

Philip Thiel

Person — Environment Relations

**Professional Intentions and Public Results,
and What Might be Done to Reduce
the Differences**

If, as has often been claimed, Architecture is “the mother of the arts”, then by the same token Psychology may well be “the father of the (behavioral) sciences”, and it is by now (pleasantly or painfully) obvious to (most) all that the innocent dalliance of these two over the past decade has taken a very serious turn; and indeed has passed well beyond the point of any possibility for a therapeutic abortion.¹ “Environmental psychology” (perhaps the most common name of the several applied to this variously received offspring²) is now an undeniable fact of life. The professional schools of environmental planning and design — as the socially institutionalized purveyors of expertise in the practice of the (“social”) art and the (“man is the measure”) science of intervening in the physical environment for experiential purposes, and especially as one of the means for the advancement of this art and science—have no choice but to acknowledge the issue of this academic and professional miscegenation by legitimizing it in their curricula and programs.

But our institutional awareness of the existence of this innocent child of love ranges from blissful ignorance through horror-struck suspicion to comprehensive cognizance, with corresponding institutional recognition running the gamut from smug indifference through timid tokenism to enthusiastic exploitation.³ To change the metaphor and put the matter another way, these varied responses illustrate the several ways the environmental design professions and their established schools are coping with the general paradigm-shift (Eberhard, 1970) that has gradually overtaken them; and as such these attitudes are only one manifestation of the crises of adaptation they continue to encounter at increasingly shorter intervals.

Under the current conditions of accelerating change, the ability of these professions and their schools to deflect the juggernaut of institutional inertia from its accustomed rut, and to thus more ef-

fectively implement their leadership role vis-à-vis the public, the practitioners, and the students they presume to serve, becomes a matter of major concern and the first priority. The point of this paper is to assist in this effort of adaptation by suggesting, implicitly or explicitly, how by closing the comprehension gap between the environmental arts and the behavioral sciences we may reduce the performance gap between our professional intentions and our public results. The latter deficiency may be seen as due to problems in five distinct but closely-related areas: those of service evaluation, user empathy, student education, simulation effectiveness, and environmental management; and a brief discussion of each of these problem areas now follows.

five problems

The Service Evaluation Problem. Design students may be forgiven if under the pressure of assimilating their craft they confuse the means for the ends and consider reality to be their drawings rather than that which the drawings represent. But when practitioners fall into the same trap and confuse the physical manifestations of their professional services as the point of their whole operation, too much is asked of our charity. As Bill Wurster, former dean at Berkeley was fond of pointing out, "the building is only the frame—the picture is life". Although Sommer (1973) suggests that the self-congratulatory public award procedures and ceremonies of the design professions do serve a useful purpose by calling attention to some environmental issues (as well as to "non-advertising" professionals), the essential criteria for the evaluation of an environmental design can only be in terms of the users in that environment; to which the institutional awards unfortunately have no reference. This continuing emphasis on peer-ratings of the chiefly aesthetic aspects of a hypothetical *means* (as usually represented in artistic, atypical photographs) for the achievement of an end—rather than on the social, experiential results actually achieved—suggests the nature of our deficiency problem in service evaluation capability.⁴

The User Empathy Problem. In commenting on the "life-style of an architect" Marlin (1974) expresses the traditional view of the social nature of architecture by noting that, "For one thing, there are all those *people* to meet, and get to know, and entertain, and get work from." And so there are, but they are only the tip of the social iceberg. The "client" who builds or pays for a new environment is today hardly the same "client" who lives or works or studies or plays or travels or recovers in that same environment (Madge,

1968; Zeisel, 1975); and if, as suggested in the preceding paragraph, the responses of these latter clients are the real point of it all, because of the significant differences in life styles, values, and environmental attitudes that may exist between the users of a new environment and the designers of that environment, we recognize a crucial empathy gap.

This is not to say that a close "fit" between the environment and a user-group is the ultimate desideratum; in view of the inevitable changes in the nature and composition of user-groups a close fit may not be possible, and because of the low criticality of architecture it may not be necessary, or even desirable (Rapoport, 1969; Tuau, 1964-65). But the sufficient and necessary condition is that the environment should offer its users what *they* can perceive to be desirable options in alternate constructs of person-environment relationships. This view of the goal of professional service minimizes the usefulness of practising in the role of either the "social operator" or "social prescriber", and emphasizes that of the "co-learner" (Lerup, 1973; Grant, 1975; Sprague, 1972). The key to this mode is user-empathy, which obviously depends on the development of direct and indirect instruments and procedures to provide a better understanding and appreciation of the nature of user perceptions, values, and attitudes.

The Student Education Problem. For the same reason that environmental designers have been designing for their own peer group (instead of the actual users of the designed environment), the students in design schools are trained, in the traditional case-study method, to design for their professors (instead of user-group analogues). Students inevitably present their work to a jury of just the faculty, and only exceptionally to representatives of even the authorities or the investors.

This procedure perpetuates (and perpetrates) the model of the design professional as a social operator or social prescriber in which the user-client is dominated by, or subordinate to, the expert. In this view, "Design process as practised is an elaborate and sophisticated skill capable of synthesizing unusually large numbers of variables into a hypothesis to be tested by evaluation of the designer, then recycled for another try," in which the designer should be able to assimilate contributions from the new body of behavioral data. Under these circumstances the way the social sciences can contribute to the process is thought to be by providing "defensible generalizations about human behavior in architectural contexts", generalizations based on data derived from complex and novel con-

ditions whose implications can "be connected by a series of simple logical steps to canonical, or generally accepted knowledge" which those in the field can use and build on.⁵

This attitude reflects the technological approach of proceeding by an accumulation of fragments, in which a premium is put on certainty based on reference to the past. But Stringer (1970) points out that "There seems to be no great value in arriving at a formulation of man's processes which is based on the past and only attempts to predict and control in a mechanistic way the familiar bits of behavior which have been pinned down," and suggests that the imposition of certainties is a comfortable ploy to avoid involvement with the user. The alternative and altruistic view — of the purpose of designed environments as a "convivial" means of providing the users with an opportunity and an option to reconstrue the world, and thus change themselves⁶ — quite obviously requires a very different sort of professional relationship with the user, and thus a use of the social sciences in design education subtly but significantly different from their use just as a source of additional bits of data to be "synthesized" along with those on I-beam spans, plumbing code requirements, and the "scale relationships of the building masses".

The Simulation Effectiveness Problem. The essence of the whole process of environmental planning, design, and management exists in terms of the evocation, elaboration, and evaluation of alternative courses of possible action. And the essence of all this evocation, elaboration, and evaluation is the use of simulation of "what might be" for internal communications within a given individual and for external communication between a wide range of individuals, for many different purposes at each of the many stages of the process. Simulation, and the consequent response thereto, are the opposite sides of the same coin; and that coin is the *only* medium of exchange in a social process of environmental intervention.⁷

Thus the remarks of Moore (1969) are much to the point:

If we architects wonder whether we are sufficiently outmoded in a rapidly changing world to be in danger of immediate replacement, we might get a partial answer from an examination of the language we speak, the techniques we employ. Clearly, anything we have to say is going to be limited by the language we have to say it in; and almost as clearly, the major change in architect's language thus far in the twentieth century has been the replacement of Chinese ink with India ink. The limitations of any product describable entirely in cut pieces of cardboard (which is used in most schools of archi-

ecture in lieu of India ink) are so dramatically narrow that I don't need to belabor them.

Our techniques limit what we do, in the same way that any language limits what we think about. Our techniques also describe, by default, our goals...

We architects are in desperate need of a language which can describe and respond to these complexities of (human) use.

The Environmental Management Problem. Part of the "form-giver" syndrome is the "pearls-before-swine" response to the public's misuse or non-appreciation of the product. But this situation only points up the inappropriateness of the notion that the process of intervening in the physical environment for social purposes ends with the delivery of an environmental product.⁸ Even if an operating manual is provided, or if a training program is available for the users, one recognizes the fact that, characteristically in our time, the needs and values and behaviors of the users will change, and the purpose of the designed environment will shift. The prevailing situation of necessity is one of *ad hoc* response to constant change.⁹

The implications here extend in two directions. Institutionally, there is the matter of environmental management: a new professional role in which existing environments are operated in real time, to maximize their support of social programs.¹⁰ Individually there is the matter of environmental competence, concerned with the ability of various categories of users to derive the most value from their presence in the existing environment. Because such a relatively small percentage of the existing environment is recycled by design each year, and because the ultimate criterion of environmental experience is the quality of that experience, the potential contribution to human welfare of even a small improvement in the quality of environmental management, and in the degree of environmental competence, far exceeds that of even a quantum change in the quality of environmental design. Do the professional schools of environmental planning and design have any responsibilities in these areas?

a program in person-environment relations

The significance of a program in person-environment relations to a school of environmental design (taken here to include collegiate curricula in interior, building, landscape, urban and civic design, and city and regional planning) becomes apparent when it is realized that it makes explicit, and operational, what we now recognize

Table 1

Levels of PER Competence Matched to Goals and Roles		
Level of PER Competence	Educational Goals	Career Roles
Level I <i>Acquaintance</i> know it exists, and what it is: be aware of approximate relationships to field	undergraduate liberal arts degree	informed layperson
Level II <i>Familiarity</i> know jargon, how to use consultants; understand capabilities and limitations	undergraduate design-studies degree	para-professional, writer/critic, school teacher
Level III <i>Proficiency</i> be skilled in use under supervision: or be informed as to principles, processes, and/or state of the art	graduate-level environment-related professional degree	built-space/natural resource/recreation/transportation planning/management professional
	professional planning/design degree	planning/design practitioner
Level IV <i>Mastery</i> be skilled in use without supervision; or have expert knowledge of principles and processes and/or state of the art	PER specialist degree	professional PER consultant
Level V <i>Expertise</i> have extensive skill and knowledge, including a demonstrated capacity to innovate	research and/or teaching	researcher and/or educator

as the implicit, pragmatic basis of any such school. Any environmental plan or act of management is essentially a *behavioral-experiential hypothesis*, proposed in the context of a dynamic socio-cultural ethos, and subject to ultimate judgment in those terms and in that context. By serving to clarify the de facto ends-means relationships of all the school's programs and activities, the person-environment relations program provides an orienting and integrating function for both students and faculty.

For that reason, at this point it would appear worthwhile to risk presumption and sketch out the form of a comprehensive program in person-environmental relations appropriate to such a collegiate school. This tentative "model" might then serve as a check-list for the development of a particular program, and as a reference for the comparison of different programs.¹¹

The specification of any program in person-environment relations must take into account that it will probably be required to serve a variety of students in a number of ways. Thus, the students may be expected to include both undergraduates and graduates, and to elect both professional and non-professional careers, as well as to play both traditional and non-traditional roles within those careers. In view of this it seems desirable to identify a scale of levels of competence in person-environment relations, and to match specific types of goals and roles to each of these levels. Table 1 presents such a scale and matching.¹²

Given this mapping of successively more demanding careers in PER, we may next identify a parallel sequenced program of PER Core Courses (and their prerequisites) required to provide the increasing degrees of competence appropriate to each level. This structure is presented in Table 2, and a short "catalogue" description and further explanation of each PER course follows.

a calendar catalogue of courses person-environment relations

PER 100 *Environmental Competence*

"Individual and group exercises and problem-solving directed toward the enhancement of awareness of the immediate environment and its personal impact; and to the development of ability to use or adapt environmental settings to achieve personal goals or effectiveness without detriment to the environment and to the effectiveness of others."

Table 2

Sequenced Core Program in PER, with Prerequisites		
Level of PER Competence	Prerequisites	PER Core Program
Level I <i>Acquaintance</i>	introductory courses in cultural anthropology and social geography	PER 100 Environmental Competence PER 200 Theories and Philosophies of PER
Level II <i>Familiarity</i>	Level I, plus introductory courses in psychology and sociology; and in "basic design"*	PER 300 Environmental Perception and Personality PER 301 Sociological Functions of Environmental Form PER 302 Psychological Functions of Environmental Form
Level III <i>Proficiency</i>	Level II, plus courses in techniques of environmental representation**	PER 400 Introduction to Quantitative Methods in PER PER 401 Introductory PER Design/Research PER 402 Intermediate PER Design/Research
Level IV <i>Mastery</i>	Level III, plus advanced courses in psychology and sociology.	PER 500 Advanced Quantitative Methods in PER PER 501 Advanced PER Design/Research PER 502 Advanced Topics in PER
Level V <i>Expertise</i>	Level IV, plus courses in collateral subjects as required	PER 600 Special Topics in PER

*By a course in "basic design" is meant a one-year studio and laboratory program of lectures, readings, and synthesizing exercises involving the substantive subjects of functional space systems, human physiology and natural energy systems, the expressive and significant aspects of perceptual form, and structural-material systems as the parameters in an objectified decision-making process.

**In addition to the usual programs in two-dimensional orthographic and perspective drawing, in freehand sketching and rendering, and photography, courses in these techniques should include the three-dimensional mode of scale modeling; and the four-dimensional modes of sequence, notation, gaming, computer animation, cinema, and television.

The pioneering papers by Boutourline (1970) and Steele (1970) present a discussion of the concepts and issues, and suggest procedures and techniques by means of which such a course may be implemented. See also Halprin (1969), Group for Environmental Education (1970, 1971), Lynch (1976), Wurman (1972), Sommer (1969, 1972, 1974), and Sanoff (1975).

*PER 200 Theories and Philosophies of
Person-Environment Relations*

“An introduction to a cross-cultural consideration of past, present, possible, and preferable relationships of people to environments; with reference to world and cosmological views and their implications.”

The entire cultural fabric of a society structures the ways in which its members will view and interact with their environment. Foremost among the elements of a society's culture stand its world view and/or its cosmological model. Indeed, Rapoport (1969) suggests that these determinants are much more important than those of materials, climate, and other such physical factors. These usually implicit views and models provide a holistic embodiment of that culture, often delineating goals and prescribing or proscribing activities related to the attainment of its utopian patterns.

A world-view underlies the development of every society. We cannot be sure that ours is correct, best, or even effective. To do so, to set aside other avenues of investigation, may well lead us to a dead-end of specialization analogous to that of those finely-equipped species referred to by Loren Eiseley, Tielhard de Chardin, and others.

We have good reason for choosing not to specialize in the application techniques of one set of values, in deference to an understanding of the numerous world-views and their consequences with which we co-exist on our world. Our ecological system shows no future except disaster, and choosing to persist in development along our present track may well prove our undoing, and that of all the world as well. We have no monopoly on effective utopian schemes, intelligence, or techniques.

The most suitable instructor for this course would be one whose specialization centers on a broad understanding of several cultures and their relationships between people and environment. This faculty person could offer a cultural overview, and provide a perspective of professional viewpoints within our culture and on the

methodologies employed by the various schools of thought within the social science disciplines.

PER 300 Environmental Perception and Personality

“An introduction to the process of perception, with special reference to the everyday environment, and to the individual characteristics which determine and qualify its perception.”

Perception is the link between the “objective” physical environment and the “subjective” effective environment, and an understanding of the variations in human attitudes and responses to the environment depend on a knowledge of this link. Individual differences in environmental perceptual style and disposition may be accounted for in terms of a hierarchical series of factors ranging from the physical nature and immediate condition of the sensory systems and mobile body structure, through individual histories of cultural conditioning and occupational learning, to intrinsic long-term need states and extrinsic short-term role and situational conditions. Primary references for such a course are the well-known writings of such people as James Gibson, Edward Hall, Leon Pastalan, J.S. Bruner and Abraham Maslow, with more recent contributions by George McKechnie and the present writer.

PER 301 Sociological Functions of Environmental Form

PER 302 Psychological Functions of Environmental Form

“An introduction to the sociological and psychological functions of environmental form, and to the work of the social sciences in explicating person-environment relationships. Lectures, readings, seminars, and exercises in the use of common empirical methodology in examination of selected issues.”

The nature, significance, and extent of the two-way transactions between individuals and groups of people and their physical environment tend to remain obscure because of the all-pervading nature of that environment. In the same way that a fish has trouble in discovering water, it is similarly difficult for us to become aware of our interdependence with our own also “invisible” environment. These courses propose to overcome this “blindness” by introducing the student to the sociological and psychological functions of environmental form, and to an eclectic review of the approaches thereto of the social sciences.

Examples of environmental factors related to sociological issues occur in connection with

- A. The stages of the life cycle (environmental characteristics appropriate to each age and condition).
- B. Social class (environmental expression of values, attitudes).
- C. Interpersonal interaction (environmental facilitation or frustration of community and privacy).
- D. Social dysfunction (as related to public transportation, housing density, condition and type, segregation, and pollution).

In the case of environmental factors related to psychological issues there are

- A. The human needs for environmental predictability, security, variety, novelty, and challenge.
- B. The need for environmental representability and imageability.
- C. Problems of environmental overload or sensory deprivation.
- D. The use of the environment as a medium for public and private signification, symbolization, and aesthetic expression.

PER 400 *Introduction to Quantitative Methods in PER*

“An introduction to the definition, representation, scaling, measurement, and relating of socio-behavioral variables, in application to research design and decision-making in environmental design and evaluation.”

A schedule of topics would include:

- A. Organizing and characterizing socio-behavioral variables as information in design research. (Variable, constant, their relationships and representation, their definition through operational and multi-operational means).
- B. Introduction to measurement. Problems and principles of scaling and the relationships among scale types, with emphasis on the type of information transmitted by the attachment of numbers to events in different ways.

- C. Summary techniques for quantitative information. (Graphs and tables, summary descriptive statistics)
- D. The measurement and use of relationships between socio/behavioral variables. (Simple linear and non-parametric measures of correlation and association, some regression analysis)
- E. Introduction to research design. (Dependence and independence of variables, functions of experimental controls, randomization, and the role of analytic models in determining research procedures)

PER 401 *Introduction to PER Design/Research*

“The application of behavioral research, methods, and instruments in the planning, design, management, and diagnostic evaluation of environmental interventions for experiential purposes. Lectures, and field and laboratory case studies in a variety of simple settings.”

The intent of this course is to introduce the use of the behavioral research tools and methods of PER 400 in the iterative cycling of problem identification, solution hypothesization, solution simulation, and hypothesis evaluation, in environmental planning, design, and management. In all probability this would be best implemented by a team-teaching approach, combining the services of both a full-time social scientist and an environmental planner, designer, or manager.

The methodological approach of the behavioral research used here should be based on multiple operationism, or the use of “a collection of methods combined to avoid sharing the same weaknesses”.¹³ That is, the student should be introduced to the use of a variety of techniques in observation (as well as in the techniques of the questionnaire and the interview); the observation of actions, and the elicitation of feelings and thoughts.

Lectures and exercises in this course should involve the following topics:

- A. Behavioral research as an aid versus threat; and as process versus product. Applications of behavioral research to planning, design, and management.
- B. Definition of a research project’s potential audience and purpose, and of a research project’s operational goals and assumptions.

- C. Multiple operationism and the rationale for the triangulation of several imperfect methods versus single-measure research.
- D. The uses, methods, and limitations of archival research.
- E. Participant versus non-obtrusive observation. Systematic versus informal observation. Slice-of-time versus over-time observations. Coding methods, site location, and data analysis.
- F. Interview methods and information priorities. Number and method of selection of interviewees. Question series development and implementation of the interviews. Field notes and data analysis.
- G. Mass data methods and information priorities. Sample size and method of selection. Questionnaire development and implementation. Field notes, data coding, and data analysis.

PER 402 *Intermediate PER Design/Research*

“A continuation of PER 401, with the extension of field and laboratory case studies in behavioral programming, design hypothesization, form simulation, user response elicitation, and performance evaluation to a variety of more complex situations.”

Given some measure of familiarity with the methodology, the emphasis now can shift to a greater concern with the formulation of behavioral/experiential programs, multi-media simulations of design hypotheses, elicitation and analysis of user-analogue responses thereto, and field evaluations of built-design performance in terms of user responses and attitudes. The intention here is to transcend the usual hermetically-sealed “design atelier” routine devoted to the immaculate conceptions and aesthetic deceptions of peer-group presentations, by involving the student with the implicit behavioral assumptions and ultimate experiential legacies of any purposeful intervention in the physical environment.

A key component of this course is an emphasis on the development of familiarity with the process of simulation and response, beyond the conventional use of orthographic plans and perspective sketches by design professionals. As Craik (1970) categorizes the potentials, *response formats* include descriptive, global, inferential, attitudinal, and preferential types: and the *simulatees*, in addition to architects, planners, landscape architects, real estate developers and appraisers, and bankers, include such other special competence

groups as geographers, building and space managers, and natural resource managers; as well as such special user groups as elderly persons, migrant workers, college students, flood plain dwellers; groups formed on the basis of relevant personality measures; and the general public.

This activity implies and requires an innovative association of public and/or private clients, specific user-groups, and progressive professional personnel in a real-world interdisciplinary demonstration/research format.¹⁴ The students at the PER 402 level might be assigned as assistants to task forces engaged in on-going projects, and initially distribute their time over each phase of a number of such projects, so as to acquire a comprehensive overview of the total process in a relatively short period of time. Successive longer periods spent in each phase of a single project would then extend and deepen their competence to any desired degree of proficiency, as well as qualifying them as quasi-instructors for their younger colleagues.

Such student "inter-teaching", and the cross-disciplinary association of social scientists and environmental planners, designers, and managers with lay persons, would enrich not only the professionals so involved, but also theory, research, and education as well.

PER 500 Advanced Quantitative Methods in PER

"A continuation of PER 400, to include statistical inference, psycho-physical methods, decision making, and systems modeling."

Subjects covered should include

- A. Logic and procedure in inference. (Introduction to the basis of statistical inference from classical and other perspectives)
- B. Obtaining and combining human judgments. (Principles of questionnaire and inventory construction, the estimation of quantities/qualities by human respondents, and the combination of estimates through various rules)
- C. Fundamentals of decision making. (Introduction, and normative characterization of rational choice via utility and subjective probability measurement, with applications to design decisions)

- D. Systems modelling methods. (The representation of behavior-environment systems through linear and graph-theoretic models, with emphasis on characterization of feedback and control mechanism)

PER 501 Advanced PER Design/Research

“The application of advanced quantitative techniques to problems in the design and evaluation of environments.”

This course is an extension of PER 402, incorporating the application of advanced techniques in research and analysis to selected design problems.

PER 502 Advanced Topics in PER

“Studies in advanced topics in person-environment relations, with emphasis on research and development.”

Subjects suitable for consideration here include ecological psychology, environmental cognition, personal construct theory, and environmental simulation and response.

PER 600 Special Topics in PER

“Individually formulated design/research studies, in selected topic areas.”

This course provides students with an opportunity to undertake their own advanced research, and to formulate new methods of analysis in the area. Each time the course is offered it will be an intensive involvement in a special topic representing a frontier of environmental design/research. The emphasis will be on original development of the topic area that should aim or extend beyond its present boundaries.

notes

1. Craik (1970), Winkel (1970), and Zeisel (1975) among others document the development of this interest.
2. Here, as in most new fields, nomenclature is a problem. The coexistence of such designations as “social ecology”, “ecological psychology”, “environmental sociology”, “architectural psychology” (and “landscape psychology”, or “urban design psychology”?), and “man-environment relationships” (sic) all testify to the parochial nature and tentative consciousness of this field; which might best be referred to as “person-environment relationships”.

3. For a sampling of this gamut see Norberg-Schultz (1968, Lobell (1975), Hildebrand (1973), Zeisel and Frazier (1974), and Perin (1970).
4. But for straws in the wind see W. B. Foxhall, "Evolution and Evaluation of Environment for Mental Health, *Architectural Record*, July, 1975; M. Hall, and E. Hall, *The Fourth Dimension in Architecture*, Santa Fe: Sunstone Press, 1975; and the *American Institute of Architects Journal*, August, 1976.
5. Hildebrand (1973). See also Conway (1973) for another view of the present professional state of mind in this matter.
6. Langer (1966) presents a review of this function of design.
7. The December 1967 issue of the *American Institute of Architects Journal* has papers by Rusch, Silverstone, and Stea which elaborate on this issue.
8. This point is emphasized by the contemporary emergence of a true "environmental art" (Kepes, 1972) which thus clarifies the heretofore equivocal nature of those other interventions in the environment which profess some "utilitarian" function. For a discussion and a categorization of this matter see Thiel (1974).
9. Jenck's and Silver (1972) document the pervasive nature of this phenomenon.
10. In this connection see Boutourline (1970) and Steele (1973). The present extent of professional activity in this area is limited to hotel, resort, and tour management; to building custodial maintenance operations; and to writing for housekeeping magazines.
11. The material that follows incorporates formulations and suggestions from a number of people, including Frank Becker, Bill Curtis, Gary Moore, Jean Shorett, Bill Sims, Bob Sommer, Fritz Steele, Gary Winkel, and Jim Wise; but the use of this material herein is the writer's responsibility only. For additional suggestions for PER courses see Zeisel and Frazier (1974).
12. The scale of levels of competence is adapted from Eberhard and Brill: see Morton and Murphey (1971).
13. "Once a proposition has been confirmed by two or more independent measures, the uncertainty of its interpretation is greatly reduced. The most persuasive evidence comes through a triangulation of measurement processes. If a proposition can survive the onslaught of a series of imperfect measures, with all their irrelevant error, confidence should be placed in it. Of course, this confidence is increased by minimizing error in each instrument and by a reasonable belief in the different and divergent effects of the sources of error." (Webb et al. 1966)
14. "Public and/or private clients" include officials in city, state, and federal administration, bankers, real estate developers, merchants associations, community groups and neighborhood associations; and "user groups" include the latter two, as well as the general public, subgroups thereof, and the clients of specific settings or institutions.

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