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Multiple scientific paradigms in environmental psychology

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The developmental-historical pattern of environmental psychology is analyzed. It is seen to reflect primarily the discovery of engaging puzzles within the man-environment context by several mature research paradigms currently viable within scientific psychology. This invasion of the paradigms is illustrated by brief accounts of: 1) ecological psychology ; 2) environmental perception; 3) environmental assessment; 4) personality and the environment; 5) environmental cognition, and 6) analysis of functional adaptations. The implications of this perspective are noted for the new field's pure and applied research potential; for communication between researchers and environmental decision-makers; for the prospects of a common conceptual framework, and for advanced research training in the field.

During the past decade I have been observing the emergence of environmental psychology from the vantage point of Berkeley, California (Craik, 1970; Craik, 1973; Heimstra and McFarling, 1974; Ittelson, Proshansky, Rivlin, and Winkel, 1974). From there one can readily discern developments in the United States and Canada, to a lesser extent in Great Britain, somewhat in Scandinavia, and not very well at all elsewhere. Obviously, my purpose at this International Congress is to enlarge upon my perspective, but the intent of these introductory remarks is simply to alert you to the possibility that the interpretation of the current intellectual-scientific structure of the field that I will now offer may be constrained by my limited familiarity with world-wide endeavors.

What is the present intellectual-scientific structure of environmental psychology? My tentative formulation is that an array of different research paradigms currently viable within scientific psychology have discovered engaging puzzles within the man-environment context. Consequently, several autonomous and distinctive strands of normal science undertakings make up the primary fabric of environmental psychology.

The concepts of the paradigm and normal science will be recognized as drawn from Kuhn's analysis of the development of scientific activity (Kuhn, 1962). In his scheme, the unit that produces scientific knowledge is a group

of practitioners who are bound together by common apprenticeship and education, aware of each other's work, in full professional communication, displaying consensus on technical judgments, and engaged in the refinement, articulation and extension of a shared paradigm. Not simply a theory, the paradigm is generated by exemplary achievements whose elaboration sets an agenda of worthwhile puzzles entailing precision of measurement, testing of predictions, conceptual clarification, and applications to new settings (Masterman, 1970; Kuhn, 1970).

By reviewing briefly a selected set of the quite distinct research paradigms presently active in the study of man-environment relations, the present character of environmental psychology can be appreciated. Following these succinct characterizations, I will point to some of the implications of the present structure of the field.

PARADIGM I: ECOLOGICAL PSYCHOLOGY

Ecological psychology has developed out of the research program of Roger Barker and his associates at the Midwest Psychological Field Station, established in Kansas in 1947 (Barker, 1968; Barker and Wright, 1951, 1955). Their analysis of behavior settings has led to an impressive series of accomplishments.

Behavior settings consist of standing patterns of behavior having definite place and time boundaries and coordinated with their physical milieux. Examples in Midwest include Clifford's Drug Store, the Methodist Church Worship Service, the annual Spring Clean-up Drive, and the High School Senior Class Commencement. The regularly occurring human activities characterizing these settings persist independently of specific participants. Once defined, the public behavior settings of Midwest could be counted and described according to their properties, such as geographical locus, temporal locus and duration, occupancy time, action qualities (*e.g.*, aesthetics, business, education, recreation) and inhabitant attributes (*e.g.*, age, sex, social class). A second field station was established in 1954 in a comparable agricultural town (referred to as Yoredale) in Yorkshire, England. A monumental comparative analysis of the two communities based upon complete behavior setting surveys in 1954-55 and 1963-64 has recently appeared (Barker and Schoggen, 1973). A theory of undermanning conditions in behavior settings was suggested by this cross-cultural comparison and subsequently has received confirmation in studies of large and small high schools and large and small church congregations (Barker and Gump, 1964; Wicker, 1969; Wicker and Mehler, 1971).

Testing predictions from undermanning theory and extending it to overmanned settings, such as Yosemite National Park, constitutes one of the significant items remaining on the agenda (Wicker and Kirmeyer, 1976). The behavior setting survey also offers an important method in establishing the program for architectural and planning projects and in appraising their

impacts. The method is currently being applied in the analysis of urban neighborhoods, residential environments, and shopping centers (Bechtel, 1970, 1972; Lozar, 1974).

PARADIGM II: ENVIRONMENTAL PERCEPTION

The environmental perception paradigm focuses upon the experience of settings and places, and upon the processes and factors influencing the varied impressions that observers form of environments. In this context, the term " perception " is used broadly, encompassing not only immediate visual perception but other forms of environmental awareness, and pertaining to both descriptive and evaluative responses. The field parallels and is guided by concepts and methods drawn from the more highly developed research on person perception, which analyzes the attributions and evaluations individuals make of other persons (Hastorf, Schneider and Polefka, 1970).

The impressions an observer forms of a setting depend not only upon its physical attributes, but also upon: 1) the person's cognitive set, familiarity with the setting, and professional training; 2) the medium of presentation (or how the place is encountered, *e.g.*, via direct site visit, photograph, sketch, model); 3) the format available for recording responses; and 4) a host of other variables (Craik, 1968; Lowenthal, 1972; Leff, Gordon and Ferguson, 1974).

The environmental perception paradigm plays an important role in appraising the psychological effectiveness of various forms of simulation. In evaluating certain kinds of environmental policies and projects, professionals and the general public are often faced with the problem of visualizing what the proposed alternatives and their consequences would really look like. At the University of California in Berkeley, a dynamic environmental simulator has been constructed which enables observers to " walk " or " drive " through scale models of urban, suburban or natural environments. A remotely guided camera lens, controlled by computer, moves through the scale model, projecting an eye-level view on television monitors. In addition, stopframe color films and videotapes can be made of the simulated tours. Thus, the technique can provide previews of alternative environments for feedback in the planning and design process, for use in public hearings and the preparation of environmental impact statements, and for experimental manipulations in environmental psychological research. But first, it must be demonstrated that the impressions gained in these tours through the scale models are sufficiently similar to the impressions that would be formed during an actual tour through the real environment. Using the environmental perception paradigm, a broad program of research aimed at gauging the effectiveness of dynamic simulation techniques is underway (Appleyard and Craik, 1974; McKechnie, 1976).

The environmental perception paradigm has a broad agenda of research before it, and has engaged the efforts of many geographers, architects, and planners, as well as psychologists (Goodey, 1971; Saarinen, 1976).

PARADIGM III: ENVIRONMENTAL ASSESSMENT

Unlike ecological psychology, the environmental assessment paradigm treats the dimensions and properties of settings and places as independent variables, rather than as part of a joint behavior-milieu unit, and seeks to establish their relationship to behavioral variables. The paradigm represents a new extension of psychological assessment, which has been developing for over four decades and is most familiar in its applications to personnel testing and selection programs (Dunnette, 1966; McReynolds, 1968; Craik, 1971). The paradigm consists of: 1) a multidimensional taxonomic model providing predictor variables; 2) a set of criterion or outcome variables; and 3) a repertory of self-critical concepts and multivariate statistical techniques for gauging the validity and utility of predictions, including incremental validity, base rates, experience tables, and multitrait-multimethod analysis (Wiggins, 1973).

The prediction of scenic quality appraisals from geomorphological and other physical variables illustrates the paradigm (Zube, Pitt and Anderson, 1975; Anderson, Zube and MacConnell, 1976). However, the environmental dimensions need not be restricted to physical variables. Moos and his associates have developed observer-based instruments for assessing the social atmosphere of various institutional settings, such as dormitories, psychiatric wards, and work environments (Gerst and Moos, 1972; Moos, 1973).

In the form of criterion measures, evaluations of environmental quality play a central role in the assessment paradigm. One noteworthy approach is to use observers to provide evaluations of environmental quality that would complement the current use of physical indices (*e.g.*, air and water quality indices) based upon public health and economic criteria (Craik and Zube, 1976). Explorations of the scientific, policy and procedural issues entailed in the development of Perceived Environmental Quality Indices (PEQIs) is currently underway, regarding: 1) scenic and recreational environments; 2) residential and institutional environments; and 3) air, water and sonic environments. This strategy was effectively championed this morning by Berglund (Berglund, 1977).

In summary, the environmental assessment paradigm constitutes a sequence of descriptive environmental assessment, evaluation, and feedback, with the promise of eventual predictive relations between environmental attributes and appraisals of environmental quality. Although currently rare, the incorporation of this sequence as an institutionalized component of environmental planning, design, and management would represent a revolutionary shift in practice and possibly progress toward more adaptive man-environment relations (Campbell, 1969; White, 1971; Cooper, 1972).

PARADIGM IV: PERSONALITY AND ENVIRONMENT

While ecological psychology takes the behavior setting and environmental assessment takes the place as the basic unit of analysis, the personality

paradigm focusses upon the individual and recognizes that persons are extraordinarily complex and multidimensional entities (Craik, 1976).

A wide variety of well-understood instruments are available for assessing such facts of personality as intrapsychic functioning, interpersonal traits, personal values, cognitive capacities and styles, vocational interests, social attitude orientations and psychophathological propensities.

The personality paradigm is being extended into environmental psychology, in part, through the development of new techniques for assessing environmental dispositions. While some personality dimensions refer to the way a person relates to himself (for example, self-accepting, self-punishing) or his characteristic manner in relating to other persons (such as dominant, nurturant), environmental dispositions denote individual variations in fairly enduring styles of relating to the everyday physical environment. The Environmental Response Inventory, for example, assesses an array of environmental dispositions: Pastoralism; Urbanism; Environmental Adaptation; Stimulus Seeking; Environmental Trust; Antiquarianism; Need for Privacy; and Mechanical Orientation (McKechnie, 1974).

Previously, the personality paradigm has been applied to the task of forecasting such socially important behaviors and outcomes as job satisfaction, marital adjustment, participation in community life, alcoholism, norm violations and effectiveness in various occupational roles and positions. The paradigm is being extended in environmental psychology by focusing upon a host of criterion behaviors and outcomes which in the aggregate have significant implications and consequences for the use and form of the everyday physical environment. Environmental criterion behaviors include: decisions to migrate and adjustments to migration; geographical preferences; judgments of environmental quality; extent of home area and personal orbit; outdoor recreational choices; and participation in environmental decision-making in various civic and professional roles.

Within personality research, the issue of person $\times$ situation interaction is being re-examined (Endler and Magnusson, 1976; Magnusson and Endler, 1977). Ideally, investigations of this issue would include: 1) assessed attributes of persons; 2) assessed attributes of situations and environments; 3) behavioral responses observed *in situ*; and 4) representative types and ranges of persons and environments. In addition to their theoretical implications, interaction studies have a bearing upon the issue of generating guidelines for attaining greater person-environment congruence across the entire sweep of man-environment relations.

PARADIGM V: ENVIRONMENTAL COGNITION

In 1960, Kevin Lynch reported on the results of his explorations of the image of cities held by their residents, based upon asking them for directions and requesting them to sketch maps of their cities (Boston, Jersey City, Los

Angeles) (Lynch, 1960). And this afternoon, we will learn about psychological maps of Paris (Milgram and Jodelet, 1976a, 1976b).

The cognitive developmental paradigm originated by Heinz Werner and Jean Piaget offers a promising route to better understanding of topographic representations of the large-scale environment (Hart and Moore, 1973). Research has related children's conceptions of space to the invariant stages of intellectual development posited by this paradigm, *i.e.*, the familiar sensorimotor, preoperational, concrete operational and formal operational stages (Piaget and Inhelder, 1967). Presumably, conceptions of spatial relations (*e.g.*, topographical, projective, Euclidean) play a role in constructing topographic representations of specific large-scale environments, such as a person's own neighborhood or city, although the nature of the linkages remains to be explored.

Topographic representations of the large-scale environment can be usefully studied microgenetically as well as ontogenetically. By examining the map-sketches and verbal descriptions rendered by individuals at intervals along a walking tour through an unfamiliar city, Gittins has initiated a study of the microgenesis of topographic representations, and Moore has shown that in high school students, cognitive representations of familiar areas of their city meet higher levels of developmental criteria than those of less familiar areas (Gittins, 1969; Moore, 1973).

In the new Cuidad Guayana in Venezuela, Appleyard documented the variety of images held by sub-populations of residents and, importantly, the discrepancies between residents' images and those of the professional planning team (Appleyard, 1976). These findings highlight the practical importance of research on environmental cognition for communication and mutual understanding in the process of urban design and planning.

PARADIGM VI: FUNCTIONAL ADAPTATION

Guided by an evolutionary perspective, this paradigm employs the concepts of ethology, psychobiology, and social psychology, to study such behavioral phenomena as territoriality, home range and orbit, personal space and crowding. The approach is alert to the possible adaptive functions of behavioral and social mechanisms and adjustments from the standpoint of biological and socio-cultural evolution (Campbell, 1965; Esser, 1971; Altman, 1975). Sources of environmental stress and the relative effectiveness and costs of coping with them also receive special attention (Lazarus, 1971). This paradigm is perhaps the most strongly represented in the present symposium in the contributions of Russell, Frankenhaeuser, and Gardell (Russell, 1977; Frankenhaeuser, 1977; Gardell, 1977).

Experimental research on such evidently stressful conditions as noise and crowding has served to emphasize the impressive short-term coping ability of research participants and the need to examine carefully for possible

long-term psychological and physiological costs. Satisfactory task performance can be demonstrated under conditions of intense noise and high density. However, in subsequent quiet or uncrowded conditions, tolerance of frustration and performance on tasks requiring careful attention to detail show deterioration (Glass and Singer, 1972; Sherrod, 1974; Weinstein, 1974; Evans, 1975). These delayed effects following upon seemingly effective coping with stressors recalls Rene Dubos' admonition to give thought to the long-term implications of present adjustments for mankind's future quality of life (Dubos, 1965).

IMPLICATIONS

In offering this perspective on the development of environmental psychology over the last decade, I have attempted to show that a multiple paradigm field has emerged which can be expected to produce a sustained yield of scientific findings. The six paradigms were selected for illustrative purposes and are not intended to be exhaustive; also, a considerable body of pre-paradigm studies has not been treated here.

Environmental psychology has undoubtedly become a vigorous and almost bewilderingly diverse research field. From a societal perspective, this turn of events is welcome. The research is bound to generate information pertinent to decision-making contexts, to sharpen the conceptual underpinnings and analytic tools of the environmental professions, and to refine methods for specific applied research tasks such as providing feedback on the behavioral consequences of decisions embodied in environmental plans, designs, management policies, and administrative regulations and guidelines. Unlike some urgent social problems that seem never to engage research paradigms, examination of the psychological facets of man-environment relations clearly has taken hold scientifically.

However, such research tends to be selective, accepting primarily those problems which can be turned into puzzles capable of solution by a paradigm; thus the direction of research may often fail to mesh with the priorities that environmental professionals assign to problems. Furthermore, the implications of current research for environmental practice may be more innovative, challenging, perhaps disquieting, and far-reaching than its initial aim of simply developing more accurate knowledge of clients and users. Thus, environmental simulation techniques may alter the format of public hearings and environmental impact statements; methods of post-construction evaluations suggest the possibility of institutionalizing modes of follow-up and accountability for the social and behavioral consequences of planning, design and management.

I must also note the toll that the multiple paradigm character of the field has taken: practitioners at research conferences complain about the esoteric nature of research reports and their seeming lack of relevance; scientists publish stock-taking pieces regreting the lack of common conceptual

frameworks (Altman, 1973; Sommer, 1973; Wapner, Kaplan and Cohen, 1973; Wohlwill, 1973). With the possible exception of ecological psychology, these normal science traditions represent paradigm extensions. Some environmental psychologists view the extension of paradigms as an asset, providing an effective readiness to identify interesting puzzles and the conceptual and methodological equipment for attempting to solve them. Others deem the carry-over of established paradigms a liability, leading to cognitive and strategic rigidity and thwarting efforts to view man-environment phenomena in new and appropriate ways.

Realistically considered, perhaps the future of environmental psychology is likely to rest with the fate of these autonomous and distinctive strands of normal science which now constitute its major directions and sources of viability. Beyond the present evidence of local progress, the conjoint extension of multiple paradigms into the man-environment context affords opportunities for paradigm merging which in the long run may have important implications for scientific psychology generally. In the meantime, greater recognition of the multiple paradigm nature of the field in graduate research programs and more explicit training in their distinctive scientific-intellectual structures may facilitate such linkages in the long run.

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RÉSUMÉ

Selon l'analyse de l'auteur, la genèse historique de la psychologie de l'environnement s'est réalisée principalement par la rencontre entre certaines questions attrayantes apparaissant dans le contexte de la relation homme-milieu et divers paradigmes de recherche bien établis en psychologie scientifique. Cet apport des paradigmes est illustré par de brefs exposés sur : (1) la psychologie écologique ; (2) la perception de l'environnement ; (3) l'appréhension du milieu ; (4) la personnalité et l'environnement ; (5) la connaissance du milieu ; (6) l'analyse des adaptations fonctionnelles. Les implications de cette perspective sont mentionnées aux niveaux suivants : potentialités de recherche fondamentale et appliquée dans ce nouveau domaine ; communication entre chercheurs et organes de décision en matière d'environnement ; recherche d'un cadre conceptuel commun ; formation de chercheurs qualifiés.