



Empirical research in environmental psychology: Past, present, and future

Maria Vittoria Giuliani^{a,*}, Massimiliano Scopelliti^{a,b}

^a Institute for Cognitive Sciences and Technology, National Research Council (CNR), Via Nomentana 56, 00161 Rome, Italy

^b Department of Social and Developmental Psychology, Faculty of Psychology 2, University "La Sapienza", Via dei Marsi 78, 00185 Rome, Italy

ARTICLE INFO

Article history:

Available online 11 February 2009

Keywords:

Journal of Environmental Psychology
Environment & Behavior
Trends
Changing research interests
Future directions

ABSTRACT

Have research interests in environmental psychology changed over the years? If so, in which direction? What can we learn from the past to direct future research? To answer these questions, empirical studies published in *Environment & Behavior* (E&B) and in *Journal of Environmental Psychology* (JEP), from their foundation to 2005, were reviewed. The articles were classified in relation to the following criteria: mode of human–environment transaction, research topic, type of setting and function of places, socio-demographic characteristics and environmental role of people, mode of presentation of the setting, sampling procedure, and source of data. Results showed both variations through the years and differences between the journals. The main research topics can be identified as the study of the residential environment, environmental cognition, observation of actual behaviour in the environment, and concern for the ecological value of the global environment. Trends in research interests showed a stable interest in the analysis of the built environment, a more place-specific approach in the beginning, strongly anchored in observational studies, and a central concern for sustainability and conservation of the environment in recent years. With respect to journals, the central role attributed to psychology by JEP, and the stronger participation by designers and planners in E&B, are reflected in the emphases given to the different modes of human–environment transaction. Trends in research interests help address the strengths and weaknesses of the discipline, thus suggesting future directions of inquiry.

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1. Introduction

When Kenneth Craik published in 1973 the first review of the development of environmental psychology in the Annual Review of Psychology, he claimed that a distinctive feature of “the scientific study of the interplay between human behaviour and its environmental settings” (Craik, 1973, p. 403) is its inherently multidisciplinary character. This is one of the reasons for different terms employed to designate the study of man–environment relationships (in 1973, people was still “man”). Within psychology, the choice of the label “environmental psychology”, instead of “ecological psychology” (Barker, 1968) or “architectural psychology” (Canter, 1970) was motivated by its being “an inclusive, theoretically neutral term” (Craik, 1973, p. 403). Craik’s presentation ended with a question, i.e. “whether environmental psychology will function narrowly and usefully as a chapter title for disparate but related topics, or will instead come to signify a coherent theoretical framework for understanding man–environment relations from a psychological perspective” (Craik, 1973, p. 412).

Subsequent reviews of the field (Stokols, 1978; Russell & Ward, 1982; Holahan, 1986; Saegert & Winkel, 1990; Sundstrom, Bell, Busby, & Asmus, 1996), all begin by emphasising the developments occurred in the field, and the increasing number of publications, both in journals and in edited series. Actually, in 1980–1983, in addition to the pioneering *Environment & Behavior*, also the journals *Architecture & Comportement/Architecture & Behaviour*, *Journal of Environmental Psychology*, and *Journal of Architectural and Planning Research* appeared.

The acknowledgment of the growth of the field is often accompanied by concerns about its coherence and conceptual development and by a persistent worry about a distinctive identity of the psychological perspective with respect to the wider area of environment and behaviour studies and its capacity to survive.

Ralph Taylor (1980) already wondered whether the environmental psychology season was over (cit. in Canter & Craik, 1981); in the first, big *Handbook of Environmental Psychology*, Proshansky (1987)—one of the founders of environmental psychology—while recognising that during the last five years the field had not shown any real growth, declared that it was “holding its own”. He then asked himself “Will growth occur over time that is significant or will the field eventually fade away?” (Proshansky, 1987, p. 1475), and stated that: “... the future of environmental psychology may

* Corresponding author. Tel.: +39 06 4416 1528; fax: +39 06 4416 1513.
E-mail address: vittoria.giuliani@istc.cnr.it (M.V. Giuliani).

still be in jeopardy. Its ability to endure and continue to develop as a social institution and, therefore, in its scientific achievements is cast in considerable doubt.” (Proshansky, 1987, p. 1476). In Proshansky’s view, a critical step for environmental psychology success is “strengthen itself as a social institution” (Proshansky, 1987, p.1486), starting by demonstrating its significance for other fields of psychology.

In a similar vein, nearly ten years later a much-debated paper by Daniel Stokols (1995) brought to the foreground the subject of environmental psychology identity. However, it must be noted that, unlike Proshansky (1987), Stokols considers environmental psychology not as a branch or subfield of psychology, but “as part of a multidisciplinary field of environment and behaviour” or “as a disparate set of research areas and perspectives, spanning multiple disciplines, that are linked by a common focus on people’s relationships with their sociophysical surroundings” (Stokols, 1995, p. 822).

According to Stokols, the identity of the field as a distinct area of study had become increasingly “diffuse” and “transparent” for three fundamental reasons: its multidisciplinary complexity, its international scope, and the incorporation of environmental issues into all or almost all sectors of psychology. At the same time, environmental psychology is bound to continue losing its identity because more and more its conceptual and methodological principles are included in other areas of psychology and other disciplines.

As a matter of fact, starting from the 1990s, some new trends emerged in publications related to environment and behaviour studies. With the thirteenth volume on *Women and Environment*, in 1994 the Plenum Series on *Human Behavior and Environment: Advances in Theory and Research* (first published in 1976 by Irwin Altman and Joachim F. Wohlwill) stopped its publications. One year later, *Architecture & Comportement/Architecture & Behaviour* also stopped its publications, and the same happened in 1997 (ten years after the first publication) with the fourth and last volume of the Plenum Series *Advances in Environment, Behavior, and Design*, edited by Gary Moore and Robert Marans.

This did not mean that publications in environmental psychology languished: illustrating some changes in the editorial board of the *Journal of Environmental Psychology*, David Canter (1998) wrote that during the 1980s “environmental psychology lost its momentum”, but “the field started to grow again in the 1990s”, with an increasing number of papers submitted to the journal, and papers in environmental psychology published in journals on community and health psychology, on tourism or ecology. The journal *Medio Ambiente y Comportamiento Humano* created in 2000 in Spain constitutes a reference point not only for Spanish scholars, but also for the lively and numerous communities of environmental psychologists in Latin America.

As regards textbooks and edited books, in addition to Cambridge University Press and Avebury, with their series dedicated to environment and behaviour still under way, an increasing number of volumes came to light with many different publishers, from Sage to Erlbaum, from MIT Press and Oxford University Press to Kluwer, from Springer to Blackwell. Lastly, starting from 2002, edited books including selected papers from IAPS Conferences were published by Hogrefe and Huber.

However, starting from the 1990s, the label “environmental psychology”, once considered too narrow with respect to the multidisciplinary environment and behaviour field, began to appear too general for many research areas looking for a distinctive identity.

A sign of the new trend could be considered the fact that in the *Annual Review of Psychology* the last chapter with the title “environmental psychology” was published in 1996, while two subsequent reviews dealt with more specific and limited topics, that is

“The environmental psychology of capsule habitats” (Suedfeld & Steel, 2000), and “Environmental Psychology. Child development and the physical environment” (Evans, 2006).

The best example, however, is represented by the research field devoted to pro-environmental attitude and behaviour.

As early as 1993, Enric Pol gave his book on the development of *Environmental Psychology in Europe* the sub-title “From architectural psychology to green psychology”. In 1995, in the introduction to a special issue of JEP on “natural psychology”, Robert Gifford wrote that “Natural psychology is that branch of environmental psychology in which the scientific study of person-nature transactions is pursued” (Gifford, 1995, p. 167).

In the *Handbook of Environmental Psychology* edited in 2002 by Robert Bechtel and Arza Churchman, Mirilia Bonnes and Marino Bonaiuto argued that present-day environmental psychology could be identified with the “environmental psychology of sustainable development”. In 2001, the 2nd number of *Population and Environmental Psychology Bulletin* of APA was devoted to a debate on “conservation psychology”, with articles somewhat echoing environmental psychologists’ debate about the label of the field, and one year later Carol Saunders organised the first conference on conservation psychology. Apart from the narrow scope—i.e. its focus on the conservation of the natural world—it is difficult to find “scientific” motivations for the birth of this new field. In fact, according to Saunders (2003, pp. 139–140), most of the features characterising the “new” field labelled “conservation psychology” appear to be characteristics as well of environmental psychology from the onset (e.g. the multidisciplinary tendency and the interest in application).

Finally, in a recent number of the *Journal of Social Issues*, Robert Gifford (2007) claims that a sign of the maturation of environmental psychology is indeed its evolution toward an environmental psychology of sustainability.

A synthetic overview of the terminology employed over the years to refer to people–environment studies is given in Table 1.

Whilst we agree with the claim that sustainability is a key issue for current century research, we hesitate about identifying the object of environmental psychology merely with “the ecological problem”: wouldn’t this mean wasting the richness of knowledge accumulated over the years in many areas of people–environment transactions?

In this frame, it seemed to us of particular interest to examine whether and how the scientific concerns of the discipline have

Table 1
Definitions and research concerns of people–environment studies over the years.

Author	Definition	Research concerns
Barker (1968)	Ecological psychology	The study of human behaviour situated in a specific context/environment
Canter (1970)	Architectural psychology	The role of psychological processes in individual-built environment relationship
Craik (1973)	Environmental psychology	The study of man–environment relations from a psychological perspective
Pol (1993)	Green psychology	A change from the concern for architecture and urban milieu towards an interest in the pro-ecological issues and the green
Stokols (1995)	Environmental psychology	Part of a multidisciplinary field of environment and behaviour, with the common focus on people’s relationships with their sociophysical surroundings
Gifford (1995)	Natural psychology	A branch of environmental psychology in which the scientific study of person–nature transactions is pursued
Bonnes & Bonaiuto (2002)	Environmental psychology of sustainable development	The study of behaviours—and psychological processes influencing them—in everyday environments that affect natural processes or resources at the local and global level

evolved over the past 40 years. In this respect, it is useful to investigate not only what were the specific research topics addressed by environmental psychology since its very beginning to current publications, but also—and more important—to understand how these topics were addressed. The inner core of a science of people–environment relations is presumably to be found in the relationship between a research issue that has to do with human behaviour, an environment in which it is situated, the actors involved, and the methods assumed to be appropriate to the issues at stake.

Understanding the past and the present of people–environment studies can be considered, in our view, a key starting point for identifying the strengths and the weaknesses of the discipline, thus suggesting potential developments for the future.

2. The study

In line with Robins, Gosling, and Craik (1999), who suggested the importance of evaluating disciplinary trends on empirical investigation rather than on mere speculation, we tried to highlight the distinctive features of environmental psychology by analysing the articles published in the two most influential journals in the field, namely *Environment and Behavior* (E&B) and the *Journal of Environmental Psychology* (JEP). We are aware that a large part of the activity carried out in this field is not reflected in these journals—in particular applied research is definitely under-represented, work on cognitive mapping and wayfinding is also reported in other more specialised and prestigious journals in cognition and neuroscience as well as in computer science, and the English-speaking world is undoubtedly over-represented. Nevertheless, limiting our analysis to these journals has unquestionable advantages in this context: first, they offer a good picture of “mainstream environmental psychology”, being the only journals that refer to the entire field of environment and behaviour studies, and not to a specific theoretical approach or sub-area; second, they secure a continuity over the years essential for our purpose; and finally they are cited in all the websites as the main journal resources for environmental psychology.

2.1. Objectives

The first objective of the study was to clarify the major trends in environmental psychology research, from the very beginning to the present, by identifying the topics addressed and the dimensions of person–environment transactions, the environments investigated, the role of people, the methodological choices, and the relationships among all of these aspects. A second objective was to pinpoint possible differences between the two journals, in order to better understand the specificity of environmental psychology in the strict sense, as highlighted by JEP, with respect to the broader field of environment and behaviour research, which, according to the name and the editorial programme of the journal, we assumed would be best reflected in E&B production.

2.2. Method

A data base was created including all the articles published in E&B and JEP since the first issue (in 1969 for E&B, and in 1981 for JEP) up to 2005.

The total number of articles sums up to 1787, respectively 1160 in E&B and 627 in JEP.

2.2.1. Classification of journal articles and preliminary analyses

The first step was to separate articles reporting empirical research from theoretical/methodological articles or review essays.

The former group of articles (Total number = 1499, E&B = 974, JEP = 525) was then classified according to the following criteria:

2.2.1.1. The mode of human–environment transaction. According to Stokols (1978), people try to optimise their relationship with the environment through a dynamic process, in which “they orient to the environment in terms of existing information, goals and expectations; they operate in the environment to achieve their goals [...]; they are directly affected by environmental forces [...]; they evaluate the quality of the environment as a context for future activity and goal attainment” (Stokols, 1978, p. 259). So, the human–environment transaction “can be characterised in terms of two basic dimensions: (1) cognitive (or symbolic) vs. behavioural (of physical) form of transaction; and (2) active vs. reactive phase of transaction. Taken together, these dimensions yield four modes of human–environment transaction” (Stokols, 1978, p. 259), namely Interpretive, Operative, Evaluative, and Responsive (see Table 2).

2.2.1.2. The research theme. The next criterion is the research theme and the specific problem dealt with. Research themes were identified as follows, with reference to the four modes of transaction:

1. Interpretive mode:
 - 1.1. spatial cognition, cognitive maps, wayfinding, perception of the environment;
 - 1.2. meaning and sense of place, place and identity processes, affective processes;
 - 1.3. personality and the environment.
2. Evaluative mode:
 - 2.1. aesthetic evaluation;
 - 2.2. assessment of environmental quality, preferences and satisfaction;
 - 2.3. environmental attitudes and disposition, environmental concern and values, risk perception.
3. Operative mode:
 - 3.1. pro-environmental behaviour (recycling, littering, energy use, etc.), interventions to preserve the environment;
 - 3.2. control of the environment, and use of space and distance in the management of social interaction (territoriality, privacy, personal space);
 - 3.3. organisation and use of the space, location choices, participation in planning;
4. Responsive mode:
 - 4.1. behavioural and health consequences of environmental stressors, coping behaviour;
 - 4.2. environmental properties and impact of the built/natural environment on performance, health, and behaviour.

At times, some simplifications were required, given that, as Stokols (1978) observed, the borders between the different modes are not always clear and distinct, and numerous studies encompass more than a single transactional mode or research theme. For example, most research on aesthetics looks like a borderland between cognition and evaluation; the studies on density and crowding often examine not only people’s reactions,

Table 2
Modes of human–environment transaction (from Stokols, 1978).

		Form of transaction	
		Cognitive	Behavioural
Phase of transaction	Active	Interpretive	Operative
	Reactive	Evaluative	Responsive

but also aspects of assessment and interpretation; pro-environmental attitudes are nearly always considered in relation to behaviour, etc. In this respect, when different modes and research themes were identified in the same article, we focused on the most prominent, so that in our classification each article was included in only one category. For instance, the interpretive mode was preferred when the active role of psychological processes in human–environment transaction emerged in the study, and the evaluative mode was preferred when people respond to specific features of the environment; likewise, research on wayfinding clearly has to do also with behaviour, but if the main concern was on the processes by which people develop their personal representation of the environment, it was classified in the interpretive mode.

2.2.1.3. The type of setting. A central issue in environmental psychology is the place-specific character of people–environment relationships. The analysis of the setting types in which people's perceptions, affects and behaviours were investigated allowed us to identify which places the empirical research in environmental psychology was focused on over the years. The built/natural character of environments was considered, as well as the level of analysis, the specific place investigated and its function (Krämer, 1995). These trends can provide insights for understanding what the future directions can be, namely which places are underrepresented, and are likely to be the focus of attention in future research.

In particular, the following criteria were taken into account in our research:

- (1) The typology of environment (natural vs. built).
- (2) The nature of the environment (indoor vs. outdoor).
- (3) The size or level of “anthropisation” of the environment. Different levels of size were identified for the built environment (rooms, buildings, built areas, neighbourhoods, towns/cities) and of anthropisation for natural environment (nearby nature, urban parks/natural facilities, rural areas, natural/wild areas). Furthermore, some very specific and circumscribed settings (cars, ships, etc.) or elements in the settings (trees, objects, etc.) were identified, as well as examples of environments which can hardly be defined as properly built or natural (large scale environments as regions/counties, and the world as a “global environment”); finally, many studies were found referring to a joined analysis of—or comparisons between—environments of different size (e.g. house and neighbourhood; local and global environment, etc.) or typology (e.g. built and natural areas).
- (4) The specific place considered in the study.
- (5) The function of the environment, whether residential, working, leisure/recreational, service (e.g. places for daily—such as supermarkets, or institutional—such as schools, libraries, hospitals—necessities), connecting different places (e.g. streets, pathways, etc.), ecological (environments whose preservation is considered by people as having an intrinsic value per se, independent from the specific purposes or needs of a person or group), or experimental (when the relationship with the environment is imposed by the researcher in order to detect specific characteristics of human functioning—e.g. cognitive mapping—or to understand general environmental properties associated with human response—e.g. preference, aesthetic value/scenic beauty, etc.). Several studies proposed an analysis of environments with mixed function (e.g. the city as a whole, in which people contemporaneously live, work, spend their leisure time, etc.), or a comparison between settings with a different function.

2.2.1.4. The characteristics of people involved in person–environment transactions. An interesting question concerns the relationships between mode of transaction/topical areas of inquiry and population. Have any topics been studied more effectively in some age groups? If so, does this mean that a specific issue is not important for people at any stage of the lifespan? The different age groups identified were developmental age (children and adolescents), young people, adults, elderly people, and, of course, a mixed age group resulting from comparisons between two of more of them.

A second feature characterising people–environment relationships is the *environmental role* of participants (Barker, 1968). A general consideration of environmental role has to take into account the involvement (active vs. passive) and the duration of the relationships with the setting (for instance, visitors vs. residents). According to these criteria, we distinguished between managers/policy makers/designers, on the one hand, and “users” of the environment, on the other. Further, users were divided in “general users” (users of the world as a general environment), “residents”, “workers”, “visitors/customers”. Nonetheless, some topics were traditionally addressed neglecting the specific nature of the transactions between people and the environment. For example, in studies on cognitive mapping university students were frequently recruited, implicitly assuming that the general organisation of cognitive schemata can be investigated independently from the specific environmental role. So, the additional category of “experimental subjects” was included.

2.2.1.5. Methodological issues. In addition to aspects directly related to the setting and the “actors”, a couple of methodological issues were also considered. One is the *mode of presentation of the setting*, which has to do with the experience of the environment involved in the study. A classification which proved to be effective is based on the distinction between: field studies implying an on-site relationship with the environment; studies in which respondents are asked to think about one or more real environments and to give a personal evaluations and/or reconstruction of their experience, usually through interviews and questionnaires (e.g. studies on residential satisfaction, place attachment, etc.); studies of environments through simulations (visual, graphic, verbal or virtual simulations) and laboratory studies.¹ The choice among them, far from being a matter of practical opportunity alone, is to be viewed as evidence of preference for some information on human–environment relations which is more likely to emerge through a specific methodology.

A second methodological aspect we took into account was the *sampling procedure*, distinguishing among case/ethnographic studies, opportunistic samplings, samples selected on the basis of specific characteristics of the population (e.g. age, income, ethnic group, personality, etc.) or the environment (e.g. rural vs. urban, level of noise, typology of dwelling, etc.); and lastly representative samples. An additional type of sampling was considered the recruitment of students, chosen for their availability more than for their distinctive features.

Moreover, we classified the *source of data* employed in the different investigations, distinguishing between observational studies, research using reports (including verbal and/or graphic answers to interviews, questionnaires or different kind of tasks), and indirect data collections.

Journal articles were classified with reference to all of these criteria, even though for some of them it was impossible to apply

¹ These two last categories were conceptually similar and included a lower amount of cases. As a consequence, they were collapsed together in the analyses.

entirely the present taxonomy, and the label “not applicable” (NA) was used. Two raters independently classified all the articles. On the whole, inter-rater reliability was high (Cohen’s kappa = .81).

2.3. Analyses

A two-stage statistical approach was adopted, using SPADN 11 Program, in order to provide a picture of the general patterns—including aspects of the setting, people, and relationships between them—that characterised environmental psychology research over the years. In the first stage we performed Multiple Correspondence Analysis (MCA), a method of factoring categorical variables and mapping their association into geometric distances easy to illustrate on simple graphs (factorial plans). The input to MCA is a design matrix in which cases are rows and categories of variables are columns. In the second stage Hierarchical Cluster Analysis (HCA) was carried out in order to determine clusters from the MCA principal components. It must be noted that Multiple Correspondence Analysis is an exploratory, not a confirmatory technique. Therefore, Chi-square tests were performed in order to check whether specific issues (mode of transaction, research themes, type of setting and research methods) showed any significant change over the years or between the journals.

Eight active variables (for a total number of 56 modalities) were employed in MCA, namely research theme, typology (natural, built, and mixed) and function of the environment, age and environmental role of respondents, sampling procedure, mode of presentation of the setting, and source of data. Six supplementary variables were also used, namely form and phase of transaction, indoor–outdoor nature of the environment, size/level of anthropisation, journal, and year of publication. In this regard, publications were gathered in six lustrums (1976–1980, 1981–1985, 1986–1990, 1991–1995, 1996–2000, 2001–2005), plus an initial seven-year period (1969–1975). The first two periods included only papers published in E&B.

2.4. Results

2.4.1. Patterns of people–environment relationships

The MCA suggests that the data can be well represented in a multi-dimensional space characterised by six main axes, which reproduces 34.1% of the total information.

The *first axis* is strongly related to environmental role and function, mode of presentation of the setting and research theme: a clear opposition emerges between studies on simulated environments having an experimental function, associated with an experimental role of participants, and focusing on cognition and aesthetics, on the one side; and studies on real environments having an ecological or residential function, associated with the role of general user or residents, and focusing on environmental attitudes, on the other side.

Environmental function and role score high on the *second axis* too, in association with the nature of the environment: the ecological function is associated with the global environment and the “general user” role, in opposition to the service function experienced by visitors in built environments.

The *third axis* is less informative, differentiating mainly the use of indirect data collection, associated with the absence of specific sampling procedures and a characterisation of population in terms of role and age, to the variety of verbal and behavioural data in which all these aspects are taken into account.

The *fourth axis* involves again environmental function and role, in association with the mode of presentation of the setting, suggesting an opposition between field studies focusing on short duration relationships with environments having a connecting,

service–institution, recreational or ecological function, and studies on residents’ relationships with their residential environment, developed through different methodologies.

The *fifth axis* differentiates between work and residential environments, mainly on the basis of environment function and role.

The *sixth axis* has a residual character, isolating the association between a poor—if any—interest for the characteristics of the environment, and the focus on personal features of people (e.g. empirical research on determinants of participation in groups/organisations, perception of hazards, models of privacy, cognitive skills, etc.).

The second step of our analysis was to identify significant patterns of associations among research themes, environments, populations and related methodologies, applying a hierarchical method of cluster analysis in the factorial space of the first six axes (or factors). A 7-group partition was found at a level of 78% for the Inertia inter/Total Inertia ratio. The plot of the barycentre of the groups in the factorial space created respectively by axes 1 and 2, and by 4 and 5—these are, as described in the MCA, the most interesting dimensions—illustrates the relationships between clusters and factors (see Figs. 1 and 2).

Fig. 1 shows that *Cluster 2*, including mainly studies on environmental attitudes and behaviour, is highly characterised by the two first factors, being opposed on the first axis to *Cluster 1*, including experimental studies on cognition and aesthetics, and, on the second axis, to *Cluster 7*, including observational studies, and *Cluster 3*, grouping studies using indirect data. *Clusters 4, 5, and 6* score low on these axes.

Fig. 2 shows that *Clusters 3, 4* (including studies on residential environments), *5* (grouping studies on work environments) and *6* are opposed to *Clusters 2 and 7* on the fourth axis. *Clusters 1, 2, 3, 6, and 7* score low on the fifth axis, which opposes *Cluster 4* and *Cluster 5*.

A more detailed description of the clusters is presented below. Statistics of the modalities significantly associated to the clusters are given in Tables 3–9. In each table test-values of modalities (>2), associated *p*-values, and percentages of cluster/modality (the ratio between the cases showing one specific modality in the cluster and in the total sample), modality/cluster (the proportion of cases in the cluster showing one specific modality), and global (the proportion of cases in the total sample showing one specific modality) were reported.

Cluster 1 ($N = 341$ —23%) is mainly characterised by methodological aspects: namely, the experimental character of the studies. Participants are often young people recruited among students, who either were presented with simulated environments or performed specific tasks in campuses and laboratories. Reports are used for data collection. Preferred themes are visual preferences and affective appraisal, environmental cognition and navigation, but also mood and performance related to specific environmental conditions, such as light or reduced stimulation. These studies are significantly associated to JEP, while no significant association with specific periods is found (see Table 3).

Cluster 2 ($N = 161$ —11%) is represented by studies on the global environment, which appears to be of interest for its intrinsic ecological value. Research themes deal with environmental attitude and pro-environmental behaviour, and are mostly developed by asking either representative samples of generic users, or people involved in managing the environment, their beliefs toward environmental sustainability, concerns about nuclear hazard, and behavioural intentions toward waste reduction or energy conservation. This group is significantly associated with E&B and to the most recent (2000–2005) lustrum (see Table 4).

Cluster 3 ($N = 74$ —5%) is characterised by studies in which data collections are predominantly obtained through access to indirect/

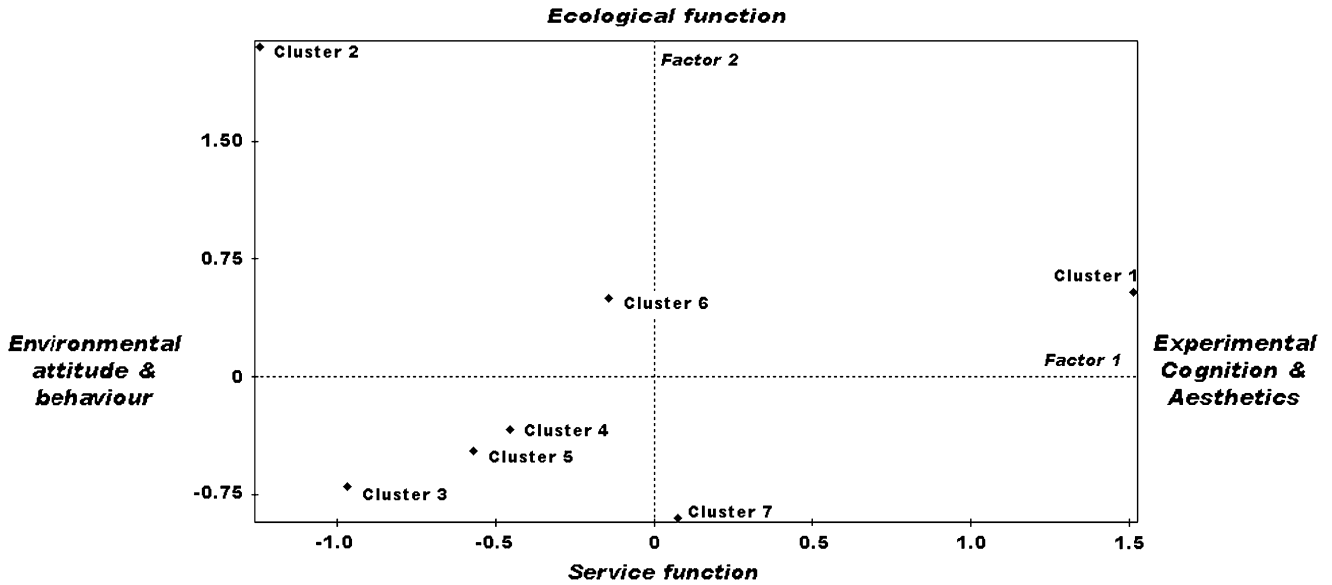


Fig. 1. MCA: factorial space of Axes 1 and 2.

objective data (e.g. police reports on criminal behaviour, databases on the effectiveness of interventions on pro-environmental behaviour, etc.). This cluster is significantly associated with the behavioural form of transactions, both in the operative and in the responsive mode, and to the urban context. Criminal behaviour, often in relation to climate and temperature, constitutes a widespread topic, followed by studies on environmental policy. As for the journals, here too we find a significant association with E&B (see Table 5).

Cluster 4 ($N = 451$ —30%) is the largest one, accounting for 30.09% of the articles. It represents the “hard core” of environmental psychology, since the barycentre of the group is located near the origin of the first five axes, and it is the only one which is neither associated to a specific period nor to a journal. It is characterised by research on residential environments, at different levels of scale, with special emphasis on house and neighbourhood.

Residential preferences and satisfaction, together with place identity and attachment, the analysis of potential sources of stress, and recycling behaviour are the main research themes. Adult residents are preferably involved in expressing evaluations, even though specific studies on elderly people or on different age groups’ perception are significantly associated with this cluster. The research methodology includes questionnaires to representative samples of population, or a more focused choice of respondents on the basis of personal (e.g. age, gender, income, etc.) or environmental (e.g. low- vs. high-rise buildings, rural vs. urban settings, low vs. high levels of noise, etc.) features (see Table 6).

Cluster 5 ($N = 100$ —7%) is characterised by studies on work environments, in which the responsive mode of person–environment transaction is mainly investigated. Therefore, participants are mainly adult workers, and an ethnographic/case study methodology is adopted, focusing on specific environmental features (e.g.

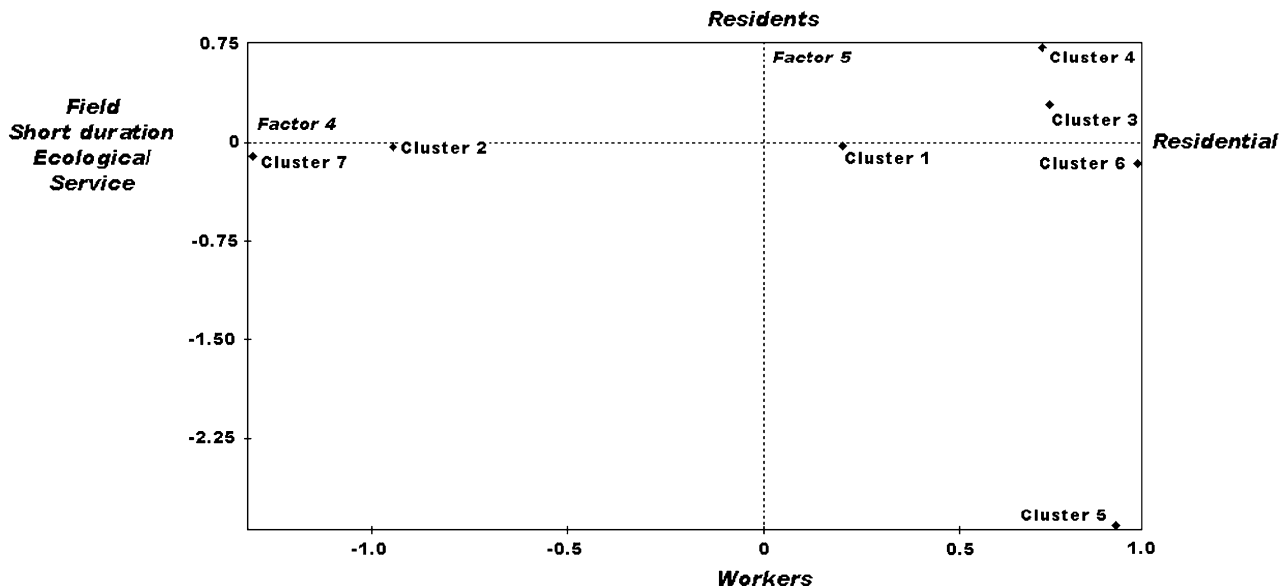


Fig. 2. MCA: factorial space of Axes 4 and 5.

Table 3
Cluster 1—Significant modalities.

Test-value	p-Value	Clu/Mod	Mod/Clu	Global	Modality	Classification criterion
31.47	<.001	87.94	87.68	22.68	Experimental	Environmental role
28.50	<.001	81.98	82.70	22.95	Simulation/ Experimental	Presentation of the setting
24.71	<.001	97.89	54.55	12.68	Experimental	Function of the environment
21.94	<.001	69.41	69.21	22.68	Students	Sampling procedure
19.90	<.001	57.53	73.90	29.22	Young people	Age
14.70	<.001	94.19	23.75	5.74	Aesthetic evaluation	Research theme
10.27	<.001	52.34	32.84	14.28	Cognition	Research theme
8.11	<.001	26.22	96.48	83.72	Report	Source of data
7.38	<.001	33.90	52.20	35.02	JEP	Journal
7.02	<.001	37.28	37.83	23.08	Interpretive	Mode of transaction
6.71	<.001	31.55	57.18	41.23	Outdoor	Nature of environment
2.78	.003	27.18	39.30	32.89	Evaluative	Mode of transaction
2.51	.006	34.44	9.09	6.00	Connecting	Function of the environment

open plan vs. traditional office, windowed vs. windowless rooms, as well as extreme environments, etc.). The main research themes are the analysis of stress reactions or environmental features promoting satisfaction and well-being, but also personality is significantly represented. The most representative directions of inquiry are post-occupancy evaluation and polar psychology. Reports are the main source of data collection. Finally, E&B and the fifth lustrum (1991–1995) are significantly associated with this cluster (see Table 7).

Cluster 6 (N = 45—3%), including only a few dozen items, is a residual cluster, mainly defined by the absence of both specific characteristics of the environment and the environmental role of people. For the most part, empirical data are used to explore a variety of theoretical or methodological issues (from privacy to hazard perceptions; from place meaning to noise sensitivity or effect of climate on sleep; from decisions to volunteer in nongovernmental organisations to perceptions of environmental change or connectedness to nature), without any definite reference to particular people–environment relationships. JEP is significantly associated with this cluster (see Table 8).

Table 4
Cluster 2—Significant modalities.

Test-value	p-Value	Clu/Mod	Mod/Clu	Global	Modality	Classification criterion
28.82	<.001	91.67	95.65	11.21	Ecological	Function of the environment
25.27	<.001	93.43	79.50	9.14	NA	Typology of environment
23.68	<.001	93.55	72.05	8.27	Global	Size/anthropisation
23.42	<.001	69.50	86.34	13.34	NA	Nature of environment
22.14	<.001	81.25	72.67	9.61	General user	Environmental role
20.02	<.001	61.00	75.78	13.34	Environmental attitude	Research theme
11.78	<.001	24.75	75.78	32.89	Evaluative	Mode of transaction
8.26	<.001	15.40	90.68	63.24	Reconstruction	Presentation of the setting
8.09	<.001	30.37	36.02	12.74	Representative	Sampling procedure
7.42	<.001	12.83	100.00	83.72	Report	Source of data
4.04	<.001	30.91	10.56	3.67	Manager	Environmental role
3.42	<.001	14.21	52.80	39.89	Adult	Age
3.19	<.001	15.82	32.92	22.35	2000–2005	Lustrum
2.66	.004	17.76	16.77	10.14	Pro-environmental behaviour	Research theme
2.61	.004	18.55	14.29	8.27	Mixed	Age

Table 5
Cluster 3—Significant modalities.

Test-value	p-Value	Clu/Mod	Mod/Clu	Global	Modality	Classification criterion
23.45	<.001	98.65	98.65	4.94	NA	Sampling procedure
18.98	<.001	98.18	72.97	3.67	Indirect data	Source of data
17.01	<.001	46.15	89.19	9.54	NA	Age
11.70	<.001	31.76	63.51	9.87	NA	Environmental role
8.84	<.001	33.33	39.19	5.80	NA	Presentation of the setting
5.97	<.001	8.82	77.03	43.10	Behavioural	Form of transaction
5.06	<.001	13.43	36.49	13.41	Urban	Size/anthropisation
3.78	<.001	11.00	31.08	13.94	Environmental properties	Research theme
3.74	<.001	9.40	40.54	21.28	Operative	Mode of transaction
3.23	.001	14.12	16.22	5.67	Mixed	Function of the environment
2.88	.002	8.31	36.49	21.68	Responsive	Mode of transaction
2.65	.004	13.64	12.16	4.40	NA	Function of the environment
2.21	.014	9.21	18.92	10.14	Pro-environmental behaviour	Research theme
2.15	.014	5.85	77.03	64.98	E&B	Journal

Cluster 7 (N = 327—21%) is characterised by observational studies on behaviour in the environment, which have to do with territoriality and personal space and, in general, with the use of the environment, both in the operative and in the responsive mode of transaction. Settings having different functions are included in this cluster, ranging from recreational to service or connecting. Moreover, both natural and built environments (indoor and outdoor) are found. A variety of specific places are represented: in addition to streets, schools, shops, and hospitals; also parks, museums or zoos were included. Visitors/customers are the typical population investigated, frequently through field experiments or studies in which observation emerges as a fundamental method for data collection. As a consequence, opportunity samples are often employed. In addition, this approach is significantly associated with

Table 6
Cluster 4—Significant modalities.

Test-value	p-Value	Clu/Mod	Mod/Clu	Global	Modality	Classification criterion
32.80	<.001	91.21	85.14	28.09	Residential	Environmental role
27.54	<.001	83.99	75.61	27.08	Residential	Function of the environment
16.15	<.001	43.67	91.80	63.24	Reconstruction	Presentation of the setting
14.62	<.001	83.77	28.60	10.27	Neighbourhood	Size/anthropisation
11.60	<.001	39.83	85.59	64.64	Built	Typology of environment
9.45	<.001	43.98	58.31	39.89	Adult	Age
8.10	<.001	34.02	94.68	83.72	Report	Source of data
8.02	<.001	86.96	8.87	3.07	Service/Institutional	Function of the environment
7.87	<.001	68.82	14.19	6.20	Meaning	Research theme
7.44	<.001	44.47	41.91	28.35	Characteristics of environment	Sampling procedure
7.15	<.001	53.40	22.62	12.74	Representative	Sampling procedure
6.50	<.001	45.78	31.26	20.55	Building	Size/anthropisation
6.19	<.001	49.28	22.62	13.81	Evaluation	Research theme
6.12	<.001	77.50	6.87	2.67	Elderly people	Age
3.48	<.001	42.26	15.74	11.21	Indoor & Outdoor	Nature of environment
3.40	<.001	44.83	11.53	7.74	Stress	Research theme
3.19	.001	37.62	26.61	21.28	Operative	Mode of transaction
2.50	.006	45.31	6.43	4.27	Large scale	Size/anthropisation
2.44	.007	40.32	11.09	8.27	Mixed	Age
2.36	.009	36.91	19.07	15.54	Characteristics of population	Sampling procedure
2.34	.010	38.82	13.08	10.14	Pro-environmental behaviour	Research theme

Table 7
Cluster 5—Significant modalities.

Test-value	p-Value	Clu/Mod	Mod/Clu	Global	Modality	Classification criterion
23.61	<.001	91.00	91.00	6.67	Worker	Environmental role
21.05	<.001	87.78	79.00	6.00	Working	Function of the environment
10.74	<.001	15.05	90.00	39.89	Adult	Age
6.83	<.001	16.00	52.00	21.68	Responsive	Mode of transaction
6.70	<.001	9.70	92.00	63.24	Reconstruction	Presentation of the setting
6.33	<.001	13.65	58.00	28.35	Characteristics of environment	Sampling procedure
6.04	<.001	12.79	60.00	31.29	Indoor	Nature of environment
4.90	<.001	28.85	15.00	3.47	Ethnographic/Case study	Sampling procedure
4.86	<.001	19.83	23.00	7.74	Stress	Research theme
4.25	<.001	9.91	64.00	43.10	Behavioural	Form of transaction
4.25	<.001	9.17	75.00	54.57	Reactive	Phase of transaction
3.97	<.001	13.88	29.00	13.94	Environmental properties	Research theme
3.64	<.001	13.43	27.00	13.41	Room	Size/anthropisation
3.03	<.001	8.11	79.00	64.98	E&B	Journal
2.72	<.001	20.51	8.00	2.60	Personality	Research theme
2.72	<.001	11.07	27.00	16.28	1991–1995	Lustrum
2.69	<.001	10.39	32.00	20.55	Building	Size/anthropisation
2.66	<.001	7.41	93.00	83.72	Report	Source of data

the study of developmental ages. These studies are significantly associated with the first lustrum, and hence to E&B (see Table 9).

2.4.2. Trends in environmental psychology and differences between E&B and JEP

Trends in environmental psychology and differences between the journals were investigated through a Chi-square analysis.

Overall, in terms of trends over time, there is no significant change in the emphasis given to the different modes of person–environment transactions (Chi-square = 25.02, $df = 18$, not significant), whereas a comparison between E&B and JEP, and the analysis of trends in specific research themes suggest a greater diversity.

A significant difference between journals emerges in the interest towards the different modes of transaction (Chi-square = 22.38, $df = 3$, $p < .001$), with E&B placing more emphasis on the Operative mode and JEP mainly focusing on the Interpretive mode (see Fig. 3).

Trends in modes of transaction in each journal (see Fig. 4) show a slow decline in JEP of papers focusing on the cognitive form of transaction, in particular as regards the Evaluative mode, with a corresponding increase in articles focusing on the behavioural

Table 8
Cluster 6—Significant modalities.

Test-value	p-Value	Clu/Mod	Mod/Clu	Global	Modality	Classification criterion
99.99	<.001	66.67	97.78	4.40	NA	Function of the environment
14.57	<.001	76.74	73.33	2.87	NA	Size/anthropisation
14.48	<.001	75.00	73.33	2.94	NA	Nature of environment
14.48	<.001	75.00	73.33	2.94	NA	Typology of environment
8.69	<.001	18.92	62.22	9.87	NA	Environmental role
7.55	<.001	22.99	44.44	5.80	NA	Presentation of the setting
2.83	<.001	10.94	15.56	4.27	Large scale	Size/anthropisation
2.75	<.001	3.51	97.78	83.72	Report	Source of data
2.71	<.001	4.76	55.56	35.02	JEP	Journal
2.58	<.001	10.91	13.33	3.67	Manager	Environmental role

Table 9
Cluster 7—Significant modalities.

Test-value	p-Value	Clu/Mod	Mod/Clu	Global	Modality	Classification criterion
29.19	<.001	89.35	79.51	19.41	Visitor	Environmental role
16.20	<.001	88.79	31.50	7.74	Service/Institutional	Function of the environment
16.17	<.001	87.50	32.11	8.01	Field	Presentation of the setting
15.16	<.001	79.41	33.03	9.07	Recreational	Function of the environment
15.11	<.001	69.95	39.14	12.21	Observation	Source of data
10.68	<.001	58.97	28.13	10.41	Child/Adolescent	Age
8.19	<.001	47.28	26.61	12.27	Opportunity	Sampling procedure
7.81	<.001	80.00	9.79	2.67	Service/Daily	Function of the environment
7.50	<.001	31.11	61.47	43.10	Behavioural	Form of transaction
7.35	<.001	56.67	15.60	6.00	Connecting	Function of the environment
7.06	<.001	55.68	14.98	5.87	Built area	Size/anthropisation
6.45	<.001	35.74	34.86	21.28	Operative	Mode of transaction
6.08	<.001	29.17	59.33	44.36	Active	Phase of transaction
5.79	<.001	52.00	11.93	5.00	Use of the environment	Research theme
4.14	<.001	28.57	40.98	31.29	Indoor	Nature of environment
4.01	<.001	24.97	74.01	64.64	Built	Typology of environment
3.60	<.001	24.64	73.39	64.98	E&B	Journal
3.14	<.001	30.85	18.96	13.41	Room	Size/anthropisation
2.96	<.001	38.71	7.34	4.14	Territoriality	Research theme
2.94	<.001	33.94	11.31	7.27	1969–1975	Lustrum
2.80	<.001	29.67	18.96	13.94	Environmental properties	Research theme
2.49	<.001	25.08	47.40	41.23	Outdoor	Nature of environment
2.24	<.001	29.53	13.46	9.94	Natural	Typology of environment
2.19	.003	26.46	26.30	21.68	Responsive	Mode of transaction

form of transaction. In E&B, the first period shows a flourishing of studies placing greater emphasis on the Operative mode, while studies on the Responsive mode are underrepresented. Over the next six lustrums the variations in transactional modes do not show any clear trend, but mere fluctuations.

Further significant differences between E&B and JEP (Chi-square = 79.79, $df = 11$, $p < .001$) can be noted with reference to research themes: studies on evaluation (assessment of environmental quality, preference and satisfaction), pro-environmental behaviour, and use of the space are more specifically addressed in E&B, whereas research on environmental cognition, meaning and aesthetics are more represented in JEP (see Fig. 5). In both journals, the number of articles devoted to personality and environment is negligible.

In terms of trends over the years, in E&B the first lustrum is characterised by studies on territoriality, use of space, and environmental cognition. Interest in these themes constantly declines over subsequent periods, while studies on pro-environmental behaviour dramatically increase over the last three lustrums. In JEP, a significant variation in research themes emerges only in the last lustrum, with a rise of studies on meaning, environmental attitude and pro-environmental behaviour and a decline of studies on aesthetics.

With respect to the indoor–outdoor nature of the environment being studied, the trend analysis does not show a general effect (Chi-square = 10.11, $df = 6$, not significant) nor a significant difference between journals (Chi-square = 2.19, $df = 1$, not significant). Nonetheless, residual analysis outlines a strong interest in the last lustrum for research on the outdoors, confirmed by the increasing interest towards the study of natural and global environments (Chi-square = 43.60, $df = 12$, $p < .001$).

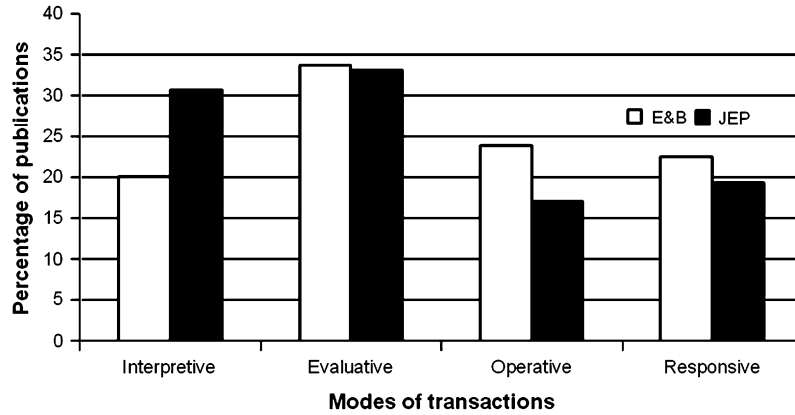


Fig. 3. Modes of transaction in E&B and JEP.

As to methodological issues, a significant difference in the *mode of presentation of the environment* between journals emerges (Chi-square = 76.43, $df = 2$, $p < .001$). Studies employing a reconstruction of the experience in the environment are overrepresented in both journals, but E&B shows a greater interest in field observations than JEP, and JEP a stronger concern with experimental research and use of simulations than E&B (see Fig. 6).

This difference is partially due to the significant change occurred over the years (Chi-square = 54.79, $df = 12$, $p < .001$), with field

studies more represented in the first and second lustrums (when only E&B was present) and then decreasing, to the advantage of experimental studies, which reached the top in the late 1980s and in the 1990s. The use of a reconstruction of the experience in the environment is constant through the years, and, as noticed, paramount in both journals (see Fig. 7). Accordingly, a clear trend is outlined in the *source of data*, with reports underrepresented in the first and second lustrums and overrepresented in the last one, while observation shows the inverse pattern (Chi-square = 26.03,

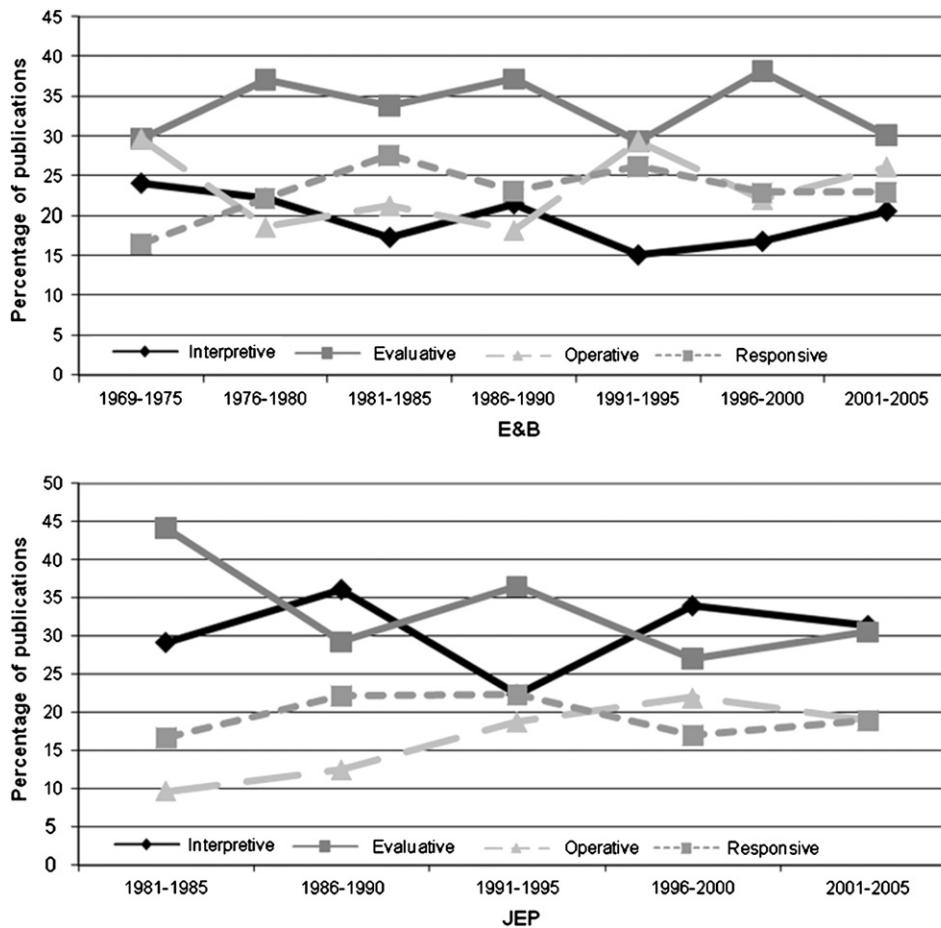


Fig. 4. Trends in modes of transaction in E&B and JEP.

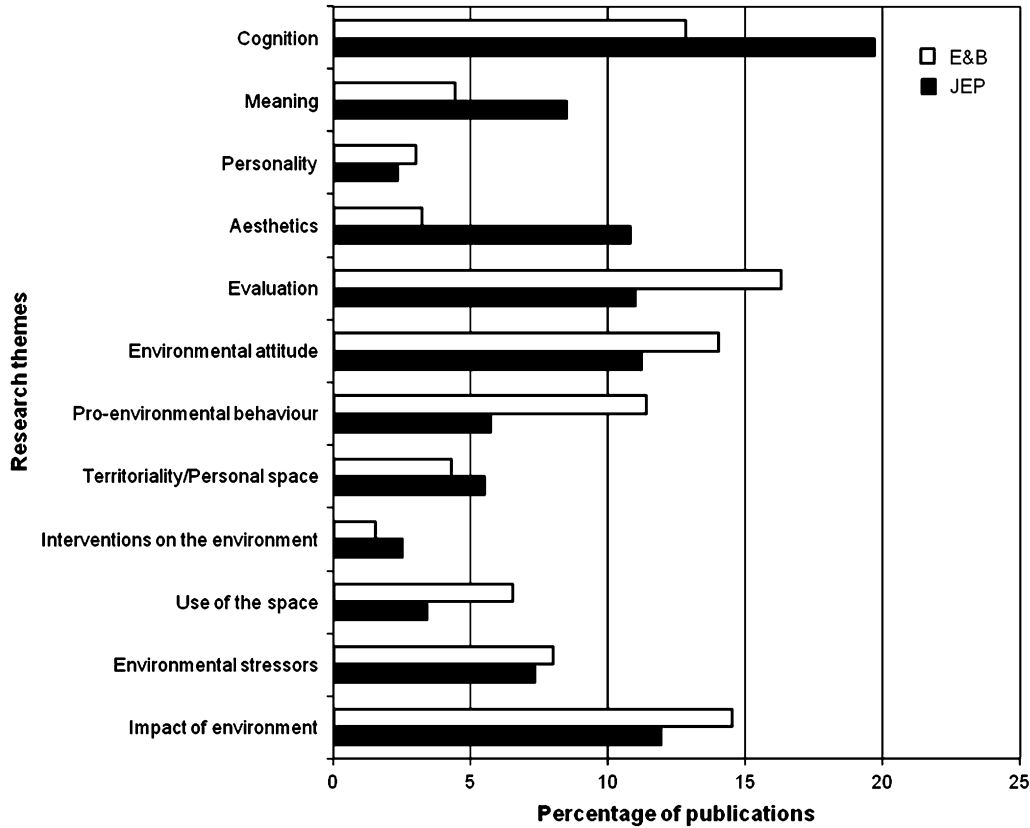


Fig. 5. Research themes in E&B and JEP.

df = 6, $p < .001$). Again, E&B (Chi-square = 18.49, df = 1, $p < .001$) is significantly more characterised by studies employing observations and JEP by studies employing reports.

3. Discussion

The analysis of empirical research in environmental psychology can help in addressing the peculiarities of the discipline, its internal dynamics, its weaknesses and directions for the future.

With respect to what are the main research interests in environmental psychology, the bulk of studies we examined clearly showed the prominence of four areas of inquiry, which can be considered the leading topics in the discipline. First, the study of

the residential environment, whether home, domestic surroundings or neighbourhood, which was addressed from different points of view: people's satisfaction and preferences for their residential environment, as well as sources of stress/discomfort; affective evaluations, attachment and the connection between place experience and the definition of personal identity. Second, the study of environmental cognition, preference and affective evaluation, mainly pursued through an experimental approach in the laboratory setting, and by using simulations of the environment. Third, the study of actual behaviour in the environment (whether natural or built, indoor or outdoor), in which observation is the key method to understand how people use the environment, or react to it. Fourth, and strongly increasing in the last years, the study of nature

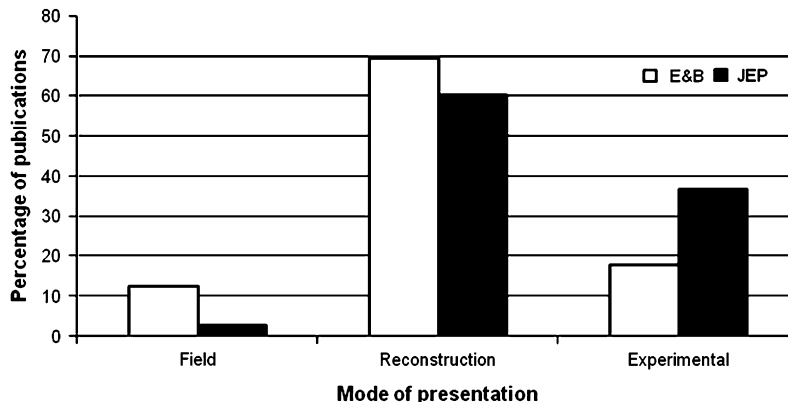


Fig. 6. Mode of presentation of the environment in E&B and JEP.

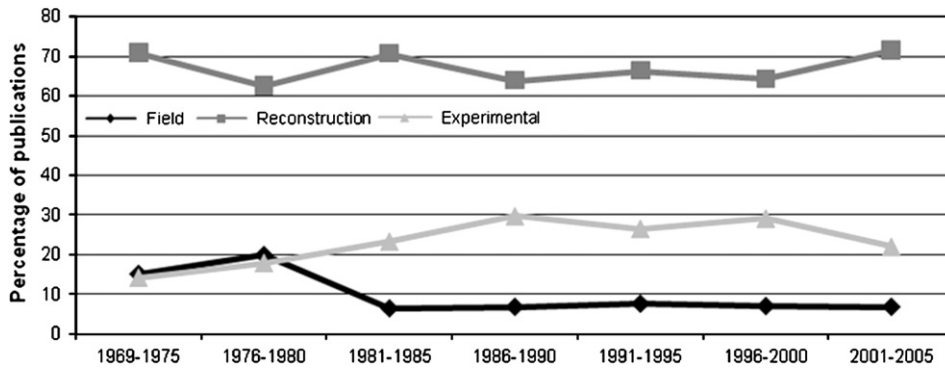


Fig. 7. Trends in the mode of presentation of the environment.

and global environment, which were taken into consideration by emphasising ecological problems.

Beyond this static picture, differences between journals and variations of research interests over the past 46 years account for directions of development in the field.

Jonathan Sime (1999), in a survey of six textbooks on environmental psychology published between 1995 and 1997, entitled—“What is environmental psychology”, showed how the views of scholars in the field differ as to both the theoretical paradigm and the methodologies that define the field, and the role assigned to psychology as part of the study of relations between people and the environment. Comparison of the two journals helps us to answer the question about differences between environmental psychology in the strict sense, and the study of people–environment relationships in the broad sense. The central role attributed to psychology by JEP is reflected in the greater emphasis given to the interpretation of the environment. Conversely, the greater interest for the reactive mode of transaction in E&B, whether evaluative or responsive, could be interpreted as deriving from a deeper involvement of the component of design and planning.

E&B also shows a stronger variation in research interests than JEP, especially when considering the operative mode of transaction this is probably due to both the wider variety of topics included in the area and contextual factors affecting the development of research on behaviour in place.

With reference to research themes as well, there are differences between the journals, with pro-environmental behaviour, evaluation, and use of the environment more represented in E&B, and aesthetics, cognition, and meaning in JEP.

We stated previously that the border between studies on pro-environmental attitudes and behaviour is rather arbitrary, given that many studies focus on the relation between the two. The recent increase in contributions in both areas makes one think that one key element is concern for the environment, rather than interest in the one or the other transactional mode. On the other hand, studies on environmental control, privacy and territoriality have been continually declining; research on place meaning showed a positive trend, while the area that encompasses studies on organisation and use of the space maintained the same level throughout the entire period.

The results of our analyses also highlight some underdeveloped or missing areas of investigation, from the multimodal perception of the environment (e.g. auditory and olfactory, in addition to visual) to the impact on urban environment of massive migration. Evidencing deficiencies is surely a very easy criticism, but two of them need to be highlighted. First, the impact of communication technology on relationships with place: Stokols (1995) suggested it as a new direction for environmental research, and reiterated this proposition in his chapter on the psychology of technology (Stokols

& Montero, 2002), but no trend in this direction emerged from our data. Second, the incapability of taking advantage of recent developments in neurosciences²: research in this direction would constitute a big challenge in many respects, especially because it would mean introducing a molar level of analysis in a psychological domain dominated by focus on molecular units, as happened for early research on restorativeness (see Ulrich, 1981). Conversely, references to environmental psychology in neurological studies on wayfinding, and even in computer science, can be found. Environmental psychology is better in sowing than in harvesting!

With reference to methods, a progressive decline of the innovative emphasis on both the “social” and the “physical” side of the socio-physical environment, also by means of observation and field research, was observed. New methods hardly emerge, overwhelmed by approaches and methodologies borrowed from other sub-fields of psychology, such as social psychology. As shown by the modalities included in Cluster 2, which is indicative of the more recent trend, the environment often appears to be confined on the background, missing any specific definition of its nature and functional character, except for a quite generic ecological function.

4. Conclusion

Our empirical approach to environmental psychology literature has identified some strengths and weaknesses of the field that provide useful suggestions for future research. However, if we try to go over a neutral description, and express our evaluation of past trends and our perspective on what should be done, probably empirical data are less important than personal and direct experience with research problems and people.

The two authors of this paper belong to two different generations, and thus, in addition to personality differences (for instance, a more optimistic vs. a more pessimistic attitude), differ also both in their practical and emotional involvement in the future, and in their mode of looking at the past.

For somebody who has experienced a time when, in many countries, the establishment of environmental psychology as a new scientific field was an arrival point, not a starting one, current tendencies toward creating subfields, or parallel, sister fields, can appear as a fragmentation; that is to say, a failure in making effective the coherent and unifying theoretical framework auspicated by Craik (1973), but also by many other pioneers of environmental psychology like Wapner (1995) and Proshansky (1987). From a more personal point of view, this would mean also that the community of

² The recent publication in JEP of the paper on wayfinding in the real world by neuroscientists Hugo J. Spiers and Eleanor A. Maguire (2008) could be a sign of change.

friends, more than colleagues, that constituted the world of environmental psychology research, risks disappearing—as of course will happen for demographic reasons—without leaving to our younger colleagues a precious heritage of human relationships.

For newcomers of the field, the onset of new “environmental psychologies” could be a vital sign of the differentiation that usually accompanies the growing of an organism, including scientific disciplines, often deriving from the impact of environmental psychology on other disciplines and psychological sub-fields. Although the collaboration between architects and psychologists has not fully satisfied all the initial promises, environmental psychology continues to be a reference point for many architects and planners, not only as regards the integration in design of an increased attention to users need, but also for concepts like place identity and attachment. In addition, the recognition by gerontologists of the role of the environment in maintaining the autonomy and well-being of ageing people stimulated a merging of interests and competences between researchers from both disciplines (Lawton, 1985), resulting in a new and specific discipline, environmental gerontology (Phillipson, 2004; Wahl, 2006). Similarly, the importance of transactions with the environment has been acknowledged in developmental psychology, for their value in the construction of personal identity (Korpela, 2002), and in work psychology (McCoy, 2002).

What about the possibility for environmental psychology to build up a unifying framework for understanding people–environment transactions? Unfortunately, the urgency and seriousness of our planet situation do not allow us to think—as could be thought at the end of the 1970s—that concerns about sustainability could be considered as a short-lived fashion (cf. Stokols, 1978). But does this mean that environmental psychology as a whole has to transform in green or sustainable psychology? We think that we should learn from the past in order to develop the future of our discipline. The concept of sustainability might assume a unifying role, but only in the light of the place specificity of human behaviour (Russell & Ward, 1982): hence, with reference to all the different—and specific—environments which have been studied for decades. Sustainability has to do not only with a foresightful use of environmental resources, but also with the maintenance of personal and social ones, which may be threatened in everyday environments; as such, it implies the idea of psychological well-being. In this view, van den Berg, Hartig, and Staats (2007) addressed the issue of sustainability in the development of the urban environment.

This would not mean emptying the word sustainability of all meaning, using it as a mere fashionable label, but tracing back the study of people–environment relationships to the original aim of understanding the role of different environments in psychological well-being.

Acknowledgements

We would like to thank Carlo Plaino and Luca Giachi for their relevant contribution to the classification of E&B and JEP articles.

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