The meaning of dwelling from an ecological perspective

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Abstract
The meaning of dwelling has been studied from many different perspectives such as psychology, phenomenology, sociology and environment behavior studies. Several authors have argued that a more integrative and interdisciplinary approach is needed in which physical, socio-cultural, psychological and economic dimensions are interrelated. However, in many of these studies dwelling is mainly treated as such. What is lacking is an approach in which dwelling is considered as integral part of environment-behavior relations. An ecological approach offers such a perspective. An ecological approach focuses on the individual's ongoing transactions with meaningful features of the environment; it emphasizes the intentionality of individual's actions. The reciprocity of the environment and the individual is a central feature of an ecological approach, and it may be studied at different levels of organization. For instance, a dwelling is an individual's primary anchor in the environment. It may serve many functions such as shelter, privacy, security, control, and status. From an ecological point of view the meaning of dwellings lies in these functional relations between human beings and their dwellings. At a different level, a neighborhood park is a suitable arrangement of features that may also serve functions at a collective level, such as running and playing, walking the dog, and social contacting. In the paper the conceptual and methodological framework for studying the meaning of dwelling from an ecological perspective will be presented. The framework will be illustrated with examples from recent research on the meaning of dwelling in the Netherlands.

1. Introduction

The meaning of dwellings has been studied from many different perspectives such as psychology, phenomenology, sociology and environment-behavior studies (Despres, 1991; Moore, 2000; Mallett, 2004). Several authors have argued that a more integrative and interdisciplinary approach is needed in which physical, socio-cultural, psychological and economic dimensions are interrelated (e.g. Despres, 1991; Somerville, 1997). However, in these studies dwellings are mainly treated as such. What is lacking is an approach in which a dwelling is considered as an integral part of the environment. Moreover, studies in this area pay mainly attention to the dwelling (noun) and hardly to dwelling as a stream of behavior. An ecological approach offers such a perspective.

An ecological approach focuses on the individual's ongoing transactions with meaningful features of the environment; it emphasizes the intentionality of individual actions. The reciprocity of the environment and the individual is a central feature of an ecological approach: 'The fact is worth remembering because it is often neglected that the words *animal* and *environment* make an inseparable pair. Each term implies the other. No animal could exist without an environment surrounding it. Equally, although not so obvious, an environment implies an animal (or at least an organism) to be surrounded.' (Gibson, 1986, p. 8, italics in original).

This reciprocity of the environment and the individual may be studied at different levels of organization. For instance, a dwelling is an individual's primary anchor in the environment. It may serve many functions such as shelter, privacy, security, control, and status. From an ecological point of view the meaning of a dwelling lies in these functional relations between a human being and his/hers dwelling. At a different level, dwelling may also comprise suitable arrangements of features that serve functions at a collective level, arrangements such as a supermarket, a school, and a park. In the paper the conceptual and methodological framework for studying the meaning of dwelling from an ecological perspective will be presented. This framework will be illustrated with examples from my own research. In section two the basic ideas of the ecological perspective are outlined. The meaning of the environment is considered from this perspective in section three, and the meaning of a dwelling is discussed in section four. The conceptual framework is presented in section five. Measurement aspects are considered in section six. Examples of different ways to analyze data, obtained through our approach, are described in section seven. The paper ends with a discussion of several aspects of the framework.

2. The Ecological Perspective

The ecological perspective on the meaning of dwellings as presented in this paper rests on five basic ideas (cf. Blumer, 1969; Heft, 2001):

1. The relation between the human being and the environment is best characterized as a mutual and reciprocal relation. At a functional level of analysis, human being and environment make an inseparable pair; each implies the other. Social and psychological processes are relational processes. There is a dynamic relation between the human being and its environment. A human being intentionally selects or adjusts to present features of the environment, and in many instances people alter the environment to better fit with their aims.
2. The meaning of objects reside in these functional relations between features of the environment and the needs and intentions of human beings. It is in these relations that meanings are discovered, and where they are created

3. The meanings that objects have for human beings are central in their own right. To ignore or bypass the meaning of objects towards which people act is seen as a serious neglect of the role of meaning in the formation of action.
4. Meaning is seen as arising in the process of social interaction between people. The meaning of an object for a person grows out of the ways in which other persons act toward the person with regard to the object. Their actions operate to define the object for the person. Thus, meanings are seen as social and cultural products, as creations that are formed in and through the defining activities of people as they interact.
5. This does not mean that the use of meaning by a person is but an application of the meaning so derived. The use of meaning by a person in his actions involves an interpretative process, in which the actor selects, checks, suspends, regroups and transforms meanings in the light of the situation in which he is placed and the direction of his action. Accordingly, interpretation should not be regarded as a mere automatic application of established meanings but as a formative process in which meanings are used as instruments for the guidance and formation of action.

3. The Meaning of the Environment

An individual's operating environment consists of objects, the things toward which the individual is oriented, they form the focal points around which the individual's activities become organized. An object is anything that can be referred to or designated; objects may be material or immaterial, real or imaginary, in the outer world or inside the body, have the character of an enduring substance or be a passing event. From the perspective of a human being the environment may be classified in at least five categories: other human beings, other animals, physical objects, social objects, and abstract objects. If the individual notes or is aware of any one of these things, it is an object for that individual. Objects constitute the world or operating environment of the human being (Blumer, 1969). Taken together, they constitute the individual's world of existence, that is, the things the individual deals with in life activity.

Objects have value for human beings in terms of the possibilities they offer for actions and intentions; that is, an object may have certain features in relation to a goal of the individual. The concept of affordances (Gibson, 1986) most basically highlights this congruence between structural features of the environment and the intentions and goals of individuals. For example, a firm, obstacle-free ground surface affords walking on, a chair affords sitting on, a door to a room affords opening and passage. Affordances are relations between features of objects and abilities of human beings (Chemero, 2003); they are attributable to the intrinsic features that objects possess by virtue of their make-up, and are specified in relation to a particular individual. Environmental features are experienced as having a functional meaning for the individual.

Environment-behavior relations also occur at the extra-individual level. Barker (1968) uses the term synomorphy to refer to the presence of congruence between topographic and designed features of settings, on the one hand, and the collective activities that take place in the settings, on the other. A behavior setting is a more or less permanent behavior pattern together with the part of the environment to which the behavior is attached and with which it has a synomorphic relationship (Barker and Wright, 1978). Individuals as well as objects are 'interjacent' components of a behavior setting. A behavior setting is comprised of a particular pattern of relations generated and maintained by its occupants. It is the relations among the components (i.e., individuals and objects) that generate and maintain the setting. Structurally,

behavior settings are behavior-environment synomorphs. The meaning of a behavior setting – that is, what kind of setting it is and thus what kind of activities are appropriate in it – resides in perceived synomorphic relations between environment features and action. For example, functionally adequate classrooms possess synomorphy between, on the one hand, furnishings and lighting, and on the other, the planned educational activities. As for its meaning, the kind of setting a classroom is, that is, the kinds of activities that normaly go on there, are posited to be perceivable in its structure. From an ecological perspective behavior settings are relevant, because very little behavior seems to ocurr outside their limits (Barker and Wright, 1978).

The concepts of affordances and synomorphs have much in common, and in some cases they may nearly overlap. What distinguishes affordances and synomorphs at a conceptual level is that synomorphs refer to environmental features that define settings and functionally support collective actions of individuals. Affordances, by definition, do not support collective actions, but instead are identified relative to the actions of an individual perceiver. But the boundary between these two concepts is not sharp. They both refer to publicly accessible, meaningful features of the environment specified relative to the behavior of individuals (Heft, 2001).

The features of the environment are only one facet of dynamic individual-environment relations; the other facet is intentional actions of individuals, and this aspect of the individual-environment relation becomes most apparent in the selection, the discovery, and the creation of meaningful environmental features (Heft, 2001). Individuals selectively engage particular objects in their surround; individuals typically make choices from among the range of potential features in a setting to support some activity. However, individuals do not have unconstrained choice. Factors outside of their control may limit the range of socially and/or culturally sanctioned choices. So there is self-selection of affordances and behavior settings but often within constraints.

Intentionality is also apparent in the processes through which individuals learn about and discover the features of objects, and their affordances and synomorphs, in their surroundings. This is not a random process; which objects are selected in the first place is delimited by the perceived congruence between an object's features and the individual's functional capabilities and intentions. This reciprocity gives rise to exploration and discovery within constraints. Finding novel uses for familiar objects is a particular satisfying way for new affordances to be discovered. In the case of synomorphs, individuals can discover the meaning of a setting through participation.

Actions involving the learning about environmental features are frequently guided by others. Throughout life, most apparently during childhood, individuals are explicitly taught, often in very subtle ways, to recognize and utilize the functional features of objects. Individuals also learn about the meanings of objects by observing the actions of others.

Finally, affordances and synomorphs are sometimes created when the range of possibilities available in the environment are insufficient to meet certain goals. The environment is comprised of meaningful features that were created by an individual or a group of individuals at some time. This omnipresent fact about the world is one manifestation of the fundamental reciprocity of individuals and environment. Individuals do not merely take the world as they find it, the environment is continually being modified. Many of these activities are efforts to create new affordances or synomorphs in order to address specific individual and collective needs.

This ubiquity of affordances and synomorphs points to an important issue. In many cases, meaningful features of the environment that are created reflect individual's knowledge about environment-behavior relations. This means that a great deal of what is known is embodied in the environmental structures individuals create; we live our lives in environments rich in what might be called ecological knowledge. An ecological perspective

proposes that the meanings of objects reside in the relations between features of the environment and human beings. It is in these relations that meanings are discovered, and where they are created.

In this functional sense every object has a meaning that distinguishes it from other objects. This meaning constitutes the nature of the object for the individual for whom the object exists. One confronts an object, sees it, refers to it, talks about it, or acts toward it in terms of the meaning it has for one. No objects exist for a person except in terms of the meaning it has for the person. Meaning is not something that is inherent in an object; it is not an intrinsic part or attribute of the object. The meaning of an object exists in a relation between the object and the individual for whom it is an object; its meaning exists in how the individual designates the object, and in this sense an object may have different meaning for different human beings.

4. The meaning of dwelling

A dwelling is defined as the sub-system of settings, embedded in the larger system of settings called the environment, in which certain systems of activities take place (Rapoport, 1990a). It forms the primary anchor for an individual in the environment and provides such primary functions as concealment and shelter. Defining a dwelling as a sub-system of the environment makes it possible to understand its specific functions, such as a place of retreat, not only in terms of its occupiers but also in the context of the other sub-systems in the environment. Only a subset of all human activities takes place in a dwelling. This subset of activities may be different for different individuals and the subsystem of settings that makes up the dwelling may also vary. Dwelling as a sub-system of all environment-behavior relations may be limited to the activities and settings that take place in the dwelling, but it may also comprise of other environment-behavior relations. An a priori assumption about what settings/activities are part of an individual's dwelling, therefore, can not be made. It could include such behavior settings as shops, a school, a church, a park, and many other settings.

Since behavior settings are public in nature, private behavior in dwellings was generally not observed in behavior settings research (Bechtel, 1982). Although a dwelling was assigned as a behavior setting in its own right (Barker and Wright, 1955), one has to realize that it often affords a mixture of individual (affordances) and extra-individual (synomorphs) environment-behavior relations. For instance, a dwelling is an individual's primary anchor in the environment, and as such it affords him/her individually, albeit often as a member of a family, shelter, retreat, privacy, and so on. But a dwelling may also have settings that allow for family activities such as a family dinner. So, a dwelling is a system of settings in which the boundaries between affordances and synomorphs are not very sharp.

Most previous research into the meaning of dwelling has taken a holistic view of dwelling (Rapoport, 1995; Moore, 2000). However, the approach in this paper deviates from this practice and focuses on both physical and non-physical features, separate settings, of dwelling. There are several reasons for studying the meaning of dwelling from the perspective of dwelling features. First, there is the heterogeneity of the category of dwelling. There are many different types of dwellings that differ mainly in their features. Single family dwellings differ not only in many features from apartments but also among themselves, for instance some have a garden. Secondly, people perceive dwelling not only holistically but also in terms of their features, clearly demonstrated in research into the reasons for moving, where many people include dwelling features as a reason (Rossi, 1955). Thirdly, the holistic view of dwelling and the feature view of it are just two different ways of considering the same phenomenon, they are just two sides of the same coin. Finally, a dwelling has many potential

uses and people are looking for multi-functional dwellings that can have many different meanings, which are, in the first place, afforded through the features of dwellings.
So, the meaning dwelling has for people lies in the functional relations between the features of dwelling on the one hand and the goals and intentions of people on the other.

This conception of the meaning of dwelling is closely related to Rapoport's work on the meaning of the built environment (Rapoport, 1988, 1990b). According to Rapoport (1988) meaning links environments and people by providing much of the rationale for the ways in which environments are *shaped* and *used*. He also believes that the common distinction between function and meaning is misguided, that meaning is not only part of function, but is often the most important function of the built environment. Rapoport (1988) distinguishes three levels of meaning in the built environment. *High-level* meanings are related to cosmologies, world views, philosophical systems, etc.; *middle-level* meanings such as identity, privacy, status, wealth, power, etc. which are also called latent functions; *lower-level,* everyday meanings, for example accessibility, seating arrangements, movement, etc. which are also called manifest functions. According to Rapoport everyday meanings have mostly been neglected in research on the meaning of the built environment, although they are essential for understanding the built environment. People's activities and built environments are primarily linked by lower-level meanings, although middle-level meanings also tend to be important.

It is believed that especially manifest and latent functions are related to specific features of dwelling (Rapoport, 1988). This is not to deny that dwelling, considered as a whole, may also have meanings. My conjecture, though, is that these will be occasionally middle and mostly higher level meanings.

5. Conceptual framework

The conception of meaning that has been elaborated in the previous sections results in a conceptual framework for studying the meaning of dwelling features from an ecological perspective. This framework is depicted in figure 1 together with an example.

The approach that is taken here deviates from the conventional practice of exploring the meaning of dwelling holistically. Instead, the holistic view of dwelling is deconstructed, looking specifically at features of dwelling. Based on the notions of affordances and synomorphs, the relations between dwellers and dwelling features are investigated in terms of what the dwellers do, or want to do, *in and around* the dwelling. In order to do so, one needs to look at dwelling in terms of different features and different functions.

In the above framework, an investigation of meanings starts with a specific dwelling feature. The relations between a dwelling feature and its functions for an individual, which are the meanings attached to that specific feature by the individual, may be identified by means of interviewing. For instance, a dweller may attach to the dwelling feature number of rooms such functions (meanings) as space, activities, privacy, and social contacts. These meanings express the intentions and aims the person has in mind. In other words, people's intentions and goals are reflected in their evaluation of the features of dwelling, which they believe may facilitate or hinder the achievement of their goals (Coolen and Hoekstra, 2001).

The framework and the research methodology allow for a certain layering of meaning. Rapoport's distinction in high-level, middle-level and lower-level meanings suggests such a layering, but previous research has shown that this layering of meaning is not always observed empirically (Coolen and Hoekstra, 2001). The relation(s) between a dwelling feature and its meaning(s) is called a meaning structure.

Figure 1 Conceptual framework for studying the meaning of dwelling features

Ecological framework	**Example 1**	**Example 2**
Latent functions	Privacy	Social contacts
Manifest functions	Space	Activities
Dwelling features	Number of rooms	Park

6. Measurement

The measurement procedure for measuring the meaning structures of dwelling features is an adapted version of the procedure for the determination of means-end chains (Reynolds and Gutman, 1988; Coolen and Hoekstra, 2001). The measurement of the meaning structures of dwelling features takes place in three phases:

1. elicitation of the salient dwelling features;
2. elicitation of the (preferred) levels of the salient dwelling features;
3. measurement of the meaning structures.

The first step in measuring the meaning structures concerns the elicitation of salient dwelling features. Many elicitation methods are available that range from letting the respondents mention the features themselves, to presenting the respondents with a list of features (cf. Reynolds, Dethloff, Westberg, 2001). Since much is known about important dwelling features two sets of cards were compiled – one set containing housing features and the other containing neighborhood features. Respondents had to select the most important features from both sets. They also had the possibility to add features they considered important and that were not on the cards, enabling them to determine exactly what a dwelling is to them. The choice to use cards with features was enhanced by the fact that there are so many dwelling features. It was expected that, because of the limited information processing capability of human beings, sets of cards would support the respondents in conceptualizing their important dwelling features.

In the second phase the respondents are asked to indicate which level of each of the salient features they prefer. If, for example, the number of rooms was mentioned as a salient feature, then the respondent has to indicate the preferred number of rooms. Where the type of dwelling is a salient feature, either the preferred type is indicated or the dwelling type that is definitely not wanted. Allowing respondents to indicate what they definitely do not prefer, their so-called non-preference, is particularly relevant for situations in which the respondent can not articulate their preference for a certain level of a salient feature very well. For example, some respondents know very well that they do not want to live in an apartment, but have no clear preference for either a dwelling in a row or a semi-detached dwelling.

The starting point for determining the meaning structures of each salient dwelling feature is the preferred or non-preferred level of that feature. The meaning structures are measured, in the third phase, by a semi-structured interviewing technique known as laddering (Reynolds and Gutman, 1988). The interview proceeds according to a tailored format using primarily a series of directed probes of the form ‘Why is that important to you?’. The purpose of this interviewing format is to determine the relationships between on the one hand the

preferred or non-preferred level of a salient feature and on the other hand the meaning or meanings this dwelling feature has for the respondent. So, if the respondent has indicated that a dwelling that has a garden is preferred, he/she is subsequently asked 'Why is a garden important to you?' The why question is repeated as a reaction to the answer of the respondent. The process stops when the respondent can no longer answer the *why* question. Letting the interview begin at the preferred or non-preferred level of a salient dwelling feature and subsequently proceeding with several why questions allows the most closely associated meanings of the feature to be revealed. In this way meaning structures can be determined for each salient dwelling feature level and for every respondent. The meaning structures are constructed during the interview by the interviewer and the respondent together on paper. There are good reasons for constructing the meaning structures in this way. Writing each answer down on paper gives the respondent some time during the interview to reflect about his or her answer and to explore and discover other aspects of the cognitive structure under construction. It also gives the interviewer some time to reflect about the answer and to make sure he/she understood the answer correctly. If necessary, the interviewer can probe the respondent about the exact meaning of his answer. Furthermore, instead of being an interviewee who only has to answer questions passively, the respondent has a more active role in the interview and this involvement may work as a motivating factor.

7. Analysis

In this part of the paper data are used that were collected on the basis of our conceptual framework. Since they were collected not specifically for this paper but for another research purpose, they are only used here to illustrate our approach. After the data are described some general indicators of the selected dwelling features and their meanings are presented. Subsequently, one way of analyzing the data that the measurement procedure yields is illustrated.

7.1 Data

The data that are used to illustrate our approach were collected for a project with the aim of comparing the meanings that planners and designers had attached to two new dwelling projects with the meanings of the occupiers of those projects. For this purpose two locations with an uncommon architectural and urban design were selected: Haverleij near the city of Den Bosch and Sveaparken near the town of Schiedam, both in the Netherlands.

Haverleij is a dwelling project some ten kilometres north of Den Bosch. About 1000 dwellings, both single family houses and apartments, are being developed in an area of 225 hectares. The dwellings are situated in nine 'castles' each containing 50-90 houses and one 'fortress' containing some 450 houses. Both the architecture and the planning are special. The architects and planners were inspired by the notions of French medieval castles and Britisch mansions. The main idea of the project is 'urban living in a green landscape', it is a plan in which living in an urban area is combined with the spaciousness of rural life. To achieve this only 10% of the area will be built on, with the remaining space being used for a golf course, parks, woods and open fields. The 'castles' are free-standing in the landscape and contain compact, high-density housing units. Each 'castle' has its own access road, and an inner court that borders the front doors of the dwellings. This area is semi-private, only to be used by the inhabitants and their visitors. The houses are located in the outer walls of the 'castles', so that they overlook the surrounding landscape. The 'castles' are designed by different architects.

Sveaparken is a dwelling project on the north side of Schiedam. About 1050 houses, mainly single family dwellings, are being built in four different plans each of which has its

own character. The whole project is based on ideas from Swedish urban design and planning. Special is the design of semi-public spaces. These are green spaces between the houses, which can be used by all inhabitants, and the transition between private, semi-public and public space is very gradual. Only relatively low fences are allowed, so that private gardens quite naturally shade off into semi-public space. The master plan for the project was developed by a Swedish architect. Central in this plan are lively street scenes in which people can meet each other in the many semi-public areas. Therefore much attention is being paid to the architecture, the use of materials – a lot of wood – and color schemes. Typical for the architecture are the short building blocks, which form the physical barriers of the semi-public areas, and which at the same time aim at making the streets livelier and more diversified. The streets in between the building blocks are narrow and bendy, and only for use by pedestrians. Building regulations are strict in order to maintain as much of the character of the plan in the future.

The research project consisted of four phases. In the first phase documentation and literature about the projects was gathered and studied. Subsequently, interviews were conducted with a real estate agent, a project developer, and two civil servants to fill several information gaps. In the third phase group discussion were held on both locations with occupiers of the dwellings. In the fourth and final phase semi-structured interviews were conducted with local dwellers of both projects. For phases 3 and 4 all inhabitants of Haverleij (188) and Sveaparken (341) who lived there for at least one year were sent an introductory letter asking them to participate in the group discussions, or in the interviews, or in both. In Haverleij 14% (27) were prepared to participate, and in Sveaparken 16% (51). Of these inhabitants 19 were interviewed in Haverleij and 23 in Sveaparken. Most interviews were conducted at the interviewees home. The interviews were recorded and the meaning structures were also constructed on paper.

The interview started with the question “Could you mention some aspects of dwelling in Haverleij/Sveaparken that are important to you?”. The interviewer was instructed to probe for more aspects after the initial answer. Subsequently, the interviewee was asked to select from two sets of cards - one containing dwelling features and the other residential environment features - those features which they considered important when thinking about dwelling in Haverleij/Sveaparken. In Sveaparken the two sets contained a total of 21 features, and in Haverleij 22 features, see table 1. If more than five features were selected from one or both sets, the interviewee had to rank the features in order of importance. During the interview only the meanings of the five most important features of each set were determined, because the interview would otherwise last to long. Table 1 shows the percentage of respondents who selected each feature; if a feature is not applicable for one of the locations this is indicated in the table by ‘n/a’. The table shows that many features were selected by more than 50% of the interviewees. Both housing features as well as residential environment features share this popularity, which indicates that for the interviewees both affordances and synomorphs seem to be relevant environment-behavior relations. Since the data are used in this paper to illustrate our approach and not to report about the research project for which they were collected itself, in the remainder of the paper only the most popular features that occurred in both locations and whose meanings were determined frequently enough, are used. This concerns the features: dwelling type, number of rooms, garden, size of living room, architecture, semi-public area/inner courtyard, building density, public parks and gardens/surrounding landscape, and view. For the purpose of this paper it also is unnecessary to make the distinction between the two sub-populations, so the dataset is sometimes treated as one.

Table 1 Percentage of interviewees that selected each feature

	Sveaparken (n=23)	Haverleij (n=19)
Dwelling type	70%	79%
Number of rooms	61%	74%
Garden	57%	63%
Balcony	n/a	53%
Size of balcony	n/a	42%
Storeroom	48%	47%
Wood in facade	48%	n/a
Building regulations	61%	21%
Size of living room	65%	74%
Architecture	91%	74%
Dwelling quality	78%	74%
Color scheme	52%	21%
Semi-public area / Inner courtyard	78%	80%
Building density	65%	68%
Public parks and gardens / Surrounding landscape	87%	95%
Narrow, bendy roads	52%	n/a
One access road	n/a	26%
Being reachable	65%	53%
Composition of the inhabitants	39%	53%
Elementary school	44%	32%
No sidewalks	52%	n/a
Amenities	39%	26%
Parking for friends	57%	42%
View	91%	100%
Golf course	n/a	47%

7.2 Some general indicators

The raw data generated by the laddering interviews, both on paper and file, are the verbalizations of the respondents. First, a content analysis was carried out on these free responses. This resulted in a set of categories for all respondents. Subsequently, the meaning structures of each respondent were coded according to the set of categories. In this process, several choices about the interpretation of the various elements of the meaning structures had to be made. To reach as much intersubjectivity as possible, at least two researchers were involved in the construction of the categories from the interviews. The categories each researcher had constructed were compared with each other and possible differences were discussed until agreement was reached.

Table 2 gives an overview of the number of different meaning categories per dwelling feature, the total number of meanings that were mentioned by the interviewees for each feature, the median number of meanings per dwelling feature, and the range of the number of meanings for each feature. The number of interviewees whose meaning structure was determined is indicated in brackets for each dwelling feature.

Table 2 Some general indicators of the features

Dwelling feature	Number of different meanings	Total number of meanings	Median number of meanings	Range number of meanings
Dwelling type (n=28)	19	133	4	1 – 12
Number of rooms (n=23)	11	97	4	1 – 9
Garden (n=18)	16	61	3	1 – 7
Size of living room (n=26)	12	92	3	1 – 8
Architecture (n=32)	16	172	5	2 – 11
Semi-public area /inner courtyard (n=27)	16	97	4	1 – 6
Building density (n=23)	18	81	3	1 – 10
Public parks and gardens/surrounding landscape (n=33)	14	97	3	1 – 5
View (n=34)	14	114	3	1 - 7

For the nine dwelling features the number of different meanings varies between 11 and 19. The total number of meanings mentioned per feature ranges from 61 to 172, and is strongly associated with the number of interviewees whose meaning structures were determined for each feature. Comparing the range of the number of meanings with the median clearly shows for seven of the nine features a positively skewed distribution of the number of meanings, which indicates that most interviewees did not mention much more than the median number of meanings. The exceptions are the features semi-public area/inner courtyard and public parks and gardens/surrounding landscape.

Table 3 shows several indicators of the fifteen most popular meanings. Among the nine dwelling features the total number of different meanings was 31. The fifteen meaning categories shown in table 3 account for 87% of the total number of meanings mentioned on the nine features. Thirteen meaning categories are shared by five or more features, the exceptions are the meanings compact/bounded and no maintenance.

Table 3 Some general indicators of the most popular meanings

Meaning	Number of features	Total number of times mentioned	Median number of times mentioned	Range number of times mentioned
Enjoying life (n=38)	9	144	4	1 - 8
Privacy (n=31)	9	77	2	1 - 7
Freedom (n=22)	9	32	1	1 - 4
Social contact (n=31)	9	64	2	1 - 6
Quietness (n=25)	9	37	1	1 - 4
Spaciousness (n=39)	8	114	3	1 - 8
Nature (n=30)	8	56	1	1 - 5
Defects (n=14)	7	27	2	1 - 4
(Multi)functionality (n=34)	6	82	2	1 - 6
Distinguished (n=31)	6	76	2	1 - 7
Safe (n=13)	6	16	1	1 - 2
Space (n=36)	5	61	1	1 - 4
Clean (n=9)	5	12	1	1 - 2
Compact/bounded (n=13)	4	13	1	1 - 1
No maintenance (n=10)	4	13	1	1 - 2

Given the number of features on which the meanings occur as well as the range of the number of times mentioned the median number of times each meaning is mentioned seems to be relatively low.

Tables 4 and 5 show the frequency distributions of the features number of rooms and semi-public area/inner courtyard.

Table 4 The meanings of the feature number of rooms and their frequency (n=23)

	Frequency	Percentage
Privacy	41	42
(Multi)functionality	24	25
Space	9	9
Enjoying life	7	7
Social contact	6	6
Clean	3	3
Quietness	2	2
Family life	2	2
Freedom	1	1
Safe	1	1
Defects	1	1
Total	97	100

The feature number of rooms affords privacy and (multi)functionality, for instance a separate study, but it also facilitates extra-individual environment-behavior relations, i.e. synomorphs, such as social contact, family life and (multi)functionality, for instance a separate dining-room. Notice that the meanings privacy and (multi)functionality account for two third of the total number of answers given on this feature.

A first analysis of the meanings of the feature semi-public area/inner courtyard suggests that the feature is perceived as a behavior setting. This is indicated by the most popular meaning social contact, and by the fact that it supports such functions as parking area and playground for children.

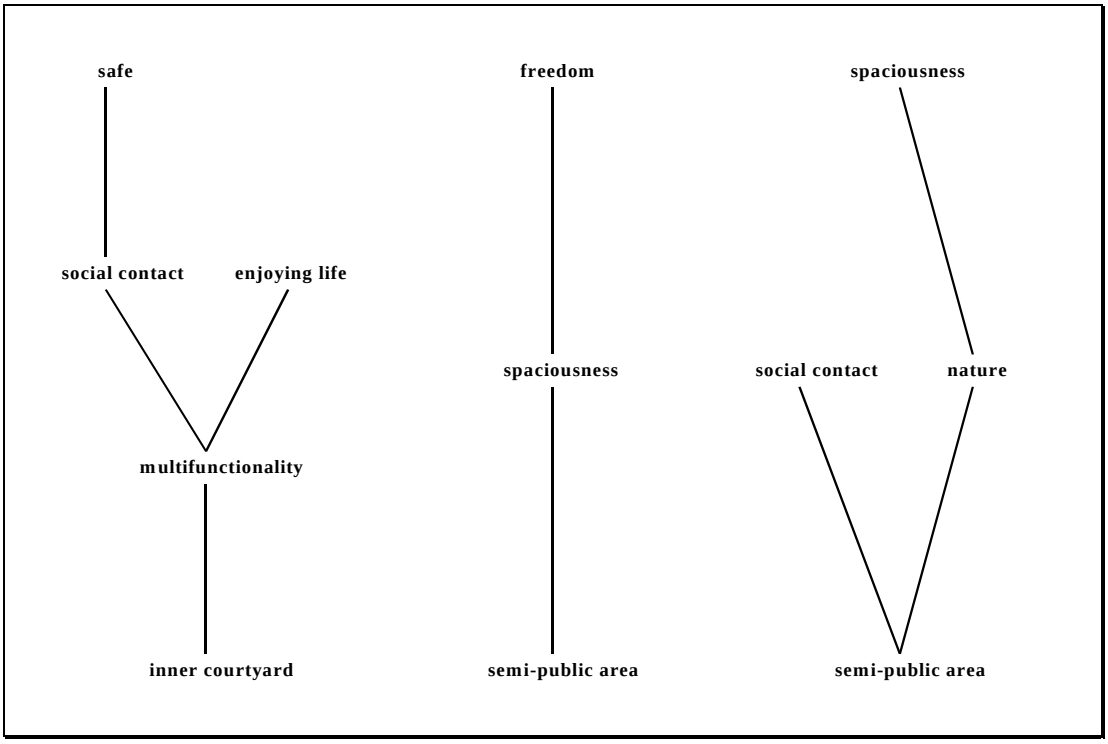
Table 5 The meanings of the feature semi-public area/inner courtyard and their frequency (n=27)

	Frequency	Percentage
Social contact	21	22
Space	13	13
Enjoying life	11	11
(Multi)functionality	9	9
Defects	8	8
Spaciousness	6	6
Safe	6	6
Nature	5	5
Distinguished	4	4
Freedom	3	3
Quietness	3	3
Compact/bounded	3	3
Clean	2	2
No maintenance	1	1
Unsafe	1	1
Privacy	1	1
Total	97	100

7.3 Meaning network

In the previous section we have looked at the meanings as separate categories. But the meaning structures are determined in such a way, see section 6, that they also may contain relations between the meanings. In a structural analysis of the coded meanings one takes these relations between the meanings explicitly into account, and by doing so one can construct two types of representations with meaning structures. One type represents only individual meaning structures, the other type contains the relationships between the meaning structures of all respondents and is called a meaning network. Figure 2 shows several examples of individual meaning structures of the feature semi-public area/inner courtyard. These individual meaning structures, which are relational data, form the basis for the construction of a meaning network.

Figure 2 Examples of individual meaning structures

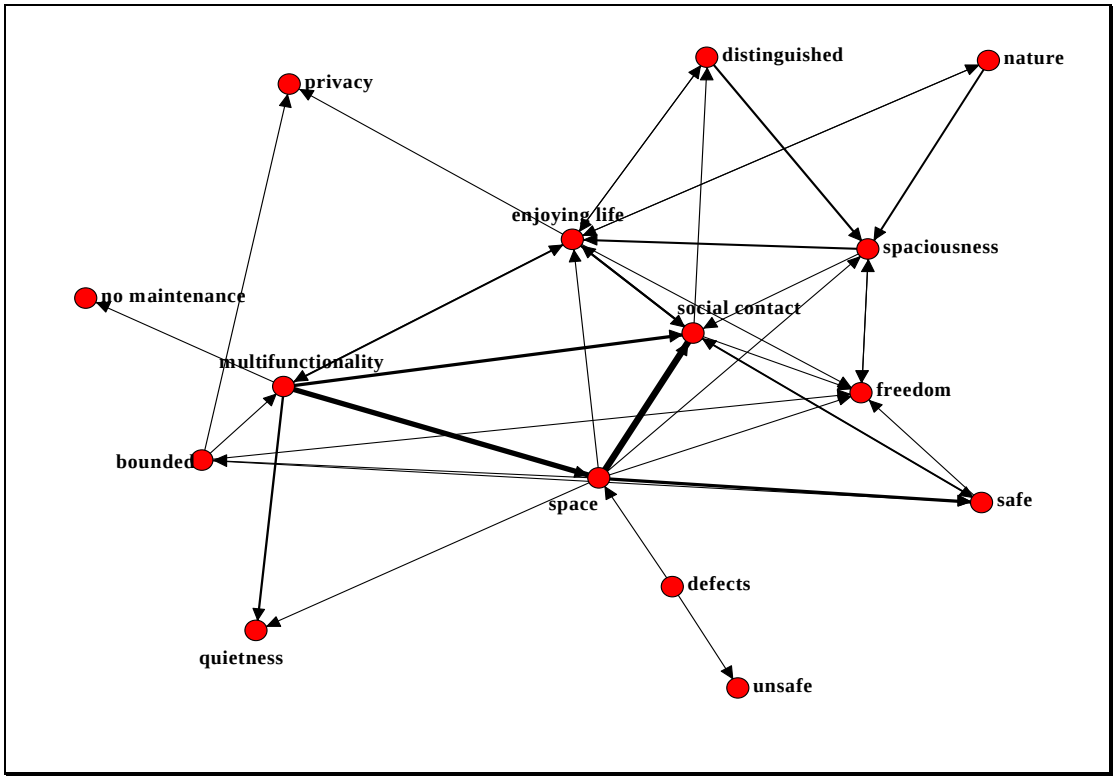


A meaning network is constructed from the individual meaning structures by means of a so-called adjacency matrix. An adjacency matrix is a square matrix that represents the relationships between the meaning categories from the meaning structures. The rows and the columns of the matrix are formed by the meanings, and the cells of the adjacency matrix show the number of direct links between the meanings in the individual meaning structures. The connections between the meaning categories can be represented graphically in a valued digraph - a network representation - in which the meanings are represented as nodes and the directed links between them as arcs. Associated with each arc is a value that indicates the number of times that the link between the two nodes connected by the arc has been observed. For more technical details about this procedure the interested reader is referred to Wasserman and Faust (1994).

The graphical display of the relations in the adjacency matrix, which is not presented here, is called a meaning network, and the meaning network for the dwelling feature semi-

public area/inner courtyard is depicted in figure 3. The thicker the link between two meanings in this figure, the stronger the relation between those meanings.

Figure 3 Meaning network for feature semi-public area/inner courtyard



A meaning structure of a dwelling feature is a representation of the meanings of this feature as perceived and conceived by an individual. As such it might be highly idiosyncratic representing mainly personal meanings. It may also be less idiosyncratic in the sense that it contains meanings that are shared by other people. Because dwelling is considered to be, at least partly, a cultural artefact (Rapoport, 1969, 1990b), one might expect that meaning structures of dwelling features contain both idiosyncratic and shared meanings. One way of investigating whether some meanings are more shared than others is by studying the frequencies of the meanings, see table 5. Another way is by studying the centrality of meanings in a meaning network such as the one in figure 3. Although this figure seems to indicate that some meanings are more central than others, we have to be careful with our conclusions since this may be the result of the way the graphical display is constructed. Therefore, a centrality measure based on indegrees and outdegrees is used. The indegree of a node is the number of arcs terminating at that node. The indegree of a particular meaning is the number of times that the meaning is the destination of a connection with other meanings. The outdegree of a node is the number of arcs originating from that node. The outdegree of a particular meaning is the number of times the meaning is the origin of a connection with other meanings. Centrality of a meaning is defined as the ratio of indegrees plus outdegrees of a particular meaning over the sum of all indegrees and outdegrees (Wasserman and Faust, 1994). Centrality ranges from 0 to 1; the higher the index, the larger the proportion of links in the meaning network that run through the particular meaning. The centrality measures for the meanings of the dwelling feature semi-public area/inner courtyard are depicted in table 6.

Inspection of table 6 shows that social contact, space, enjoying life and (multi)functionality are the most central meanings in the network. Since these are also the most popular meanings, see table 5, both analyses agree with respect to the importance of these meanings. This is not the case for the meaning defects. Its centrality is low and it has a relatively isolated position in the network, while on the other hand it is the fifth most popular meaning in table 5. The opposite is the case for the meaning freedom, which seems to have a more prominent role in the network than it has in the frequency analysis. So, aggregating individual meaning structures of a dwelling feature into a meaning network clearly provides new and relevant information about the prominence of meanings of a dwelling feature.

Table 6 Centrality of meanings of feature semi-public area/inner courtyard

	Centrality
Social contact	0.69
Space	0.69
Enjoying life	0.62
(Multi)functionality	0.54
Defects	0.08
Spaciousness	0.38
Safe	0.31
Nature	0.15
Distinguished	0.19
Freedom	0.27
Quietness	0.12
Compact/bounded	0.19
No maintenance	0.04
Unsafe	0.04
Privacy	0.08

8. Discussion

In this paper a conceptual and methodological framework for studying the meaning of dwelling from an ecological perspective was outlined and illustrated with data from a study about the inhabitants of two new and uncommon dwelling projects. The reciprocity of the environment and the individual is a central facet of an ecological approach, and consequently this approach focuses on the relations between intentional human beings and meaningful features of the environment, which at the individual level are called affordances and at the extra-individual level synomorphs. Studying the meaning of dwelling fits neatly into this approach, and leads quite naturally to studying the meaning of features of dwelling instead of taking a holistic view of dwelling, which is so popular in the literature.

In evaluating the empirical results reported in this paper one has to keep in mind that they were only presented for illustrative purposes, and that they are based on small-scale exploratory studies. One consequence of this is that the empirical results are somewhat speculative and should be treated with care since little can be said about their robustness. Follow-up research is planned in which a survey will be administered (cf. Bagozzi and Dabholkar, 2000).

Interestingly, only lower and middle level meanings appeared in our illustration, and in other studies we performed (Coolen and Hoekstra, 2001; Coolen, 2004), but higher-level meanings were not found. Rapoport (1988) suggests in this context that nowadays lower and

middle level meanings are more prominent at the expense of higher-level meanings. One wonders whether this is true. Higher-level meanings - as systems of meanings - are probably so strongly internalized by people that they may give rise to almost automatic and unconscious reactions (cf. Kearney and Kaplan, 1997), which make them difficult to externalize. Moreover, Rapoport (2001) and Coolen and Ozaki (2004) argue that culture, which can be considered as a higher-level meaning, can not be observed itself. Culture only becomes visible through its consequences, which are embodied in people's goals, intentions and everyday activities. Culture affects the way in which people think about and use a dwelling, and as such it influences our meanings of dwelling features. It clarifies the relationship between people and dwelling: why people prefer certain features, how they expect to use them, and consequently, what those features mean. Culture therefore provides us with contextual information, which helps us to understand the relations between an individual's intentions and the features of dwelling.

In this paper the study of the meaning of dwelling has been approached in a deconstructed way and from an ecological perspective. The meaning of dwelling is believed to lie in the relations between the features of dwelling on the one hand and people's goals and intentions on the other. Studying the meaning of dwelling from this perspective enhances our knowledge, because it sheds light not only on *what* dwelling features people want but also on *why* these features are wanted. Since the framework is conceptualized at the level of the individual dweller it can also serve many other purposes. The individual's collection of meaning structures of dwelling features can be considered as his/hers preferred dwelling-quality profile. This profile may contain valuable information for architects and planners when designing new dwelling projects, redesigning already existing dwellings and restructuring neighborhoods. The conceptual and methodological framework can also be used for evaluating dwelling satisfaction or quality by comparing meaning structures of the current dwelling features with those of the preferred ones. Finally, the meaning structures of dwelling features can form the basis for studying intra- and inter-cultural differences of the meaning of a dwelling, since these differences are most likely best understood by studying the manifest and latent functions of dwelling features (Rapoport, 1988).

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