THE PREFERENCES OF PRACTICING ARCHITECTS FOR THE COMMUNICATION OF ENVIRONMENT BEHAVIOR RESEARCH INFORMATION IN DESIGN

by

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Firmness, Commodity and Delight

> In Architecture as in all other Operative Arts,
> the end must direct the Operation.
> The end is to build well.
> Well building hath three conditions,
> Commodity, Firmness and Delight.
> (Sir Henry Wotton, 1624)

These often quoted words provide an appropriate starting point for this discussion. "Firmness" corresponds to the technological concerns of building. It is a primary responsibility of the architect to master the components of structure and environmental systems. "Commodity" refers to the functional aspects of building. This is the architect's duty to address the design problems and ensure that the building "works." "Delight" represents the domain of esthetics that architects are expected to include in their solutions. Ideally, architects provide for a balance of all three dimensions in their designs. However, there is much in the literature to indicate that achitects have allowed "Delight" to overshadow Wotton's other two components of "Well building. According to Schluntz (1981, p.410): "Architecture continues to believe it is a 'fine art,' no more, no less."

Questions exist as to whether or not architects can continue to attain all three goals of "Well building" in today's complex society. Gutman (1977, p.58) states,

> The profession advertises its confusion, too, when some of its members treat seriously the view that architecture is primarily an art form which has little to do with satisfying user requirements.

This point of view has been most clearly established in the writings of Christopher Alexander. Responding to the lack of systematic and explicit design theory, Alexander (1966) explained that the form of any object should evolve over time from the logical and systematic examination of the problem setting. He pointed out that many architects address complex design problems in a very unsystematic fashion, often trying to force the solution into a form which was conceived independent of the problem setting. Alexander's basic premise was that although, ideally, the form should reflect all the known information relevant to its design, the intuitive resolution of all this input in a contemporary design problem is beyond any individual's abilities. Lawson (1980) echoed this position and asked how a few hours or days of effort on the drawing board could replace the result of centuries of adaptation and evolution. Alexander pointed out that the slow cultural evolution of form--the time testing of solutions derived from the true nature of the problem--had vanished. In place of the master builder is the architect, overwhelmed by the complexity of the problem, clutching and clinging to the catchwords of

"style" and "art." Filler (1983, p.53) summarized Alexander's argument in this way:

> According to the philosophy Alexander has been formulating over the past 20 years, architecture diverged from its true course around the time of Michelangelo, when architects began to replace masons and carpenters as the designers of buildings and, as Alexander sees it, introduced 'ego' to architecture.

Lawson (1980, p.17) again supports Alexander's position and points out that the shift in the goals of architecture was inevitable, given the sudden, rapid, and culturally irreversible changes brought on by the industrial revolution.

> Changes in both the materials and technologies available became too rapid for the craftsman's evolutionary process to cope. Thus the design process as we have known it in recent times has come about not as the result of careful and willful planning but rather as a response to changes in the wider social and cultural context in which design is practiced. The professional specialized designer producing drawings from which others build has come to be such a stable and familiar image that we now regard this process as the traditional form of design.

As Lawson (1980) has stated, the shift in values toward the individual designer as the keeper of the style has been firmly institutionalized in the architectural education system, giving rise to the "cult of the individual." The current studio system, according to Seidel (1980), is not far removed from the medieval system of master and apprentice. Students place themselves under the tutelage of a recognized "master," with the intent of absorbing his individual skills and prejudices, and with the hope of one day becoming "masters" themselves. Burgess (1981, p.377) points out the difficulties of this studio aproach in a pluralistic society.

> Instead current educational practice presents almost monolithically the egoist--'give-'em-what-I-want'--role model, ignoring the two identifiable alternate models, the pragmatist--'give-'em-what-they'-want'--and the facilitator--'give-'em-what-we-can'--together with the requisite value and knowledge systems.
>
> The upshot of which is the professional institutionalization of a narrow, homogeneous set of values and the inevitable estrangement of architects from any understanding of society's values, with deleterious consequences for the design process.

Due to the emphasis on the architect as egoist and on architecture as a fine art, much information about the design setting and the users is bypassed in order to focus more effort on instilling "Delight." The many questions about users that arise during the design of a building are answered by simply making assumptions about their behavior. This process of operating from imperfect data is taught in schools of architecture and obviously carries over into professional practice.

> The practice of acting on the basis of easy assumptions about other people is not confined to the architctural profession, but wherever it occurs it is highly dangerous and error-prone. Very few readers would care to make crucial decisions about the taste, preferences, values or lifestyles even of close friends, let alone utter strangers. Yet architects make such decisions all the time. Their facile assumptions--based on introspection---stem from a training in doing just that--making assumptions.
> (Deasy, 1974, p.149)

> ...you're crushed into the breach, so you perform, either by habit, by past experiences or by repeating things you have done. If you haven't done them before, you guess...
> (Robert Slattery, in SOM, 1978, p.35)

This haphazard methodology was unblinkingly described by Heimsath (1977, p.27) and McCue (1970, p.294).

> One might feel that architects are trained to include behavior in all decisions and that the intuitive sensitivity of the designer can be relied on. While I admit there are many sensitive designers and that their intuition is considerable, it is also apparent that the architectural profession as a whole solves building problems by rules of thumb, few of which are ostensibly concerned with behavior, yet each of which indirectly and haphazardly affects behavior.
>
> No other viable profession has such a poor history of scholarship and research, nor depends so totally upon other fields for the advancement of knowledge of its speciality. Few other fields are so inadequate in recording and transmitting the knowledge developed through its practice.

Gutman (1977) reminds us that architecture exists as a profession because it alone is expected to incorporate "Firmness, Commodity and Delight." He states that continued emphasis on architecture as art could result in the loss of the architect's societal role as builder, and points out that engineers and construction companies are poised and ready to wrench it away.

The Call for Rationality in Design

Christopher Alexander's Notes on the Synthesis of Form provided the catalyst for a rash of investigations into the design process, as described by Lawson (1980, p.19).

> However that generation of design methodology for which Alexander's work now stands as a symbol was motivated by the common unease shared by designers about the inadequacy of their models of reality.

The call for a more rational and systematic design process included an increased emphasis on human factors in design. Many designers felt that the esthetic goals of Modern architecture were being met at the expense of the human comfort of the building users. These proponents of design for human factors found much ammunition for their argument in the field of ecological psychology. The over-worked words of Winston Churchill, "We shape our buildings and afterwards our buildings shape us," received empirical support from the work of psychologists such as Lewin (1936), Barker (1968) and Lawton (1973). Through their work, human behavior was shown to be a function not only of the individual, and not only of the environment, but of the interaction of the two. The research of these and other psychologists demonstrated that the environment serves as a social milieu, calling forth complex patterns of human behavior. What many architects had intuitively sensed was now empirically established: Due to the interactive nature of man-environment relations, the design of the physical environment necessarily involves making decisions which have direct effects on people's behavior.

Thus, a basic dialetic was established between the esthetic-based, intuitive method of design and the systematic, behavior-based method of design. Enlisting the above mentioned research, proponents of the behavior-based methodology prepared a challenge to the architectural profession's status quo, as shown by McCue's (1970, p.279) comments.

> It is the methodology for analysis and decision which may be the most fundamental characteristic of a profession and which contributes most to the value system of its professionals.
>
> It is the dependence upon personal judgement which is both the strength and weakness of the profession. The architect's strength lies in the fact that he must define his own problem and establish the factors against which he weights alternative solutions; at the same time this characteristic forms his weakness, because his reliance on personal decision making often causes him to function on an ad hoc basis, frequently not recording or systematically evaluating his work and disregarding more procedural analytical techniques operative in other fields but which may have applicability to the field of architecture.

As the movement for increased rationality in design grew, Deasy (1974) describes criticisms such as the following as "coming thick and fast."

> ...most architects don't have the foggiest notion how society works, how people live, and how they want to live.
> (Herbert Gans,in Deasy, 1974, p.9)
>
> They have encouraged the development of an extensive self-congratulatory system within the design professions. The present system is reasonable if architects are giving themselves awards for sculpture but not if the awards are intended for buildings in which certain activities will take place.
> (Robert Sommer,in Deasy, 1974, p.9)
>
> ...for whenever he (the architect) designs buildings he controls or guides human behavior. When enlightened as to the effects of the physical environment upon behavior, he designs by intent; but when ignorant of these facts, he designs by default.
> (Roger Wehrli, in Deasy, 1974, p.9)

Gradually, opinions such as those expressed above led to introspection on the part of the architectural profession. The complaints about the architect's design methods were

painfully accurate, and the search for an alternate methodology was begun, as described by McCue (1970, p.280).

> Recently there is evidence that the profession is growing uncomfortable with the art values with which it has been traditionally associated. It now wishes to be identified with the science of problem solving and seeks a methodological base for the resolution of social and technological problems which relates to the building and to the larger question of habitation.

The search for a new paradigm for architecture led to the examination of the scientific community, as noted by Lawson (1980, p.19).

> Somehow the whole process had to become more open to inspection and critical evaluation. The model of the scientific method proved to be irresistible. Scientists made explicit not just their results but also their procedures. Their work could be replicated and criticized and their methods were above suspicion.

In addition to the methodological rigor and clarity of the scientific paradigm, science also provided access to bodies of information that the architect needed in order to design successfully in a rapidly changing society.

> When that client is not even the prospective user of the design the problem becomes even more remote. This increasing remoteness of designers from those for whom they design has created the need for user-requirement studies. Almost in desperation designers have turned to social and human scientists from ergonomists through architectural psychologists to urban sociologists to tell them what their users actually need.
> (Lawson, 1980, p.67)

> The interest in joining the resources of the social and design disciplines arises from several sources. Probably the major factor in this process is the realization by the design professions that the intellectual traditions of architecture and planning are simply not adequate for grasping the complexity of the building needs of urbanized

> and industrialized societies. Architects find themselves facing tasks and clients for which their training did not prepare them.
> (Gutman, 1972, p.xi)

Using the publication of Alexander's Notes on the Synthesis of Form (1966) as a benchmark, the nearly twenty years since then has seen the emergence of a new area of study which focuses on the interaction of the physical environment and human behavior. This field has been given a number of names, but is most often referred to as environment-behavior research (EBR). This field includes basic research from the fields of sociology, psychology, and other social sciences, but also includes architectural applications of research such as post-occupancy evaluation and behavior-based methods of design programming.

As described by Merrill (1976), the growth of interest in this area was rapid. A collection of research dealing with the behavioral aspects of school design, titled School-Environment Research (SER 1), was published in 1965. The scope of this publication was expanded beyond school design in 1970, resulting in another catalogue of EBR papers, Man-Environment Research (MER). About the same time a newsletter, Man-Environment Systems, and a journal, Environment and Behavior, began publication. Graduate study programs were developed that dealt specifically with the environment-behavior interface. In 1968, the Environmental Design Research Association (EDRA) was formed, providing a network of professionals and a forum for the exchange of ideas related to

EBR. Another milestone was the creation of a task force on Environment and Behavior in 1973 by the American Psychological Association. The American Institute of Architects (AIA) also became involved by sponsoring conferences and research dealing specifically with the interaction of architecture and the social sciences.

Given the context of the call for increased rationality in design, as well as the rapid development of the field of EBR, one might logically assume that architects would eagerly seek out EBR information pertinent to their design problems. This would seem likely since it has been shown repeatedly that architects are both aware and concerned about the behavioral implications of their work (Merrill, 1976). A study of architectural belief systems by Lipman (1969) showed that architects believe strongly that their work affects social relations. In addition, Gutman (1972, p.340) points out "...that no architect can talk about his medium or his schemes without reference to how they will be used by people." Further, Deasy (1974, p.8) states, "One of the fondest hopes of architects and planners is that the practice of their act will lead to a better life for mankind." This line of thought is echoed by many others, Boughey (1968), McCue (1970), Broady (1972), and yet the fact is that buildings are rarely designed in concert with EBR information.

> It is hard to imagine more eligible candidates for collaboration than architects and social science. Social science, well versed on people's needs,

> seems a natural help-mate in architecture's quest to improve the quality of the messages that buildings communicate to people. Yet in the past decade, as casual come-ons have led to deeper involvement, tough times rather than good times have typified the relationship.
> (Korobkin, 1975, p.2)

Defining the Application Gap

Despite the fact that both architects and researchers express a desire to create better environments, very little collaboration occurs between the two, as Perin (1970, p.6) observed.

> Why is it that what seems just a simple matter of getting together--an idea born of common sense--is so complex and difficult?

Even a casual review of EBR literature would reveal a great deal of interest in addressing the problem of the "application gap"--the non-utilization of EBR findings by practicing architects (Hillier 1972). The application gap has been extensively discussed in EBR literature by a variety of individual authors, has been studied by professional associations (RIBA, 1970; Conway, 1974), by firms in the private sector (SOM, 1978), and has even been the focus of entire conferences (Conway, 1972, 1974; Suedfeld, 1977).

No single, simple solution can be expected; the use of EBR in design is a complex and emotionally-charged issue. However, steps have been taken to examine the nature of the application gap and its constituents, in order to develop more successful methods of collaboration. One of the most

telling examinations of the application gap was conducted by John Merrill (1976), Factors Influencing the Use of Behavioral Research in Design. Merrill explored the nature of the constraints on the use of EBR in design and concluded that they break down into two types--external constraints and internal constraints.

External constraints are those factors outside the control of the architect that limit or prevent the use of EBR in design. One of the most frequently cited external constraints is the problem of access to EBR information, as described by Merrill (1976, p.30).

> Better dissemination was the most prominent problem mentioned by architects at AR9. Difficulty in finding EBR was also mentioned by 54 percent of the respondents in Reizenstein's sample. 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. When the searcher has obtained what appear to be promising documents, he must read through them to locate the one in a hundred, to use Sommer's estimate, that is acutally relevant and then interpret the information.

Merrill (1976, p.32) points out that further constraints lie in the differences between the architects' and researchers' communication styles, formats, and forums.

> 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, and apparent preoccupation with methodological and theoretical considerations, among other objections.

Additional external constraints arise from clients, developers, bureaucrats, or other actors in the design process who may be uninformed or uninterested or unwilling to pay for services they may perceive as unnecessary.

Internal contraints are the more basic, and yet more complex, problems at the heart of the application gap. For example, architects have repeatedly shown a strong desire for behavioral research information, and have indicated a high degree of interest in designing for people (Conway, 1974; Merrill, 1974, 1976). Although architects seem to be aware of the potential impact of behavioral research on their work, EBR findings are rarely used in design. These seemingly contradictory positions--at once acknowledging the relevance of EBR and yet not using it in design--are evidence of internal constraints; ie., the architect's own attitudes toward EBR act as the constraints. It is a demonstration of the incompatibility of the fields and their respective processes, as described by Altman (1973, p.105).

> In the mid- to late 1960's it appeared as if the early honeymoon was over, as basic value systems and styles of behavioral scientists and practitioners began to clash. The criterion-oriented, problem directed, unit/place strategy of the practitioner was not being satisfied by the researcher, and vice versa.

As Lawson (1980, p.32) has pointed out, the social sciences are primarily descriptive, while design is necessarily prescriptive, resulting in a mismatch between the strategies used by the two professions.

> The essential difference between the two strategies is that while the scientists focused their attention on discovering the rule, the architects were obsessed with achieving the desired result. The scientists adopted a generally problem focused strategy and the architects a solution focused strategy.

This points to the basic differences between architects and researchers. Kuhn (1970) explained that professional communities can be distinguished by the paradigms they employ to mediate between themselves and physical world. A paradigm is shared by a professional community and defines acceptable professional values, roles, communication techniques, and modes of thought. Because of the differences between the scientific paradigm and artistic paradigm, researchers and architects live in very different worlds. Although obviously surrounded by the same physical environment, the paradigms by which they interpret, organize and make sense of that environment are quite dissimilar.

These internal differences between architects and researchers were addressed by Andrew Seidel (1980) in his examination of the architect's information needs. Seidel explains that the non-utilization of research findings by practitioners has been a problem in many fields, not just in architecture. Depending upon who is reporting, attempts at analyzing the problem of non-utilization alternately fix the blame on either the research producer or the research consumer. In order to more successfully address the problem, Seidel proposes the use of the "Two Communities Model,"

which portrays architects and researchers as forming two separate professional communities, each with its own set of communication methods, professional values, incentives, rewards, and group perceptions of information quality. This model suggests that attempts at collaboration between professional communities need to acknowledge and address these differences, instead of ignoring them. Only through this mutual understanding and respect can the two communities establish a truly interactive collaboration.

Seidel notes that the research process itself has been often studied and well documented. He adds, however, that by comparision the architectural design process is virtually unexamined. Further study of the information needs of the architectural community is needed in order to determine if designers are receptive to the use of EBR in design, and if so, what format(s) are most preferred for the integration of EBR into the design process.

Linking Research and Design

The difficult relationship between research and design has followed a predictable path. Thomas Kuhn (1970) described the course of the relationship in his book, The Structure of Scientific Revolutions.

Kuhn establishes first that people who operate under competing paradigms, e.g., architects and researchers, live in different worlds. For one to understand the world of the

other involves a "paradigm shift," often requiring a complete change of perspective. The testing of an alternate paradigm only occurs after a particular puzzle, e.g., the relationship of environment and behavior, proves unsolvable by the existing paradigm and gives rise to crisis. These "crucial" situations--problems that the established paradigm cannot solve--encourage the examination of a new paradigm and facilitate "paradigm shift."

In addition, Kuhn states that "paradigm shift" can be further hastened if the new paradigm offers a degree of precision not found in the established paradigm. However, Kuhn points out that new paradigms usually are not completely worked out, and often cause many problems when implemented. As a result, people who subscribe to the established paradigm can find many inadequacies when challenging the validity of a new paradigm. Likewise, believers in the new paradigm must often rely only on faith in an as yet incomplete paradigm.

It is remarkable how closely the course of the relationship between researchers and designers has followed Kuhn's description. Similar situations were described by Goldstein (1978) in the field of evaluation research. In discussing the relationship between program evaluators and program administrators, he cites the frequent complaints about communication problems. Evaluators were criticized for writing long, wordy documents full of jargon and technical data.

Complaints about the inaccessibility of the research were also mentioned.

The same communication problems exist in the architect-researcher relationship. One of the primary reasons for not utilizing EBR is that the findings are not translated into formats that architects can use.

> Research in the form of published results is still one stage from completion as far as the practice of architecture is concerned. It still remains to translate findings into tools that architects can and will use...
> (RIBA, 1970, p.5)

Following Kuhn's logic, it would seem that the burden of translation falls to the researcher. As followers of the challenging paradigm, it seems likely that they would embrace the responsibility of facilitating collaboration. Since architects will continue to design without EBR, researchers seem to be the party with the most to gain through translation efforts.

> ...it appears obvious , at least to this observer, that to increase the likelihood that behavioral research will become utilized in environmental design requires that social scientists, especially, work toward removing some of the barriers that lie between them and design professionals. It is up to us to make the overtures.
> (Jue, 1983, p.7)

However, researchers do not generally seem to consider translation part of their responsibilities. The researchers' lack of translation strategies serves as witness to the organizational settings in which research is often produced, as described by Seidel (1980, p.210).

> It has been indicated that the researcher, if acting in his or her own best interest within a university teaching department, pursuing the incentives or rewards that his or her organizational environment provides, will tend not to produce research that is either useable by architects or research that fits the architects criteria for information quality.

The research on the application gap has shown that there are very real differences between architects and reseachers. Neither the architect nor the researcher is wholly responsible for the application gap. Realistically, neither group is going to flatly reject the operant paradigm of their profession. Therefore, suggestions for bridging the application gap need to address the differences between the two fields, establish a framework for collaboration, and avoid the didactic overtones of previous proposals. In order to achieve this, further study is needed to determine the information needs and preferences of practicing architects, as stated by Merrill (1976, p.51) and Seidel (1980, p.49).

> Unfortunately there is little information about what designers expect from EBR or how they evaluate the utility of specific findings. Information on these issues seems particularly relevant if researchers are to mount an effective campaign to increase the utilization of EBR.
>
> The more salient questions to ask are what are the characteristics of the information sought and, given the role message received by potential users, how would they define those characteristics.

Several proposals for linking research and design have been published. Conway (1974) reports architects requesting that the AIA produce contract documents for architect-re-

searcher collaboration. Conway, Merrill (1976) and McCue (1970) call for increased the emphasis on behavior-based design in schools of architecture. Reizenstein (1980) describes the importance of format in the presentation of EBR, recommending the minimizing of jargon, increased use of graphics, and development of multiple presentation modes for different audiences. Seidel (1980) called for the publication of a new EBR journal written specifically for architects. Merrill (1976) proposed the creation of an agency, modeled on the agricultural extension service, to disseminate EBR information and provide spot consulting.

Most of thse proposals are untested. Whether these or other methods are to be implemented, certain procedural concessions will be necessary on the parts of both architects and researchers. Architects need to realize that research is not often produced in formats that fit architectural practice, and that the quantification of behavioral phenomena is both difficult and subjective. Researchers need to realize that architects are not callous to human needs. They are not blind to new information, but they operate under strict time and budget limitations, so any new input to the design process must display a significant cost/benefit ratio. Proponents of the behavior-based approach to design need to lessen their hard line position toward the use of EBR in design. The architect's intuition is born of many years of precedent and informal study. For many building

types, this intuitive approach to design will adequately provide for the environment/behavior interface. However, grounds for collaboration are most likely to be established in the design of buildings for special populations or for buildings with complex functional and behavioral requirements. As explained by Kuhn (1970), these "crucial" problem settings provide the most fertile ground for "paradigm shift," and thus an opportunity for increasing designer-researcher interaction. By eliminating the argument over whether design is art or science, more effort could be focused on the task at hand, creating environments that simultaneously provide "Firmness, Commodity, and Delight."

SURVEY DESIGN

Exploratory Research

Despite the efforts of Merrill (1976), Seidel (1980), and others, no established theoretical model of the application gap between architects and researchers exists. In fields with rich theoretical traditions, research efforts often take the form of perfecting established theory or testing rival hypotheses. However, at this point in the development of the field of environment-behavior research (EBR), the lack of established theory suggests that exploratory research is needed to examine this application gap. Therefore, this thesis has been designed to gather additional descriptive data about architects and their attitudes toward the use of EBR in design.

Specifically, this thesis is designed to identify the methods of EBR communication most preferred by practicing architects for the transfer of EBR information from researchers to practitioners. Previous studies by Merrill (1976), Conway (1974), SOM (1978), have indicated that architects are receptive to EBR information, but the most preferred mechanisms for information transfer have not been identified. Clearly, not all architects will be equally receptive to the application of EBR information in design, nor

will they all share the same preferences for communication methods. If there were a method of measuring architect's receptivity to EBR, researchers interested in the utilization of their work by designers could report their findings via the communication methods preferred by those architects judged to be receptive to EBR.

Measuring EBR Receptivity

Since little empirical data exists on the application gap and the attitudes related to it, the EBR community has a multitude of questions about the architect's attitudes toward EBR: Would you hire an EBR consultant? Does EBR cost too much to use? Could expertise in EBR get you more commissions? Could EBR information help you with your current commissions?

A list of 70 such questions was compiled. Some were newly generated, some were drawn from the literature, and many overlapped each other. However, the content of the questions was clustered in three subject groupings: 1) How much do you know about EBR?, 2) Do you think EBR is useful for design?, and 3) Would you want to use EBR in design?

These three areas were to be included in the measure of the architects' receptivity toward EBR, and were termed AWARENESS (Do you know of EBR?), UTILITY (Does it seem useful?), and PROPENSITY (What are your attitudes for or against using it in design?). Specific sets of questions

for each area were developed, and then combined to form an index or composite measure of attitudes toward the use of EBR in design.

Measuring EBR Awareness

For the first component of the index of receptivity, a set of questions was needed to measure architects' awareness of the field of EBR. In-depth interviews would have provided a good means of testing EBR awareness, but were not a feasible method of data gathering for this study. Given the budget limitations of this investigation, and taking precedent from past studies, a self-administered mail survey was chosen as the most appropriate method of data gathering.

Concise and clearly worded questions were particularly vital in order to encourage response to the questionnaire. To measure EBR awareness, a list of items associated in some way with the field of EBR was generated. Respondents were asked to rate their familiarity with each item on a five-point Likert scale. These items were drawn from the literature and from a list of leading figures in EBR developed for an earlier study by Seidel (1980). The final list was reduced to 26 awareness items, including architects, researchers, authors, books, associations and ideas linked to the field of EBR (Table 1).

TABLE 1

EBR AWARENESS ITEMS

A-1	ECOLOGICAL PSYCHOLOGY
A-2	CHRISTOPHER ALEXANDER
A-3	E.D.R.A. (ENVIRONMENTAL DESIGN RESEARCH ASSOCIATION)
A-4	C. M. DEASY
A-5	A.I.A. RESEARCH CORPORATION
A-6	PROGRESSIVE ARCHITECTURE RESEARCH AWARDS
A-7	CLARE COOPER MARCUS
A-8	BARRIER FREE DESIGN
A-9	COOLFONT MODEL
A-10	EDWARD HALL
A-11	PERSONAL SPACE
A-12	BEHAVIOR BASED DESIGN PROGRAMMING
A-13	LEON PASTALAN
A-14	DESIGN FOR THE ELDERLY
A-15	OSCAR NEWMAN
A-16	BEHAVIORAL ISSUES IN SCHOOL DESIGN
A-17	KEVIN LYNCH
A-18	BEHAVIOR BASED POST OCCUPANCY EVALUATION
A-19	ARCHITECTURAL LEGIBILITY AND WAYFINDING
A-20	HENRY SANOFF
A-21	CAUDILL ROWLETT SCOTT
A-22	BEHAVIORAL ISSUES IN PUBLIC HOUSING DESIGN
A-23	A PATTERN LANGUAGE
A-24	JOHN ZEISEL
A-25	EZRA EHERENCRANTZ
A-26	BEHAVIORAL ISSUES IN HEALTH CARE DESIGN

Measuring EBR Utility

An instrument was needed to measure architects' attitudes toward the utility of EBR, to determine if they felt EBR was useful in design. Fortunately, an instrument for measuring EBR utility was developed for an earlier study by Merrill (1976). It consisted of 16 items, each presenting a small piece of EBR information about designing for the elderly.

The respondent was asked to assume that he was an architect designing a retirement housing project. He was then asked to rate each EBR item in terms of its usefulness for such a task. The example of designing a retirement housing project was chosen because of the large body of EBR information available regarding the relationship of the physical environment and the behavior of the elderly. Elderly persons are often very sensitive to environmental constraints, and as a result, the architect must carefully design the physical setting to meet their needs.

These items were carefully constructed and extensively pretested by Merrill and range from very specific physical design criteria to more theoretical considerations about the psycho-social well-being of elderly persons. The ratings were done on a one to five scale of "not very useful" to "very useful" (Table 2).

TABLE 2

EBR UTILITY ITEMS

B-1	AS HEARING AND VISION DECLINE, THE OLDER PERSON DEPENDS INCREASINGLY ON HIS SENSE OF TOUCH.
B-2	A LOUNGE SHOULD BE PROVIDED ADJACENT TO DINING AREAS TO ALLOW FOR SOCIALIZING WHILE AWAITING MEALS.
B-3	OLDER PERSONS DISLIKE LARGER, OPEN SPACES.
B-4	LIMITATIONS IN HEALTH, SKILLS AND OTHER RESOURCES LEAVE A PERSON MORE VULNERABLE TO ENVIRONMENTAL CONSTRAINTS.
B-5	A STANDUP GARDEN BUILT WAIST HIGH AND WITH ACCESS TO ALL POINTS FROM THE PERIMETER WORKED WELL IN ONE RETIREMENT HOME.
B-6	AN OPTIMAL LIFE SPACE FOR THE AGED SHOULD ALLOW THE PERSON TO SELECT HIS OWN COMBINATION OF PRIVACY AND INVOLVEMENT WITH SOCIAL GROUPS.
B-7	IT IS RECOMMENDED THAT WALKS DESIGNED FOR THE ELDERLY HAVE RESTING PLACES NO MORE THAN 150 FEET APART.
B-8	EFFICIENCY APARTMENTS ARE UNDESIRABLE FOR THE ELDERLY BECAUSE THEY OFTEN CREATE CONFUSION ABOUT THE FUNCTIONS OF SPACES.
B-9	IN ONE RETIREMENT HOME A SMALL LOUNGE CROWDED WITH FURNITURE WAS JUST AS POPULAR AS ONE 5 TIMES LARGER WITH MORE SPACE BETWEEN FURNISHINGS.
B-10	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.
B-11	OLDER PERSONS FIND GREAT SATISFACTION IN OBSERVING THE ACTIVITY OUTSIDE THEIR QUARTERS. TO THIS END LOW WINDOW SILLS AND UNOBSTRUCTED VIEWS ARE DESIREABLE.
B-12	COLORS TEND TO APPEAR FADED TO THE OLDER PERSON, PARTICULARLY COOL SHADES OF BLUE AND GREEN.
B-13	PROVIDING EASY ACCESS TO ACTIVITIES AND SERVICES AND ENCOURAGING FRIENDSHIPS ARE IMPORTANT MEANS OF PROLONGING AN OLDER PERSON'S INDEPENDENCE.

B-14 IT IS MORE DIFFICULT FOR AN 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.

B-15 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.

B-16 THE ELDERLY REDUCE THEIR ATTENTION TO THE ENVIRONMENT BECAUSE THE PREVIOUSLY AUTOMATIC MOVEMENTS OF EATING AND WALKING NEED TO BE WATCHED.

Measuring EBR Propensity

For the third component of the index of receptivity, an instrument was needed to measure architects' specific attitudes toward the use of EBR in design. Merrill (1976) assembled a list of statements consisting of the most common criticisms of EBR. The statements were all negative, e.g., "EBR costs too much"; "clients don't see the point of using EBR"; etc. However, for use in this study, some of the items were re-worded so that some statements were anti-EBR and some pro-EBR. Respondents were asked to rate their level of agreement with each statement on a five point Likert scale (Table 3).

TABLE 3

EBR PROPENSITY ITEMS

C-1	THE FORM IN WHICH BEHAVIORAL RESEARCH FINDINGS ARE PRESENTED IS OVERLY WORDY AND FULL OF JARGON.
C-2	GOVERNMENT CODES AND REGULATIONS ALLOW THE DESIGNER THE LATITUDE TO APPLY BEHAVIORAL RESEARCH FINDINGS.
C-3	THERE ARE ALREADY TOO MANY THINGS OF AT LEAST AS GREAT IMPORTANCE AS BEHAVIORAL RESEARCH FOR THE DESIGNER TO CONSIDER.
C-4	BEHAVIORAL RESEARCH IS OF MARGINAL IMPORTANCE SINCE DESIGNER CAN GENERALLY DO AN ADEQUATE JOB OF INTERPRETING USER NEEDS FOR HIMSELF.
C-5	CLIENTS SEE THE POINT OF USING BEHAVIORAL RESEARCH.
C-6	BEHAVIORAL RESEARCH COSTS TOO MUCH CONSIDERING WHAT IT HAS TO OFFER.
C-7	BEHAVIORAL INFORMATION IS READILY AVAILABLE TO THE ARCHITECT.
C-8	THERE SHOULD BE MORE EMPHASIS ON BEHAVIORAL FACTORS DURING ARCHITECTURAL EDUCATION.

Other Measures

Early in the development of the survey instrument it was realized that there might be more to EBR receptivity than simple measures of awareness, utility and propensity. It became obvious that the personal make-up of an individual might have a large bearing on his receptivity to EBR. Awareness, utility and propensity measures might define whether an individual is receptive to EBR, but measures of

personality traits might explain "why" he is receptive. An attempt was made to locate a standardized battery of tests to measure certain traits that might have a bearing on the level of acceptance of the behavior-based approach to design. Two traits that seemed likely to be of some influence were "social accountability" and "acceptance of change." Although others would certainly figure into the model, these two were selected because EBR has often been promoted as a more socially accountable method of design and because the use of EBR in design obviously represents a great change from traditional design methods.

Unfortunately, no applicable tests were located. Those found were either too long for inclusion in the questionnaire, too general, outdated, or mixed with other measures. Also, it seemed that the presence of such psychological tests might intimidate some respondents and in turn reduce the response rate.

Measuring EBR Communication Preferences

The index of receptivity was developed as a means of partitioning the architects that are most receptive to the use of EBR in design from the rest of the sample. Researchers interested in maximizing the application of their work by architects could utilize the communication methods preferred by the most receptive group.

Seidel(1980) reviewed communication theory in his study, and showed the recurrence of the concept of "targeting." This concept is the basis of much marketing and advertising, and involves the design and packaging of information to fit the needs and preferences of potential users.

Several methods of EBR communication have been proposed that are based on this concept of targeting. A few methods involve the use of experts, such as consultants or EBR translators. A few involve changing the educational system of architects, which is in fact a modification of the target and not the information. Some suggest changes in EBR information packaging and dissemination. However, all are proposed in response to the reality that current EBR communication methods do not seem to reach the practicing architect.

A list of ten EBR communication methods was developed from the sources in literature (Merrill 1976, Seidel 1980, SOM 1978, Conway, 1974). Respondents were asked to rate each method from "not very preferable" to "very preferable" on a five point Likert scale (Table 4).

TABLE 4

EBR COMMUNICATION PREFERENCES

D-1	HIRING NEW, SPECIFICALLY TRAINED EMPLOYEES TO ACT AS "IN-HOUSE" EBR TRANSLATORS
D-2	PUBLIC OR PRIVATELY FUNDED EBR SERVICE AGENCY, PROVIDING SPOT CONSULTING AND INFORMATION DISSEMINATION
D-3	PROFESSIONAL BEHAVIORAL CONSULTANTS, SUBCONTRACTED FOR SPECIFIC PROJECTS
D-4	CHANGES IN ARCHITECTURAL SCHOOL TRAINING WITH INCREASED EMPHASIS ON DESIGN FOR BEHAVIORAL FACTORS
D-5	CONTINUING EDUCATION PROGRAMS FOR PRACTICING ARCHITECTS, SUCH AS SHORT COURSES, WORKSHOPS, AND CONFERENCES
D-6	EBR INFORMATION PUBLISHED IN ARCHITECTURAL JOURNALS
D-7	EBR INFORMATION IN A NEW JOURNAL WRITTEN SPECIFICALLY FOR ARCHITECTS, NOT RESEARCHERS
D-8	A.I.A. HANDBOOKS, SUPPLEMENTS AND CONTRACT DOCUMENTS DEALING WITH EBR USE IN DESIGN
D-9	DESIGN GUIDE BOOKS WITH EBR INFORMATION ORGANIZED BY BUILDING TYPE
D-10	COMPUTER ACCESS TO EBR INFORMATION RETRIEVAL SYSTEM

Descriptive Profile of the Respondents

The last section of the survey instrument was developed to obtain a descriptive profile of the respondents. This profile consists of demographic and descriptive information about the respondents and their work settings. Most of this section consists of direct and self-explanatory items such

as age, sex, professional training, years in practice, and number of design professionals in firm.

The use of closed-ended questions required the careful development of appropriate response categories. These were questions concerning each respondent's position within the firm, primary area of professional specialization, and type of organizational setting. The final item in the descriptive profile was an open-ended question asking respondents to list the type(s) of projects undertaken by their firms.

Sampling

Following the preliminary development of the questionnaire, steps were taken to obtain a sample population. The individual architect was chosen as the unit of study, due to the difficulty of measuring the attitudes of an entire firm. Using a table of random numbers, a sample of 400 architects was drawn from the 40,000 names listed in the 1982 edition of AIA Profiles. The sample represented about one percent of the AIA membership.

A larger sample would increase the reliability of the results. However this sample size was chosen as large enough to allow for the use of parametric statistics, given the budgetary limitations of the study and a projected return rate of 30 to 50 percent. This sample size was also large enough to approximate national distribution, with architects chosen from 45 of the 50 states, plus Washington D.C., and Puerto Rico.

Some sampling bias is introduced by the use of the AIA membership rolls as a sampling universe, since not all architects belong to the AIA. Due to the relative youth of the field of EBR, those architects most recently graduated from school are more likely to have been exposed to it in their college training. This group of recent graduates would not be represented in the AIA sample since professional registration is required for membership, and usually takes a minimum of three years of experience. Also, the expense of belonging to the AIA can be considerable. For this reason, many firms have only one person from their staff belonging to the AIA, often the principal of the firm.

However, the membership of the AIA could clearly be considered as broadly representative of the mainstream of the architectural profession in the United States. In addition, no other list of architects' names and addresses exists which could rival the AIA membership.

Finalizing the Questionnaire

After a preliminary draft of the questionnaire was developed, a short pretest of the instrument was conducted, using members of the College of Architecture and Design faculty at Kansas State University as respondents. Although many faculty members do not, or have not practiced architecture, they were asked to assume that role for purposes of this pretest. This small scale simulation was conducted to iden-

tify problems in the wording and graphic layout of the questionnaire, and resulted in only slight changes in the survey instrument. More extensive pretesting was bypassed since much of the instrument was adapted from the questionnaire tested and sucessfully used in Merrill's (1976) study.

Following the survey research guidelines set forth by Babbie (1973), instructions for the questionnaire were kept as brief and direct as possible. Sections were boldly identified with transfer lettering, in an attempt to break up the body of questions into less forbidding segments. Special attention was given to maximizing the legibility of the response field, so that the response boxes did not appear cramped and difficult to mark. This was also done to speed the coding of the returned questionnaires.

The master copy of the questionnaire was produced on an electric typewriter, and the mail surveys were then printed on a photocopying machine. Typesetting would have produced the most attractive copy, but would have cost too much. The dot-matrix computer printer was also rejected for producing the questionnaires. Although cheaper than offset printing or photocopying, the computer generated type has much less resolution. Also, the computer generated type conveys to many people a message of automation and anonymity, which could in turn result in a reduced response rate.

The questionnaire was originally designed for a five page, 8 1/2 by 11 inch layout, but this proved to be too

cumbersome. Through photo-reduction, the questionnaire was reduced to a four page layout. This allowed for front and back printing on a single 11 by 17 inch sheet of paper, which was then folded into an 8 1/2 by 11 inch booklet form.

Maximizing Response Rate

Since this mail survey required the respondent to answer nearly 70 items, special steps had to be taken to maximize the response rate.

In addition to the care taken to produce a legible survey instrument, a cover letter was included with each questionnaire. The text of the letter was carefully composed to introduce the topic of EBR, to briefly explain the nature of this study, and to impress upon the reader the importance of each individual's responses. The cover letters were printed on offical Kansas State University, Department of Architecture letterhead, and each letter was individually signed by Eugene Kremer as Department Head and by Frederick Schmidt as Principal Investigator. This was done in an attempt to convey a message of personal care and interest in each respondent.

U.S. Postal Service embossed stamp envelopes were used rather than metered envelopes. Each envelope was neatly addressed by hand, to further the message of personal attention. Pre-addressed return envelopes with embossed stamps were also included for the return of the survey instrument.

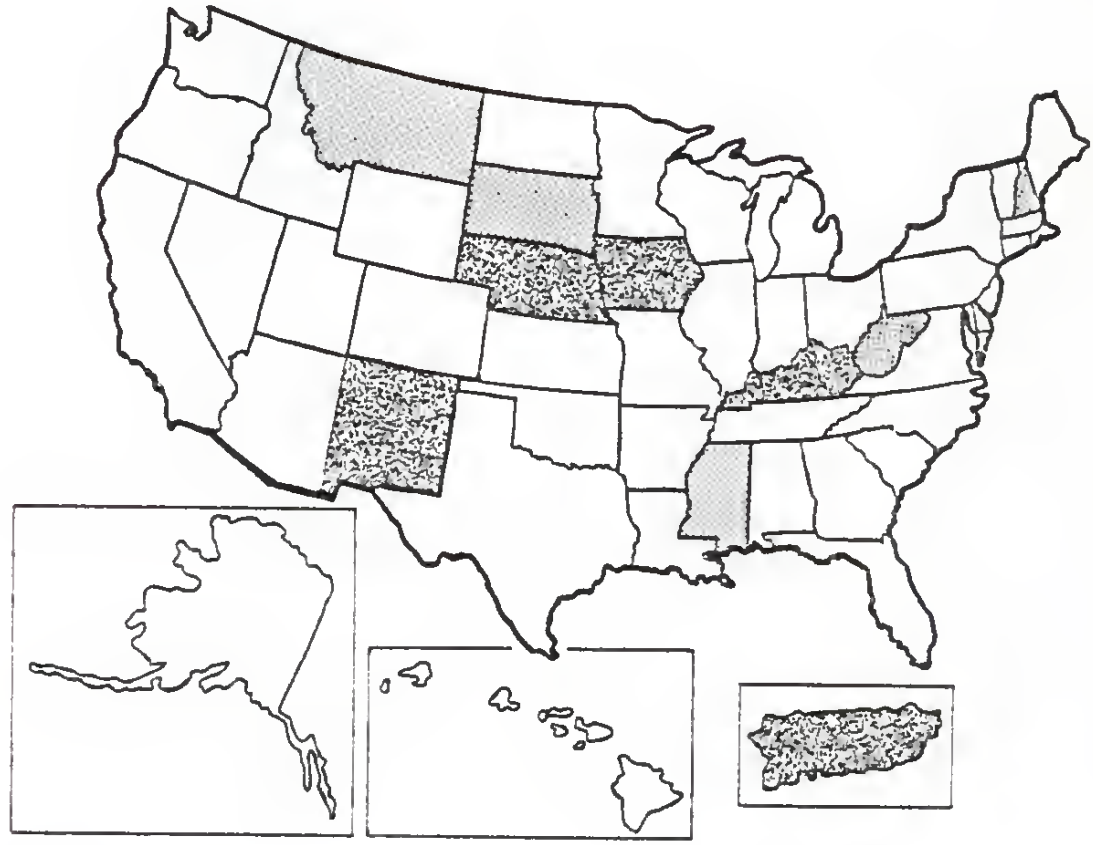
Copies of the survey instrument, cover letter and mailing envelopes are included in the APPENDIX.

DATA ANALYSIS

Response Rate

Four hundred questionnaires were mailed out on June 27, 1983. The first responses came back on June 29, and in the six week period after mailing 180 questionnaires were returned, yielding 167 useable surveys. Three forms were returned blank. Two were marked "deceased," two were marked "retired" and one was marked "out of business." One other was returned with the cryptic message "not enough time" scrawled across it. Eight more surveys were eventually returned as the data analysis was being completed, but these were not used.

The total return of 188 out of 400 surveys yielded an overall response rate of 47 percent. Although 21 of the responses were either unuseable or arrived too late to be included in the study, the final sample size of n=167 allowed for the use of parametric statistics in the data analysis. Due to the good response rate, follow up letters were not needed. Responses were received from 41 of the 45 states in the sample plus Washington, D.C. (FIGURE 1).



NOT IN SAMPLE: Mississippi, Montana, New Hampshire, South Dakota, West Virginia

NO RESPONSES: Iowa, Kentucky, Nebraska, New Mexico, Puerto Rico

Figure 1: GEOGRAPHIC DISTRIBUTION OF SAMPLE

Data Management

The response field on the questionnaire was designed to facilitate automated coding of the data. Using an input/code program available in the K.S.U. Department of Architecture Computer Lab on a Tektronics 4054, data was entered onto computer tape as the questionnaires were returned. With the Tektronics and the input/code program, returned questionnaires were placed on an electronically sensitive tablet at pre-set coordinates, and the boxes marked by each respondent were then touched with an electronic stylus, thereby coding the data on computer tape. This process allowed for quick and accurate coding of the survey data, and minimized the time lag and human error associated with key-punching methods of data coding.

Using a Courier terminal and a NAS 6630 mainframe, a SAS (Statistical Analysis System) data set was created from the coded surveys. All data analyses were then conducted with this SAS data set, using procedures specified in the SAS Users Guide (Ray, 1982). Production of the research manuscript was also performed using the Courier terminal, by accessing the SCRIPT word processing program.

Descriptive Profile

The first step in the data analysis involved a preliminary examination of the demographic and personal characteristics of the respondents. Means and frequencies were calculated for each of these descriptive variables.

The ages of the respondents to the survey ranged from 26 to 79 years. Their mean age was 44.6, with a standard deviation (sd) of 11.5 (Table 5).

TABLE 5

RESPONDENTS' AGE DISTRIBUTION

26-29	3%
30-39	39%
40-49	26%
50-59	19%
60-69	10%
70-79	3%

The respondents were predominantly male (97 percent). Twenty-four percent reported having graduate degrees, 72 percent reported having bachelor's degrees, and 4 percent reported having no degree at all.

Their years of professional practice range from 0 to 56, with a mean of 17.8 (sd=10.8) (Table 6).

Sixty eight percent of the respondents were principals of their firms (Table 7).

TABLE 6

RESPONDENTS' YEARS IN PRACTICE

0-10	35%
11-20	29%
21-30	26%
31-40	8%
41-50	2%

TABLE 7

RESPONDENTS POSITIONS IN FIRMS

PRINCIPAL	68%
ASSOCIATE	14%
EMPLOYEE	12%
OTHER	2%

The number of design professionals in their firms ranges from 0 to 500, with a mean of 21.3 (sd=65.9). Many of the respondents work in one person firms or in small groups, with a total of 78 percent working in firms with ten or less design professionals (Table 8).

The majority of the respondents listed "design" as their primary area of specialization, followed by "production" and "client contact." The category of "other" is the largest, because many respondents marked more than one area of specialization, and thus had to be coded as "other" (Table 9).

TABLE 8

NUMBER OF DESIGN PROFESSIONALS IN FIRM

1	22%
2	19%
3	11%
4	7%
5	5%
6-10	14%
11-20	9%
21-50	5%
51-100	4%
101-500	4%

TABLE 9

RESPONDENTS' AREAS OF PROFESSIONAL SPECIALIZATION

RESEARCH	0%
PROGRAMMING	1%
DESIGN	25%
PRODUCTION/SUPERVISION	17%
CLIENT CONTACT	11%
OTHER	46%

Less than 10 percent of the respondents work in organizational settings other than private architectural practice (Table 10).

The last item in the descriptive profile was an open-ended question. Respondents were asked to indicate the type(s) of projects undertaken by their firms. The range of respon-

TABLE 10

RESPONDENTS' ORGANIZATIONAL SETTINGS

PRIVATE PROFESSIONAL ARCHITECTURAL PRACTICE	90%
PUBLIC AGENCY	1%
COMMERCIAL/MANUFACTURING	2%
EDUCATIONAL/TEACHING	1%
OTHER	6%

ses was then compiled to form a list of 65 separate responses. Nine categories of projects were developed from this list, in order to allow for computer coding of the responses. The most common response category was "commercial," followed by "residential" and "educational" (Table 11).

TABLE 11

TYPES OF PROJECTS DONE BY RESPONDENTS

COMMERCIAL	60%
RESIDENTIAL	51%
EDUCATIONAL	29%
OFFICES	28%
INSTITUIONAL	26%
INDUSTRIAL	25%
MEDICAL	22%
OTHER	20%
RELIGIOUS	11%

Analysis of the Awareness Component

In the awareness section of the survey, respondents were asked to indicate their level of familiarity with an assortment of EBR related items such as authors, books and organizations. The initial step in the analysis of the awareness component was to calculate the mean awareness score for each of the 26 items. The item judged to be most familiar by the respondents was "barrier free design," which had a mean of 4.6 on a five point scale. The lowest scoring item was the "Coolfont Model," with a mean score of only 1.1. Overall, respondents were not very familiar with the items in the awareness component, as shown by the fact only four had mean ratings above 3.0 (Table 12).

Factor analysis was used to determine the number and nature of the conceptual factors underlying the variables in the awareness component. It is a parsimonious method of analysis which reduces the number of items to a more manageable set of variables or factors. Factor analysis reveals which items belong together; i.e., which items seem to be measuring the same thing. In this way, items that are unique and that do not contribute much to the amount of variance explained by the factor model can be disregarded in the data analysis.

The 26 items in the awareness component of the survey instrument were factor analyzed using principal components analysis. This analysis yielded six factors, of which four

TABLE 12

MEAN AWARENESS RATINGS

VAR.	RANK	MEAN	SD	ITEM
A-8	1	4.6	.9	BARRIER FREE DESIGN
A-14	2	3.5	1.2	DESIGN FOR THE ELDERLY
A-21	3	3.4	1.4	CAUDILL ROWLETT SCOTT
A-5	4	3.1	1.2	A.I.A. RESEARCH CORPORATION
A-6	5	2.9	1.3	PROGRESSIVE ARCHITECTURE RESEARCH AWARDS
A-11	6	2.8	1.5	PERSONAL SPACE
A-17	7	2.6	1.5	KEVIN LYNCH
A-22	8	2.4	1.3	BEHAVIORAL ISSUES IN PUBLIC HOUSING DESIGN
A-16	9	2.3	1.3	BEHAVIORAL ISSUES IN SCHOOL DESIGN
A-26	10	2.2	1.3	BEHAVIORAL ISSUES IN HEALTH CARE DESIGN
A-12	11	2.2	1.2	BEHAVIOR BASED DESIGN PROGRAMMING
A-19	12	2.1	1.3	ARCHITECTURAL LEGIBILITY AND WAYFINDING
A-18	13	2.0	1.2	BEHAVIOR BASED POST OCCUPANCY EVALUATION
A-25	14	2.0	1.3	EZRA EHERENCRANTZ
A-15	15	1.8	1.2	OSCAR NEWMAN
A-23	16	1.8	1.3	A PATTERN LANGUAGE
A-2	17	1.8	1.2	CHRISTOPHER ALEXANDER
A-1	18	1.7	1.7	ECOLOGICAL PSYCHOLOGY
A-3	19	1.7	.9	E.D.R.A. (ENV. DESIGN RESEARCH ASSOC.)
A-10	20	1.5	1.0	EDWARD HALL
A-20	21	1.4	.9	HENRY SANOFF
A-24	22	1.3	.9	JOHN ZEISEL
A-7	23	1.3	.7	CLARE COOPER MARCUS
A-4	24	1.3	.7	C. M. DEASY
A-13	25	1.2	.6	LEON PASTALAN
A-9	26	1.1	.4	COOLFONT MODEL

were eventually retained. These six factors explained a total of 59 percent of the variance in the awareness scores; 31 percent of this variance was explained by the first factor alone.

As mentioned, the factors generated represent the underlying constructs that organize similar variables into logic-

al sets. Thus, these factors can be named based on the constructs that unify the variables. Typically, not all the variables in each grouping fit neatly into the construct which seems to be organizing the factor. Similarly, some variables appear in more than one factor grouping. In this case, some distinction can be made as to which factor a variable belongs by examining the factor loadings. A factor loading is a measure of a variable's correlation with a factor, with the direction and magnitude of the correlation expressed as a number between -1 and +1 (Table 13).

Not all the variables are clearly or strongly associated with the factors generated, and as a result are disregarded in the data analysis. Likewise, not all the factors generated by the computer analysis are useful in explaining the variance in the awareness scores; those which contribute little explained variance (<.40) are therefore not retained. Six factors were generated in this analysis of the awareness component. Four factors were retained because they explained a significant amount of the variance (>.40) in the awareness scores and because they seemed to group conceptually similar items. Factor 1 contained six items which are all basic EBR concepts, and which explained 31 percent of the variance in awareness scores. Factor 2 grouped more popular EBR books, authors, and concepts, and added eight percent of the explained variance. Factor 3 included figures in EBR and explained seven percent, while factor 4

TABLE 13

FACTOR ANALYSIS OF AWARENESS COMPONENT

variable		factor loading
	Factor 1: EBR Concepts proportion .31/cumulative .31	
A-26	BEHAVIORAL ISSUES IN HEALTH CARE DESIGN	.73
A-16	BEHAVIORAL ISSUES IN SCHOOL DESIGN	.71
A-22	BEHAVIORAL ISSUES IN PUBLIC HOUSING DESIGN	.70
A-19	ARCHITECTURAL LEGIBILITY AND WAYFINDING	.63
A-14	DESIGN FOR THE ELDERLY	.56
A-1	ECOLOGICAL PSYCHOLOGY	.43
	Factor 2: Popular EBR Books, Authors, and Concepts proportion .08/cumulative .39	
A-17	KEVIN LYNCH	.77
A-2	CHRISTOPHER ALEXANDER	.75
A-23	A PATTERN LANGUAGE	.68
A-11	PERSONAL SPACE	.53
A-18	BEHAVIOR BASED POST OCCUPANCY EVALUATION	.44
A-8	BARRIER FREE DESIGN	.41
	Factor 3: Figures in EBR proportion .07/cumulative .46	
A-24	JOHN ZEISEL	.71
A-15	OSCAR NEWMAN	.59
A-20	HENRY SANOFF	.57
A-7	CLARE COOPER MARCUS	.50
A-25	EZRA EHERENCRANTZ	.48
A-23	A PATTERN LANGUAGE	.45
A-4	C. M. DEASY	.40

Factor 4: Organizations Associated with EBR
proportion .05/cumulative .51

variable		factor loading
A-21	CAUDILL ROWLETT SCOTT	.75
A-5	A.I.A. RESEARCH CORPORATION	.73
A-6	PROGRESSIVE ARCHITECTURE RESEARCH AWARDS	.57
A-25	EZRA EHERENCRANTZ	.54

grouped EBR organizations and added five percent. The last two factors were discarded because they contained only a few variables, and added only .04 explained variance each. The variables A-3, A-9, A-10, and A-13 had the weakest associations with any factor and were discarded.

Following the removal of these items, the scores on the remaining 22 variables were compiled to yield an overall mean awareness rating of 2.3 on a five point scale. This score represents the average score for the awareness items, over the entire sample of 167.

Analysis of the Utility Component

The second section of the survey presented a sampling of EBR information related to designing for the elderly. Respondents were asked to assume they were designing a retirement housing project, and to then rate each EBR item in terms of its usefulness in such a task.

As with the awareness component, the initial step in the analysis was to calculate the mean ratings for each of the

16 items. These means range from 3.1 to 4.4 on a five point scale, and show that the respondents perceived the EBR items to be useful. As previously mentioned, the utility component was replicated from an earlier study by Merrill. The architects in Merrill's 1976 sample ranked the utility items in an order very similar to this 1983 sample (Table 14).

Following the calculation of the mean ratings for each item, the utility component was factor analyzed. Using the principal components analysis four factors were produced, but only three of these were retained. One factor was discarded because its items did not explain a substantial amount of the variance in utility scores. The four factors together accounted for 59 percent of the variance in the utility scores, with the first factor explaining 32 percent.

Merrill (1976) also performed a factor analysis of these items in his study and his analysis also yielded four factors. The first two factors in the current study were very similar in composition to those developed by Merrill, and as a result, were given the same names. Those items which appear in the same factor in both this and in Merrill's study are marked with an asterisk (Table 15).

The variables B-1 and B-5 were not linked to the first three factors, and together did not form a meaningful fourth factor. These two items were discarded, and the remaining 14 variables were compiled to yield an overall mean utility rating of 3.8 on a five point scale.

TABLE 14

MEAN UTILITY RATINGS

VAR.	RANK* (1976)	RANK* (1984)	MEAN (SD)	ITEM
B-11	1	1	4.4 (.8)	OLDER PERSONS FIND GREAT SATISFACTION IN OBSERVING THE ACTIVITY OUTSIDE THEIR QUARTERS. TO THIS END LOW WINDOW SILLS AND UNOBSTRUCTED VIEWS ARE DESIREABLE.
B-13	3	2	4.3 (.8)	PROVIDING EASY ACCESS TO ACTIVITIES AND SERVICES AND ENCOURAGING FRIENDSHIPS ARE IMPORTANT MEANS OF PROLONGING AN OLDER PERSON'S INDEPENDENCE.
B-2	2	3	4.3 (.9)	A LOUNGE SHOULD BE PROVIDED ADJACENT TO DINING AREAS TO ALLOW FOR SOCIALIZING WHILE AWAITING MEALS.
B-7	4	4	4.1 (1.0)	IT IS RECOMMENDED THAT WALKS DESIGNED FOR THE ELDERLY HAVE RESTING PLACES NO MORE THAN 150 FEET APART.
B-6	6	5	4.1 (1.0)	AN OPTIMAL LIFE SPACE FOR THE AGED SHOULD ALLOW THE PERSON TO SELECT HIS OWN COMBINATION OF PRIVACY AND INVOLVEMENT WITH SOCIAL GROUPS.
B-1	7	6	4.0 (.9)	AS HEARING AND VISION DECLINE, THE OLDER PERSON DEPENDS INCREASINGLY ON HIS SENSE OF TOUCH.
B-3	5	7	3.9 (1.0)	OLDER PERSONS DISLIKE LARGER, OPEN SPACES.
B-12	8	8	3.8 (1.0)	COLORS TEND TO APPEAR FADED TO THE OLDER PERSON, PARTICULARLY COOL SHADES OF BLUE AND GREEN.
B-4	10	9	3.8 (1.0)	LIMITATIONS IN HEALTH, SKILLS AND OTHER RESOURCES LEAVE A PERSON MORE VULNERABLE TO ENVIRONMENTAL CONSTRAINTS.
B-10	12	10	3.8 (1.1)	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.

B-9	9	11	3.7 (1.2)	IN ONE RETIREMENT HOME A SMALL LOUNGE CROWDED WITH FURNITURE WAS JUST AS POPULAR AS ONE 5 TIMES LARGER WITH MORE SPACE BETWEEN FURNISHINGS.
B-8	13	12	3.6 (1.2)	EFFICIENCY APARTMENTS ARE UNDESIREABLE FOR THE ELDERLY BECAUSE THEY OFTEN CREATE CONFUSION ABOUT THE FUNCTIONS OF SPACES.
B-5	11	13	3.5 (1.1)	A STANDUP GARDEN BUILT WAIST HIGH AND WITH ACCESS TO ALL POINTS FROM THE PERIMETER WORKED WELL IN ONE RETIREMENT HOME.
B-14	14	14	3.4 (1.1)	IT IS MORE DIFFICULT FOR AN 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.
B-15	15	15	3.3 (1.2)	THE PHYSISCAL 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.
B-16	16	16	3.1 (1.1)	THE ELDERLY REDUCE THEIR ATTENTION TO THE ENVIRONMENT BECAUSE THE PREVIOUSLY AUTOMATIC MOVEMENTS OF EATING AND WALKING NEED TO BE WATCHED.

* 1976=ranking in Merrill's (1976) study
  1984=ranking in current study

TABLE 15

FACTOR ANALYSIS OF UTILITY COMPONENT

Factor 1: Environmental Coping
proportion .32/cumulative .32

variable	*=contained in Merrill's (1976) factor analysis		factor loading
B-15		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.	.76
B-16		THE ELDERLY REDUCE THEIR ATTENTION TO THE ENVIRONMENT BECAUSE THE PREVIOUSLY AUTOMATIC MOVEMENTS OF EATING AND WALKING NEED TO BE WATCHED.	.74
B-10	*	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.	.67
B-14		IT IS MORE DIFFICULT FOR AN 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.	.58
B-4	*	LIMITATIONS IN HEALTH, SKILLS AND OTHER RESOURCES LEAVE A PERSON MORE VULNERABLE TO ENVIRONMENTAL CONSTRAINTS.	.52
B-6	*	AN OPTIMAL LIFE SPACE FOR THE AGED SHOULD ALLOW THE PERSON TO SELECT HIS OWN COMBINATION OF PRIVACY AND INVOLVEMENT WITH SOCIAL GROUPS.	.47

Factor 2: Environmental Preference
proportion .12/cumulative .44

variable	(1976)		factor loading
B-8		EFFICIENCY APARTMENTS ARE UNDESIRABLE FOR THE ELDERLY BECAUSE THEY OFTEN CREATE CONFUSION ABOUT THE FUNCTIONS OF SPACES.	.75
B-3	*	OLDER PERSONS DISLIKE LARGER, OPEN SPACES.	.74
B-9	*	IN ONE RETIREMENT HOME A SMALL LOUNGE CROWDED WITH FURNITURE WAS JUST AS POPULAR AS ONE 5 TIMES LARGER WITH MORE SPACE BETWEEN FURNISHINGS.	.66
B-12	*	COLORS TEND TO APPEAR FADED TO THE OLDER PERSON, PARTICULARLY COOL SHADES OF BLUE AND GREEN.	.60
B-7	*	IT IS RECOMMENDED THAT WALKS DESIGNED FOR THE ELDERLY HAVE RESTING PLACES NO MORE THAN 150 FEET APART.	.49

Factor 3: Design Concepts
proportion .09/cumulative .53

variable	(1976)		factor loading
B-11		OLDER PERSONS FIND GREAT SATISFACTION IN OBSERVING THE ACTIVITY OUTSIDE THEIR QUARTERS. TO THIS END LOW WINDOW SILLS AND UNOBSTRUCTED VIEWS ARE DESIREABLE.	.70
B-2		A LOUNGE SHOULD BE PROVIDED ADJACENT TO DINING AREAS TO ALLOW FOR SOCIALIZING WHILE AWAITING MEALS.	.67
B-13		PROVIDING EASY ACCESS TO ACTIVITIES AND SERVICES AND ENCOURAGING FRIENDSHIPS ARE IMPORTANT MEANS OF PROLONGING AN OLDER PERSON'S INDEPENDENCE.	.66
B-6		AN OPTIMAL LIFE SPACE FOR THE AGED SHOULD ALLOW THE PERSON TO SELECT HIS OWN COMBINATION OF PRIVACY AND INVOLVEMENT WITH SOCIAL GROUPS.	.61
B-7		IT IS RECOMMENDED THAT WALKS DESIGNED FOR THE ELDERLY HAVE RESTING PLACES NO MORE THAN 150 FEET APART.	.46

Analysis of the Propensity Component

The third section of the questionnaire was designed to measure specific attitudes for or against the use of EBR in design. Respondents were presented a list of comments and criticisms about EBR, and then asked to indicate their level of agreement with each statement.

The wording of the items was varied so that the statements were neither all for nor all against EBR. The computer input statement adjusted the polarities of the items such that the items all scored in the same direction. Since the other components used a five point scale, with five representing the positive responses of "very familiar" or "very useful," the coding of the propensity component was set up similarly, so that a high score translated to a positive attitude toward EBR. This also allowed for the calculation of a mean score for the eight propensity items. The highest score was 3.9 for variable C-8, reflecting the respondent's feelings that EBR should play a bigger role in architectural education (Table 16).

Through factor analysis, two factors were generated, both were retained, and the two seemed to have a simple distinction between them. Factor one contained almost all negative statements about EBR and appeared to represent the views of those dissatisfied with EBR. Factor two contained mostly positive statements about EBR and seemed to represent the position of those satisfied with the current state of EBR-

TABLE 16

MEAN PROPENSITY RATINGS

VAR.	RANK	MEAN	SD	ITEM
C-8	1	3.9	1.0	THERE SHOULD BE MORE EMPHASIS ON BEHAVIORAL FACTORS DURING ARCHITECTURAL EDUCATION.
C-3	2	2.7	1.1	THERE ARE ALREADY TOO MANY THINGS OF AT LEAST AS GREAT IMPORTANCE AS BEHAVIORAL RESEARCH FOR THE DESIGNER TO CONSIDER.
C-1	3	2.7	1.0	THE FORM IN WHICH BEHAVIORAL RESEARCH FINDINGS ARE PRESENTED IS OVERLY WORDY AND FULL OF JARGON.
C-5	4	2.5	1.1	CLIENTS SEE THE POINT OF USING BEHAVIORAL RESEARCH.
C-2	5	2.3	.9	GOVERNMENT CODES AND REGULATIONS ALLOW THE DESIGNER THE LATITUDE TO APPLY BEHAVIORAL RESEARCH FINDINGS.
C-7	6	2.1	1.0	BEHAVIORAL INFORMATION IS READILY AVAILABLE TO THE ARCHITECT.
C-6	7	1.8	.9	BEHAVIORAL RESEARCH COSTS TOO MUCH CONSIDERING WHAT IT HAS TO OFFER.
C-4	8	1.3	1.2	BEHAVIORAL RESEARCH IS OF MARGINAL IMPORTANCE SINCE DESIGNER CAN GENERALLY DO AN ADEQUATE JOB OF INTERPRETING USER NEEDS FOR HIMSELF.

design integration. An alternate explanation is that of "response set." This is a problem commonly associated with survey research. This occurs when a respondent reads the first few items of a survey to decide which end of the se-

mantic differential reflects his point of view, and then blindly marks the same response for similar items. In this case, those in favor of EBR marked all the positive items and those against EBR marked the negative items (Table 17).

All the variables in this component loaded significantly (>.40) on one of the two factors, and as a result none were discarded. The overall mean propensity score for the eight items was 2.9 on a five point scale, which seems to demonstrate ambivalence toward the use of EBR in design.

TABLE 17

FACTOR ANALYSIS OF PROPENSITY COMPONENT

variable		factor loading
	Factor 1: Dissatisfied with EBR proportion .32/cumulative .32	
C-3	THERE ARE ALREADY TOO MANY THINGS OF AT LEAST AS GREAT IMPORTANCE AS BEHAVIORAL RESEARCH FOR THE DESIGNER TO CONSIDER.	.72
C-6	BEHAVIORAL RESEARCH COSTS TOO MUCH CONSIDERING WHAT IT HAS TO OFFER.	.64
C-4	BEHAVIORAL RESEARCH IS OF MARGINAL IMPORTANCE SINCE DESIGNER CAN GENERALLY DO AN ADEQUATE JOB OF INTERPRETING USER NEEDS FOR HIMSELF.	.62
C-1	THE FORM IN WHICH BEHAVIORAL RESEARCH FINDINGS ARE PRESENTED IS OVERLY WORDY AND FULL OF JARGON.	.59
C-5	CLIENTS SEE THE POINT OF USING BEHAVIORAL RESEARCH.	.52
C-8	THERE SHOULD BE MORE EMPHASIS ON BEHAVIORAL FACTORS DURING ARCHITECTURAL EDUCATION.	.52
	Factor 2: Satisfied with EBR proportion .16/cumulative .48	
C-7	BEHAVIORAL INFORMATION IS READILY AVAILABLE TO THE ARCHITECT.	.68
C-2	GOVERNMENT CODES AND REGULATIONS ALLOW THE DESIGNER THE LATITUDE TO APPLY BEHAVIORAL RESEARCH FINDINGS.	.59
C-5	CLIENTS SEE THE POINT OF USING BEHAVIORAL	.49
C-4	BEHAVIORAL RESEARCH IS OF MARGINAL IMPORTANCE SINCE DESIGNER CAN GENERALLY DO AN ADEQUATE JOB OF INTERPRETING USER NEEDS FOR HIMSELF.	.47

Measuring EBR Communication Preferences

The fourth section of the questionnaire presented a list of the leading proposals for the communication of EBR information. Respondents were asked to indicate their level of preference for each of the communication methods on a scale of one to five, (1=not very preferable, 5=very preferable). Mean preference ratings were calculated for each of the communication methods, with the highest scoring item rated at 4.5. An overall mean preference rating of 3.6 was calculated from the means of the ten items (Table 19).

TABLE 19

MEAN EBR COMMUNICATION PREFERENCE RATINGS

VAR.	RANK	MEAN	SD	ITEM
D-9	1	4.5	.7	DESIGN GUIDE BOOKS WITH EBR INFORMATION ORGANIZED BY BUILDING TYPE
D-6	2	4.3	.9	EBR INFORMATION PUBLISHED IN ARCHITECTURAL JOURNALS
D-5	3	4.2	.9	CONTINUING EDUCATION PROGRAMS FOR PRACTICING ARCHITECTS, SUCH AS SHORT COURSES, WORKSHOPS, AND CONFERENCES
D-7	4	3.9	1.2	EBR INFORMATION IN A NEW JOURNAL WRITTEN SPECIFICALLY FOR ARCHITECTS, NOT RESEARCHERS
D-8	5	3.8	1.2	A.I.A. HANDBOOKS, SUPPLEMENTS AND CONTRACT DOCUMENTS DEALING WITH EBR USE IN DESIGN
D-4	6	3.7	1.1	CHANGES IN ARCHITECTURAL SCHOOL TRAINING WITH INCREASED EMPHASIS ON DESIGN FOR BEHAVIORAL FACTORS
D-10	7	3.6	1.3	COMPUTER ACCESS TO EBR INFORMATION RETRIEVAL SYSTEM
D-3	8	4.2	1.1	PROFESSIONAL BEHAVIORAL CONSULTANTS, SUBCONTRACTED FOR SPECIFIC PROJECTS
D-2	9	2.8	1.3	PUBLIC OR PRIVATELY FUNDED EBR SERVICE AGENCY, PROVIDING SPOT CONSULTING AND INFORMATION DISSEMINATION
D-1	10	1.6	1.6	HIRING NEW, SPECIFICALLY TRAINED EMPLOYEES TO ACT AS "IN-HOUSE" EBR TRANSLATORS

Constructing the Index of Receptivity

The awareness, utility, and propensity sections of the survey were designed as components of an index. The measurements made by these components were combined to form a composite measure, an index of receptivity to EBR.

Each respondent has a mean awareness, utility, and propensity score. The index of receptivity is a grand mean of these three component scores. Since all the component means were scores from one to five, the grand mean was also expressed as a score from one to five. These scores were converted to a 100 point scale. Although a score of 100 was possible, the highest individual index of receptivity score was 75, with a minimum of 24, and a mean of 50 (Table 18).

TABLE 18

DISTRIBUTION OF INDEX OF RECEPTIVITY SCORES

receptivity score------(n)	receptivity score------(n)	receptivity score------(n)
24 ----- 1	48 ----- 12	54 ----- 5
25 ----- 1	49 ----- 4	55 ----- 5
28 ----- 1	50 ----- 12	56 ----- 8
32 ----- 1	51 ----- 10	57 ----- 4
34 ----- 4	52 ----- 4	58 ----- 2
35 ----- 5	53 ----- 6	59 ----- 3
36 ----- 4	+	60 ----- 3
38 ----- 3	----------	61 ----- 3
40 ----- 3	n= 55	62 ----- 4
41 ----- 4		63 ----- 2
42 ----- 5		64 ----- 4
43 ----- 6		65 ----- 2
44 ----- 5		66 ----- 3
45 ----- 3		68 ----- 5
46 ----- 5		69 ----- 1
47 ----- 5		72 ----- 1
+		75 ----- 1
----------		----------
n= 56		n= 56

Partitioning High and Low Receptivity Groups

After the initial examination of the index of receptivity and the EBR communication preferences, efforts were focused on the relationships between these two measures. The first step in this analysis was the partitioning of the high and low receptivity scores. The index of receptivity scores were rank-ordered, and then divided into thirds at 48 and 54, yielding 56 respondents in both the high and low receptivity groups.

These groups were partitioned to allow for a comparative analysis of their respective EBR communication preferences. Although the ten communication methods were ranked in a similar order by both groups, an analysis of variance procedure was needed to examine the relationships between the two rankings. A one-way analysis of variance (ANOVA) procedure was used to compare the two groups by methods of EBR communication (2 x 10)= (high/low receptivity) x (methods). A Duncan Multiple Range Test was used to determine the statistical significance of the differences between the two group's mean ratings for each variable. The Duncan test determines whether a variable is systematically rated differently by the two groups (Table 20).

TABLE 20

MEAN COMMUNICATION PREFERENCE RATINGS BY GROUP

VAR.	MEAN		f* p<.05	ITEM
	high group	low group		
D-9	4.6	4.3		DESIGN GUIDE BOOKS WITH EBR INFORMATION ORGANIZED BY BUILDING TYPE
D-6	4.5	4.0	*	EBR INFORMATION PUBLISHED IN ARCHITECTURAL JOURNALS
D-5	4.5	3.8	*	CONTINUING EDUCATION PROGRAMS FOR PRACTICING ARCHITECTS, SUCH AS SHORT COURSES, WORKSHOPS, AND CONFERENCES
D-7	4.2	3.4	*	EBR INFORMATION IN A NEW JOURNAL WRITTEN SPECIFICALLY FOR ARCHITECTS, NOT RESEARCHERS
D-8	4.1	3.5	*	A.I.A. HANDBOOKS, SUPPLEMENTS AND CONTRACT DOCUMENTS DEALING WITH EBR USE IN DESIGN
D-4	3.9	3.4	*	CHANGES IN ARCHITECTURAL SCHOOL TRAINING WITH INCREASED EMPHASIS ON DESIGN FOR BEHAVIORAL FACTORS
D-10	3.8	3.3	*	COMPUTER ACCESS TO EBR INFORMATION RETRIEVAL SYSTEM
D-3	3.6	3.2		PROFESSIONAL BEHAVIORAL CONSULTANTS, SUBCONTRACTED FOR SPECIFIC PROJECTS
D-2	3.0	2.5		PUBLIC OR PRIVATELY FUNDED EBR SERVICE AGENCY, PROVIDING SPOT CONSULTING AND INFORMATION DISSEMINATION
D-1	1.7	1.5		HIRING NEW, SPECIFICALLY TRAINED EMPLOYEES TO ACT AS "IN-HOUSE" EBR TRANSLATORS

* degrees of freedom (df)=2

Multiple Regression Analysis

The final step in the data analysis was the multiple regression analysis. Multiple regression is a method of examining the correlations between multiple independent variables and one dependent variable.

The type of multiple regression used was the Maximum R-Square Improvement (MAXR) method. This is a stepwise method which attempts to construct predictive models that maximize the amount of explained variance of the dependent variable. It starts with a model that includes all the independent variables, and and then removes the variable with the weakest correlation with the dependent variable. With each step, MAXR attempts to find the next best predictive model, even if that requires reintroducing a variable that was discarded for an earlier model. The MAXR method was chosen over the Stepwise backward method because it takes into account any interaction effects that might increase the explained variance.

The multiple regression analysis was used to measure the correlations between the full range of scores on the index of receptivity as the dependent variable, and the 17 independent variables in the descriptive profile. The purpose was to establish a multivariate model that would allow for the prediction of receptivity scores based on descriptive variables such as age, size of firm, etc. Additional regression models were constructed using each of the three

components of the index of receptivity, awareness, utility and propensity, as the dependent variables and the items in the descriptive profile as the independent variables. The first regression analysis used the index of receptivity as the dependent variable and yielded a model which explained 13 percent of the variance. This model contained all 17 independent variables in the descriptive profile, however, only one (E9f, industrial) affected the variance significantly (Table 21). The most parsimonious model was a two variable model, (other, industrial), in which both variables acted significantly, but explained only five percent of the variance in receptivity scores (Table 22).

The next regression model used the overall mean awareness score as the dependent variable. Twenty percent of the variance was explained using all 17 variables, with six variables achieving statistical significance. The most parsimonious awareness model was a 12 variable model, with six significant variables, (age, professional training, organizational setting, other, residential, industrial) explaining 20 percent of the variance (Table 23).

The regression models for utility yielded a 17 variable model that explained 13 percent of the variance, but had only one significant variable. The most parsimonious model contained only one varible (gender) and explained six percent of the variance (Table 24).

TABLE 21

INDEX OF RECEPTIVITY REGRESSION MODEL I

Variable	Item	Prob>f(.05)
E-1	AGE	.60
E-2	GENDER	.36
E-3	PROFESSIONAL TRAINING	.14
E-4	YEARS IN PROFESSIONAL PRACTICE	.78
E-5	POSITION IN FIRM	.22
E-6	PRIMARY AREA OF PROFESSIONAL SPECIALIZATION	.71
E-7	NUMBER OF DESIGN PROFESSIONALS IN FIRM	.36
E-8	TYPE OF ORGANIZATIONAL SETTING	.09
E-9	TYPE(S) OF PROJECTS UNDERTAKEN BY FIRM:	
E-9a	OTHER	.28
E-9b	COMMERCIAL	.90
E-9c	EDUCATIONAL	.29
E-9d	OFFICES	.26
E-9e	RESIDENTIAL	.31
E-9f	INDUSTRIAL	.05
E-9g	MEDICAL	.64
E-9h	INSTITUTIONAL	.17
E-9i	RELIGIOUS	.99
	r-Square=.13	

The last regression analysis used the propensity component mean as the dependent variable. The 17 variable model explained 11 percent of the variance, with only one significant variable. That variable alone (years in practice) provided the most parsimonious model, explaining five percent of the variance (Table 25).

TABLE 22

INDEX OF RECEPTIVITY REGRESSION MODEL II

Variable	Item	Prob>f(.05)
E-9a	OTHER	.03
E-9f	INDUSTRIAL	.02
	r-Square=.05	

TABLE 23

AWARENESS REGRESSION MODEL

Variable	Item	Prob>f(.05)
E-1	AGE	.05
E-3	PROFESSIONAL TRAINING	.003
E-4	YEARS IN PROFESSIONAL PRACTICE	.07
E-5	POSITION IN FIRM	.33
E-7	NUMBER OF DESIGN PROFESSIONALS IN FIRM	.24
E-8	TYPE OF ORGANIZATIONAL SETTING	.01
E-9	TYPE(S) OF PROJECTS UNDERTAKEN BY FIRM:	
E-9a	OTHER	.005
E-9b	COMMERCIAL	.12
E-9c	EDUCATIONAL	.36
E-9e	RESIDENTIAL	.04
E-9f	INDUSTRIAL	.01
E-9h	INSTITUTIONAL	.40
	r-Square=.20	

TABLE 24

UTILITY REGRESSION MODEL

Variable	Item	Prob>f(.05)
E-2	GENDER	.002
	r-Square=.06	

TABLE 25

PROPENSITY REGRESSION MODEL

Variable	Item	Prob>f(.05)
E-4	YEARS IN PRACTICE	.005
	r-Square=.05	

DISCUSSION AND CONCLUSIONS

Overview

This chapter will provide an interpretation of the results presented in the previous chapter. This will include the discussion of each item in the three domains of the index of receptivity: EBR awareness, utility, and propensity. The discussion will also include the characteristics of the respondents and potential biases of the sampling frame, attempts at constructing a predictive model of EBR receptivity through multiple regression, anecdotal data and study limitations. The discussion finally focuses on the EBR communication formats preferred by the respondents, and concludes with recommendations for implementing the most preferred formats.

Response Rate

The measures taken to maximize the response rate, as discussed in the previous chapter, seemed effective. The overall response rate of 47 percent is good for an unsolicited mail survey. As predicted, the sample size of 400 was adequate--a larger sample would have increased the reliability of the results , but given the budget limitations of this study, the 47 percent response rate provided enough respon-

ses to allow for the use of parametric statistics. This response rate could possibly have been improved with the use of higher quality typesetting and paper stock, follow-up letters or phone calls, but budget limitations were again the overriding consideration.

As previously discussed, the use of the American Institute of Architects (AIA) membership rolls as a sampling universe introduces a certain amount of sampling bias. Several groups are systematically eliminated from this sampling frame. Persons who have not been licensed as architects cannot, as a rule, become full members of the AIA, and therefore were not sampled. Many architects cannot justify the expense of joining the AIA because another member of the firm, often the principal, is already a member. Some architects may have political or philosophical differences with the AIA. Others may simply have a personal grievance with someone in their local chapter. Some architects practice on a small scale or on a part-time basis, and feel no need for the services of the AIA. Others may work in engineering or manufacturing firms and feel similarly. Still others may be unaware of the AIA or may not consider themselves "joiners."

In any case, the central question that arises out of the issue of sampling bias is whether or not architects that are receptive to EBR have been systematically eliminated from the study by using the AIA membership rolls as a sampling universe. It is obvious that a wide variety of circumstan-

ces lead many architects to decide against joining the AIA. Is it possible that the most receptive architects in this sample are in reality only moderately receptive in comparison to those who have been systematically under-represented? Or could it be that the elimination of the sampling biases would not significantly alter the range of receptivity scores? Unfortunately these questions cannot be completely answered. However it is worth noting that the number of architects using EBR in design is not very large, as judged by this and other studies (Conway, 1974; Merrill, 1976; SOM, 1978; Seidel, 1980, 1981). Therefore, it seems reasonable to assume that even if the sampling biases associated with the AIA were eliminated, the number of architects that would score extremely high on the index of receptivity would be so small that their addition to the sampling frame would not result in a significantly different distribution of receptivity scores.

Architects' Awareness of EBR

The first component of the index of receptivity was designed to measure architects' awareness of the field of EBR by their familiarity ratings for various authors, ideas, books, etc., associated with it. However, no self-administered questionnaire can be considered a truly objective evaluation. Rather, the architects' self-ratings of their EBR awareness is a subjective evaluation, and can be influ-

enced by a number of confounding effects, such as the "on-stage" effect. The "on-stage" effect is a phenomenon commonly associated with survey research, by which the respondent selects answers that he thinks the investigator "wants" him to pick, thereby increasing his "social desireability."

The mean EBR awareness score for the whole sample was only 2.3 (sd=.59), indicating an overall lack of familiarity with the items pertaining to EBR. This mean awareness rating was calculated for all 167 respondents. A higher mean of 2.9 (sd=.59) was calculated for the high receptivity group, but was still below the midpoint of the five-point ordinal scale.

Despite the low awareness means, several individual items were rated quite high, raising questions about the validity of these scores. Were these items truly familiar to the respondents, or were the high ratings due to an attempt to appear "smart" in the researcher's eyes? Some interesting discussion is generated by applying these questions to the top rated items.

Variable A-8, barrier free design, had a mean rating of 4.6 (sd=.91) for the whole sample, 4.7 (sd=.65) for the high receptivity group, and was by far the highest rated item. Does this high rating mean that the respondents are very familiar with the topic of barrier free design as they have indicated? Or is this high rating merely due to the fact that almost every architect, under the restrictions of

building codes, has at one time or another detailed a grab bar for a public restroom? Could the high awareness rating received by this item also be related to the fact that "any program or activity" that receives federal funding must conform to federal accessibilty standards? (Architectural Barriers Act of 1968, Rehabilitation Act of 1973)

Variable A-14, design for the elderly, was rated 3.5 (sd=1.23) by the whole sample, and 4.1 (sd=.90) by the high receptivity group. As with barrier free design, the same questions arise about the validity of this high rating. Are these architects familiar with the field of gerontology and its importance in designing for the elderly? Could they be expected to explain the effects of design decisions on the physical and psycho-social well-being of an older user group? How does the high rating of this variable relate to rating of 1.2 for Leon Pastalan, author of Spatial Behavior of Older People, one of the most important books on elderly person's interactions with the physical environment. Is the high degree of familiarity indicated in this survey evident in the buildings that are being constructed today for the elderly? Or is the high rating for this item a response to the fact that the elderly are the fastest growing segment of the population, and therefore provide for many large and lucrative commissions from which no architect wants to disqualify himself?

Variable A-21, Caudill Rowlett Scott, was the third highest rated item, was rated 3.5 (sd=1.37) by the whole sample, and was rated 4.0 (sd=1.10) by the high receptivity group. CRS is a large architectural firm with 250 employees, based in Houston. They have done a large variety of projects, both in the U.S. and abroad, and have been extensively published in architectural journals. One area of accomplishment for CRS has been in architectural programming. In fact a member of CRS, William Pena, has published a book, Problem Seeking, dealing with methods of design programming from a behavioral standpoint. As one of the largest firms in America, CRS has a very high recognition factor. Mr. Pena is also renowned as a leading author and lecturer in the area of programming. This causes an obvious dilemma in trying to interpret the high familiarity rating CRS received. Was the high rating due to the fame of CRS as a firm or due to the programming work of Mr. Pena? This question could have been easily answered if either Mr. Pena or his book were included in the list of awareness items. However, several other items associated with design programming were included in the survey instrument. These include variable A-12, behavioral-based design programming; A-23 and A-2, A Pattern Language and its author Christopher Alexander; A-20 and A-24, Henry Sanoff and John Zeisel, noted educators and authors of books dealing with behavior-based design programming. The notion that CRS received high familiarity ratings due to the

programming work of Mr. Pena fades when compared to the mean ratings of the other items associated with programming. These items, in the above listed order received mean familiarity ratings of 2.2, 1.8, 1.8, 1.4, and 1.2.

Variable A-5, AIA Research Corporation, was rated 3.1 (sd=1.19) by the whole sample, and 3.3 (sd-1.16) by the high receptivity group. Did this item receive the fourth highest score because the architects were familiar with the EBR studies done by the AIA Research Corporation, because of other AIA Research Corporation publications, such as energy research, or because they recognized and responded to the AIA? Although it seems pessimistic to question the validity of each high scoring variable, inconsistencies in the responses make such doubts unavoidable.

This item, A-5, provides an excellent example of these inconsistencies. If the architects were as familiar with the AIA Research Corporation as they have indicated, how did variable A-9, the Coolfont Model, score the lowest of all the items, with a mean rating of 1.1? The Coolfont Model is a product of the AIA Research Corporation, and is a process model for collaboration between architects and environment-behavior researchers. It is the result of a conference/ workshop of leading architects and researchers held in 1973, and represented the state of the art in collaboration models at that time.

Variable A-6, the Progressive Architecture Research Awards, was rated 2.9 (sd=1.30) by the whole sample and 3.5 (sd=1.19) by the high receptivity group. Although this rating is above the overall mean awareness score of 2.3, it is still below the halfway mark of 3.0 on a five point ordinal scale. This indicates that although it was the fifth highest rated variable, it is still not very well known.

Again, the issues of validity and recognition arise. Do the architects know about the research awards? Could they name any winners? Are they confusing this with the Progressive Architecture Design Awards? Or are they simply recognizing and responding to the name of the popular journal? This would seem to be the case since three former winners of the Progressive Architecture Research Award, John Zeisel, Ezra Eherencrantz, and Kevin Lynch, were included in the questionnaire and received ratings of 1.3, 2.0, and 2.6, respectively.

Variable A-11, Personal Space, had a mean familiarity rating of 2.8. It was not surprising to find this variable, or the next highest variable, A-17, Kevin Lynch, among the top rated items. Personal Space is a "pop" treatment of environmental psychology issues. Kevin Lynch is the author of Image of the City, a well known book about the cognitive images that people use to negotiate their daily environments. Both books were published in paperback and were very widely read in the 1960's and 1970's in a variety of disciplines,

including architecture, planning, geography and psychology. These items were expected to score highly, and were ranked sixth and seventh out of twenty-six items. However, their whole group means of 2.8 (sd=1.48) and 2.6 (sd=1.50) do not indicate a truly high level of familiarity.

The rest of the items were ranked near or below the overall mean and although not highly rated, deserve some discussion. The items ranked eighth through thirteenth all scored low in familiarity, and yet represent the major issues in EBR today: A-22, behavioral issues in public housing design; A-16, behavioral issues in school design; A-26, behavioral issues in health care design; A-12, behavior-based design programming; A-19, architectural legibility and wayfinding; and A-18, behavior-based post occupancy evaluation. Rated even lower by the whole sample at 1.7 (sd=.93), was the Environmental Design Research Association, EDRA. This organization is a large association of architects and researchers interested in the issues of EBR, and provides a forum for information sharing and dissemination through conferences and publications. The lowest ranked items were mostly figures associated with EBR. Although obviously not well known to the respondents, these people are nationally prominent architects, authors, researchers and educators. Thus, the most prominent people and ideas associated with EBR were rated very low. This ranking of items shows clearly that the architects in this study were not very aware of EBR, despite the high ratings received by a few items.

It seemed that simple recognition substituted for true understanding. If the respondent recognized any part of an item, it was automatically given the highest rating. As a result, the high familiarity ratings given to certain items can be explained when viewed in relation to other, completely unfamiliar items.

Architects' Perception of EBR Utility

The second component of the index of receptivity was adapted from an earlier study by Merrill (1976), and was designed to measure architects' perception of the utility of EBR findings in design. In Merrill's study, and in this study, the results indicate that architects think EBR information is very useful in design. Presented with a list of 26 EBR findings related to design for the elderly, respondents were asked to rate the utility of each item on a five point scale. The overall mean utility rating was 3.8 (sd=.60) for the whole sample of 167 respondents, while the high receptivity group had a mean utility rating of 4.2 (sd=.55). These scores are substantially higher than any other component, and show that architects have very positive attitudes toward the utility of EBR findings in design.

In interpreting these results, it is essential to remember that the high scores are subjective evaluations, and only indicate positive attitudes toward the utility of EBR as defined and measured by this instrument. In any self-ad-

ministered questionnaire, the validity of the results will always be subject to question because of the variety of confounding effects that can occur. The utility ratings were especially suspect, since the scores were so much higher than any other component. Were these scores due to the "on-stage" effect, as seemed to be the case with some of the awareness items, or were these responses an accurate product of a reliable instrument?

These questions can be partially answered by examining the consistency of the results. In the awareness component, mean scores ranged from 4.6 to 1.1 for individual items, with an overall mean of 2.3 (sd=.59). This shows a great deal of variance between items. However, in the utility component, the scores range from 4.4 to 3.1, with an overall mean of 3.8 (sd=.60), thus demonstrating a great deal more consistency.

Further consistency is shown by the fact that the order in which the utility items were ranked in this study is almost identical to the order in Merrill's study. Merrill's survey was conducted seven years earlier, using an otherwise different survey instrument and a different sampling frame. The fact that the respondents in Merrill's study also indicated that EBR was useful in design and ranked the items in a very similar order demonstrates a consistency that would not exist if the confounding effects were significant. In addition, these results are in line with many sources in the

literature that claim that architects want and need more information dealing with environment/behavior interaction (Conway, 1974; Merrill, 1976; SOM, 1978).

The paradox of these findings becomes evident. As often stated in the literature, and as shown by the scores in the awareness component, architects do not make much use of EBR findings in design. Yet in keeping with the literature and as demonstrated by the scores on the utility component, when presented with EBR findings pertinent to a design scenario, architects indicate that they believe EBR to be quite useful.

The items that are rated highest in this study and in Merrill's study are those which give concrete information about the design of the physical setting, i.e., items which specify dimensions of physical design considerations. Items dealing with more theoretical EBR concepts were ranked lowest. Thus, theory building, which is the basis of the scientific paradigm, seems of little importance to architects. In keeping with the architect's solution oriented approach described by Lawson (1980), specific physical design characteristics are most highly rated. Unfortunately, most EBR findings are stated in terms of theory, not feet and inches.

Architect's Propensity for EBR

The third component of the index of receptivity was designed to measure architects' atitudes toward the use of EBR in design. This is a very subjective assessment, and is much less straightforward than the measurements in the first two components.

A problem commonly associated with survey instruments is that of "response set." To avoid this problem, the wording of some of the items was reversed. By alternating the polarity of the statements, some are pro-EBR and some are anti-EBR, so that a respondent would need to read and respond to each item separately.

For the purposes of index construction, however, all items must have a common polarity. Therefore, in computer coding the responses, the polarity of the anti-EBR statements was reversed. Admittedly, this causes some confusion in interpreting the scores for discussion purposes, but it was necessary to score the items this way in order to calculate the overall mean propensity rating and to construct the index of receptivity. The mean propensity rating was 2.9 (sd=.47) for the entire sample, and 3.2 (sd=.40) for the high propensity group. Both of these scores are very near the midpoint of 3.0, and do not reflect strong attitudes toward EBR.

Only one pro-EBR statement, C-8, was rated above 3.0. This item states that architects should receive more EBR

training in school. The mean rating for this item for the for the high receptivity group was 4.1 (sd=1.0) and 3.5 (sd=1.11) for the low receptivity group. It is not suprising that the high receptivity group sees the need for more EBR training; however, it is surprising to see that the low receptivity group has similiar feelings. Whether or not an architect is receptive to the use of EBR in design could depend on a great many factors, but a universal opinion seems to be that more emphasis is needed on behavioral factors during architectural education.

The next two highest rated items were both anti-EBR statements, and were both rated 2.7 by the entire sample. Variable C-3 (sd=1.10) states that there are too many things that are more important that EBR, and C-1 (sd=1.0) states that EBR findings are wordy and full of jargon. By rating these statements at 2.7, the respondents have disagreed with the anti-EBR statements, albeit not by much.

Other pro-EBR statements did not receive the level of agreement that C-8 (architectural education) did. The respondents tended to disagree with three pro-EBR items: clients see the point of using EBR (2.5, sd=1.10), government codes allow for the use of EBR (2.3, sd=.95), EBR is readily available to the architects (2.1, sd=1.0). These ratings indicate a position of low receptivity, and probably are accurate representations of the rest of professional practice. It is likely that clients do not see the point of

using EBR. Of course they have probably never been introduced to the topic, probably never stroll in and ask for it, and would probably assume it costs too much anyway. It may even be that people outside the architectural profession assume that architecture works within the same scientific paradigm that guides most other professions. As a result, a client could easily assume that hypothesis testing, theory building and information dissemination are part of standard architectural practice, just as a patient tends to assume that his doctor is "up" on his reading.

The most surprising results come from the lowest ranked variables, C-6 and C-4, which received mean ratings of 1.8 (sd=.91) and 1.3 (sd=1.15) respectively. Both are anti-EBR statements, and the respondents tended to strongly disagree with them. Variable C-6 states that EBR costs too much considering what it has to offer, and C-4 states that EBR is marginally important since the designer can do an adequate job of interpreting user needs. Both scores are surprising because the respondents have indicated a propensity toward EBR even if it requires some expense or loss of control.

By disagreeing so heartily, respondents seem to be saying that EBR isn't a "frill" or an "extra." This is surprising since the primary concern of any business venture is profit. This is not to say that architects are profiteers; in comparison to other professions they should probably be paid more. But it is the fear of losing money that eliminates

many services that architects could provide, including EBR. Unfortunately, good design often does cost more.

Equally surprising is the fact that the respondents do not believe that architects can do an adequate job of interpreting user needs themselves. Although this response might have been caused partially by the desire to appear socially acceptable to the researcher, it is still a clean break from the stereotype of architect as egomaniac, and should be viewed in a positive light by researchers.

Although the "on-stage" effect may have had some role in the architects' ratings, it is doubtful that it had a major effect. The same propensity items were used in Merrill's (1976) study, and the items were ranked in a very similiar order. A Spearman rank order correlation was conducted between the two rankings, with a correlation coefficient of .81 ($p<.05$). It is not likely that this correlation would have occurred if the architects were responding positively to EBR due to the "on-stage" effect.

As the overall mean of 2.9 indicates, opinions toward EBR are not very strong. This is partly due to the fact that a small number of items are being used to make a very subjective assessment of a complex set of opinions. Another problem is that many of the items assume a prior knowledge of EBR--knowledge that the awareness component did not uncover. It would be difficult for respondents to decide if EBR is too wordy or too expensive if they have never heard of it.

This would explain why the propensity mean was so close to the midpoint of 3.0. This demonstrates the apparent reliability of the propensity ratings; since the respondents have demonstrated low awareness of EBR, it stands to reason that they would not have strong opinions either for or against it.

A Summary of the Index of Receptivity

Index construction is an attempt to form a composite measurement of a construct, such as receptivity to EBR. Obviously no single variable can accurately and unambiguously measure receptivity. However, by combining a series of variables measuring various aspects of the construct, the composite measure serves as a means of data reduction and provides for a more efficient and accurate measurement.

In this case, the construction of the index of receptivity was a means to an end. The index itself is not of primary interest. It does not provide an absolute and undisputable measurement of receptivity to EBR, and, in fact, no measure could. Rather, the measurement of receptivity served only as a tool for partitioning the highly receptive respondents from the sample, so that their preferences for EBR communication methods could be reported. To this end, the index served well.

The scores on the index ranged from 24 to 75, on a scale from 0 to 100. They were normally distributed, with few

outlying scores. The absence of extremes probably reflects more on the homogeneity of the sampling frame than on the instrument itself.

The scores on the awareness component were uniformly low. The high receptivity group had scores higher than the low receptivity group, but in all, not many respondents were familiar with the prominent issues, books, and leaders in the field of EBR. For the few individual items that received high ratings, simple recognition seemed to substitute for true familiarity, as previously discussed.

Additionally, the "chicken or the egg" paradox is applicable to this component: which comes first, awareness or receptivity? What about a person who is very much open to the idea of using EBR, but simply has not heard much about it? Conversely, what of a person, who through reading or training or colleagues is well aware of the issues of EBR, but rejects them as an outrage to the "art" of architecture? This dilemma is obvious, and yet it would be impossible to ignore the more typical situation where a high level of familiarity with EBR correlates positively with a high level of acceptance of the behavior- based approach to design. Therefore, due to the large number (26) of items used to measure EBR awareness, due to the consistency of the results, and because of its logical role in receptivity, the awareness component was included in the index of recpetivity.

The utility component also seemed to provide reliable results, based on the consistency of the scores. Both the high receptivity and low receptivity groups indicated that EBR was useful in design. In addition, the ranking of the utility items by the entire sample had a very strong correlation (.97, $p<.05$) with the results from Merrill's (1976) study.

The conclusion that can be drawn from the utility component is that architects do think EBR is useful for design, as was also shown by Conway (1974), Merrill (1976) and SOM (1978). However, this only underscores the long standing questions of why EBR is not used more by architects, and what could be done to facilitate its use?

The propensity component probably comes closest to measuring the essence of EBR receptivity, because it directly questions respondents on their opinions about EBR. However, these opinions are harder to measure than the questions about EBR awareness or utility. The propensity component was also hampered by problems resulting from the reversing of the item polarities. Without a full discussion of the semiotics of the English language, it will suffice to say that the full meaning of a statement does not automatically reverse when a few words are changed. Although subtle differences in the meanings of statements are difficult to measure, they nevertheless affect the respondent.

This imprecision is compounded by the fact that the component consists of only eight items, and by the fact that some of the items pre-suppose the respondents' prior knowledge of EBR. However, given the direct nature of the questions in the propensity component, it seemed essential to include it in the index.

Architects' EBR Communication Preferences

In the fourth part of the survey, respondents were presented with a list of ten communication methods for the transfer to EBR information, and were asked to rate each on a five point scale from "not very preferable" to "very preferable." The respondents expressed generally positive feelings toward the methods, since the overall mean rating was 3.6 (sd=.56) for the entire sample, 3.8 for the high receptivity group and 3.3 for the low receptivity group.

Although the high receptivity group rated the ten methods higher than the low group, the differences between the two groups' mean ratings were not substantial. The high and low receptivity groups ranked the methods in almost the same order, as shown by the Spearman rank order correlation coefficient of .96 ($p<.05$). The three highest rated and four lowest rated methods were ranked in the same order by both groups. As part of a one-way analysis of variance procedure, a Duncan multiple range test was used to compare the variable means between the two groups.

By simply glancing at the variable means for the two groups, it is clear that the items were rated similarly. However, the Duncan test also considers the amount of variance around each mean. According to the Duncan test, the differences between the variable means of the high and low receptivity groups are statistically significant ($p<.05$) for six of the ten variables. Despite the apparent similarity of the ratings for these six variables, they belong to statistically distinct groups; i.e., the scores are different not by chance, but due to systematic differences in the way the two groups respond to the variables.

Variable D-9 proposed the use of design guide books with EBR information organized by building type. This was by far the highest rated item for both the high and low receptivity groups. According to the Duncan test, there was no statistical difference in the way this variable was treated by both groups.

It was not surprising that this communication method was the highest rated. Design guides provide the best of both worlds, allowing the designer to be responsive to human needs, with a minimum investment of time, money and effort. Design guides represent a format that architects are familiar with, and which fits the time and cost restraints that often govern decisions in professional practice. Unfortunately, EBR information is not often suited to a cook-book style presentation.

As Seidel (1980) has shown, architects and researchers use entirely different approaches in defining the quality of information. Seidel points out that the qualities that architects look for in information have little to do with the incentives that researchers work under, and that a translation gap exists between the products of research and the requirements of architects. He concludes that neither the architects nor the researchers see translation as their responsibility, and that the academic settings in which research is typically conducted actually discourage researchers from taking the additional steps of translating their work into a form useable by architects. In a pressurized, "publish or perish" academic setting, such translation work does not substitute for publication in a refereed journal. Therefore, researchers concerned with tenure and career advancement would do well to meet the expectations and requirements of their own reference group, not those of the architectural profession.

Variable D-6, proposing that EBR information be published in architectural journals, was ranked second by both the high and low receptivity groups and had an overall mean rating of 4.3 (sd=.90). The Duncan test showed a significant ($p<.05$) difference between the high receptivity group's rating of 4.5 (sd=.90) and the low receptivity group's rating of 4.0 (sd=.98).

The high ratings received by this variable are not surprising, since most architectural firms maintain subscriptions to architectural journals. In light of Seidel's (1980) findings, it is even less surprising to see architectural journals so heavily favored. As part of his study, Seidel asked architects to indicate what kind of information search process is: Taught in most architectural schools? Encouraged by most firms? Respected most by your reference group? The use of architectural journals was cited as the type of information search process taught in most schools (31 percent), encouraged by most firms (71 percent), and respected most by the architects' reference group (59 percent). In response to the same question, a review of the research literature was among the least taught (3 percent), encouraged (10 percent), and respected (17 percent), methods of information gathering. This does not speak well of architects' academic rigor; however, it clearly points to the architecture magazines as a way of reaching the architects.

Variable D-5, which proposes continuing education programs for architects received a mean rating of 4.2 (sd=.90) from the entire sample. It was rated 4.5 (sd=.63) by the high receptivity group and 3.8 (sd=1.11) by the low receptivity group, a difference which the Duncan test proved to be statistically significant.

One state requires architects to take a minimum of continuing professional education credits in order to maintain

registration. It is unclear from this data whether the respondents were interested in EBR courses for credits or for professional development. Either way, it demonstrates that the respondents were interested in learning about EBR.

Variable D-7, calling for a new EBR journal written specifically for architects, was ranked fourth and received a mean rating of 3.9 (sd=1.20). The high rating received by this variable underscores the architects' affinity for journals, and indicates a preference for an informal format.

This new type of journal was suggested by Andrew Seidel (1980) as an approach to increase EBR utilization. Among the guidelines Seidel proposes, the journal would need EBR related articles written from an application-based approach, tied to specific design scenarios, and laden with illustrations.

Variable D-8 proposes the use of AIA handbooks and contract documents dealing with the use of EBR in design, and was rated 3.8 (sd=1.16) by the entire sample. It was surprising to find this variable ranked fifth, since it describes the translating and packaging of EBR being carried out under the auspices of the AIA. However, the respondents may not feel a need for contract documents, or they may have negative feelings about the way the AIA disseminates information, or they may feel that it would be too expensive. Although rated lower than expected, the 4.1 (sd=.93) rating by the high receptivity group and 3.5 (sd=1.24) rating by

the low receptivity group still indicate a preference for the packaging of EBR information and contracts.

Even more unexpected was the low ratings received by variable D-4. Since D-4 calls for increased EBR training in architecture schools, the rating of 3.7 (sd=1.05) was surprisingly low, given that in the propensity section the respondents strongly agreed that more emphasis was needed on behavioral factors in architectural education.

However, Seidel (1980) addressed the contention that increasing EBR education would be a panacea for the gap between research and practice. He points out that due to the scarcity of time and money, little client demand for EBR, and little organizational incentive to encourage EBR use, new EBR-trained architects would quickly learn the difference between what they learned in the academic world and what they use in the "real world" of professional practice. Perhaps the fact that changes in architecture schools would have little or no immediate effect on professional practices explains why this proposal was ranked sixth.

The four lowest rated communication methods share a common denominator; they are expensive. Variable D-10 calls for computer access to an EBR information retreival system, and received a mean rating of 3.6 (sd=1.27) from the entire sample. It is worth noting that in addition to the real utility of a computer, it is also a very fashionable symbol in the business world today. Respondents may have rated

variable D-10 highly, i.e., above 3.0, in order to avoid appearing like technological Cro-Magnons.

Conversely, the computer is a very expensive piece of equipment, which may partially explain why variable D-10 was ranked seventh. A third possibility is that the respondents were not familiar with computerized retrieval systems, as typically used in research libraries. This is quite likely, given Seidel's (1980) description of the methods of information retreival typically used by architects.

Variable D-3, proposed the use of professional EBR consultants, received a mean rating of 3.5 (sd=1.09) and was ranked eighth. Although expensive, the procedures for contracting with various consultants are already well established. In addition, Seidel (1980) points out that consulting firms provide the best organizational setting for producing applied research materials, since they do not need to fulfill traditional academic criteria or achieve publication in refereed journals.

However, Seidel also shows that architects feel little motivation to use EBR unless required to do so by clients or codes. He asked his sample of architects whether an architect could build respect among his colleagues by correctly anticipating the behaviors that will occur in the buildings he designs. Over half responded "no." This rejection of the very essence of behavior-based design diminishes even further the likelihood that architects would absorb the additional costs of EBR consultants.

The EBR agency described in variable D-2, was proposed by Merrill (1976) to be modelled after the agricultural extension service. Merrill reckoned that an EBR agency could provide behavioral information to designers free or at a low cost, and would alleviate the designer's complaint about the inaccessability of EBR. Seidel (1980) countered Merrill's proposal by saying that comparisons with agricultural extension agencies do not hold true, because unlike agricultural products, there is not a strong consumer demand for EBR. Additionally, Seidel argued that the extension service would be very costly, and would probably receive more use from other researchers than from practicing architects.

Still, it is doubtful that respondents considered the issue in such depth. It would seem that the extension service model meets the architect's need to contain costs and to obtain specific EBR information quickly and efficiently. Perhaps the respondents felt that the costs, however low, would be too much, or that a public agency would represent governmental meddling. Another explanation could be that architects simply do not want to allow any "outsider" to monitor their design decisions.

The respondents overwhelmingly disliked variable D-1, which proposed hiring new employees to act as "in-house" EBR translators. At first glance, this was a surprising result; having an "in-house" translator obviously eliminates the previously discussed difficulties of sub-contracting with

EBR consultants, and problems with EBR access and translation. However, the respondents' objection to this proposal quickly becomes obvious. Hiring any new employee is a difficult and multi-faceted decision. Hiring a new employee to translate EBR is even more difficult. Such a move would require a fundamental commitment by the firm to implementing a behavior-based approach to design. There is little in this or other studies to indicate that many architectural firms have made this commitment. In addition, hiring a new employee is a very expensive proposition, more than a computer, more than a consultant, and certainly more than a journal subscription.

An interesting question that arises is whether or not the respondents would have felt differently if the new employee could interpret and translate EBR in addition to the skills expected of an architect in professional practice. Another question is whether the respondents would pay more for such an employee. Unfortunately, these questions cannot be answered from this study.

Summary of Architects' EBR Communication Preferences

The first and most obvious observation is that the high and low receptivity groups ranked the EBR communication methods in almost the same order. Although ranked in a similar order, the Duncan multiple range test showed that the two groups differed significantly in their evaluation of six

of the ten communication methods. It was expected that the two groups would differ; the primary purpose of the index of receptivity was to partition the high and low receptivity groups. Therefore, it was surprising to find that the groups showed no significant difference in evaluating four of the ten methods. The responses of both groups were virtually identical for the highest rated method, EBR design guides, and the three lowest rated methods, EBR consultants, EBR extension service and EBR trained employees.

The respondents had an almost unanimous preference for the communication of EBR information in a design guide format. Design guides fit the time and cost constraints common in architectural practice, and architects are already familiar with this format. However, as previously discussed, many problems hamper their production.

In looking for trends among the EBR comunication preferences, it seems that Seidel's (1980) conclusion held true; architects are resistant to changes in professional procedure, therefore, communication attempts should follow formats that are already known and accepted.

Thus it follows that the preferences seem to be ranked in a decending order of degree of format change. Additionally, cost seems to be an organizing factor. As a result, the top three preferences for EBR communication involve low cost and existing formats: EBR design guides, EBR in architectural journals, and EBR continuing education courses. The next

three highest rates communication methods involve low cost, with slight changes in existing formats: EBR in a new type of journal, AIA documents and contracts, and increased emphasis on EBR in architecture schools. Finally, the four lowest rated methods involve higher costs and more significant changes in professional procedure: Computer retreival of EBR information, EBR consultants, and new EBR trained employees.

Predicting EBR Receptivity by Descriptive Profile

Survey respondents were asked to provide demographic data about themselves and their work settings. The purpose of obtaining this information was to develop a descriptive profile of those architects judged to be receptive to EBR.

Multiple regression analysis was used to examine the relationships between scores on the index of receptivity and the demographic and descriptive variables. The purpose of this analysis was to establish a multivariate model that would allow for the prediction of high receptivity scores based on descriptive variables such as age, size of firm, type of projects, etc. Researchers interested in the application of their work could use this model in targeting potential consumers of EBR.

It was hoped that the product of the multiple regression analyses would be a profile of the highly receptive architect, e.g., 30-35 years old, 10 years experience, principal

of firm with five design professionals, specializing in medical and institutional work, etc. Unfortunately, the results of this analysis were inconclusive. No single, logical model was discovered to reliably and accurately predict a substantial amount of the variance in receptivity scores. None of the descriptive variable groupings stood out as significant predictors of receptivity to EBR , as measured by this study. As shown in the previous chapter, a maximum of 13 percent of the variance could be explained by the descriptive variables. The lack of a predictive link could mean that the index of receptivity is not truly measuring receptivity after all. It could also be that the key to predicting EBR receptivity depends on factors more complex and more personal that simple demographics.

As previously discussed in the development of the survey instrument, measures such as personality indices were considered for the descriptive profile. However, no personality scales were found that were appropriate for inclusion in this study; the measures were too long and too personal for use in an unsolicited mail survey.

Anecdotal Data

The respondents were not asked for additional comments, however some people wrote bits of their opinions in the margins. Although this data is not scientifically gathered, it does give some insight into the opinions that some of the respondents hold toward EBR.

The comments ranged from "glad to be of assistance" to "I think this questionnaire is stupid."

Some of the respondents seemed hostile toward the EBR bias of the survey. One respondent apparently felt that EBR represented over-specialization in architecture, and wrote "Specialization substantially reduces the value of a design professional to small and medium sized firms. Professionals unable or unwilling to attain reasonable proficiency in all phases of architectural practice are not accepted by this firm."

Another respondent actually seemed threatened by the survey, and included little comments challenging the validity of the survey items. One of the items in the awareness component is "behavioral issues in school design." The respondent marked the number "1", indicating that he was "not very familiar" with the topic. However, he also wrote in the margins that "we design schools, (award winners, too!)" Another awareness item lists "behavioral issues in public housing design." The same respondent again marked "1", and then included the note that "we have done over 1200 units." In the utility component, one of the items states, "Efficiency apartments are undesireable for the elderly because they often create confusion about the function of spaces." Again, the respondent marked "1", and then asked, "If so, why did two projects we did work so well and be liked by the clients?" In this respondent's case, the EBR findings

seemed to clash with his professional experience. Unfortunately, architects are designing buildings everyday that are intended to support complex behavioral interactions, and doing so based only on their own experience.

Another respondent, either motivated by time constraints or laziness or both, did not mark any of the boxes, but he wrote "In designing any facility, I should think that any information about the users would be useful...as long as it doesn't take too long to read!"

One respondent was already convinced of the value of EBR, and asked "Isn't it obvious that all of these statements are of great importance in the design of housing for the elderly?" Another respondent was not so sure, and wrote "I tend to be skeptical of the status of information of this sort as 'fact'."

The comments of some of the respondents demonstrated that there are architects in practice who are receptive to EBR. One respondent recommended "Results of this survey should be published in professional journals (AIA Journal, P.A., A.R., etc.)." Another respondent emphatically stated "Behavioral research is important. And it's useless if we practitioners cannot get to it so that findings can be used. Publish! Publish! Publish! Publish! Everywhere!"

Finally another respondent echoed the call for more EBR, and in a short note described the very basis of the behavioral-based approach to design. "Emphasis on design for be-

havioral factors is certainly missing in most architecture schools in this country. I am convinced that this must be made an inseparable part of every school curriculum. Architecture as art has its place, but let's face it, we are primarily designing buildings for people--to accommodate them, not to impress them."

Study Limitations and Recommendations for Further Study

As with any study, limitations become obvious during the course of the project. For this study, the problems that arose were not significant enough to impede the purpose of the project. However, certain limitations warrant discussion.

In the awareness component, respondents seemed to substitute recognition for familiarity with the items. Although these results could not have been anticipated, future studies might employ a different method, such as interviewing, to determine architects' awareness of EBR and related topics.

In the propensity component, several problems became evident after the study. First, the reversal of some of the item polarities was not entirely successful. This was done in an attempt to avoid "response set," but as discussed previously, simply changing a word or two does not automatically reverse the entire meaning of a phrase. Secondly, most of the propensity items required a previous knowledge of the

workings of EBR in order to respond. This probably contributed to the fact that the propensity ratings were very near the midpoint, thus indicating no strong opinions in either direction. The measurement of attitudes toward EBR is a complex subject, and would probably be best achieved through in-depth interviews. The probing and subsequent qualifying of opinions would result in a clearer understanding of architects' attitudes toward EBR.

Related to the above mentioned limitations is an overall question of sampling. As mentioned, the architects in this study tended to be unfamiliar with EBR and as a result, did not maintain strong opinions about it. A stratified sample of architects already familiar with EBR might reveal more substantial findings. A sample of this type might be obtained by cross-referencing architects who belong to both the AIA and EDRA.

In the descriptive profile, only one question caused problems. Respondents were asked to indicate their area of professional specialization by marking one of the following: research, programming, design, production, client contact, or other. However, more than half of the respondents marked more than one speciality. While this is probably an accurate statement of their duties, it rendered their responses useless. Future studies could avoid this by having the respondents rank their specialities.

Although no predictive model of receptivity was discovered, a different sample, particularly a stratified sample of EBR users, might yield different results. In using such a stratified sample, interviews might provide a better method of data gathering than surveys. An interview format would also allow the use of personality scales, as previously discussed.

Conclusions

In review, the survey results appear somewhat contradictory in several instances. For example, the results of the awareness component indicate that architects are not very familiar with EBR. However, the responses in the utility component show the architects to be very much convinced of the usefulness of EBR. In the propensity component, respondents tended to hold a neutral position. When presented with a list of EBR communication methods, the positive feelings demonstrated in the utility section seemed tempered by the realities of time and budget constraints. Architects seem to be saying that although they are not familiar with EBR, it seems to be a useful design tool--as long as it is easy to use and doesn't cost too much. This is an understandable position. Presented with the notion of changing his design methodology to incorporate the use of EBR, an architect might easily rationalize that the profession has survived to date without EBR. He might also add that he

never heard of EBR in school or in practice, that he has a successful career, has gained respect and recognition from peers and clients, and that he has accomplished it all without EBR. Besides, he might reckon, a "good" designer always takes the user into account anyway. Despite the arguments of the proponents of EBR, the above mentioned architect does have a point. Architects cannot be expected to restructure their perceptions of the design process half-way through successful careers, simply because some academic types think they have a better way. If the architects are successful, it's because they have learned to manage time and budget restrictions, manage the design and building processes, and still turn a profit. If the use of EBR represents potentially better buildings, but with a decline in profits, business instincts will rule out EBR.

Additionally, suggesting a new method of design is bound to intimidate some architects, regardless of its expense. One of the most alluring aspects of the architectural profession is the opportunity to create on a heroic scale; it is a powerful experience to have a design realized in physical form. Because of the explicit and systematic methodology of the behavior-based approach to design, architects might fear the loss of their discretionary powers. Certainly no architect wants to be scolded for the unscientific nature of his leaps of insight.

This is not to say that architects are evil or stupid. Who would willingly change the very foundation of his career? Who thinks badly of his own designs? Who wants to lose power, or money, or both?

Not many people, architects or otherwise, would be receptive to such major changes. Architects have shown in the utility component and in other studies, (Merrill 1976, SOM 1978, Seidel 1980), that they are receptive to EBR information and that they are interested in making their buildings work better for the users. Therefore, researchers need to understand that architects are not blind to new opportunties to improve their designs. However, the use of solar design, computer drafting, or any other new approach is a risk, and as such, must fit within the restrictions of professional and business practices.

Persons interested in the utilization of EBR in design must demonstrate that it is a useful tool for improving the quality of buildings, and that it can be used without a substantial loss of income or control.

Since the status quo of the architectural profession does not require the use of EBR, the onus of application clearly falls to the researchers. However, researchers could also claim that the status quo of their profession will continue without efforts at application.

This demonstrates the dilemma in the application of EBR in design. Researchers cannot be expected to change the ba-

sis of their careers, either. Although architects say they would use EBR if it were in a design guide format, researchers say that their job is to produce research, not design guides.

Apparently, neither architects nor researchers feel directly responsible for the translation of EBR findings into forms that are useable by architects. Perhaps architecture schools could develop specific programs of study for training EBR translators. Creating programs that develops fluency in both architectural and research languages seems like the next logical step in addressing the issue of translation. According to Seidel (1981), the number of architecture schools that offer design studios using EBR is increasing. In addition, the architects in this study and in Merrill's (1976) study favor increased emphasis on behavioral factors in architectural schools. In creating a new role of EBR translators, the increased emphasis on EBR in architectural schools will likely result in future practitioners who are more receptive to using EBR. The final result would be an improved product--EBR translations, and an improved market--future practitioners.

The architects in this study clearly demonstrated a desire for EBR information in a design guide format. Both this study and Seidel's (1980) study show that architects prefer architectural journals as a communication method, and in fact, consider them a primary information base. A logic-

al outgrowth of these findings would be the publishing of EBR articles and design guidelines in architectural journals. Just as most architectural journals have a monthly installment of technical and legal information, EBR information could also be presented in a regular monthly department. This approach would hasten the translation of EBR into the design guide format most preferred by architects, remedy the problems of access and readability, and do so at no additional cost to the architect.

As time goes on, and as more EBR is translated into useable forms, additional steps could be taken to implement other communication methods that were preferred by the architects in this study. Continuing education programs were ranked third, and could provide a means to educate those architects who were not exposed to EBR in college. A new EBR journal, AIA contracts, computerized EBR retreival systems, etc., could all follow if the first steps were successful.

As EBR is emphasized in more architectural schools, the eventual result will be an increased consciousness of behavior-based design. A parallel rise in awareness will occur among the public, i.e., clients. As building costs rise, and as more and more clients discover that in fact the majority of the architectural profession is not acting on the best available information, consumer demand for change will surely increase.

Given a demonstration of dollar loss, clients will add to the impetus to use EBR in design. It may start as a demonstration of decreased vandalism in schools, or decreased crime in housing projects, or decreased absenteeism in offices, but as more clients use the behavior-based programming-design-evaluation process to maximize comfort, satisfaction and efficiency, others will follow.

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Appendix A

COVER LETTER

KSU
KANSAS STATE UNIVERSITY

Department of Architecture

College of Architecture and Design
Seaton Hall
Manhattan, Kansas 66506
913 532 5953

June 20, 1983

Dear Colleague:

This survey is being conducted through the Department of Architecture at Kansas State University, as part of a study designed to determine how behavioral research may better meet the needs of architects.

Establishing a functional relationship between behavioral research and architectural practice is a growing concern in our profession. In order to do so, it is important that the researcher understand what types of information the architect needs. It is only from registered architects like yourself that this information can be obtained.

Your name was randomly selected from the membership roles of the American Institute of Architects. Since we are contacting only a small number of architects, your response is particularly important. You can be assured of the complete confidentiality of your responses.

Whether you have employed behavioral research or not your responses will greatly aid in the development of better research products and programs, for the benefit of the architectural profession. Would you please take a few minutes to complete the enclosed questionnaire and return it to us at your earliest convenience? A postage-paid return envelope has been provided for your convenience.

Thank you for your kind cooperation.

Sincerely,

Eugene Kremer

Eugene Kremer, AIA
Head, Department of Architecture

Frederick J. Schmidt

Frederick J. Schmidt
Project Director

ck

MAILING ENVELOPES

Department of Architecture
College of Architecture and Design
Manhattan, Kansas 66506
Attn: Fred Schmidt

USA 20c

ROBERT M. GORLOW AIA
138-D ESCONDIDO
STANFORD, CALIFORNIA
94305

USA 20c

Department of Architecture
College of Architecture and Design
Manhattan, Kansas 66506
Attn: Fred Schmidt

SURVEY INSTRUMENT

Page 1

INTRODUCTION

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

Try to answer the questions on the basis of your first reading. Any comments you wish to add will be greatly appreciated. Please respond to each item and return the completed questionnaire in the enclosed postage paid envelope.

1 The items listed in this section include ideas, books, organizations and people that are associated in some way with the field of environment-behavior research. Indicate your level of familiarity with each item by marking the appropriate boxes on the left. Please respond to each item.

NOT VERY FAMILIAR				VERY FAMILIAR	
1	2	3	4	5	A) ecological psychology
1	2	3	4	5	B) Christopher Alexander
1	2	3	4	5	C) E.D.R.A. (Environmental Design Research Association)
1	2	3	4	5	D) C. M. Deasy
1	2	3	4	5	E) A.I.A. Research Corporation
1	2	3	4	5	F) Progressive Architecture Research Awards
1	2	3	4	5	G) Clare Cooper Marcus
1	2	3	4	5	H) barrier free design
1	2	3	4	5	I) Coolfont Model
1	2	3	4	5	J) Edward Hall
1	2	3	4	5	K) Personal Space
1	2	3	4	5	L) behavior based design programming
1	2	3	4	5	M) Leon Pastalan
1	2	3	4	5	N) design for the elderly
1	2	3	4	5	O) Oscar Newman
1	2	3	4	5	P) behavioral issues in school design
1	2	3	4	5	Q) Kevin Lynch
1	2	3	4	5	R) behavior based post occupancy evaluations
1	2	3	4	5	S) architectural legibility and wayfinding
1	2	3	4	5	T) Henry Sanoff
1	2	3	4	5	U) Caudill Rowlett Scott
1	2	3	4	5	V) behavioral issues in public housing design
1	2	3	4	5	W) A Pattern Language
1	2	3	4	5	X) John Zeisel
1	2	3	4	5	Y) Ezra Eherencrantz
1	2	3	4	5	Z) behavioral issues in health care design

SURVEY INSTRUMENT

Page 2

2 Listed in this section is a sampling of actual research findings available for one population group: The elderly. Similar information is available for other groups. Assume for a moment that you are writing an architectural design program for a retirement housing project and mark the box at the left of each statement that best indicates how useful you think the information would be to you in such a task.

NOT VERY USEFUL				VERY USEFUL		
1	2	3	4	5	A)	As hearing and vision decline, the older person depends increasingly on his sense of touch.
1	2	3	4	5	B)	A lounge should be provided adjacent to dining areas to allow for socializing while awaiting meals.
1	2	3	4	5	C)	Older persons dislike larger, open spaces.
1	2	3	4	5	D)	Limitations in health, skills and other resources leave a person more vulnerable to environmental constraints.
1	2	3	4	5	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	F)	An optimal life space for the aged should allow the person to select his own combination of privacy and involvement with social groups.
1	2	3	4	5	G)	It is recommended that walks designed for the elderly have resting places no more than 150 feet apart.
1	2	3	4	5	H)	Efficiency apartments are undesirable for the elderly because they often create confusion about the functions of spaces.
1	2	3	4	5	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	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	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	L)	Colors tend to appear faded to the older person, particularly cool shades of blue and green.
1	2	3	4	5	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	N)	It is more difficult for an 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	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	P)	The elderly reduce their attention to the environment because the previously automatic movements of eating and walking need to be watched.

SURVEY INSTRUMENT

Page 3

3 Listed here are some statements about environment-behavior research and design. Mark the box which best indicates the degree to which you agree with each of the following statements.

STRONGLY DISAGREE	1	2	3	4	5	STRONGLY AGREE A) The form in which behavioral research findings are presented is overly wordy and full of jargon.
	1	2	3	4	5	B) Government codes and regulations allow the designer the latitude to apply behavioral research findings.
	1	2	3	4	5	C) 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	D) Behavioral research is of marginal importance since the designer can generally do an adequate job if interpreting user needs for himself.
	1	2	3	4	5	E) Clients see the point of using behavioral research.
	1	2	3	4	5	F) Behavioral research costs too much considering what it has to offer.
	1	2	3	4	5	G) Behavioral information is readily available to the architect.
	1	2	3	4	5	H) There should be more emphasis on behavioral factors during architectural education.

4 There have been many proposals for increasing the communication of environment-behavior research (EBR) information to designers. Some proposed communication methods are listed below. Indicate your level of preference for each item by marking the appropriate box. Please respond to each item.

NOT VERY PREFERABLE				VERY PREFERABLE	
1	2	3	4	5	A) Hiring new, specifically trained employees to act as "in-house" EBR translators.
1	2	3	4	5	B) Public or privately funded EBR service agency, providing cost consulting and information dissemination.
1	2	3	4	5	C) Professional behavioral consultants, subcontracted for specific projects.
1	2	3	4	5	D) Changes in architectural school training with increased emphasis on design for behavioral factors.
1	2	3	4	5	E) Continuing education programs for practicing architects, such as short courses, workshops, and conferences.
1	2	3	4	5	F) EBR information published in architectural journals.
1	2	3	4	5	G) EBR information in a new journal written specifically for architects, not researchers.
1	2	3	4	5	H) A.I.A. handbooks, supplements and contract documents dealing with EBR use in design.
1	2	3	4	5	I) Design guide books with EBR information organized by building type.
1	2	3	4	5	J) Computer access to EBR information retrieval system.

SURVEY INSTRUMENT

Page 4

5 Please fill in the following background information.

1) Age _____

2) Gender _____

3) Professional Training: Degree ____ Year ____ School _____
Degree ____ Year ____ School _____

4) Years in professional practice _____

5) Position: Principal _____ Associate _____ Employee _____ Other _____

6) Primary area of professional specialization (check one):
_____ Research (not project related)
_____ Programming
_____ Design
_____ Production/Supervision
_____ Client contact
_____ Other

7) Number of design professionals in firm _____

8) Type of organizational setting:
_____ Private professional architectural practice
_____ Public agency
_____ Commercial/Manufacturing
_____ Educational/Teaching

9) Type(s) of projects undertaken by firm: _____
_____
_____

Please return this questionnaire in the envelope provided as soon as possible.
Thank you.

THE PREFERENCES OF PRACTICING ARCHITECTS FOR THE COMMUNICATION OF ENVIRONMENT BEHAVIOR RESEARCH INFORMATION IN DESIGN

by

FREDERICK JAMES SCHMIDT

B. Arch., Kansas State University, 1980

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF ARCHITECTURE

Department of Architecture

KANSAS STATE UNIVERSITY
Manhattan, Kansas

1984

ABSTRACT

The last twenty years have seen the rapid development of a new field of study, environment-behavior research (EBR). Through research in a wide variety of disciplines, a large body of information has been accumulated dealing with the interaction of the physical environment and human behavior. Despite the development of the field of EBR, buildings are rarely designed in concert with this information. The result has been the identification of "the application gap"--the non-utilization of EBR findings by practicing architects.

Using survey research on a nationwide sample of practicing architects, this study addresses the issue of the application gap by gathering descriptive data concerning architects' attitudes toward EBR. A survey instrument was developed to measure the architects' awareness of EBR, perception of its utility, and attitudes toward its use in design. These assessments were combined to construct an index measuring the architects' overall receptivity to the use of EBR in design. The scores on the index were used to partition the most receptive group from the rest of the sample. Respondents were also asked to rate ten EBR communication formats that have been proposed in the literature on the ap-

plication gap. The EBR communication formats preferred by those practicing architects judged to be most receptive to the use of EBR in design are thereby identified. These include EBR design guidelines, EBR-related articles published in architectural journals, continuing education programs in EBR for architects, and increased emphasis on behavioral factors in design during architectural school training.