Environment Behavior researchers today come from a wide variety of fields: architecture, landscape architecture, planning, psychology, sociology, anthropology, geography, engineering, and public health among others. Their research has appeared in a surprisingly diverse array of publications. For example, MER 1, referred to above, contains references to the American Anals of the Deaf, Civil Engineer, Earth and Mineral Sciences, International Labor Review, Library Quarterly and the Proceedings of the American Philosophical Society.[3]

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[1] Robert Sommer, "Whatever Became of the Environment," p. 115; Edwin P. Willems, "Behavioral Ecology as a Perspective for Man-Environment Research," in Environmental Design Research, Vol. 2, ed: Wolfgang F. E. Preiser (Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1973), p. 159.

[2] William H. Ittelson, et al, An Introduction to Environmental Psychology (New York: Holt, Rinehart and Winston, 1974), p. 3.

[3] Architectural Research Laboratory, 1974.

The fact that researchers have come from such a wide variety of backgrounds and that their work, when published, appears in such disparate and unlikely sources, has meant that Environment Behavior Research has had difficulty building on its collective achievements. It has also meant that researchers have pursued environment behavior issues on a variety of fronts with a variety of different strategies. In the next few paragraphs, some of the ways in which environment behavior researchers vary will be described. These various approaches to EBR are described here because they are pertinent to subsequent discussion.

Linkage to the Design Process. When one looks at the genesis of EBR and reads the introductory statements in the literature, it is possible to develop the impression that the primary concern of researchers is to do research which will aid designers and other environmental planners in making the designed environment more humane. In a general sense this may be true. However, researchers vary considerably in the degree to which a desire to directly affect the design decision process is a consideration in their work. They also differ widely in the type of information they feel designers most need.

For some researchers, the desire to affect design decisions is paramount. They work directly with designers or on problems generated by designers. The need for research to be timely and useful affects the nature of their work. Such researchers are often involved in the preprogramming and programming stages of the design process. They help to determine the need for proposed facilities, develop profiles of potential users, or develop behavioral performance standards for particular parts of the project, among other tasks. For example, Proshansky and his colleagues at the City University of New York were asked "how to design psychiatric facilities with a therapeutic atmosphere and influence on social interactions that would facilitate the treatment

of institutionalized mental patients."[1] Architect C. M. Deasy has worked with a sociologist to develop what he calls "behavioral programs" for a number of projects.[2]

Other researchers operate on their own. The issues they consider are usually relevant to design decision making. It is this relevance that leads government agencies or private foundations to support their research. However, there is usually no requirement that the information produced have an immediate pay-off to environmental decision-makers. The issues that concern these researchers are quite similar to those that concern the first type of researcher; however, they appear to see themselves as scientists responsible for generating data. Others must recognize the relevance of the data and put it to use. The work of Robert Sommer on seating patterns is an example of such research.[3]

Another group of researchers are even less concerned with application. In a sense, they are basic scientists who are interested in environment-behavior interactions for the inherent interest of the issues. They may be interested in developing theory about the relation of behavior to environmental variables, in improving understanding of human behavior by determining the impact of environmental factors, or in developing methods for investigating environmental behavior. This type of research addresses itself to such issues as how humans learn about their environment, code information from their environment, and attribute meaning to this information. For these researchers, the environment is often useful primarily as an aid to understanding human behavior.

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[1] Proshansky, 1970, p. 27.

[2] C. M. Deasy, Design for Human Affairs (New York: John Wiley & Sons, 1974), p. 75.

[3] Sommer, 1969, p. 49.

Variation in the concreteness of focus. Another way in which EBR varies is in the extent to which research findings relate specifically to physical settings. While this may appear identical to the type of variation discussed above; in fact, it is somewhat different. The critical factor here is whether or not the findings concern specific physical design elements.

The most concrete level of information provides the designer with actual physical design specifications. For example, research might suggest lighting levels or other ambient conditions required for certain human activity; it might suggest adjacencies between activities or indicate the specific spatial requirements of potential users.

At a somewhat less concrete level is research which endeavors to describe or predict behavior in specific physical settings or setting types. The designer can use such information to broaden his understanding of users. However, it is left to him to determine what the physical requirements of the users are.

At the most abstract level is research which is not related to specific settings. Altman has called information resulting from this type of research process information.[1] Such research provides a conceptual framework which can assist design decision makers in recognizing important behavioral issues in their work. It can serve a similar function for researchers working at more concrete levels. The level of concreteness of research information appears to have implications for the utility of EBR in design. These implications will be explored in later chapters.

Other types of variation. The diversity among environment behavior researchers is apparent in a number of other areas as well.

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[1] Irving Altman, "Some Perspectives on the Study of Man-Environment Phenomena," in Environmental Design Research, Vol. 2, ed: Wolfgang F. E. Preiser (Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1973), p. 102.

For example, Rapoport has described twelve separate theoretical models which are in use. Craik has catalogued the variety of substantive environmental issues that enjoy research attention.[1]

The Application Gap

One might expect that designers would be eagerly seeking out EBR to aid in alleviating some of the problems they encounter in responding to human requirements. Unfortunately, this does not generally appear to be the case. In fact, there appears to be a serious application gap blocking the utilization of EBR in design.[2]

As part of a survey exploring the role of behavioral research in design practice, Reizenstein described each of five major subareas of EBR. The subareas were ergonomics, environmental assessment, user needs, territoriality and psychological impact. She asked a sample of architects and planners how often they had used each. Only 21 of her 144 respondents reported often using environmental assessment research. Even fewer respondents reported using the other categories of behavioral research with any frequency.[3] The situation had not changed much from the time of an earlier study by Windley. He asked about use of behavioral research in more general terms. Only 19

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[1]Kenneth H. Craik, "Environmental Psychology," Annual Review of Psychology, eds: Paul H. Mussen and Mark R. Rosenzweig, Vol. 24 (1973); Amos Rapaport, "An Approach to the Construction of Man-Environment Theory," Environmental Design Research, Vol. 2, ed: Wolfgang F. E. Preiser (Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1973).

[2]Bill Hillier, John Musgrove and Pat O'Sullivan, "Knowledge and Design," in Environmental Design: Research and Practice, Vol. 2, ed: William J. Mitchell (Los Angeles: Environmental Design Research Association, 1972), p. 29-3-2.

[3]Reizenstein, p. 32.

percent of his 80 respondents reported having "used a sociologist, psychologist or psychiatrist as a consultant on any project." Fifty-seven percent indicated that they had not even "used findings from social research to help develop a design program."[1]

Another indication of the lack of integration of behavioral research into design practice is the relatively minor role of the behavioral sciences in design education. Data gathered in 1967 indicate that an average of three percent of credit hours earned by an undergraduate architecture student were in the social sciences.[2] An examination of the 1973-1974 edition of the Faculty Directory of the Architectural Schools of North America, indicates that EBR still receives little attention in architectural education. The directory lists the name, title, and teaching specialties of each faculty member for 99 architecture programs. An analysis of the listings revealed that 53 schools had not even a single faculty member listed with a teaching specialty in anything apparently related to Environment Behavior Research. Another 25 had only one faculty member with such a listing, while only 18 had two or more.[3]

Frequently, the behavioral science input that does occur is on an elective basis, and is isolated from the mainstream of the student's studies. When it comes to the moment of truth in design education, the so-called jury, behavioral issues, are not seriously considered.

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[1] Paul Windley, "Translating Social Research into Physical Form: Attitudes of the Design Profession." (Undergraduate thesis, University of Colorado, 1969), p. 33.

[2] Constance Perin, With Man in Mind: An Interdisciplinary Prospectus for Environmental Design (Cambridge: MIT Press, 1970), p. 120.

[3] The Appendix provides a description of the procedure use to obtain these figures.

One study showed that only two out of 45 categories of criticism were concerned with the users.[1]

Summary

Contrary to the reports of some critics, designers are concerned with the impact of their work on people. If their work at times appears insensitive to human requirements, it may be because they did not have adequate information on what the human requirements of a project were and what the implications of various human requirements were for design.

A new field of research has recently emerged which is specifically concerned with how human behavior and the physical environment are related. This field, and the information it produces, would appear to provide designers with information which can help them understand and satisfy the human requirements in their work.

Unfortunately, designers do not appear to be utilizing this new source of information. There appear to be some problems at the interface between EBR and design practice which have resulted in an application gap. In the following chapters, the basis of this gap will be explored.

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[1] Perin, p. 120.

CHAPTER III

EXPLORING THE BASIS OF THE APPLICATION GAP

Overview

In this chapter, existing information from various sources will be examined in an attempt to discover the basis of the application gap currently afflicting EBR. This effort will focus primarily on the perceptions designers have of EBR and its role in their work. Designers cite some factors beyond their control when asked to explain their non-use of EBR. These conditions will be explored first. Some more basic issues will then be considered. These relate to the way designers conceive of their need for information in general, and the way they see their need for information on behavior in particular.

Introduction

There has been an awareness of the application gap for some time, and it has been the subject of increasing concern among researchers. For example, a recent Architectural Research Conference (AR 9), was devoted to exploring the gap. In summing up the results of the conference, Don Conway, Director of the Research Programs for the AIA, noted that no new ground had been broken in providing solutions to the problems. The very lack of practitioners at the conference was itself evidence of the gap.[1] Subsequent to that conference, the AIA

[1] Don Conway, Report of AR 9, Washington, D.C.: American Institute of Architects, undated (Mimeo).

established a Research Communications Fellowship to encourage research aimed at alleviating the application gap. The subject has also displayed increasing prominence at yearly EDRA conferences.[1]

As Constance Perin said some time ago, "Why is it that what seems just a simple matter of getting together - an idea born of common sense - is so complex and difficult? If the situation is to change, this has to be discussed from the point of view of both designers and human scientists."[2]

In the last chapter the recent origin of EBR was noted. This, together with the heterogeneity of researchers and research interests, has undoubtedly had a negative effect on the utilization of EBR in design practice. However, if designers need better behavioral information, as much as was suggested earlier, one would expect them to be seeking out research findings and the assistance of researchers. The fact that they are not suggests that there are other impediments to the utilization of EBR in addition to limitations on the inherent value or immaturity of the research product. The present research was undertaken to help define and explain these impediments.

Research Focus

In the exploration of the application gap that follows, the focus will be primarily on the designer as the intended user of EBR. This is because researchers seem to be in the best position to initiate any change that might be required to increase utilization, and the present study is intended to provide researchers with information to plan such changes.

The primary advantage that the researchers have is that, at present,

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[1] This is attested to by the number of sessions with titles alluding to the application of research in the Program for EDRA 6.

[2] Perin, p. 6.

they are still in the process of developing their role or niche. Consequently, they have more flexibility to adjust their role to better mesh with the needs of the designer whose role is already fixed to some extent by a number of external factors.

A second reason for placing much of the burden of initiating change on the research community is that researchers appear to be the party with the greatest direct stake in increasing the utilization of research information. In addition to the obvious financial benefit to be derived from increasing the demand for their services and products, there are a number of other potential gains for the researcher.

As was suggested earlier, environment behavior researchers generally profess a desire to improve the quality of human environments.[1] If this is truly important to them, they should be eager to increase utilization of their research simply to increase their influence on design.

It is also important from a methodological point of view that the researcher's work be used. Environment Behavior Research is distinct from most traditional behavioral research because of its concern for studying naturally occurring behavior in actual settings.[2] It is not easy to alter physical environments for research purposes. Consequently, researchers must depend on existing settings and attempt to build experiments into the environmental design process. For this to happen, researchers must have the cooperation of designers.

As the party with the most to gain and presumably with the greatest awareness of the need for change, it would seem that the research community should take the initiative in bringing about change. Just as designers appear to need better information about the people who use the buildings they design, so it seems that environment behavior

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[1] Ittelson, p. 3.

[2] Ibid, pp. 208 & 222.

researchers should seek better information about the intended users of the research they produce.

Unfortunately, researchers have not displayed particular vigor in attempting to understand why designers do not more commonly utilize EBR. After surveying the literature relating behavioral research to design, architect C. M. Deasy observed that he could not find

> any hint of why these design professionals perform as they do or what action these emminent social scientists would suggest in order to bring about a constructive change. . . . (if these scientists) . . . would use these techniques to study the design field and the special constraints under which the design disciplines work, they would not only explain some puzzling phenomena, they might also set the stage for a change in direction.[1]

Waller, who has written on marketing building research, suggests that "research organizations have been 'product oriented'." He asserts that they generally place their "emphasis on the research itself with only little regard for the dissemination and application of results."[2] In a study of the utilization of research results in the building industry, Wilson found that various studies had been conducted "to point out who is doing research and what research is being conducted -- that is, the state of the art -- no one is doing a study of how practitioners such as architects are using research results."[3] It is for these reasons that the focus of this study is on the designer.

Initially, the possibility that conditions beyond the control of designers prevent them from utilizing EBR will be explored. Specifically, designers may not be able to obtain research data, and they may

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[1]Deasy, 1974, p. 12.

[2]George Waller, The Concept of Building Research as a Marketable Product (London: Institute of Marketing, 1971), p. 28.

[3]Duncan Wilson, "Utilization of Research Results in the Building Industry," Boston: Boston Architectural Center, 1974, p. 24 (Mimeo).

not have the freedom to use it. Some more subtle possibilities will then be considered. Either because of its style or substance, designers may see EBR as incompatible with their needs for information on behavior.

External Constraints on the Use of EBR

One obvious explanation of why designers do not use EBR is that they are unable to. Conditions beyond their control may prevent them from using it. This seems likely in view of their professed interest in better information concerning behavioral factors. In cases where designers have been asked to explain why they are not using research on behavior, they frequently cite such problems.

Access Problems

Where does the designer turn once he has decided he would like some information on the human implications of a project? As indicated earlier, the EBR literature is thinly spread through a variety of unlikely sources. From personal experience and observation, the author can testify to the difficulty of ferreting out useful information on particular design problems. Better dissemination was the most prominent problem mentioned by architects at AR 9. Difficulty in finding EBR was also mentioned by 54 percent of the respondents in Reizenstein's sample.[1] To begin with, the searcher must have access to a university library. Much EBR material is so specialized that only large university libraries are likely to have it. Even if such a library is available, it is difficult to interpret obscure titles in indexes or card catalogues in order to determine their relevance.[2] When the searcher has obtained what appear to be promising documents, he must read through them to locate

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[1] Reizenstein, p. 12; Merrill, p. 2.

[2] Deasy, 1974, p. 11.

the one in a hundred, to use Sommer's estimate, that is actually relevant and then interpret the information.[1]

A recent analysis of systems-building workshops and conferences supports the difficulty of information access. The "lack of a centralized information source was unchallenged as one of the main problems facing these (building) decision makers."[2]

One answer that has been proposed to help the architect deal with the massive maze of inaccessible information and find information which is pertinent to his needs is an information retrieval system. While such a system could conceivably save the architect the effort of finding his own references, it is not at all certain it would solve the problem of getting him the information he desires in a form he can understand. In one study of information transfer, the authors observed that ". . . it is clear that information transfer is not just a problem of information retrieval. In the transfer of technical information in industrial laboratories, information looking for the man seems to be nearly as frequent an occurrence as the man seeking the information." They cite the case of a retrieval system set up at great expense in a Dupont laboratory. After four years of operation, one-third of the clients had not used it, and the average user had made only 1.5 querries.[3]

Wilson has pointed out several weaknesses of conventional information dissemination systems. He indicates that they often are not sufficiently discriminating in selecting material for inclusion in the

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[1]Robert Sommer, "Can Behavioral Studies be Useful as well as Ornamental," Transactions of the Bartlett Society, Vol. 5 (1966-1967), p. 51.

[2]Wilson, p. 4.

[3]Richard S. Rosenbloom and Francis W. Wolek, Technology and Information Transfer, Division of Research, Graduate School of Business Administration, Harvard University, Boston, 1970, p. 37 and p. 15.

system, and that the key wording used in the retrieval process is often inadequate and may not match the needs of users.[1]

Unless other conditions are right, simply making more information available to designers will not solve the application gap. If designers do not understand the relevance of EBR to their work, it will have little value to them. Bavelas even "suggests that an individual's capacity for making sound judgments about a complex situation may be seriously impaired by supplying him with a lot of information which he believes to be relevant but whose influence on the situation is not clear to him."[2]

Research Information Is Not Communicated Effectively

One reason that designers may not understand the relevance of a piece of behavioral information is that they do not understand the information. Designers frequently complain that research is presented in an obtuse way and that it is difficult to translate into operational terms. They point to excessive verbage, unnecessary use of jargon, apparent preoccupation with methodological and theoretical considerations, among other objections.[3]

Designers Do Not Have the Freedom to Apply EBR

There appear to be at least two ways in which designers may feel constrained by external factors from using EBR. The first centers around the number and complexity of factors which the designer must already take into account.[4] Forty percent of Reizenstein's sample

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[1] Wilson, p. 32.

[2] Millikan, p. 164.

[3] Merrill, p. 2; Reizenstein, p. 8; Windley, pp. 32 & 35.

[4] Alexander, p. 4.

cited time and money constraints to explain why they did not use EBR.[1] Controlling costs, dealing with the maze of changing building and safety codes, and the requirements of financing agencies such as the Department of Housing and Urban Development (HUD), requires much of the architect's effort.[2] Furthermore, these agencies already specify many elements of the design product. Even though the designer may still actually have considerable latitude to apply behavioral research, he may be so overwhelmed by existing constraints that he is reluctant to accept additional burdens such as those he might expect that EBR would create.

The second argument is based on the premise that the designer has less and less power vis a vis other actors in the design process; i.e., bureaucrats and developers.[3] Can the designer convince the client to employ research findings or commission research? The common image of the developer is of a person motivated by narrowly defined self-interest, unwilling to pay for frills. If this is at all accurate and the designer believes that behavioral research is only a frill, the chances are that he probably does not have much chance of convincing a client to use it.

Boughey found that many architects take pride in the fact that they determine the true needs of the client, and these architects are the ones most respected by their peers.[4] If such architects are convinced of

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[1] Reizenstein, p. 8.

[2] Conway, 1973, p. II-7; Roger Montgomery, "Comment on: Fear and the House as Haven in the Lower Class," Journal of the American Institute of Planners, January 1966, p. 31.

[3] Peter Blake, "The Folly of Modern Architecture," The Atlantic, September 1974, p. 66.

[4] Boughey, p. 98.

the importance of behavioral data, they are certainly creative enough to convince clients.[1] Conway suggests that behavioral researchers themselves may be helpful in persuading clients of the value of including behavioral research in a project.[2]

The Different Worlds of the Designer and the Researcher

When one looks closely at the reasons given by designers for not using EBR, they do not seem sufficient to explain the application gap. In fact, the conditions they speak of seem indicative of more subtle problems. It has been observed that, in some important respects, designers and researchers virtually live in separate worlds. These differences appear to be at the heart of the application gap.

Designers and researchers certainly inhabit the same physical world of human beings and buildings. However, in other ways, their worlds may be quite different. There have recently been a number of arguments put forth for the existence of an internal psychological structure or cognitive map that intervenes between the external world and an individual's understanding of that world.[3] A person's cognitive map is the residue of his experience which is stored in highly schematic

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[1] William Brubaker, remark made during a workshop held at the University of Michigan, May 1974.

[2] Conway, p. II-8.

[3] Kenneth E. Boulding, The Image (Ann Arbor, Mi: The University of Michigan Press, 1956); Stephen Kaplan, "Cognitive Maps, Human Needs and the Designed Environment," Environmental Design Research, Vol. 1, ed: Wolfgang F. E. Preiser (Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1973); Thomas S. Kuhn, The Structure of Scientific Revolutions, 2nd edition, enl. (Chicago: University of Chicago Press, 1970).

terms.[1] In a sense, it is the map a person consults to give meaning to experience and guidance in decision making.

Cognitive maps are based not only on an individual's direct personal experience but on the collective experience of cultural groups to which the person belongs as well. The term paradigm has been used to refer to this collective cognitive map. Thomas Kuhn, who popularized this use of the word, explains that, as he uses it, paradigm "stands for the entire constellation of beliefs, values and techniques and so on shared by members of a given community."[2] Kuhn has argued that scientific communities can be distinguished by the paradigms they develop to mediate between themselves and the world with which they interact. Paradigms determine what is accepted as fact and what is considered worthy of one's attention.[3] The professions also appear to have their own characteristic paradigms.[4] The paradigm and associated individual cognitive maps that are characteristic of designers appears to differ in a number of important respects from those that are characteristic of researchers. In the paragraphs that follow, some of these differences will be described.

Different Values

Perhaps the most apparent difference has already been introduced in another connection. Architects see and evaluate environmental elements differently from non-designers including researchers. In part, this difference arises from the educational and professional experience of designers which intensifies awareness of many aspects of the physical environment. This emphasis may be coincidental with a

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[1] S. Kaplan, 1973, pp. 275 & 276.

[2] Kuhn, p. 175.

[3] Ibid, p. 4.

[4] McCue, p. 279.

deemphasis of the social environment. The implications of this difference go beyond aesthetic taste. They extend to judgments of what problems are important and what information is important to solve a given problem.[1]

Communication Differences

Communication or language problems have also been pointed to as a key to the application gap.[2] In fact, it does appear that the communication patterns of designers differ substantially from those preferred by researchers. The language of the architect is visually and qualitatively oriented. Designers depend heavily on pictorial or graphic means of communication. The heavy reliance on visual communications has even led some successful architects to confess that they feel relatively illiterate.[3]

There are several ways to illustrate the distinctive communication style of designers. In the first place, one can look at architectural magazines. They have traditionally been filled with pages of glossy photos and drawings but relatively little writing.[4] The words that are used are also indicative of a distinctive style of communicating. Louis Kahn provides particularly dramatic examples of this special use of

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[1]Alan Lipman, "Professional Ideology: 'Community' and 'Total' Architecture," Art, April 1971, p. 39.

[2]Edward Ostrander, "Visual-Semantic Communication Gap: A Model and Some Implications for Collaboration between Architects and Behavioral Scientists," A paper presented at the Gerontological Society Summer Institute on "Frontiers and Methods for Research and Knowledge Building in Gerontology--Social and Behavioral Perspectives," Syracuse University, August 1973, p. 4.

[3]William Brubaker, remark made during a workshop held at the University of Michigan, May 1974.

[4]Robert Goodman, After the Planners (New York: Simon & Schuster, 1971), p. 108.

words. In explaining the role of the designer he said, "The designer gives presence by calling on nature to satisfy the requirements of man."[1] A definition of architecture offered by architect William Caudill provides another example. He states that "architecture is an aura which emanates from the man-made environment. . . ."[2]

It is unclear whether this special communication style arises from the process of professional aculturation or whether persons with such characteristics gravitate toward architecture. Certainly, the design education system stresses graphic communication and does not emphasize reading and verbal expression.

Different Modes of Thinking

There is some interesting speculation which suggests that differences in values and communications patterns may stem from more basic transcendent differences in styles of thinking. The belief that there are two types of thinking, one associated with reason and science and the other associated with intuition and artistic creativity, has a long history.[3]

Recently there have even been attempts to trace such differences to hemispheric dominance within the brain.

> The cerebral cortex of the brain is divided into two hemispheres. . . . The left hemisphere is predominantly involved with analytical thinking, especially language and logic. This hemisphere seems to process information sequentially, which is necessary for logical thought. . . . The right

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[1] John W. Cook and Heinrich Klotz, Conversations with Architects, with a forward by Vincent Scully (New York: Praeger, 1973), p. 179.

[2] William W. Caudill, Architecture by Team (New York: Van Nostrand Reinhold, Co., 1971), p. 47.

[3] Jerome S. Bruner, On Knowing: Essays for the Left Hand, (Cambridge: Harvard University Press, 1964), p. 2.

> hemisphere, by contrast, appears to be primarily responsible for our orientation toward space, artistic talent, body awareness and recognition of faces. It processes information more diffusely . . . and integrates material in a simultaneous, rather than linear fashion.[1]

Differences in Professional Roles

The apparent differences between designers and researchers outlined above may, in large part, be due to the very different demands placed on each of them by their respective vocations.

> To produce a plan the designer has to make a series of decisions uniting in an unambiguous and definite statement - lines on paper translatable into three dimensions. To have arrived at a plan, the designer has to decide among an enormous range of possibilities in size, shape, location, materials, proportion, cost. He - or his team - alone will be working on that particular problem at that time. All his training is directed toward producing and defending a single set of plans.[2]

Designers are called upon to make decisions or judgments that frequently have permanent and irreversible effects. To make these decisions, they must consider a vast array of factors. Their task is further complicated because they frequently do not have important pieces of information, and the information they do have is often inconsistent. Gutman remarked that he found it "amazing and wonderful that architects are willing and able to design buildings given the fragmentary character of the knowledge in terms of which they must proceed."[3] "Solutions are neither encoded nor subject to mathematical or other precise methods of analysis but are measured by subjective values."[4]

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[1] Robert E. Ornstein, "Right and Left Thinking," Psychology Today, May 1973, p. 87.

[2] Perin, p. 10.

[3] Gutman, p. 366.

[4] McCue, p. 279.

The researcher operates in a very different fashion.

> Problems are dealt with by many others at the same time, and whatever he claims to see and conclude is open to discussion from many points of view. The publicness of investigation and interpretation is, in fact, an invitation to other scientists to replicate his work. He constructs his proofs as rigorously as possible so as to circumscribe the variables under test; he claims no more from his research than is contained in its original purpose . . . Ultimately he is interested in predicting or forecasting the behavior of a class of phenomena as a consequence of changed conditions.[1]

Researchers have the solace when they make decisions of knowing that they are only providing advice, and someone else has the responsibility for acting. They also can withhold their advice until it can be legitimated by indices of reliability and validity.

Psychologist Irwin Altman has attempted to conceptualize the differences between the problem-solving style of architects and that of researchers. He suggests that researchers have traditionally been process oriented. While they have often looked at very specific physical settings, they do so while studying specific behavioral processes, such as privacy, that occur in a variety of settings. Designers, on the other hand, must consider a variety of processes in the context of a definite physical setting, such as an office building or housing project.[2]

Observations reported by Millikan suggest that these distinctions between the professional requirements of designers and those of researchers are characteristic of the more general distinction between decision makers (be they designers or policy makers) and researchers. After vividly describing some of the frustration of policy makers and social scientists with attempts at collaboration, Millikan concludes that the disillusionment of policy makers with researchers is more than

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[1] Perin, p. 11.

[2] Altman, p. 100.

a mere semantic problem. He suggests that it goes back to misconceptions as to the relation of knowledge to action.[1]

In a discussion of factors separating planners from political decision makers, Friedmann comes to a similar conclusion: "A yawning gap of non-communication separates his (the expert's) world of learning from the world of acting. The rules that govern the behavior of these two worlds have nothing in common."[2] He goes on to list some of these rules. Many of his rules coincide with the descriptions of designers and researchers given above.

Regardless of their sources, these differences between designers and researchers seem to have important implications for the application gap. The implications are of two types. The first set of issues will be referred to here as stylistic. These issues are independent of the subject matter of the research. They concern stylistic characteristics of information designers find useful. The second type of implication is specific to behavioral research information.

Stylistic Issues

Many of the differences between researchers and designers outlined above suggest that the style of information designers find useful will be somewhat foreign to researchers. This distinctive style arises from the way designers use information. Some characteristics of the designer's use of information are listed below.

Designers Are Solution-Oriented

Designers operate under an imperative to do whatever is necessary to solve a given problem. Case studies of the design process have

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[1] Millikan, p. 162.

[2] John Friedmann, Retracking America: A Theory of Transactive Planning, (Garden City, N.Y.: Anchor Press, Doubleday, 1973), p. 109.

shown that, instead of systematically assembling information into abstract relationships and attributes, the designers observed always began by generating a design concept and then exploring its qualities.[1] To put it another way, rather than trying to assemble all the pieces to the puzzle before determining a solution, they would first adopt a tentative solution and then see if the information they had matched their proposed solution.

Prestructuring Is Essential to Design

The solution-orientation of designers, described above, is essentially a means of prestructuring problems. Just as some type of internal structuring or map is necessary to deal with the world as a whole, some type of prestructuring is necessary to deal with design problems. As mentioned earlier, the designer must cope with huge amounts of incommensurate information as well as huge gaps in information.

Hillier has argued for the importance of prestructuring in coping with design problems. He suggests that much environmental research has intervened at the wrong point in the design process. By supplying formal information about human requirements and building specifications, research may cause the designer to question his own preconception and become conservative in his prestructuring - sticking to basic solutions.[2]

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[1] Charles M. Eastman, "On the Analysis of Intuitive Design Processes," in Emerging Methods in Environmental Design and Planning, ed: Gary T. Moore (Cambridge: MIT Press, 1970), p. 27; Richard I. Krauss and John R. Meyer, "Design: A Case History," in Emerging Methods in Environmental Design and Planning, ed: Gary T. Moore (Cambridge: MIT Press, 1970), p. 20; Lang, p. 7.

[2] Ibid, pp. 29-3-8.

The Importance of Personal Knowledge

Synthesizing the type of information with which the designer must deal requires considerable creativity. MacKinnon in his research on creativity found that the most creative architects were " . . . highly intuitive in that they were ever alert to the as not yet seen."[1] In describing the creative process, Craik proposes a multi-stage approach. His first two stages seem to relate to the operation of intution. The first is preparation. For this the individual must be sufficiently acquainted with the structure of his intellectual field to enable him to conceptualize the problem. Incubation is the next stage. Here the person must be able to withdraw from the certainties of skill and knowledge to the uncertainties of his inner depths and processes to act open-mindedly rather than critically.[2] This second stage stresses patterns and implications of information rather than the information itself.[3] When Craik suggests that the creative act requires withdrawal from certainties of skill and knowledge, this should not be taken to mean that the person is relying on some super-human or irrational source of inspiration. Rather, it means that the person is relying on extra-rational or non-verbal information from his own experience and observations.

It is not the function of this study to discuss the merits of various design methodologies. This brief discussion of the role of intuition has been included only to point out the importance of "personal knowledge" to the design process at present. Friedmann proposes a distinction between this kind of knowledge and what he calls processed

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[1]Donald W. MacKinnon, "The Nature and Nurture of Creative Talent," in Readings in Psychology, eds: Eugene L. Hartley and Ruth E. Hartley, 3rd edition (New York: T. Y. Crowell, 1965), p. 435.

[2]Kenneth H. Craik, "The Architectural Student in Architectural Society," Journal of Architectural Education, May 1969, p. 26.

[3]MacKinnon, p. 436.

knowledge, which he characterizes as abstractions formulated about reality that are subject to verification.[1] He proposes that experts and decision makers are kept apart by the fact that experts rely on processed knowledge while decision makers rely largely on personal knowledge.[2] He suggests that "processed knowledge suppresses the operational detail that may be of critical importance" to the decision maker. The language of processed knowledge "is conceptual and mathematical, consciously drained of the lifeblood of human intercourse in its striving for scientific objectivity." On the other hand, the language of the decision maker " . . . is less precise . . . and it may encompass congeries of facts and events that, even though they form a meaningful whole in terms of practice are unrelated at the level of theory.[3]

The Imperative to Act

Another important characteristic of the designer's situation is that he must act and must do so under pressure of time. As one architect has stated it, "The architect is one of a set of people whose ideas mean nothing unless he gets the stuff built."[4] He cannot wait until all the answers are in before he acts. He must proceed with whatever information is available. This means he often must be satisfied with approximate answers,[5] and he has little patience with procedural

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[1] Friedmann, p. 101.

[2] Ibid, p. 172.

[3] Ibid, p. 173.

[4] Cook and Klotz, p. 226.

[5] Gutman, p. 364.

detail and theoretical background.[1] There is an obvious conflict here with the researcher's desire to be theoretically consistent and to not generalize beyond his evidence.

Preference for Graphic Communications

As suggested earlier, designers appear to depend heavily on graphic communications. Not only do they use various pictorial means to represent their ideas to others, but often they use diagrams and sketches as an aid to thinking and problem solving. This heavy use of graphic techniques appears to be adaptive in view of their need to link together various kinds of information. It is important to mention another dimension of this bias toward graphic communications that appears to be common among designers. When words are used, they are often used metaphorically, in a sense to draw word pictures.

Issues Specific to EBR

The discussion to this point has considered issues arising from the special way designers use information. These issues could affect the utilization of research information on any subject. It appears that there are also issues affecting EBR that are specific to information on behavior. When designers are called upon to use EBR in their work, they are asked to add a new element to their deliberations. There are a number of reasons why they might be reluctant to do so.[2] They might

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[1] Jane Goodey and Kate Matthew, "Architects and Information," Research Paper 1, Institute of Advanced Architectural Studies, University of York, U.K., January 1971, p. 34.

[2] Viewed in this way, the problem is essentially one of diffusion of innovation. Accordingly, research literature on this topic was consulted. Two references were particularly helpful in conceptualizing the issues. They are: Ronald Lippett and Ronald Havelock, "Needed Research in Research Utilization," Research Implications for Educational Diffusion, National Conference on the Diffusion of Educational Ideas (Lansing: Michigan Dept. of Education, 1968) pp. 30 & 31; Everett Rogers, The Diffusion of Innovation (Glencoe, N.Y.: Free Press of Glencoe, 1962).

not feel the need for new information on the topic, they might be unaware that a new type of information is available, or they might consider that the new type of information is not useful. In the next few pages, information will be reviewed that pertains to such questions.

Do Designers Recognize a Need for Additional Information on Behavior

It was established earlier that designers are generally concerned with designing for people. However, this phrase can have many meanings, and the interpretation it is given is likely to affect the type of information on behavior that is desired by designers. It is also likely to affect whether EBR is seen as relevant or not.

At the simplist level, designers may feel that their responsibility to users is limited to providing efficient shelter such as is required by the Federal Housing Administration minimum property standards. Some designers seem to believe this is the case.[1]

Most architects take a broader view of their work. They recognize that their designs must be functional. This means that the design of a building should start with an understanding of its use.[2] This understanding usually includes only the manifest functions such as bedrooms are for sleeping, dining rooms are for eating. Unfortunately, what Brolin and Zeisel have referred to as the latent functions are often neglected. Latent functions are the more subtle uses of space which are necessary for the social and psychological stability of various cultures.[3] For example, front steps often double as outdoor rooms, or kitchens as multi-purpose work rooms.

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[1] Conway, 1973, p. II-11

[2] Benjamin A. Handler, Systems Approach to Architecture (New York: American Elsevier Publishing Co., 1970), p. 7.

[3] Brent C. Brolin and John Zeisel, "Mass Housing: Social Research and Design," Architectural Forum, July 1968, p. 67.

Designers have often been accused of being preoccupied with the aesthetic aspects of design.[1] To the extent that this is accurate, it may be a reflection of another common interpretation of designing for people. Designing for people may be taken exclusively to mean enhancing human existence by making the built-environment a thing of beauty. For example, architect Pietro Belluschi commented not long ago that, "The architect's role is to make the human environment so compellingly beautiful that anyone would want to live in it for the inherent value it offers."[2] To be sure, beauty is usually construed in a broad sense.

When designers assume that their primary responsibility to users is to provide a beautiful environment, they are assuming that others share their own value priorities as well as their own highly refined aesthetic sense. This is frequently not the case. C. M. Deasy tells of an architect who worked diligently to design a low income housing scheme that met budget requirements but also provided exceptional design quality. Unfortunately, the residents did not appreciate his efforts. They felt that the design was poor because it set their housing apart from the rest of the neighborhood. Deasy describes the remainder of the neighborhood as consisting of "ostentatious and vulgar" upper income apartments.[3]

The above example serves to illustrate another interpretation of designing for people as well. As Zeisel notes, there may be instances when designers feel that they are designing for people but are actually designing exclusively for what "they think" people want or need. Gans'

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[1] Goodman, p. 120.

[2] Pietro Belluschi, "The Unchanging in a Time of Change," AIA Journal, July 1972, p. 25.

[3] Deasy, p. 41.

comments about the problems with master plans, cited earlier, exemplify the results of such an elitist approach to planning for people.[1] The architectural historian, Pevsner, has captured the essence of this approach to designing for people when he said that "a Frank Lloyd Wright private house is a house in which the architect speaks and the client can only echo what the architect has pronounced."[2]

In another variation of design for people, the designer makes a brief attempt to determine what users want. He does this in an attempt to prestructure his problem in order to spark the design effort. Unfortunately, developing such a rationale does not necessarily require any more than a passing concern for human requirements.

To the extent that designers' interpretations of "designing for people" is limited to any of the above conceptions, it is unlikely that they would feel the need for better information on behavioral questions.

Are Designers Aware of EBR and What It Has to Offer?

Seventy-eight percent of the respondents to one survey of architects reported that they were aware of the formal field of EBR.[3] Another indication that the awareness of the general field of EBR is quite high in the architectural profession was the theme of the 1975 American Institute of Architects (AIA) convention. The convention included practice collaboration between social scientists and architects attending the convention.[4]

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[1] Gans, p. 63.

[2] Nikolaus Pevsner, "Architecture as a Humane Art," The Raoul Wallenberg Lecture (Ann Arbor: University of Michigan, 1973), p. 53.

[3] Reizenstein, p. 5.

[4] Memo, Newsletter of The American Institute of Architects, #497, April 22, 1975, p. 1.

However, designers may have no more than a passing acquaintance with EBR. For example, they may not be aware of precisely what types of EBR is available. This is, in part, because they are not kept abreast of developments in EBR through their casual reading.[1] Information on the reading habits of architects indicates that few read the journals in which EBR material appears.[2] One reason for this is that architects are flooded with information. In a recent study by the British Building Research Station (BRS), participants indicated that they had problems keeping up with all the correspondence coming into their offices. As a result, up to 90 percent of the unsolicited literature was discarded without even being read. BRS papers were among the few kept. However, in only nine out of 180 instances could recent BRS papers be retrieved upon request.[3] The quantity of specialized information of various sorts available to assist architects is now so large and so poorly organized that it is not surprising that designers have difficulty keeping up with it.[4]

Do Designers Feel EBR Is Useful?

Not only could the various interpretations of "designing for people" listed earlier affect whether the designer would feel the need for better information on behavior, but they would affect judgments of the relevance of EBR to meet these needs.

Some architects have spoken out against the use of behavioral research in design. For example, Louis Kahn is reported to have said,

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[1] Conway, 1973, p. II-13.

[2] Reizenstein, p. 9.

[3] Goodey and Matthew, pp. 13, 28, & 14.

[4] Christopher Alexander, Notes on the Synthesis of Form, (Cambridge: Harvard University Press, 1966), p. 4.

"Sociologists deal with families with 2.5 members."[1] Others have echoed what seem to be similar arguments suggesting that sociology turns people into numbers or objects.[2] On the one hand, these criticisms suggest that the social sciences break people apart into mountains of data and, on the other hand, that they group people together and only consider the averages.

Another charge is that EBR only takes measures of what people do or want, yet architects need information which will help them predict the future. Architect Charles Moore is one person who has raised this point.

> I think to be ordinary, in the sense of simply continuing what is already known to people is wrong. I get very upset with the standard student approach now which supposes that, if you interview enough housewives in a housing project, and write down what they say they like best about where they live you'll know what the solution ought to be.[3]

In a more general criticism, Philip Johnson suggested that "sociology in architecture is a crutch." He went on to explain that he learned about city planning by walking around the streets of the city and personally seeing how people feel and how he himself felt.[4]

Another type of criticism equates behavioral research with social engineering. This concern is illustrated in a commentary on architecture in Sweden. "Architectural students (in Sweden) are now almost all sociologists first and architects second." The author explains that,

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[1] Cook and Klotz, p. 252.

[2] Martin Pawley, Architecture Versus Housing (New York: Praeger, 1971), p. 92.

[3] Cook and Klotz, p. 235.

[4] Ibid, p. 42.

as he sees it, these students are intent on using their future profession to promote their social ideology.[1]

Several explanations for such negative assessments of the relevance of EBR come to mind. It is possible that these assessments stem from frustrating attempts to work with social scientists before the emergence of the environment behavior specialty.

If the criticisms refer specifically to EBR, then they may well be based on prejudices spawned in the relative naivete of EBR characteristic of many designers; this was discussed earlier.

There are two other more basic explanations that also seem probable. Most of the above criticisms appear to reflect the preference already mentioned for personal as opposed to processed knowledge. Design is seen as necessarily specific and as responsive to changing circumstances, thus requiring personal knowledge. Research-based information is seen as processed knowledge: general, indefinite and preserving the status quo.

Boughey explains the argument for the primacy of intuition or personal information somewhat differently. He suggests that it is a defense against what adherents feel is an attempt to substitute new methods for the ones presently used.[2] In other words, designers may feel that EBR is trying to replace the designer or to reduce his creative freedom.

There are indications that these criticisms of EBR may reflect the opinions of only a minority of architects. For example, 87 percent of the respondents in the study by Reizenstein, reported earlier, indicated that they felt behavioral research dealt with issues relevant to their

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[1] Roland Huntsford, "In Sweden They Are Sociologists First, Architects Second," London Observer News Service, Washington Post, Sunday, July 26, 1970, p. H6.

[2] Boughey, p. 92.

work.[1] Thirty-seven out of the fifty architects in Boughey's study agreed that research on how design influences behavior would be useful.[2] The interest of the AIA in behavioral research and the findings of the survey of research needs of AIA members, both of which were cited earlier, afford further support for this conclusion.

Since few designers have had personal experience with behavioral research, their affirmation of its relevance may be based on unrealistic expectations of what EBR can provide. When exposed to the harsh reality of experience, these expectations could result in disenchantment.

One of the problems that Millikan suggests keeps social scientists and policy makers apart is that the policy makers often have unrealistic expectations of research. For example, they expect research to predict the future.[3] Designers may have similarly inappropriate expectations of EBR. It may also be that they want precise answers. They may want to know which colors to use for a particular purpose or which shape will be preferred by users. Unfortunately, there is little information about what designers expect from EBR or how they evaluate the utility of specific EBR findings. Information on these issues seems particularly important if researchers are to mount an effective campaign to increase the utilization of EBR.

Conclusions

In searching for the reasons designers are not using EBR, several possibilities were considered. Initially, factors beyond the designer's control were considered. These include possible difficulty obtaining

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[1] Reizenstein, p. 5.

[2] Boughey, p. 89.

[3] Millikan, p. 165.

the behavioral information they need and a lack of freedom within the present design framework to apply EBR. While such explanations are frequently cited by designers, they seem to the author to be symptomatic of some more basic reasons.

On the basis of this review, it is possible to begin listing conditions that must be met if EBR is to become a part of designer thinking. These conditions are of two types. The first type concerns information style. If information is to be accepted by a designer, it must match his information needs. A few characteristics of these needs are listed below.

1. Studies of the design process show that an essential part of design is early structuring of problems to simplify and organize the information which must be considered. Information which assists this process of developing a structure or image of a problem should be particularly welcome.

2. The purpose of problem structuring is to focus the designer's attention on a manageable number of issues. Once a structure or tentative solution has been accepted, information which does not appear related to that view of the problem is likely to be screened out.

3. Designers, as well as other decision makers, depend extensively on their personal experience. Information which is accumulated through direct personal experience or builds on personal experience is most likely to be accepted.

4. Designers should be most receptive to information that is related to definite physical settings. This means that the relation of EBR findings to definite physical settings or design concepts should be clearly articulated.

5. It is the meaning of the information to their problem, not the theoretical or methodological detail, that is important to designers.

The second type of condition concerns the receptivity of designers to information on behavior, regardless of style. While it is apparent

that designers recognize a responsibility to create buildings that function for users, it is unclear how they interpret this responsibility. It may be that they have a fairly limited conception of what this responsibility entails. If this is true, then designers may not see the relevance of EBR to their work. A limited conception of their behavioral responsibilities may also help to explain the difficulty understanding and applying behavior research described by designers.

In the next chapter, a study intended to explore the way designers conceptualize and evaluate behavioral information will be described.

CHAPTER IV

SURVEY DESIGN AND EXECUTION

Overview

This chapter describes the development and execution of an empirical study intended to supplement the literature analysis discussed in the preceding chapters. The study involved an exploration of the perceptions of designers toward EBR and its role in their work. The chapter begins with a discussion of factors considered in the research design. This is followed by a description of the evolution of the research instrument and the sampling procedure. The chapter concludes with information about the designers participating in the study.

Preliminary Decisions in the Research Design

The literature analysis presented in the preceding chapters isolated some probable reasons for the limited role played by EBR in design practice. Specifically, it became apparent that designers have a distinctive style of evaluating and using information. At the end of the chapter, some preconditions for the acceptance by designers of EBR information were suggested. However, it was evident that more specific information was needed from designers concerning the implications of their information handling style for their evaluation of EBR materials and their acceptance of EBR as a legitimate input to design.

As a supplement to the literature analysis, a study was designed for the purpose of gathering such information. The study focused on how designers evaluate behavioral information, their views of the role

of EBR in design and their perception of the reasons for the application gap.

Limiting the Focus of the Study

Once the decision had been made to conduct the study, a number of decisions were required to limit and focus the effort.

Exploratory research. The orthodox method of scientific research requires establishment of specific hypotheses before data acquisition is undertaken. In well established areas of research, this can frequently be done on the basis of a literature review. The literature analysis succeeded in identifying some issues; however, the issues needed to be better understood before specific predictions or hypotheses could be formulated. Accordingly, the present research was conceived as an exploratory venture to obtain added descriptive and correlational material.[1] It should be emphasized at this point that the survey was but one element of this exploratory research strategy which also included the literature analysis and various secondary data analyses.

Focus on architects. The decision to focus the research as a whole on the role of the environmental design practitioner has already been explained. For purposes of the survey, it was decided to consider only one portion of the environmental design community, the architectural profession. This decision was based on several factors. In the first place, much of the literature concerning the role of behavioral research in design focuses on architects. In the second place, much of the Environment Behavior Research that is currently available is most applicable to architectural decisions.

The various design professions appear to operate under conditions that would result in similar paradigms. For example, they all are

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[1] Daniel Katz, "Field Studies," Research Methods in the Behavioral Sciences, eds: Leon Festinger and Daniel Katz (New York: Holt, Rinehart & Winston, 1953), p. 175.

required to make complex decisions under severe time pressures and on the basis of limited information. If this is true, and paradigm differences between the researcher and the designers are partially responsible for the application gap, then the findings of this research should, to some extent, pertain to all designers.

Focus on the elderly. The survey needed a substantive focus to be manageable for the researcher, to provide structure for respondents and, to serve as a source of examples. A convenient focus appeared to be research related to housing for the elderly. This focus was selected for a number of reasons.

1. It is particularly important that research on the elderly be incorporated into design thinking. Lawton has suggested that as a person ages, his capacity to adapt decreases. He is, therefore, no longer as capable of compensating for architectural barriers, and is more vulnerable to other effects of the physical environment.[1]

2. Because of the fact that older persons are more vulnerable or sensitive to changes in their environment, they are ideal subjects for Environment Behavior Research. As a consequence, more EBR information is available on the environmental requirements of older persons than is available for most other groups. This large body of research made it easier to select examples for use in the study.

3. The number of older persons in the population as well as their proportion, is increasing.[2] As a consequence, they constitute an ever-increasing part of the housing market.

4. The elderly are victims of stereotyping. It seems reasonable that designers, lacking more solid sources of information, would be

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[1] M. Powell Lawton, "Ecology and Aging," Spatial Behavior of Older People, eds: Leon A. Pastalan and Daniel H. Carson (Ann Arbor: The University of Michigan, 1970), p. 40.

[2] Fowles, Donald G., "U.S. 60+ Population May Rise 31% to 41 Million by Year 2000," Aging, June-July 1975, p. 17.

influenced by such stereotypes when they design for the elderly.

5. The Department of Housing and Urban Renewal has allocated up to 40 percent of its funds to support housing for the elderly.[1] It is, therefore, likely that most architects will have been involved with housing for the elderly or be interested in it.

Evolution of the Survey Instrument

As a first step in developing the survey instrument, a number of interviews were conducted to explore the capacity of designers to answer questions on the research topics and to determine the types and range of responses that could be expected. The five respondents were graduate students in architecture with a minimum of one year of professional practice and numerous years of aculturation to the design process through their professional education. The method used was a loosely structured interview.

In addition to alerting the researcher to some important substantive issues, these interviews provided two methodological insights. (1) Respondents generally found it difficult to respond to the interview topics; and, consequently, required considerable probing by the interviewer. Such probing undoubtedly produced serious bias and would cast doubt on conclusions based on such data. Students, presumably, have frequent occasion to discuss abstract ideas. If they had trouble with the interview topics, then practitioners could be expected to have even more trouble. This meant that special effort would be required to assure that survey questions were within the respondent's capacity to respond. (2) Since the interviewer evidently would be required to lead the respondent, and respondents did not have ready-to-go opinions on the research topics, a structured, self-administered questionnaire seemed appropriate.

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[1]Marie McGuire Thompson, Interview held in Ann Arbor, Michigan, February 27, 1974.

In another piece of preliminary research, three sets of data collected by the office of Research Programs of the American Institute of Architects (AIA) were analyzed.[1]

The substantive findings of these analyses are referred to in other chapters. At this point, only the methodological lessons will be reviewed. One of these was that even brief questionnaires sent by an organization voluntarily supported by the target population are likely to yield extremely small response rates: less than ten percent. In developing the survey instrument, special consideration would have to be given to maximize response rates. Another lesson concerned the use of open-ended questions. In addition to the difficulty of coding and analyzing responses to open-ended questions, it appeared that they would likely go unanswered on a self-administered questionnaire.

Rating the Usefulness of Research Findings

It was suggested to the researcher that one means of coping with the problems outlined above was to ask designers to evaluate a selection of research findings on some criterion such as "usefulness." In other words, the respondent would be asked to indicate how useful specific pieces of behavioral information would be to his work. A

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[1] The first set of data consisted of 52 evaluation forms from the November 1972 Architectural Research Conference (AR 9). The conference was structured around an exploration of the attitudes of architectural practitioners and researchers toward each other.

The second set of data consisted of 92 questionnaires which represented the response to a survey of 1,075 architectural offices concerning the extent of their research activity. The questionnaire was on AIA letterhead and consisted of a short series of forced choice questions.

The final data set consisted of 33 responses to a mailed questionnaire on research information needs. Copies of the survey were sent to 1,000 architects in major metropolitan areas. The list had been drawn from the AIA membership mailing list. Again, the format was simple and the questions brief. The data is described in more detail in (Merrill).

context would have to be provided for the rating task. For example, the respondent might be asked to assume that he was involved in the design of a retirement housing project. He would also have to be assured that he was not being tested; that there were no right or wrong answers.

If such ratings were feasible to obtain, then ratings could be obtained from a sample of designers and analyzed using factor-analytic methods. The ratings could serve several purposes. They could serve as a means of verifying and extending the list of characteristics of information which designers find useful proposed in the last chapter. The ratings could also assist in documenting the domains of behavioral data designers consider useful. Finally, they could be analyzed to discover how respondents who prefer one type of EBR differ from those who prefer another type. Such information might lead to inferences about the reasons for variations in attitudes toward use of behavioral research among architects.

The technique would require a relatively simple decision on the part of the designer. The respondent could deal only with concrete information and not have to worry about abstracting from his experience. This would avoid the difficulty encountered in the initial interviews and yet provide some specific information on the perceived usefulness of various classes of EBR.[1]

A sample of research findings was compiled from a number of articles which address environmental issues of housing the elderly. The articles consulted are listed in the Appendix. All conclusions that appear to have any possible relevance to the process of designing for the elderly were extracted verbatim. An initial list of 50 items was compiled.

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[1] Rachel Kaplan, "Some Methods and Strategies in the Prediction of Preference," in Landscape Assessment: Values, Perceptions and Resources, eds: E. H. Zube, J. G. Fabos and R. O. Brush, Preprint from the author.

Items were transcribed onto cards, and a panel of eight judges was asked to sort the cards according to any system that seemed appropriate to them. They were then asked to describe the system they had used. The groupings of cards, as well as the rationale for the groupings, were then compared to identify salient dimensions inherent in the collection of items.

Two dimensions were identified. These were labeled abstractness and legitimacy. Abstractness was defined as the degree of inference required to determine the physical implication of the information. Items at the lowest level of abstractness might provide recommendations on color or dimensions. At the other extreme of the abstractness dimension were items which provide conceptual information about behavior. A more detailed discussion of this dimension will be provided in the next chapter.

The legitimacy dimension had to do, primarily, with the way the information was presented. Some items were presented as simple statements of fact or prescriptions, with no effort to show how the information was derived. Other items appealed to common sense or logic to support the finding; e.g., because older people have difficulty seeing their environment, spaces should be differentiated by color. A final group of items cited empirical evidence or expert sources for support. For reasons to be introduced later, the legitimacy dimension was not pursued in the survey.

A second panel of judges was used to assess the reliability of the dimensions. Only items that were identically categorized by two-thirds of the judges were retained.

Other Survey Topics

In addition to the usefulness ratings, a number of other tactics were used to explore designer attitudes toward behavioral research information and to provide a basis for interpreting these attitude questions.

The goals of designers. Evidence was presented in Chapter Two indicating that designers consider their social responsibility to be important. For the most part, this evidence does not indicate the importance they assign to this responsibility in relation to their other goals or responsibilities. Consequently, it was decided to request information on goal priorities as part of the survey. In the pilot study, the question "What do you consider to be the primary responsibility of the architect?" was used. As a result of this and attempts at other wordings, it was decided that an open-ended question on this topic was subject to too many interpretations. To reduce this problem and the problem of low response rates associated with open-ended questions, a structured question was developed.

Four goals were selected by the researcher as representative of those most frequently ascribed to architects by themselves and by critics. These had to do with (a) aesthetics, (b) translating information into physical form, (c) creating technically efficient buildings, and (d) matching user needs. The topics of making money and meeting budgets were avoided. While they are important, they were considered to be instrumental to other goals such as those listed. It proved difficult to devise statements of the four goals which presented them in an equally attractive manner.

Sources of information used. Another series of questions was developed to gather information on the sources respondents used to obtain information about user requirements. Specifically, information was desired on how much use respondents made of EBR, either through readings or collaboration with behavioral researchers. Secondly, information was desired about what those architects who do not use EBR do use. The third purpose of these questions on sources of information was to determine whether those who used behavioral research were also more likely to use the less rigorous methods of gathering data about users.

It was initially intended to include more detailed questions about the use of behavioral research. However, since the level of use of behavioral research was expected to be low, it did not seem prudent to devote a large portion of the survey instrument to questions on activities in which the majority of respondents were not involved. There was a concern that this might lead to a sharp drop in response rates, and would not be as productive as relying on the usefulness ratings.

Attitudes toward EBR. A set of questions was also devised to determine respondent attitudes toward behavioral research. These questions were based on various explanations for the low level of use of EBR in design practice that were outlined in the last chapter.

Roles for EBR in design. Another set of questions concerned the roles designers saw for behavioral research in their work. The impetus for these questions came from the desire to specify the role of behavioral research in the designer's paradigm. It was expected that designers might view the role of EBR rather differently than researchers would expect. For example, two of the initial interviewees indicated that research was most useful as support for their own ideas. It also seemed reasonable to expect that different types of research would be better suited to different roles. If this were true, then persons who rated one role of research as more important than another would be expected to rate items of research differently.

Finally, a number of background questions were asked. It was anticipated that the usefulness ratings might vary as a function of the amount of experience the respondent had with designing for the elderly. Design experience with any population with conspicuously distinct design needs was also expected to affect the perceived usefulness of the research findings. The need for outside information on user requirements would seem particularly clear in such cases. Consequently, respondents were asked to indicate the amount of experience they had

had with designing for special population groups and with which groups they had had experience.

Another question concerned their experience with architecture. It was anticipated that older architects might feel budget pressures more acutely and so be less receptive to behavioral inputs. Another possibility was that, either through changes in educational emphasis or societal concerns, younger architects might view human requirements differently.

Position in firm also appeared to be a potential influence on use of EBR. Principals of firms who may have more contact with clients and user groups may be more sensitive to user requirement issues. In the same vein, respondents were asked for information about the proportion of their professional effort that was devoted to various architectural activities. The assumption here was that user requirements might have a different salience to respondents who were primarily involved with one activity, such as "programming," than it would for respondents who were involved in an activity such as "production." It also seemed that different information might be more useful for different interests. Finally, information was requested about the size of the respondent's firm and the type of project in which the firm specialized.

Pretesting and Adjusting the Survey Instrument

The wording and organization of the questionnaire was refined during the course of 14 pilot interviews. The pilot interviews were conducted with local architects. Interviewees were asked for suggestions and criticism of the questionnaire. Their responses and comments were noted, as were points where they hesitated or seemed confused by questions. For the usefulness ratings, they were asked to give reasons for their ratings.

The wording of a number of the "research findings" was a frequent

source of confusion. It will be recalled that the original wording of the items had been maintained. One reason for this was the hope that respondents would take the wording of the item into consideration in their rating. This did not appear to be the case. They appeared to rate the item strictly on the basis of whether they felt the information in the item was useful. The wording did serve to complicate their determination of what the information was.

In addition to allowing a check of the effect of language differences on the usefulness ratings, the original wording of the items was essential for construction of the legitimacy scale. Nevertheless, to reduce the confusion caused by wording, the items were all shortened so that they provided the information in the most straightforward manner the writer could devise. While some of the items representing the various levels of legitimacy were not radically changed, many were; consequently, the legitimacy dimension was deferred for future consideration.

Once the wording of items had been simplified, respondents were able to discriminate between the helpfulness of items with consistency. After the first few revisions of the questionnaire, respondents required little assistance to complete it. However, respondents generally doubted that they would answer such a questionnaire if they had received it through the mails. They reinforced the need to keep the questionnaire brief and non-threatening; fine print and large blocks of printing should be avoided.

Sample Selection

Since the objective of the research was to identify issues affecting the application gap, a nationally representative sample did not seem imperative. It did seem important that a broad cross section of architects be included.

The poor response rates obtained by the AIA research surveys, and the gloomy predictions of the pilot interviewees, made it clear that

special attention had to be given to securing high return rates. Two populations were discovered that offered promise in this respect. The first was a group of alumni of the Department of Architecture at the University of Michigan who had responded to a demographic survey conducted by the Department. This group offered several advantages. Having answered the Department questionnaire, there was evidence that they were receptive to answering mailed questionnaires. Another advantage was that information from the original survey could be used to compare those who responded to the current survey with those who did not. Some sources of response biases could be detected with this information.

The second group were architects who had been involved, in one capacity or another, with the Architecture and Environment Project of the Gerontological Society. This project involved an effort to encourage the use of research to improve environments for the elderly. There were obvious overlaps between the goals of the Architecture and Environment Project and the interests of the present research. Initially, it was hoped that some comparisons could be made between the Gerontology group and the Alumni group. This would have been useful to the Gerontology Society as an evaluation of the effectiveness of their efforts. Unfortunately, the contact of the Architecture and Environment Project with the architects in the sample varied so widely that the sample could not be considered as homogeneous. Another problem with the proposed evaluation was that, for the most part, the Gerontology Society sample was self-selected. Any effects of the Architecture and Environment Project on them would be confounded by their unusual interests which initially led them to participate in the project. For these reasons, the plans to conduct a comparison were abandoned.

The Gerontology group was a valuable addition to the sample for another reason, however. It was desirable to assure that the sample

included architects who had particular interests in designing for the elderly. One reason for this was the possibility that architects who had not been involved with housing for the elderly would feel they had no basis for making the usefulness ratings; and, consequently, might not respond. There was also a chance that experience with the elderly would affect the nature of the usefulness ratings, even if it did not preclude them. Since there was no way to assure that the alumni sample included a sizable number of architects having experience with the elderly, the Gerontology sample was an insurance of adequate representation of this group.

Maximizing Response Rates

The final preparation and packaging of the survey also reflected concern for insuring a sufficient number of responses to allow analysis. The questionnaire was laid out with a bold type face on colored paper. A variety of type sizes were used for different elements to make the questionnaire more legible and visually more attractive. Copy was arranged in an 8 1/2" x 11" format and laid out in leaflet fashion on a folded double-size piece of paper. This format meant that no parts would be lost and that questions were less likely to be overlooked. It was also believed that this format made the questionnaire appear less extensive and more attractive. To fit the questions to four pages without crowding required the deletion of two of the usefulness rating items.

Cover letters were prepared to explain the purpose of the survey and to encourage participation by associating the survey with the Gerontological Society and the University of Michigan. The letter to the Gerontology population was on letterhead from the Society and was signed by the Director of the Architecture and Environment Project. The letter was printed on high quality paper and personally addressed. The letters to alumni were typed on Architectural Research Laboratory letterhead. They were individually typed on an automatic typewriter

and signed personally by the researcher. Copies of the questionnaire and cover letters appear in the Appendix.

Postage paid return envelopes were included with each questionnaire. Questionnaires were labeled with a code number to allow for follow-up procedures. The follow-up plan provided for telephone calls to persons who had not responded within three weeks of the mailing date.

Response to the Survey

The survey was mailed on November 19, 1973. Just over two weeks after the mailing, 30 responses had been received from the Gerontology group and 127 from the alumni group. These numbers were sufficient so that follow-up procedures were not implemented. Responses continued to trickle in until February 27, 1974. The final count of responses was 34 from the Gerontology group which constituted 52 percent. One additional questionnaire from that group was returned by the post office as undeliverable. One hundred forty-eight alumni, or 68 percent, returned completed questionnaires. Eleven others were returned as undeliverable or were returned but not completed. Out of a total of 283 questionnaires mailed out, 182 usable returns were received.

Respondent Characteristics

Table 1 displays the characteristics of the sample on a number of the background variables. The information is provided to allow the reader to evaluate whether any serious biases exist in the sample. Interrelations of these variables with other survey variables will be discussed in the next chapter.

The major portion of the survey sample was drawn from alumni of the University of Michigan Department of Architecture. It should be recalled that these alumni had previously responded to a questionnaire distributed by the Department. This earlier survey provided data to compare alumni who responded to the present questionnaire with those

TABLE 1

RESPONDENT CHARACTERISTICS

Number of Respondents = 182

Characteristics	Percentage of Respondents
Number of years of Architectural Practice	
1 - 5 yrs.	25
6 - 10 yrs.	20
11 - 15 yrs.	15
16 - 20 yrs.	11
21 - 25 yrs.	11
Over 25 yrs.	10
Missing	8
Position in Firm[a]	
Owner or Principal.	51
Associate	10
Team or Job Captain	8
Designer.	26
Missing	4
Primary Professional Activity[b]	
Programming	8
Research.	2
Design.	41
Production	33
Client Contact.	16
Other	6[c]
Level experience with design problems of special populations[d]	
Very Little	35
Some	34
A Great Deal.	25
Missing.	6

TABLE 1 -- Continued

Characteristics	Percentage of Respondents
Special population with which respondent has most experience[e]	
Elderly	34
Multiple response including elderly	6
Physically or mentally handicapped	8
Other	6[f]
Experience similar for all populations	2
None	34
Missing	10
Type project in which firm specializes[g]	
All types	18
Housing the elderly	8
Housing	36
Health facilities	24
Educational facilities	28
Industrial or commercial facilities	44
Other	19
Four or more types mentioned	14
Missing	3

[a]Seventy-one percent of the AIA study respondents reported owning at least five percent of their firm.

[b]Respondents were asked to rank these activities in order of the proportion of their professional effort devoted to each. The figures presented here reflect the percentage of respondents ranking a given activity as taking the greatest proportion of their effort. In some cases, respondents gave this ranking to more than one activity; hence, the figures total more than 100 percent.

[c]This category includes administration and construction management.

[d]This panel is based on responses to part 1 of Question 2 on the questionnaire.

[e]This panel is based on responses to part 2 of Question 2 on the questionnaire.

[f]This category includes children and military personnel.

[g]Respondents were asked to indicate the type of project with which their firm most frequently worked. Up to three responses were coded for each respondent.

who did not. Table 2 displays these comparisons. Chi-square statistics were calculated for each of the comparisons between these two groups. None of the differences were significant at the .05 level or beyond.

TABLE 2

COMPARISON OF THE CHARACTERISTICS OF ALUMNI RESPONDENTS WITH NON-RESPONDENTS (PERCENTAGE DISTRIBUTION)

Characteristic	Did not respond %	Responded %	Total %	AIA Sample %
Number of Respondents	63	148	211	10,184
Architectural Activity:				
Design	49	55	53	
Nearly all activities	49	39	42	
Production	32	35	34	
Project Management	25	29	28	
Field Inspection	18	22	20	
Specifications	14	18	17	
Programming	16	14	16	
Cost Estimating	10	8	8	
Firm Management	2	6	4	
Size of Firm:				
1 - 10	64	57	59	58
10 - 30	18	14	15	
30 - 100	10	13	12	
100 +	10	16	14	
Registered as Architect:				
Not registered	26	16	23	
Registered	74	84	77	
Age:				
23 - 29	41	25	36	3
30 - 39	25	40	29	29
40 - 49	19	18	19	36
50 - 59	8	13	10	20
60 - 70	6	5	5	4
71 and over	1	0	1	3

[a]The data used in this comparison are from the survey of Alumni conducted in 1973 by the Department of Architecture, the University of Michigan.

The geographic distribution of respondents was compared with non-respondents using zip code prefixes, the first three digits of the zip code. A number of schemes were considered for subdividing the zip codes. Finally, a simple numerical division was used. This system was modified as follows: The Northeast corridor extending from New England through Pennsylvania and including the District of Columbia, was considered as one region. Michigan was considered separately because of the high proportion of the sample residing in Michigan. The West Coast was also considered separately. Table 3 displays these categories and the percentage of respondents and non-respondents residing in each region.

TABLE 3

GEOGRAPHICAL DISTRIBUTION
(PERCENTAGE DISTRIBUTION)

Zip Code region with included state[a]	Responded %	Did not respond %	AIA Sample %
Number of Respondents	182	89	10,184
000 - 205: Conn, Del, DC, Me, Mass, NH, NJ, NY, Pa, RI, Ver.	17	26	27
206 - 399: Ala, Fla, Ga, Md, Miss, NC, SC, Tenn, Va, W. Va.	5	3	18
480 - 499: Mich.	37	36	4
400 - 479, 500 - 699: Ill, Ind, Iowa, Kan, Ky, Minn, Mo, Mont, Neb, ND, Ohio, SD, Wisc.	21	19	19
700 - 899: Ariz, Ark, Col, Idaho, La, Nev, NM, Okla, Tex, Utah, Wyo.	7	5	15
900 - 990: Cal, Ore, Wash.	13	10	18

[a]The categories used in this table are based primarily on a simple division of the first three digits of respondent zip codes. The scheme was modified in an attempt to approximate natural geographic regions.

After the survey had been completed, data became available from a survey of the entire AIA membership.[1] The AIA data on 10,000 architects provided an unexpected means of assessing the representativeness of the sample used in the present study. Unfortunately, very few variables from the AIA survey were reported in categories comparable with the data gathered in the present study. Comparisons were made when possible, and the results appear in the appropriate tables. The average AIA respondent was somewhat older than the alumni respondent; 46 years of age as compared with 38 years of age. The proportion of the AIA sample that indicates owning at least part of their firm appears to be higher than that for respondents to the present survey. However, the data is not clearly commensurate, in that the AIA data concerns ownership and the present data concerns management.

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[1] Case and Co. Survey of the Membership, A report prepared for the American Institute of Architects, 1974.

CHAPTER 5

DISCUSSION OF THE SURVEY RESULTS

Overview

This chapter contains a discussion of the results of the survey described in the preceding chapter. The survey employed several techniques to obtain information on designer perceptions of behavioral research information. The first section reviews the data obtained and relates it to the conclusions presented in Chapter Three. The second section considers how these information-attitude variables relate to various background factors such as experience with behavioral research.

Designer Attitudes Toward Behavioral Research Information

In Chapter Three, the basis of the application gap was traced to the way designers conceive of their need for information in general and for information on behavior in particular. Consequently, the basic purpose of the survey was to provide researchers with data on the way designers conceptualize behavioral research information.

Other questions were included in the survey to allow verification of some of the conclusions reached as a result of the literature analysis.

The Relative Importance of Designing for People

One portion of the survey instrument was devoted to assessing the priority designers assign to dealing with human requirements. While it was clear that designers recognize that they have such a responsibility,

it was not clear what priority designing for people is given relative to other possible goals.

Respondents were asked to rank four possible goals of architecture in terms of their importance to them as professionals. Table 4 shows the results.[1]

TABLE 4

GOALS OF THE ARCHITECT
(PERCENTAGE DISTRIBUTION)

Number of respondents = 182

Most important			Least important		Goal
87[a]	10	2	1	a)	Creating environments that match the needs of the people who use them.
8	52	25	15	b)	Translating information into physical form.
8	25	35	32	c)	Creating more efficient buildings through innovative technology.
4	15	33	48	d)	Creating appropriate visual forms.

[a]Six respondents indicated all goals were equally important, hence this column total is greater than 100 percent.

It was anticipated, on the basis of earlier discussion, that Item d would be ranked highest. This was, in part, because it was difficult to make the alternative equally attractive. It was also to be expected that the obvious value-orientation of the survey toward user behavior would influence respondents to indicate user fit as the most important

[1]Economics and safety considerations appear to be instrumental to all the concerns; and, accordingly, were not included in the list of possible goals.

goal. The strong support for Item d offers additional evidence that designers are greatly concerned about human issues in their work. Eighty-eight percent of the respondents ranked Item d as "most important," while 97 percent ranked it as first or second in importance.

How Designers Explain the Application Gap

A series of descriptive statements about EBR were used in an effort to see which explanations of the application gap respondents felt were most valid. The statements were all taken from the discussion of attitudes toward EBR presented in Chapter Three. Respondents were asked to indicate the extent of their agreement with each statement on a six point scale. On the scale, one was equal to strongly agree and six was equal to strongly disagree. The statements, together with information about the responses, are presented in Table 5.

In order to determine if there were any groupings among the statements, two types of quantitative analysis were performed. The first procedure was a form of hierarchical cluster analysis known as ICLUST.[1] ICLUST first calculates correlation coefficients between items. It then transforms these coefficients into proximity correlations and proceeds to cluster items by linking those that have similar patterns of relationships.[2] The technique was used here to allow visualization of the way in which various items grouped, and as a check on the other technique.

The second technique was the Guttman Lingoes Smallest Space Analysis III (SSA-III). This procedure also begins with the calculation

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[1] J. A. Kulik, W. R. Revelle, C. L. Kulik, "Scale Construction of Hierarchial Cluster Analysis," Unpublished paper, University of Michigan, 1970 (Mimeo).

[2] Rachel Kaplan, "The Dimensions of the Visual Environment: Methodogical Considerations," Environmental Design: Research and Practice, Vol. 1, ed: William J. Mitchell, Proceedings of the Environmental Design Research Association, 1972, p. 6-7-3.

of coefficients of correlation. The correlations are rank-ordered, and a factor analysis is performed on the rank-ordered data. The use of ordinal data increases the stability of the resulting dimensions.[1]

TABLE 5

PROBLEMS WITH BEHAVIORAL RESEARCH
(PERCENTAGE DISTRIBUTION)

Disagree (1,2)[a]	(3,4)	Agree (5,6)	
			Intrinsic Problems
41	42	17	b) Too many things at least as important as behavioral research for the designer to consider.
48	41	11	c) Behavioral research is of marginal importance since the designer can interpret user needs adequately for himself.
29	48	23	g) Behavioral research is not worth the expense.
			Extrinsic Problems
26	39	36	d) Government codes and regulations do not allow the designer the latitude to apply research findings.
22	46	33	e) Clients do not see the point in using behavioral research.
6	30	64	f) Behavioral information is not readily available to the architect.
			Others
4	38	58	a) The form in which behavioral research findings are presented is overly wordy and full of jargon.
4	28	68	h) There should be more emphasis on behavioral factors during architectural education.

[a]Response categories grouped for this column.

[1]Rachel Kaplan, Appendix to "Residential Modification as a Mode of Self-Expression," Robert K. Mautz & Rachel Kaplan, Man-Environment Interactions: Evaluations and Applications, Part 9, ed: Daniel H. Carson Proceedings of the Environmental Design Research Association, 1974, p67.

These procedures revealed the presence of two dimensions. The three items listed first (Items b, c, and g) in Table 2 formed one cluster. This cluster was labeled "Intrinsic Problems." The items question whether EBR has anything to offer design. Earlier discussion indicated that designers generally feel EBR does have something to offer. The responses to this cluster of items supported this conclusion.

There were, however, a large number of mid-range answers (more than 40 percent) for each of the three items. The number of respondents who declined to answer Item g was also unusually high. Fourteen percent of the respondents did not answer this item. This was over twice the percentage of omitted responses for any of the other scaled questions. The percentage of omissions was even higher than for any of the open-ended questions. In some cases, there were comments such as "?" or "don't know" inserted instead of answers. Both types of responses may be indications that respondents have had little experience with behavioral research.

The other cluster of items identified by the factor analysis (Items d, e, and f), dealt with "Extrinsic Problems." Responses to these statements supported the earlier observations that designers explain their failure to utilize EBR as due to factors beyond their control. In particular, they seem to feel that EBR is not readily available to them. Sixty-four percent of the respondents indicated strong agreement that access was a problem.

Another "extrinsic" problem which, surprisingly, was not statistically related to the others, is Item d. The responses to this item provide a definite indication that EBR is not communicated in a clear manner.

Item h, which also did not enter into either of the above clusters, received the strongest support of any of the statements. Over 68 percent of the respondents felt strongly that there should be more emphasis on behavioral factors in design education.

The responses to all of these statements are consistent with the position taken here that designers accept the relevance of behavioral research to their work but have been frustrated in trying to use it or obtain it. The other two types of questions endeavor to explore what respondents expected from EBR, in order to pinpoint the reasons for their frustration.

Rating the Usefulness of Research Findings

The core of the survey was a device which asked respondents to judge the usefulness of a variety of specific pieces of behavioral research information. The goal of this series of items was to establish the criteria used by designers to evaluate research information. It was hoped to accomplish this by comparing information designers find most useful with that which they find least useful. These questions were also expected to yield information on subject areas respondents considered most useful.

Respondents were asked to rate each of 16 items of behavioral research information in terms of how useful they felt it would be to them if they were doing the design programming for a housing development for the elderly. Ratings were made on a six point scale in which one indicated "not useful" and six indicated "very useful."[1]

The average rating for 81 percent of the respondents was above the mid-point of the scale. The overall average rating was 4.2. Table 6 shows the distribution of these average ratings. The somewhat skewed distribution of the overall ratings suggests that respondents

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[1] Readers wishing to examine the exact wording of these and other questions may consult the survey instrument which is reprinted in the Appendix.

generally considered the information useful.[1]

TABLE 6

DISTRIBUTION OF AVERAGE USEFULNESS RATINGS[a]

Response	Not at all useful	1	2	3	4	5	6	Very useful
% of sample		0	1	18	47	29	5	

[a]The figures in this table represent the sum of the usefulness ratings given by a respondent divided by 16, the number of ratings.

The mean rating for individual items varied considerably. When the ratings for all respondents were averaged for each item, the resulting means ranged from a low of 3.4 to a high of 4.9. Statistical procedures revealed that differences of the magnitude that occurred between many items were not likely to have occurred by chance.[2] Consequently, it appears that respondents were able to distinguish different levels of usefulness among the items. Table 7 lists each item together with its mean rating.

[1]Two sources of bias, in particular, must be considered in evaluating these ratings, as well as other responses to the questionnaire. The first of these is that respondents who chose to respond may have done so because they were favorably inclined toward behavioral research. The second source of bias that must be considered is the on-stage effect. This is the tendency of respondents to play to their audience. In the present case, respondents could be expected to slant their responses toward behavioral research. There is no indication of the extent to which either of these biases was operating. The term on-stage was obtained from Neil Mck. Agnew and Sandra W. Pyke, The Science Game (Englewood Cliffs, New Jersey: Prentice-Hall, 1969), p. 76.

[2]The Newman-Keuls procedure was used to determine the likelihood that a difference between items of a given magnitude would have occurred by chance. The procedure is described in B. J. Winer, Statistical Principles in Experimental Design (New York: McGraw-Hill, 1962), pp. 77-89.

TABLE 7

USEFULNESS OF RESEARCH INFORMATION

Item	Mean Usefulness Rating	Standard Deviation	Abstractness Level
k) Older persons find great satisfaction in observing the activity outside their quarters. To this end low window sills and unobstructed views are desirable.	4.9[a]	1.37	1[b]
b) A lounge should be provided adjacent to dining areas to allow for socializing while awaiting meals.	4.8	1.50	1
m) Providing easy access to activities and services and encouraging friendships are important means of prolonging an older person's independence.	4.7	1.45	2
g) It is recommended that walks designed for the elderly have resting places no more than 150 feet apart.	4.6	1.37	1
c) Older persons dislike larger, open spaces.	4.6	1.54	2
f) An optimal life space for the aged should allow the person to select his own combination of privacy and involvement with social groups.	4.6	1.64	3
a) As vision and hearing decline the older person depends increasingly on his sense of touch.	4.4	1.44	2
l) Colors tend to appear faded to the older person, particularly cool shades of blue and green.	4.4	1.41	2

TABLE 7 -- Continued

	Item	Mean Usefulness Rating	Standard Deviation	Abstractness Level
i)	In one retirement home a small lounge crowded with furniture was just as popular as one 5 times larger with more space between furnishings.	4.3	1.62	3
d)	Limitations in health, skills and other resources leave a person more vulnerable to environmental constraints.	4.0	1.77	3
e)	A standup garden built waist high and with access to all points from the perimeter worked well in one retirement home.	4.0	1.55	1
j)	Since a person can respond only to those aspects of the environment experienced through his sense, age-related sensory losses affect very real changes in the world in which the elderly live.	3.9	1.72	3
h)	Efficiency apartments are undesirable for the elderly because they often create confusion about the functions of spaces.	3.9	1.80	1
n)	It is more difficult for the older person to locate and identify sounds, for example, to tell if a sound comes from a few feet away or from down the hall.	3.7	1.61	2
o)	The physical environment can be compared to a language in that it offers a system of cues to tell a person how to respond in a particular situation.	3.4	1.76	3

TABLE 7 -- Continued

Item	Mean Usefulness Rating	Standard Deviation	Abstractness Level
p) The elderly reduce their attention to the environment because the previously automatic movements of eating and walking need to be watched.	3.4	1.73	2

[a]The figures in this column represent the sum of the ratings of all respondents for a given item divided by the number of respondents, 182.

[b]The figures in this column indicate the judged abstractness of the items. The abstractness scale, as defined in the text, ranges from one which is the most concrete information to three which is the most abstract information.

It was suggested in Chapter Three that designers would prefer information that was tangible, with clear implications for design. To allow testing of this proposition, items were selected to represent a range of levels of abstractness. The definitions of these levels are as follows:

Abstractness Level 1 - The item is stated in terms of a physical implication for design. It may be a design prescription or rule or a statement of preference for a specific physical element; e.g., Pullman kitchens are not satisfactory for the elderly.

Abstractness Level 2 - The item is stated as a fact about the specific preferences, capabilities, or behavior of the elderly. Physical environmental implications are not included; e.g., Depth perception becomes less accurate with age.

Abstractness Level 3 - The item is a theoretical principle concerning the needs or behavior of the elderly. The designer is required to interpret the statement in terms of its implications for behavior as well as for design; e.g., When dealing with their environment the elderly depend upon different sensory information than do younger persons.

The extremely high and low usefulness ratings were consistent with the expected preference for concreteness, as was the ranking of the means for the three groups. The mean rating for the five highly concrete items was 4.4; for the six moderately concrete items it was 4.2; and, for the five abstract items it was 4.0. Occasional comments such as "too general" and "what does this mean?" written in beside some of the most abstract items also support the prediction.

For some individual items receiving a middle range score on the usefulness scale, the relation between abstractness and usefulness was less definite. Not only were several abstract items rated as more useful than the most concrete item, but there was considerable variation in ratings of items at each level of abstraction. For example, Item f was judged highly abstract but received a higher usefulness rating than several less abstract items.

One salient feature of items receiving high usefulness ratings is

that they all have a definite implication for design. These implications are often at a fairly general level, such as in Item m; however, they do provide definite guidance to the designer. This is not true for most of the items ranking below the median usefulness value. This suggests that a simpler, two-level abstractness scale may be appropriate.

It also appears that items including definite statements about behavioral preferences or needs were rated as more useful. This was true within the two abstractness categories, as well as in the overall ranking of items. This suggests that Level 2 of the original abstractness dimension is actually part of a separate dimension.

Another factor that was earlier identified as affecting designers' judgments of information was the consistency of the information with their personal experience. This could mean that an item might be rated low on usefulness because the respondent disagreed with it or did not believe it. During the pretesting of the survey instrument, several interviewees tended to judge items in this way. Items were felt to be either right or wrong. If they were right they were useful. Comments written on the margins of the questionnaire provide the only clues to the basis for the usefulness ratings on the survey itself. Such comments were made by only ten percent of the sample. Of these comments, "disagree" and "not true" were frequent. This suggests that personal judgments of the validity of the information were affecting usefulness judgments on the survey.

The ability of the information in an item to attach to existing experience or help to structure a problem may also affect its perceived usefulness. This again was suggested in one of the propositions at the end of Chapter Three. Items containing information that is descriptive, that pertains to a topic of current interest, that relates to existing categories of information, and that uses the designers' language would seem most likely to do this.

One of the reasons for seeking the usefulness ratings was to aid in understanding how behavioral information is evaluated. In particular, it was hoped to see whether respondents distinguished between various domains of behavioral information. For example, would information on environmental preference be considered as more useful than information on functional requirements.

In order to determine if these, or other considerations, were influencing the usefulness ratings in any systematic manner, the two factor analytic procedures described in the preceding subsection were employed. The ICLUST procedure indicated the presence of four clusters of factors; as a result, four dimensions were requested from SSA III. The four dimensions, together with the factor loading associated with each item appear in Table 8.

Factor 1 has been labeled Environmental coping. The items in this factor suggest ways that the environment can affect a person's well being and behavior. The items which received the highest loadings are the most general; and, incidently, received the lowest usefulness ratings.

Factor 2 contains recommendations based on Environmental preference information. Each item provides a definite physical recommendation to designers based on implied or expressed environmental preference information.

Factor 3 includes Sensory concepts. The items give information about how sensory functions can affect environmental behavior. The two items that loaded most heavily on this factor were among those receiving the lowest usefulness ratings. Neither item is clear in its meaning to design.

Factor 4 is labeled Design recommendations. The items in this cluster provide specific design recommendations based on a description of functional needs. These items seem to represent the type of information designers find most useful. The style of the information, a

TABLE 8

CLUSTERING OF RESEARCH FINDINGS

	Item	Factor Loading	Descriptive Title
d)	Limitations in health, skills and other resources leave a person more vulnerable to environmental constraints.	.77	1 Environmental coping
j)	Since a person can respond only to those aspects of the environment experienced through his senses, age-related sensory losses affect very real changes in the world in which the elderly live.	.61	
f)	An optimal life space for the aged should allow the person to select his own combination of privacy and involvement with social groups.	.45	
m)	Providing easy access to activities and services and encouraging friendships are important means of prolonging an older person's independence.	.43	Mean usefulness rating = 4.3
c)	Older persons dislike larger, open spaces.	.64	2 Environmental preference
i)	In one retirement home a small lounge crowded with furniture was just as popular as one 5 times larger with more space between furnishings.	.57	
l)	Colors tend to appear faded to the older person, particularly cool shades of blue and green.	.54	
g)	It is recommended that walks designed for the elderly have resting places no more than 150 feet apart.	.44	Mean usefulness rating = 4.5

TABLE 8 -- Continued

Item	Factor Loading	Descriptive Title
n) It is more difficult for the older person to locate and identify sounds, for example, to tell if a sound comes from a few feet away or from down the hall.	.74	3 Sensory concepts
o) The physical environment can be compared to a language in that it offers a system of cues to tell a person how to respond in a particular situation.	.51	
a) As vision and hearing decline, the older person depends increasingly on his sense of touch.	.43	Mean usefulness rating = 3.8
k) Older persons find great satisfaction in observing the activity outside their quarters. To this end, low window sills and unobstructed views are desirable.	.57	4 Design recommendations
b) A lounge should be provided adjacent to dining areas to allow for socializing while awaiting meals.	.52	Mean usefulness rating = 4.8
h) Efficiency apartments are undesirable for the elderly because they often create confusion about the functions of spaces.		These items did not load on any of the four factors.
e) A standup garden built waist high and with access to all points from the perimeter worked well in one retirement home.		
p) The elderly reduce their attention to the environment because the previously automatic movements of eating and walking need to be watched.		

definite design recommendation accompanied by a behavioral finding to support the recommendation, is what was suggested earlier as optimum.

These groupings suggest that respondents were not relying on any of the categorization schemes that had been anticipated. The factors evidently represent what, for designers, is a natural subdivision of the content of behavioral research information. The division appears to be in terms of different questions behavioral research can answer for designers. These questions are as follows: How do people cope? (Factor 1), What do people want? (Factor 2), What do people experience? (Factor 3), and What can the designer do about it? (Factor 4). If these categories can be sustained by future research, they can serve an important function for researchers. By communicating research to designers in terms of these categories, researchers may be able to reduce the alienation toward EBR felt by some designers.

Functions of Behavioral Research in Design

Another series of items asked respondents to evaluate possible roles of behavioral research in their work. The purpose of these items was to explore designers' information needs by seeing for what purposes they wanted EBR. Respondents were requested to rate each suggested role in terms of its importance to their work. Ratings were on a six point scale with one equaling "not important" and six equaling "very important." Table 9 shows how the items were evaluated. The two functions rated as most important both support the propositions put forth in Chapter Three. Respondents wanted data at the beginning of the design process to "spark new ideas" and "prevent mistakes in programming." Two other functions were rated as very nearly as important. The remaining two items were rated as much less important. One of these items, "provide support for hunches," was intended to represent the view of research as substantiating intuitive insights.

Evidently, respondents felt that assistance in generating the insights is much more important.

TABLE 9

FUNCTIONS OF BEHAVIORAL RESEARCH IN DESIGN
(PERCENTAGE DISTRIBUTION)

Unimportant %	%	Very important %	Function
28[a]	37	36	a) Provide support for hunches.
8	36	56	b) Provide evidence with which to convince clients.
2	18	79	c) Spark new ideas.
6	29	65	d) Prevent mistakes in programming.
40	37	24	e) Provide an advantage in competing for work.
9	32	59	f) Help define and describe user groups.

[a] Unimportant represent a response of 1 and 2; the untitled middle category represents responses of 3 and 4; and Very important represents responses of 5 and 6.

There may also have been a feeling that the question was designed to lead respondents to reveal a commitment to intuition. If this is the case, it supports the suggestion made in Chapter Three. This is that full utilization of EBR, or any other type of research, may be impeded by a misunderstanding of the role of personal knowledge or intuition in design. Designers, as well as researchers, may feel that intuitive judgments and scientific research are mutually exclusive rather than mutually enhancing or interdependent.

The other item that was rated relatively low in importance was Item e. It may have suffered because it raised defenses. This item suggested that behavioral research might provide a competitive advantage. Its low rating may be a reflection of the fact that, as professionals, architects consider it inappropriate to make an issue of competition. Another interpretation of this low rating is that respondents may believe that behavioral research is really just "frosting on the cake" and not an essential ingredient in a project.

Factors Affecting Views of EBR

In order to probe the basis for respondent views of EBR information, data was obtained on various background factors which could be expected to affect attitudes. In this section, the responses discussed in the preceding section will be considered in light of this background data.

Experience with Design for Special Population Groups

It was anticipated that experience with design for populations having obviously unusual design needs would affect respondent views of EBR. There were two items designed to determine respondent experience with special population groups. The first concerned experience with special populations in general. The second asked the respondent to specify with which special population he had had most of his experience. The distribution of responses to these questions was shown in Table 1. Responses to this second question were only recorded if the respondent had indicated at least some experience (a response of three or above) to the first question. Seventy percent of those who had the criterion level of experience indicated their

experience was with the elderly.[1]

Respondents with more experience with the design needs of special population groups were also more likely to be principals of firms ($t = 4.7$, $p < .001$).[2] They had been in practice an average of 18 years as opposed to 10 years for those with little experience ($t = 3.9$, $p < .001$). They more often indicated that their firm dealt with a range of project types and, specifically, more often with facilities for the elderly and health facilities. They also dealt less often with industrial and commercial projects. They devoted a greater part of their effort to programming ($t = 3.4$, $p < .001$) and to client contact ($t = 2.4$, $p < .05$) and a smaller part to production tasks ($t = 4.7$, $p < .001$).

It was anticipated that respondents with more experience with the design problems of special groups would be more appreciative of the research findings. The difference was expected to be particularly pronounced for the more theoretical findings. Respondents with more experience did generally provide higher usefulness ratings ($t = 2.2$,

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[1]Some questions arise from this. Do most architects who have experience with special groups have their experience with the elderly as this sample indicates? Did the focus of the questionnaire on the elderly lead respondents to indicate experience with the elderly? Did it lead only those architects with experience with the elderly to answer? Or are the elderly a more distinctive group so that people are more likely to separate them from the remainder of the population than they are to separate school children, for instance? As it is, the high experience group is virtually identical with the group who indicate experience with the elderly. This was apparent when the sample was subdivided on both bases and the results compared. The statistically significant differences that appeared for one group also appeared for the other group. The distinctions reported here will be the ones based on amount of experience with special populations in general. The groups compared are respondents who gave a response of one or two with those who gave a response of five or six.

[2]Student t values are only reported when F values were not significant at the .05 level or beyond.

$p < .05$). Surprisingly, the differences were most pronounced for an index of concrete items ($t = 3.1$, $p < .01$). There was no difference between the two experience groups on an index of abstract items. Ratings of the Environmental Preference Factor and the Design Recommendation Factor increased with experience ($t = 2.5$, $p < .05$; $t = 2.5$, $p < .05$). There is no way to tell if this is due to the generally high concreteness level of the items composing these factors.

TABLE 10

EXPERIENCE WITH SPECIAL GROUPS
VERSUS PROJECT TYPE
(PERCENTAGE DISTRIBUTION)

	Project Type			
	Facilities for elderly	Health facilities	Industrial/ commercial	4 or more types listed
Low experience Sample = 64	2[a]	19	62	6
High experience Sample = 46	18	39	3	20

[a]The Chi-Square value for the difference in project type is 18.3, $p < .01$.

While designers who had more experience with the problems of special groups rated the research findings as more useful, they saw less possibility of using behavioral research. This trend appears for the Extrinsic Problems as well as for the Intrinsic Problems. Only 27 percent of the low experience group strongly agreed with the Extrinsic Problems as compared with 47 percent of the high experience group. The difference was of the same magnitude for the Intrinsic Problems; 25 percent as opposed to 43 percent. Chi-Square values were calculated to test the significance of these differences. In neither case were the differences statistically significant. Nevertheless, this more

critical assessment on the part of those with presumably greater awareness of the human issues in design is surprising. This group may be more sensitive to potential problems involved with using EBR by virtue of their experience. The more positive feelings of the group with less experience may reflect naive faith in the potential assistance available from EBR. This issue will be considered further in the next section in connection with actual use of EBR.

Experience with Sources of Behavioral Information

Respondents were also asked to indicate the extent of another type of experience. They were asked to indicate on a six point scale (1 = Not at all, 6 = Very Often), how often they used each of seven possible sources of information about the people for whom they design. Sources were varied in the degree to which they reflected a systematic approach to questions of user fit. Table 11 shows these sources in this order.

Seventy-four percent indicated that they never used a behavioral specialist from their own staff, and 62 percent indicated that they never used a behavioral consultant. Respondents reported that they quite often used informal data-gathering sources; i.e., "observing and talking" and "studying similar projects." However, they most often relied on their "own experience and training" or depended on "information provided by the client" to make decisions concerning user fit.

The question arises whether use of EBR in design reflects a greater general interest in human issues, or a substitution of EBR for less formal means of obtaining information on human issues. If respondents who use EBR more often use other means of obtaining information on users, then underutilization of EBR is at least partially a matter of how much attention is given to human issues in design. However, if EBR is merely substituted for other means of obtaining the information, then

the importance of information acquisition and utilization preferences is reinforced.

TABLE 11

SOURCES OF INFORMATION ON USER BEHAVIOR MOST AND LEAST USED

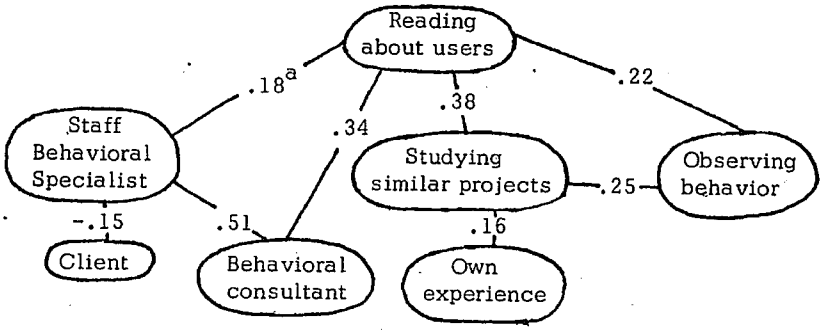
Not at all	Very often	Source of Information on User Behavior
0[a]	86	Your own experience and training
0	64	Information provided by the client
1	64	Observing and talking with potential users
2	50	Studying similar projects
7	40	Reading material on user behavior and attitudes
62	7	A behavioral consultant
74	4	A behavioral specialist on your own staff

[a]Figures given represent the percentage of respondents giving these responses. The figures in the column labeled Not at all include only respondents giving a response of one to that source of information. The figures in the column labeled Very often include respondents giving a response of five or six.

As a means of checking which of these alternatives was more compatible with the data, coefficients of correlations (r) were calculated between the various sources. The significant correlations are shown in Figure 1. While some of the correlations were significant, they were not particularly large. However, the only significant negative correlation was between having a staff behavioral specialist and depending on the client. The correlation analysis tends to support the first alternative. Greater use of information on human issues from one source does not contradict use of other, more or less scientific sources, as well.

FIGURE 1

CORRELATIONS BETWEEN THE USE OF VARIOUS SOURCES OF INFORMATION ON USER BEHAVIOR



[a]The figures shown are correlation coefficients. A coefficient .15 is significant at the .05 level. A coefficient .20 is significant at the .01 level.

Student t tests were also calculated to see if higher scores on an index of EBR use related to higher scores on the use of other sources of information.[1] There was a tendency for those who had worked with behavioral researchers to use other sources of information on human requirements more often. This tendency reached statistical significance for "studying similar projects" and "reading material on user behavior and attitudes" (BP = .984, $p < .05$; BP = 1.000, $p < .001$).[2]

In order to evaluate the effect of experience with behavioral research on respondent perceptions of its value and role, an index of experience

[1]This index is explained below.

[2]The Bayesian posterior probability (BP) were used to determine significance here since the assumption of equal variance required by the student t test could not be met. The BP is the probability that the direction of difference between means did not occur by chance.

or use of EBR was developed. The index combined responses to "staff behavioral specialist" and behavioral consultant. The distribution of these variables was so skewed that the 57 percent who indicated never having worked with a behavioral researcher were compared with the remainder, who indicated some contact with a behavioral researcher. Student t tests were calculated to check the significance of the differences between the two groups.

Those respondents who indicated some experience with behavioral researchers were also likely to have more experience with design for special populations ($t = 2.3$, $p < .05$). There was a tendency, not significant, for them to be involved in non-project related research. However, they devoted less time to programming ($t = 2.7$, $p < .01$). This finding is difficult to explain, since programming is one of the activities in which EBR should be most useful. A welcome explanation would be that the involvement of researchers decreases the amount of designer time required for programming.

Respondents who had worked with behavioral researchers tended to be somewhat more positive toward behavioral research. This tendency was apparent in their evaluation of both Extrinsic and Intrinsic Problems afflicting EBR. In these cases, the trend was not significant. In another area, the trend did reach statistical significance. Various functions of EBR were rated as more important by those who had worked with a behavioral researcher. This was true for "sparking new ideas" ($BP = .996$, $p < .01$); "preventing programming errors" ($BP = .994$, $p < .01$); and "providing a competitive advantage" ($t = 2.3$, $p < .05$). No differences were detected in the ratings of the usefulness of research information.

In an effort to develop a more sensitive measure of experience with behavioral research, the index was expanded to include "reading material on user behavior and attitudes." Student t tests were used to compare those scoring above the mean on this new index with those who

scored below the mean. Those with more experience were likely to have more authority in their firms ($t = 2.23$, $p < .05$). The tendency of experience with EBR to be associated with more positive attitudes toward EBR diminished, though it still seemed to exist.

This new measure of experience did reveal a difference in the ratings of the usefulness of research information. Those with higher experience scores tended to rate the information as more helpful ($t = 2.5$, $p < .01$). This was true for all of the items; no preferences for specific groups of items were observed.

It appears that experience with behavioral research is positively associated with perceptions of the value and role of EBR. However, before presuming that experience increases a designer's appreciation of behavioral research, additional research more directly aimed at this issue would be needed. It is possible that an existing appreciation of behavioral research led to the initiation of experience. In either case, it appears that experience has not had a negative impact on respondent feelings toward behavioral research.

Experience also does not seem to change the type of research information designers find useful. It was anticipated that experience with behavioral research might lead to recognition of new aspects of behavior that are important to design. Experience might also be expected to provide the base to which more abstract findings could be added. The data does not support either of these expectations.

The Effect of Other Variations in Experience

Cross tabulations were also performed between the attitude items and data on the respondent's position, years in practice, effort devoted to programming, as well as each of the other professional activities listed in the questionnaire. These efforts yielded very little additional insight into the source of the differences in views of EBR observed among respondents.

Principals of firms seemed to have a little less faith in the potential of EBR. Their scores were higher on the Intrinsic Problem Factor, indicating that they were somewhat more likely to agree with some negative statements about the value of EBR to design ($t = 2.2$, $p < .05$). This is particularly interesting in view of the fact that they had more experience with behavioral research ($t = 2.4$, $p < .05$).

No new information was uncovered by comparing respondents whose involvement in certain activities varied. For example, respondents who were more involved with the design phase of architectural practice did not have noticeably different feelings about EBR from those with little design involvement.

Conclusions

The findings of the survey were generally supportive of the position taken in Chapter Three. The data suggests that the application gap is more a matter of the incompatibility of behavioral research information with the nature of designer information needs, than of any basic prejudice against using EBR. Specifically, respondents rated a number of pieces of behavioral information as useful. They indicated that matching human requirements was more important than several other goals. They recognized a number of possible roles for EBR in design as important. They also disagreed with several statements which challenged the relevance of EBR to design.

Overall, they seemed to accept the relevance of EBR to design. However, they reported trouble obtaining it and feelings that EBR was full of jargon and excessive verbage. As was suggested earlier, such problems appear to be symptoms of deeper problems originating from the very different ways designers and researchers operate. The principal purpose of the survey was to provide researchers with information on how designers evaluate information and the way they see EBR fitting into design.

As a means of gathering data on how designers evaluate EBR, respondents were asked to rate the usefulness of a series of research findings. They were able to distinguish different levels of usefulness among the items. They rated as more useful items that provided them with definite design recommendations. They also seemed to prefer items that included tangible descriptions of behavior. The item that was rated as most useful combined both of these characteristics. It read as follows: "Older persons find great satisfaction in observing the activity outside their quarters. To this end low window sills and unobstructed views are desireable." A factor analysis revealed the existence of four groups of items. Factor 1 included items that conceptualized the impact of the environment on the way older people cope with life. Factor 2 included statements based on environmental preference information. Factor 3 dealt with sensory concept. Factor 4 included items, such as the one listed above, which provide design recommendations together with behavior backup. These factors appear to represent the way designers naturally categorize behavioral research. Use of such a scheme in presenting information to designers should decrease their alienation toward EBR.

The designer's desire for information to help in structuring his problems was supported by the way respondents rated the importance of various functions of EBR in design. The two items rated as most important both offered help at the front end of design. These items were "sparking new ideas" and "preventing mistakes in programming."

In the next chapter, the findings of the survey will be meshed with the findings from other studies and the author's own insights to describe some probable characteristics of design information requirements. Some proposals for reducing the application gap will also be set forth, as well as some reflections on the success of the study and ways it could be extended.

CHAPTER 6

CONCLUSIONS

The research described in this dissertation was intended to explore the issues contributing to the apparent application gap preventing EBR from making an effective contribution to design practice. The first section of this final chapter is devoted to reassessing the application gap in the light of this exploration. The reassessment is a product, not only of the author's research, but of his observations and reflections accumulated during the course of the study.

Some limitations of the study are discussed in the second section of the chapter. Most of these limitations are discussed in terms of additional avenues of research that might be undertaken to more clearly define the reasons for the application gap.

While this study was not primarily aimed at developing solutions to the application gap, the author's immersion in the problem has led to some strong convictions about the directions in which solutions lie. The final section of the chapter briefly describes some of these directions or proposals for change.

Constituents of the Application Gap

Unfortunately, while numerous researchers are devoting considerable effort to increasing the stock of knowledge concerning how human beings interact with their physical environment, designers appear not to be using the information. There has been considerable recognition of this lack of research application. However, to date, systematic attempts to explore the roots of the gap have been limited and not very fruitful in terms of establishing what the critical factors are that block greater

use of behavioral research. While a clear and detailed understanding of the problem may not be sufficient for a solution, it is certainly an essential prerequisite. The chief purpose of this study was to contribute to a clearer definition of the so-called application gap.

In this section, an attempt will be made to unravel the research application problem into a number of more manageable constituent problems. It should be made clear that these constituent problems evolved out of the research and were not available to aid in establishing the research design.[1]

Designers Feel EBR Can Be Relevant

Before reviewing conditions that appear to impede the integration of EBR into design, a condition favoring integration should be noted. As was suggested earlier, designers generally seem eager to consider human needs in their work. More importantly, indications are that they feel that information provided by EBR can help them. For example, architects responding to the survey conducted as part of the present study rated a variety of different research findings as useful. They also rated various functions of EBR in design as important, and their responses to a number of statements about EBR indicated that their attitudes toward it were generally positive. For example, over two-thirds of the sample strongly agreed that there should be more emphasis on behavioral factors during architectural education. The findings of other researchers are consistent with this general affirmation of the value of EBR by designers.

Since these same designers indicate little use of behavioral research it is likely that this affirmation is based primarily on a sense of need

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[1] Many of the observations and findings summarized in this section were presented in an expanded form earlier in the dissertation.

for the information expected from EBR rather than actual qualities of research information. However, the few respondents to the survey who indicated actual experience with behavioral researchers did register somewhat more positive feelings toward EBR. This suggests that experience, at least, does not have an adverse effect on attitudes.

How Designers Explain the Application Gap

On the present survey, as well as in other studies, designers explain the application gap in terms of problems with the state of research. Two-thirds of the survey respondents strongly agreed that EBR was not readily available to architects. Information access has been pointed to as a problem elsewhere as well. In addition to feeling that EBR was inaccessible, another problem troubled respondents. Behavioral research information was seen as full of jargon and excess verbage. Other studies point to a related problem. Designers feel that research information is often not presented in an operational or usable form.

Such explanations of the application gap do little to suggest solutions. How can EBR be made more accessible to designers? As indicated earlier, information retrieval systems, per se, are not pat answers to access problems. They must mesh with the requirements of intended users, and users must understand the relevance of information provided by the system. How can information be communicated clearly to designers? What constitutes operationalized information, and how do you know when you have it?

As one probes for answers to such questions, one begins to wonder if access and communication problems are not merely symptoms of more basic reasons for the application gap. Designers view the world and their need for information in ways that may be quite foreign to researchers. Consequently, it seems possible that there may be significant mismatches between behavioral research information and the way the

designer understands his need for information on human behavior. Mismatches may occur because of the way behavioral research construes behavior or because of the fact that, as research, it is presented in a way that is incompatible with the designer's information acquisition and evaluation style.

The Role of Information in Design

Before setting forth some propositions concerning the way information is used in design, it may be useful to review the features of the design task that help to explain the distinctive way in which information is used. Perhaps the most important feature of the design task is that it involves decision making. Like other types of decision makers, designers must operate with fragmentary information. Seldom are the answers clear from the information at hand. Yet there is rarely time to delay the decision while additional information is sought. Even if time were not a problem; in many cases, the type of information needed to make a confident decision is impossible to obtain.

Not only is the designer accustomed to working with fragmentary information, but, ironically, he must also operate with an overload of information. A nearly infinite array of information on such factors as cost, codes, aesthetics, and programming must be reduced to manageable proportions.

Requirements of the design task, such as those just mentioned, have led designers to rely on special strategies for handling information. One of these has been labeled prestructuring. Prestructuring involves organizing the information on hand into a representation of the problem. This limits the range and types of solutions that must be considered. For example, the designer might determine that the problem requires the provision of additional space. This means that he can ignore remodeling an existing space to increase the efficiency of its use or investigating whether additional space is actually needed. Not only

do many designers prestructure problems, but they also prestructure the solution, Instead of systematically piecing together a solution, they first adopt a tentative solution and proceed by testing and modifying this solution.

Another way that designers cope with the demands of their work is by relying heavily on their own experience to determine what information is pertinent. Since they must leap gaps in information and integrate incommensurate factors, scientific aids to problem solving are frequently inadequate and may be incompatible with the problems they face.

Implications of Designer Information Needs for the Application Gap

By analyzing the nature of designer needs for information, this research has succeeded in isolating two apparent constituents of the application gap.

A limited conception of the role of behavioral information. The first constituent problem is that designers appear to have a limited conception of the role of behavioral research in design. The training and experience of designers shape the preconceptions with which they approach design tasks. If, as indicated, behavioral research plays a relatively minor role in design education, then the preconceptions designers have about behavioral research and its role in their work may be limited. For example, some designers express the belief that EBR is only needed for "fine tuning" a project.

Designers can be expected to seek new or additional information primarily when existing information is recognized as inadequate. Designers readily seek information for technical problems such as acoustics or cost estimating. If they do not seek information of behavioral issues, it may be because they see their own experience as adequate in this area. This harkens back to the need for expanding the designer's understanding of the implication of behavior for design.

If designer understanding of behavioral issues can be expanded, it is likely that their demand for better information with which to make decisions about human needs will increase.

Research does not match designer information needs. The second problem is that research output is not compatible with the special information needs of designers. The propositions listed below are a crude beginning at describing these needs or preferences.

1. Whatever the nature of existing preconceptions about behavior, careful attention must be given to understanding these preconceptions and establishing links between them and research information intended for use by designers.

2. Rather than simply muddying the designer's thinking with more information, research should assist the designer in converging on the most appropriate representation of the problem. This observation, as well as the preceding one, suggest, as did the survey, that research information which has apparent implications for design will be most valued by designers.

3. Reliance on personal experience, as well as the concrete nature of design work, suggest that designers should prefer tangible, descriptive, graphic information. Ratings of the usefulness of research findings supported this preference. Respondents rated as more useful findings which included descriptions of actual behavior or preferences rather than more conceptual statements about behavior. It is important to distinguish this preference for tangible information from a demand for definite answers to design problems. Designers prefer information which helps them to make decisions. They do not want decisions made for them.

4. In rating the usefulness of research findings, respondents appeared to use four functional categories. These were (1) How do people cope? (2) What do people want? (3) What do people experience? and (4) What can the designer do about it? Information

organized in terms of these categories, or other categories that are natural to the designer's thinking, should have more meaning to designers.

5. The meaning of the information to the problem at hand is likely to be much more important to its acceptance by the designer than is methodological or theoretical detail.

6. Because scientific methods have yet to provide an alternative, designers must evaluate information on the basis of their personal experience. Information that builds on the designer's personal experience is most likely to be accepted.

7. Lacking better means to evaluate information, the reputation or trustworthiness of the source becomes crucial. One way to build trust is by an ongoing personal association between the researcher and designer.

8. When designers ask for information, they want the information immediately. They expect that the answers they want have already been formulated and/or can quickly be calculated. When a designer asks a structural engineer to evaluate a design scheme, or a soil expert for the bearing capacity of the soil of a particular site, such experts can usually provide him with the information he requires quickly, based on their experience and established technical procedures. With this model in mind, and with the need to proceed ever present, it is understandable that the designer would be unwilling to wait for a behavioral researcher to design and conduct a research study. He must proceed with whatever information is available. Researchers must realize that designers must go ahead with or without help from the researcher.

9. The pressure for action also means that the designer is frequently satisfied with information that is much less precise and reliable than the researcher would consider acceptable.

10. Designers are most likely to seek information at the time

they encounter a problem. This is a normal response to the information overload condition under which they must operate.

Limitations of the Study: Suggestions for Further Research

The research described in this dissertation was necessarily limited in many ways. Some of these limitations are described in this section to guide others who may wish to continue the exploration of the application gap described here.

The survey was undertaken as an exploratory venture to provide some clues to the ways designers view behavioral research. When it was developed, the author had little but his own speculation to guide him. The author's ongoing readings and ruminations subsequent to the survey have clarified some of the constituents of the application gap and to some extent eclipsed the survey.

The use of a mailed questionnaire caused some problems. To maximize the response rate, the number and complexity of questions was limited. Given the decision to keep the number of questions small, the number of topics should have been kept small as well. As it turned out, responses were often difficult to interpret because information that could have further defined the response was not obtained. This was particularly troublesome for the usefulness ratings. It would have been helpful to know the criteria respondents used in determining usefulness.

The question of why certain items were rated as more useful than others is one of the issues that appears to warrant further research. A number of the factors that were predicted to affect the perceived usefulness of information were not tested in the survey. Furthermore, those that were tested and supported need to be further clarified. One way to do this would be to obtain ratings on a larger number of items. Now that a number of hypothesized criteria are available, items could

be selected to allow testing of the various criteria. Another means to determine the basis of usefulness ratings would be to ask respondents for explanations. This might be done by asking respondents to distinguish between items they rate as most useful and those they rate as least useful. They also might be asked to discuss each rating as they make it. Alternately, respondents might be asked to rate items on other scales and the results compared to the ratings obtained with the usefulness ratings. For instance, they might be asked to indicate whether they believe each of the findings are true.

It would also be valuable to create some type of anchor for the usefulness scale by comparing the usefulness of behavioral information with the usefulness of other types of information that might be provided to the designer, such as soil information or cost information.

The usefulness ratings were only one way to study how designers evaluate information. Another way would be to provide designers with longer examples of research findings such as they might use in actual practice. Not only could they be asked to rate the overall value of these selections, but they could be asked to summarize what they consider the main points of the article and explain its implications.

Designer information needs could also be explored in a more direct fashion. Either through design simulations or observation of actual design activity, information could be obtained on how designers decide when they need more information, how they go about obtaining a particular type of information such as information on behavior, and how they assess the validity of information they obtain.

The research topics listed to this point are all directed toward providing those parties interested in reducing the application gap with a better understanding of how designers evaluate and use information. It would also be helpful if better information were available on how designers think about the people for whom they design. What concerns for people do they have while designing, and what effects do they

believe their work has on users? Answers to these questions would be helpful in two ways. First, they would identify areas of human impact that designers may not be aware of; and second, they would suggest areas where designers would be most receptive to assistance from researchers.

Another topic about which research is needed is the effect of actual experience with EBR on attitudes toward it. Does experience increase future readiness to use it? If this is the case, then workshops in which practice collaboration occurs and local demonstration projects might be considered as means of increasing designer demand for EBR.

It should be recalled that the role of behavioral researchers in facilitating user participation in design was not dealt with in this study. The factors affecting designer attitudes toward direct user participation may be quite different from those affecting the use of behavioral research data. The former factors need to be explored, and techniques for making user participation effective and rewarding for designers should be developed.

Increasing the Role of EBR in Design

In this section, some proposals for reducing the application gap are set forth. These proposals stem more from the author's immersion in the study of the application gap than from specific results of the research. While some of the proposals may appear impractical, in general they illustrate the type of changes the author believes must be made if EBR is to play a more important role in design.

The first series of proposed changes are directed, primarily, toward the goal of expanding designer appreciation of the range and criticality of the impact of design on human behavior and attitudes.

Thinking of People First

Usually the design process begins with some effort to determine

the nature of the facilities that must be provided in the design solution. This phase of design is often referred to as design programming. The program is "the instrument through which data about the needs of the ultimate user of the building are expressed for the instruction of the architect as he develops the design solution."[1] At the present time, a program occasionally consists of as little as a listing of the names of the rooms to be provided and their sizes. It is often transmitted orally, and may not be recorded in any permanent manner.[2] It is proposed here that the activity of programming be given considerably more emphasis in design practice. This suggestion is in line with the observation by architect C. M. Deasy. In assessing the merits of the design disciplines, he notes that they:

> display impressive talents in terms of technical competence, organizational skills, creativity and the ability to synthesize complex sets of data. The phase of their practice that requires reform is the area of preplanning, gathering information about people and establishing human criteria that will determine the nature of the design and define the purpose of the product.[3]

The importance of programming is particularly significant when one considers the necessity of prestructuring, or limiting and organizing the problems to be addressed in subsequent portions of the design process. If variables relating to human requirements are not introduced in this early stage of design thinking, it is likely that other factors will be used to prestructure subsequent design activity.

One way to give human issues more prominence at the time of programming is by requiring some type of social or behavioral impact

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[1] Harold Horowitz, "The Architect's Programme and the Behavioral Sciences," Architectural Science Review, (Sidney) Sept. 1966, p. 71.

[2] Ibid, pp. 71 & 72.

[3] Deasy, 1974, p. 13.

statement to accompany any design proposal. The basis for such a requirement already exists. The National Environmental Policy Act which required that all development be evaluated for its impact on natural systems also requires an evaluation of the impact of development on social systems. It states that:

> All agencies of the Federal Government shall - (A) utilize a systematic, interdisciplinary approach which will insure the integrated use of the natural and social sciences and the environmental design arts in planning and in decision making which may have an impact on man's environment.[1]

While environmental impact statements, in some cases, may have received largely pro forma compliance, they seem to have at least brought a consciousness of natural environmental issues into the design process. Those who are interested in seeing an increased consciousness of socio-behavioral issues and an increased use of behavioral research in design should learn from their natural environmental predecessors. With the legislative basis already in place, it only remains for those concerned with the socio-behavioral environment to lobby for the full implementation of the law.

Another means of encouraging greater emphasis on programming and inclusion of appropriate issues in the program is to require a formal programming document as part of federal and state funded projects. The questions to be addressed in the program would have to be clearly delineated. For the document to be of use in the design process, its presentation would have to take into account the way designers use information which was discussed earlier.

A third way to increase the attention given to programming is through a more explicit introduction to it in design education. This

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[1] Martin S. Baker, "Implications of the National Environmental Policy Act," in Environmental Design Research, Vol. 2, ed: Wolfgang F. E. Preiser, (Stroudsburg, Pa.: Dowden, Hutchinson and Ross, 1973), p. 89.

will be discussed further in connection with other changes recommended for design education.

User Oriented Building Evaluations

In addition to securing a more prominent role for behavioral issues in design, it is vital that designers develop a broader conception of these issues. The range of issues should be made clear to them, as should the criticality of various design decisions to behavior. One reason that designers may have only a limited conception of the behavioral implications of their work is that they rarely receive feedback on the way their projects, or those of colleagues, function for users. The charge made by some critics that designers, so to speak, never return to the scene of their crimes is certainly unfair. However, it does seem that once a building is built, little effort is made to benefit from the experience.

At present, the various design award programs constitute the only type of published evaluation architectural projects receive. A project is usually considered for a design award before its functional success has been tested by use. The awards are usually based on an examination of photographs and drawings. Until recently, some projects were evaluated without even one evaluator having visited the site. Furthermore, the juries determining the awards are composed almost entirely of designers.[1] The comments accompanying the published reports of the awards give readers little insight into how the building functions for users.

It is proposed here that evaluations, in terms of use, be conducted and published for as many buildings as possible. An ongoing program of evaluations could accomplish several things. First, it could provide designers with the type of feedback called for above to broaden

[1] Vincent G. Kling, "Confessions of an Awards Juror," AIA Journal, May 1973, p. 27.

their understanding of the human implications of their work. Secondly, it could make clear the importance of the human considerations in design. Designers might begin to see such evaluation as a possibility for their own projects. The possibility might lead them to give behavioral issues a more prominent place in their thinking.

A more basic function of evaluation might be to encourage a general recognition of the experiemental nature of the design and building process. Since the designer frequently must operate on the basis of incomplete information, he is forced to make numerous assumptions in the course of the process. Many of these assumptions are about the way people will use or react to various design elements. These assumptions can be viewed as hypotheses, and the building which is based on these assumptions as an opportunity to test the accuracy of these hypotheses. Unfortunately, these tests are seldom made and, as Michael Brill has pointed out, the untested assumptions are reused without question.[1] A wide spread use of building evaluations could change this.

When separate full scale evaluations cannot be conducted, existing architectural award systems should be modified to stress functional issues rather than subjective and aesthetic ones. The HUD award program already requires a user evaluation.[2]

As a minimum, post construction evaluations might include the following components. (1) An effort by the evaluator to determine, with the designer, what his intentions and expectations were with regard to the building in question. (2) Observations and informal

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[1]Michael Brill, "Evaluating Buildings on a Performance Basis," Architecture for Human Behavior, ed: Charles Burnette (Philadelphia: Philadelphia Chapter, American Institute of Architects, 1971), p. 41.

[2]Kling, p. 27.

conversations with building users to identify areas where these intentions were not achieved and if major user concerns were overlooked when the building was conceived. (3) Formal documentation and verification of any discrepancies. (4) Publication of the evaluation to the design community with rebuttal by actors in the building process. The object of the process is not to heap criticism on the design team but to highlight the importance of user issues. Because of this goal, it is less important that evaluations be exhaustive and extremely rigorous than it is that they identify one or more salient issues concerning users that were met successfully and deserve credit, or were not met and should be corrected in the future.

Before post construction evaluation can be expected to gain wide acceptance, its value must be established. For this to happen, researchers are going to have to muster whatever resources they can and begin conducting evaluations and publishing the results. The author's literature search in the area of post construction evaluation located very few published studies. As more and more evaluations are published, hopefully, the value of evaluation will gain acceptance among actors in the design process, and an organized system of evaluation will be established. John Zeisel and Clare Cooper are two researchers, among others, who have already begun the process of conducting and publishing evaluation studies.[1]

Changing the Education of Designers

One logical point at which to institute the changes in the design

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[1] Clare Cooper, "St. Francis Square: Attitudes of Its Residents," with a response by the Architect Robert B. Marquis, AIA Journal, December 1971, and John Zeisel and Mary Griffin (eds.), Charlesview Housing: A Diagnostic Evaluation, (Cambridge: Harvard Graduate School of Design, Architectural Research Office, 1974).

process outlined above is during the education of designers, while they are still formulating their professional paradigm.

At the most general level, if architecture is truly designing for people, as has been suggested in this study, then it seems necessary that architectural design education should emphasize behavioral issues equally with other design issues.

Currently, when design students are provided with material on EBR, it is usually through elective courses which are not an integral part of their design activity. This creates several problems. In the first place, it demonstrates to the student that the faculty consider EBR to be only a secondary input to architecture. It also means that EBR is likely to receive lowest priority for the student's scarce time. Most importantly, it usually minimizes the opportunities for dealing with the difficult task of translating and applying behavioral research information to the design decision process.

It is not intended here to suggest that designers should be trained as social scientists. What is suggested is that designers' education should help them to appreciate the limits of their own abilities to infer the design needs of other human beings. They also should be informed of alternate ways to determine these needs and be given practice in this phase of design. One way that these educational objectives might be accomplished is through including work on the behavioral aspects of programming, social environmental impact, and post construction evaluation as part of the basic design training of students. Another way is to increase the use of persons representing user interests in design critiques and in the earlier phases of design projects as well.

Various simulation techniques should be used to give behavioral information more meaning. An example of such a technique is the Empathic Model which was developed by researchers at the University of Michigan. The model has been used extensively to sensitize

various professionals, including designers, to the special environmental needs of the elderly. A rough approximation of some of the sensory losses that occur naturally as part of the aging process is provided by the model. By wearing the lenses which are part of the model, a designer can quickly gain an appreciation for some of the differences between the world as he knows it and the world as experienced by the older person.[1]

Devices such as the empathic model are particularly well suited for use with designers because they seem to fit well with the designer's reliance on personal experience. The empathic model provides a direct addition to experience. This should be more effective than providing processed information which must be meshed with experience before it can affect thinking.

Matching the Designer's Information Needs

The preceding changes focused primarily on increasing demand among designers for better behavioral information. In general, they call for changes on the part of the design community. However, if EBR is to achieve a more prominent role in design, researchers must act to develop a better match between their output and designer information needs. This may require creating new mechanisms to join research and design. The two proposals that follow are examples of the type of mechanisms that offer promise of achieving this linkage. In the course of describing these mechanisms, some general requirements of all mechanisms intended to link design and research will be noted.

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[1] Leon A. Pastalan, Robert K. Mautz II, and John Merrill, "The Simulation of Age Related Sensory Losses: A New Approach to the Study of Environmental Barriers," Environmental Design Research, Vol. 1, ed: Wolfgang F. E. Preiser (Stroudsburg, Pa.: Dowden, Hutchinson & Ross, 1973).

A Design Extension Service

This proposal involves a means of affecting designers' attitudes toward EBR and, at the same time, a way to alleviate what designers report to be one of the prime reasons they do not utilize EBR: its inaccessibility.

There have been a number of attempts to bring design services to "the people" through community design centers and other service-oriented projects, generally based in architectural schools. These projects can provide valuable practical experience to design students.

Similar institutional arrangements seem to be appropriate for bringing behavioral research findings to architectural practitioners. Perhaps the best model for this is the Cooperative Extension Service of the U. S. Department of Agriculture. Its agents bring information on innovative farming practices to farmers throughout the country. Agents, traditionally, have actively gone out to the farmers as well as being available for farmers to come to them. If behavioral information were available to designers through a similar system on a low cost or free basis, it might alleviate many of the access problems designers describe. In addition to answering questions and providing a referral service, agents could ask questions and otherwise demonstrate the importance of EBR in design.

Agents could also be available to work with groups sponsoring building projects. They could suggest ways in which such groups could accurately determine their building needs and effectively present these needs to their architect.

As with community design centers, the human requirements information service, as it might be called, could be centered in architectural schools. This would provide valuable experience for interested students.

Designer - Researcher Collaboration

The term collaboration is used here to refer to a type of working

relationship in which the designer and the researcher work together on common problems over an extended period. This is different from the traditional method of providing behavioral research to designers, which is the written research report. To be an effective collaborator, the researcher must accept certain requirements. First of all, he must recognize that the designer is going to design with or without his help. To help within the time available, the researcher may have to rely on his own experience as does the designer. Since the researcher has a very different perspective, and he is presumably more oriented to human issues, his experience will give the designer a better basis for design than he would have without benefit of it.

When time permits, the researcher should do research which will provide a stronger basis for his recommendations. However, even when he can conduct actual research as part of the project, in the end he must be prepared to draw conclusions or take a position with regard to problems the designer must solve. If the researcher intends to provide the designer with timely advice, he will rarely be able to wait until all the evidence is in before he speaks.

On the other hand, the researcher should make clear to the designer the extent to which his advice is based on opinion as opposed to more objective measures.

The direct, face-to-face contact of collaboration allows the researcher to develop an understanding of the type of information the designer needs. It also provides successive opportunities to try out various styles of presenting information.

APPENDIX

ITEMS OF BEHAVIORAL INFORMATION ON THE ELDERLY OF POSSIBLE VALUE TO THE PHYSICAL DESIGNER

1. The elderly person is particularly vulnerable to variations in his physical environment. (1, p. 40)

2. The greater the degree of competence of the organism, the less his behavior will be influenced by the physical environment. Conversely, limitations in health, cognitive skills, ego strength, status, social role performance, or degree of cultural evolution will heighten the docility of the person in the face of environmental constraints and influences. (1, p. 40)

3. One factor that appears to determine readiness of the elderly to occupy various types of newly-built senior housing is the proximity to basic resources such as shopping, transportation, family, and physical security. (1, p. 43)

4. Weather and topography are significant determinents of migration of the elderly. (1, p. 43)

5. Older people frequently substitute observation for their diminished capacity to perform various activities. (1, p. 43)

6. In the study, five times as many residents of a retirement facility were observed in a main floor lobby as were observed in nine comparably furnished lounges located on residential floors. (1, p. 43).

7. Several studies of senior housing show that proximity is one of the most potent determinents of friendship. (1, p. 46)

8. Environments for the elderly should allow the resident freedom to elect privacy or social contact. (1, p. 47)

9. Increasing the ease of visual communication by staff makes it easier for staff to avoid patient contact. (1, p. 48)

10. One of the most frequently cited reasons for the desire to move by the elderly is difficulty in climbing stairs. (1, p. 52)

11. In one study, applicants for retirement housing preferred age-segregated housing. (1, p. 56)

12. Because of differential life expectancy, most retirement facilities will be female dominated unless special provisions are made for havens for the men. (1, p. 57)

13. Living in an environment where the norm is poor health probably has a negative effect on one's own sense of health. (1, p. 58)

14. Persons whose cultural background places a high value on social contact are more likely to move into semi-congregate housing in old age. (1, p. 60)

15. Personal transactions among the elderly are characterized by very high levels of sensory involvement , usually within the distance of the extended forearm. (2, p. 72)

16. When dealing with their environment, the elderly depend upon quite different sensory information than do the younger persons in general. (2, p. 81)

17. Older people pay more attention to information channeled through peripheral receptors which magnify movement. (2, p. 82)

18. Older people rely heavily on tactile involvement with their environment, yet most new structures are notorious for tactile uniformity. (2, p. 82)

19. One reason older people often seem confused and awkward is that they are forced to live in environments coded in a language they do not share -- visual aesthetics. (2, p. 82)

20. Private space is, if anything, more important for the elderly than for other groups. (2, p. 83)

21. Failure to provide private space may lead to aggressive behavior and a decrease in cooperation. (2, p. 83)

22. Provision of semi-private space decreases aggression, increases cooperation, participation, social awareness, and public behavior. (2, p. 83)

23. In one case, social interaction increased dramatically when a semi-private lounge was provided. (2, p. 84)

24. In one series of interviews, older persons voiced a dislike for large open spaces. (2, p. 85)

25. Of the two lounges available to the residents of one home, the smaller, more densely furnished one was at least as popular as the other, which was five times larger. (2, p. 85)

26. Since a person can respond only to those aspects of the environment experienced through the sense organs, age changes in sensory and perceptual mechanisms affect very real environmental changes in the world in which the elderly person lives. (3, p. 1)

27. Compensation for the sensory losses associated with aging can be achieved by:

a) enhancing environmental stimuli
b) reducing dependence upon the affected sensory cues

(3, p. 1)

28. The physical environment can be compared with a language in that it offers a system of cues that tell a person how to respond to particular situations. (3, p. 4)

29. Redundant Cuing is one way to compensate for decline in sensory acuity associated with aging. The stop sign in which color, shape, and word combine is an example. (3, p. 5)

30. Because older people have more difficulty seeing their environment, spaces should have singular and unambiguous definition and use. (3, p. 5)

31. In facilities designed for use by the elderly, surfaces should be color coded and differential in texture to signal functionally different spaces. (3, p. 6)

32. Space designed for private use should be distinctly bounded from other spaces. (3, p. 6)

33. Various studies show that when older persons suffer a loss of control over their personal space, they have undergone seriously destructive personality changes. (3, p. 7)

34. With age there is a general decrease in a person's ability and willingness to master relationships with large numbers of people and complex spaces. (3, p. 7)

35. Research suggests that glare from uncontrolled natural light or unbalanced artificial light is the most common visual difficulty experienced by the elderly. (4, p. 5)

36. For the older person, cool colors such as blue and green often fade. (4, p. 5)

37. Edges or boundaries between planes are difficult for the elderly person to distinguish; for example, stair steps. (4, p. 5)

38. Depth perception becomes less accurate with age. (4, p. 6)

39. Abrupt transitions from brightly lighted areas to dimly lighted areas should be avoided because of the lengthening time required to accommodate to changes in light level. (4, p. 6)

40. Ability to notice, let alone decipher, fine visual detail such as that of traditional interior designing is seriously impaired with age. (4, p. 6)

41. For the elderly, it becomes increasingly difficult to distinguish conversation from background noise. (4, p. 6)

42. It is more difficult for the older person to locate sources of sounds. (4, p. 7)

43. One longitudinal study of aging concluded that it is most normal and satisfying to the older person if he can maintain as high a physical and social activity level as he enjoyed earlier in his life. (5, p. 304)

44. To deny the dying person access to others and to the information of his normal environment would seem to reduce the likelihood that he will resolve his own departure with dignity. (6, p. 7)

45. Because previously automatic movements of walking and eating need to be watched, the aged reduce their attention to the environment. (6, p. 27)

46. Older people want and need relatively more information from their environment before they are able to respond. (6, p. 27)

47. Most of the fatal accidents involving persons over 65 occur at home, thus ruling out such causes as inexperience and unfamiliarity. (6, p. 27)

48. Lighting in facilities for the elderly should be peripheral rather than overhead. (7, p. 7)

49. Hallways should be provided with places where one can sit for brief rests. (7, p. 7)

50. A lounge should be provided adjacent to dining areas to allow for socializing while awaiting meals. (7, p. 7)

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FROM ACSA DIRECTORY TALLY

The 1973-1974 Faculty Directory of Architectural Schools of North America published by the ACSA lists 99 architectural schools. The directory provides a list of faculty at each school including name, title, and teaching specialty. Teaching specialty was construed in different ways at different schools. In some cases, course titles appear to be used; in others, only the faculty is indicated, for example, architecture; the majority appear to use the person's area of special skill or interest such as computers, building science, design. However, it is often difficult to determine how precise the description of specialty is. Furthermore, it is difficult to identify all persons involved in teaching human factors in architecture from their title. In some cases, architectural programming deals with human input; sometimes it is strictly share planning. In some cases, architectural research is used to denote behavioral research; in others, it applies to technological research. For this tally, any specialty that included the word psychology, sociology, social, anthropology, behavior, man/environment, human factors, or programming was included. Schools that did not specify specialties beyond architecture were not included in this tally. There were three of these.

It must be admitted that with these weaknesses in the data, the conclusions from this tally are tentative and the tally crude, but the results are quite dramatic. Fifty-three schools had not a single faculty member listed with a teaching specialty to do with behavior. Another 26 had only one faculty member, and only 18 had two or more. The faculty lists include part-time and adjunct faculty members, as well as faculty paid out of other budgets. In the cases where there is a faculty member interested in architecture and human behavior, in many cases he is part-time or adjunct.

Gerontological Society

Suite 520 • One Dupont Circle, Washington, D. C. 20036 • 202 659-4698

November 15, 1973

As Gerontological Society Director of Architecture and Environment, I have been working closely with John Merrill of the Department of Architecture, University of Michigan, to determine how behavioral research can be made more useful to designers.

One of the Society's major approaches toward the improvement of the housing and the environmental condition of this nation's elderly (and all age groups for that matter) is through the application of research findings to the design process.

Since you have exhibited an interest in this area, I am asking you to assist us by providing the necessary feedback as to how you use behavioral information and how you feel it can be made more appropriate. Your input will greatly aid us in the development of more relevant future material and programs for the benefit of the design profession.

Please take a few minutes to complete the enclosed questionnaire and mail it to John at your earliest convenience.

Sincerely,

Thomas O. Byerts

THOMAS O. BYERTS, M Arch
Director of Architecture and
Environment

ARCHITECTURAL RESEARCH LABORATORY, THE UNIVERSITY OF MICHIGAN

ANN ARBOR, MICHIGAN 48104
TEL. 313 764-1340 763 2529

November 9, 1973

Dear

This survey is part of a study to determine how research from psychology and sociology can be brought to bear on problems of architectural and planning practice. A growing number of researchers are focusing their attention on the effects of the physical environment on man's behavior. One of their goals is to contribute to improving the quality of the architectural environment. In order for them to do so it is important that they understand the needs of the designer who is to use their findings.

It is only from practicing architects like yourself that we can obtain information on these needs. We would be most appreciative if you would assist us by completing the enclosed questionnaire. Since we are contacting only a small number of architects in this first stage of the study your response is particularly important.

As you may already know the Research Committee of the American Institute of Architects is concerned with establishing a functional relationship between behavioral science research and architectural practice. Our findings will be made available to them.

Thank you,

John L. Merrill
Project Director

USING BEHAVIORAL RESEARCH IN DESIGN

INTRODUCTION This survey is about the uses architects and planners make of behavioral research and how such research can be made more relevant to their work. By behavioral research we mean the work of architects, sociologists, psychologists and others who study how characteristics of the physical environment affect human behavior and attitudes.

TRY TO ANSWER THE QUESTIONS OFF THE CUFF, on the basis of your first reading. Any comments you wish to add will be appreciated. Whether you complete the questionnaire or not please return it to us with your comments in the enclosed envelope.

1 The information in the statements below is a sampling of research findings available to designers for one population group: the elderly. Similar information is available for other groups. ASSUME FOR A MOMENT THAT YOU ARE DOING THE DESIGN PROGRAM FOR A RETIREMENT HOUSING PROJECT, CIRCLE THE NUMBER AT THE LEFT OF EACH STATEMENT THAT BEST INDICATES HOW USEFUL YOU THINK THE INFORMATION WOULD BE TO YOU IN SUCH A TASK.

The statements are all based on actual research. Nevertheless, you may disagree with the information and so find the statement not useful. You may also consider a statement not useful because it is too general, too specific, only common sense, or has no apparent connection to design.

Not useful ▼ Very useful ▼

1 2 3 4 5 6	a) As vision and hearing decline the older person depends increasingly on his sense of touch.
1 2 3 4 5 6	b) A lounge should be provided adjacent to dining areas to allow for socializing while awaiting meals.
1 2 3 4 5 6	c) Older persons dislike larger, open spaces.
1 2 3 4 5 6	d) Limitations in health, skills and other resources leave a person more vulnerable to environmental constraints.
1 2 3 4 5 6	e) A standup garden built waist high and with access to all points from the perimeter worked well in one retirement home.
1 2 3 4 5 6	f) An optimal life space for the aged should allow the person to select his own combination of privacy and involvement with social groups.

Not at all useful ▼ ▼ Very useful

1 2 3 4 5 6	g) It is recommended that walks designed for the elderly have resting places no more than 150 feet apart.
1 2 3 4 5 6	h) Efficiency apartments are undesirable for the elderly because they often create confusion about the functions of spaces.
1 2 3 4 5 6	i) In one retirement home a small lounge crowded with furniture was just as popular as one 5 times larger with more space between furnishings.
1 2 3 4 5 6	j) Since a person can respond only to those aspects of the environment experienced through his senses, age-related sensory losses affect very real changes in the world in which the elderly live.
1 2 3 4 5 6	k) Older persons find great satisfaction in observing the activity outside their quarters. To this end low window sills and unobstructed views are desirable.
1 2 3 4 5 6	l) Colors tend to appear faded to the older person, particularly cool shades of blue and green.
1 2 3 4 5 6	m) Providing easy access to activities and services and encouraging friendships are important means of prolonging an older person's independence.
1 2 3 4 5 6	n) It is more difficult for the older person to locate and identify sounds, for example to tell if a sound comes from a few feet away or from down the hall.
1 2 3 4 5 6	o) The physical environment can be compared to a language in that it offers a system of cues to tell a person how to respond in a particular situation.
1 2 3 4 5 6	p) The elderly reduce their attention to the environment because the previously automatic movements of eating and walking need to be watched.

2 CIRCLE THE NUMBER that best indicates the amount of experience you have had with design and planning problems for special groups such as the elderly or mentally handicapped.

Very little ▶ 1 2 3 4 5 6 ◀ A great deal

With which groups have you had the most experience? _____

3 The following tasks are generally considered to be among the important goals of architecture. PLEASE RANK THEM IN ORDER OF THEIR IMPORTANCE TO YOU with "1" indicating the most important, . . "4" least important.

_____ a) Creating appropriate visual forms.

_____ b) Translating information into physical forms.

_____ c) Creating more efficient buildings through innovative technology.

_____ d) Creating environments that match the needs of the people who use them.

4 CIRCLE THE NUMBER THAT BEST DESCRIBES HOW OFTEN YOU USE EACH OF THE FOLLOWING IN OBTAINING INFORMATION ABOUT THE PEOPLE FOR WHOM YOU DESIGN.

Not at all					Very often	
1	2	3	4	5	6	a) Your own experience and training.
1	2	3	4	5	6	b) Information provided by the client.
1	2	3	4	5	6	c) Observing and talking with potential users.
1	2	3	4	5	6	d) Studying similar projects.
1	2	3	4	5	6	e) A behavioral specialist on your own staff.
1	2	3	4	5	6	f) A behavioral consultant.
1	2	3	4	5	6	g) Reading material on user behavior and attitudes.

5 CIRCLE THE NUMBER WHICH BEST INDICATES THE DEGREE TO WHICH YOU AGREE WITH EACH OF THE FOLLOWING STATEMENTS.

Strongly disagree					Strongly agree	
1	2	3	4	5	6	a) The form in which behavioral research findings are presented is overly wordy and full of jargon.
1	2	3	4	5	6	b) There are already too many things of at least as great importance as behavioral research for the designer to consider.
1	2	3	4	5	6	c) Behavioral research is of marginal importance since the designer can generally do an adequate job of interpreting user needs for himself.
1	2	3	4	5	6	d) Government codes and regulations do not allow the designer the latitude to apply research findings.
1	2	3	4	5	6	e) Clients do not see the point in using behavioral research.

Strongly disagree ... Strongly agree

1 2 3 4 5 6 f) Behavioral information is not readily available to the architect.

1 2 3 4 5 6 g) Behavioral research costs too much considering what it has to offer.

1 2 3 4 5 6 h) There should be more emphasis on behavioral factors during architectural education.

6 CIRCLE THE NUMBER THAT BEST INDICATES HOW IMPORTANT YOU THINK EACH OF THE POSSIBLE USES OF BEHAVIORAL RESEARCH LISTED BELOW IS TO THE DESIGNER.

Not important ... Very important

1 2 3 4 5 6 a) Provide support for hunches.
1 2 3 4 5 6 b) Provide evidence with which to convince clients.
1 2 3 4 5 6 c) Spark new ideas.
1 2 3 4 5 6 d) Prevent mistakes in programming.
1 2 3 4 5 6 e) Provide an advantage in competing for work.
1 2 3 4 5 6 f) Help define and describe user groups.

BACKGROUND INFORMATION

Number of years practicing architecture: _____

Professional training: Degree _____ Year _____ School _____

Degree _____ Year _____ School _____

Position: ___ Owner/principal ___ Associate ___ Designer ___ Other _____

Rank the following in accordance with the proportion of your professional effort for which they account. "1" Should go beside the activity taking the greatest part of your effort.

____ Programming ___ Production/supervision

____ Research - not project related ___ Client contact

___ Design ___ Other _____

Number of design professionals in firm: _____

Types of projects with which firm deals: _____

Architectural Research Laboratory
University of Michigan

THANK YOU

11-7-73

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76

1906 4