AFFORDANCE BASED HOUSING PREFERENCES.

Henny Coolen

Abstract

In several countries the period after World War II is characterized by building dwellings in mass production in order to bring the supply in line with the increasing housing demand. As a result little attention was paid to societal trends and actual user wants. Several trends and developments with respect to housing have been identified since then, which seem to make a more individualized approach to the development, design and building of dwellings and residential environments desirable. In such an approach a thorough understanding of the objectives and activities of inhabitants seems to be required. But how can we explore these objectives and activities? We lack a structured set of instruments that can be used by policy makers, architects, developers and builders to map out a detailed record of user wants. Although there are many methods for the elicitation of housing preferences these methods are not satisfactory for this purpose, because, among others, they focus on what people want and not on why they want it. In this paper I shall first describe the main characteristics of methods for measuring stated housing preferences. Subsequently, I will present an outline of a more user-oriented approach to the measurement of housing preferences. This approach is based on Gibson's theory of affordances.

Keywords: *Housing Preference, Affordance, User-Orientation, Stated Preference*

Introduction

Housing is a complex process that is related to many facets of life. For many people a house forms the primary anchor in the environment, which provides such basic functions as shelter and concealment. A house also fulfills several other objectives such as being an enjoyable living environment, providing privacy and territory, accommodating social contact, and being a symbol of who we are and who we would like to be. A house is also for many people by far the most expensive item of consumption, and the decision to select a particular dwelling belongs for many households to the most crucial budget allocation decisions that they make in their life. Several reasons have been mentioned in the literature (Coolen and Jansen 2012) why measuring housing preferences could be of interest. First, to improve the match between housing demand and housing supply. Although in many countries the quantitative shortage of dwellings has diminished or disappeared, a discrepancy may still exist with regard to the qualitative match between supply and demand, which may lead to dissatisfied inhabitants. A qualitative mismatch between demand and supply may also lead to unoccupied dwellings, both in the existing stock as well as newly built housing, which may have financial and economical consequences for individual sellers, housing corporations, builders, and developers. Second, measuring housing preferences may be interesting for more idealistic reasons. From the point of view of both consumer sovereignty as well as consumer emancipation, it is quite natural to take consumer preferences into account. Furthermore, it has become clear that in current discourses about housing and living certain groups are systematically overlooked. Karsten (2009), for instance, argues that in urban discourses the

creative city, the attractive city and the city as an emancipatory machine are discourses that are communicated top-down via reports, debates and media attention, but do not address families as urban citizens. She showed, by way of a bottom-up analysis, that there is also a family-oriented discourse that she called the balanced city which is a city that integrates the different domains of life, and that many family-oriented aspects of this discourse do not occur in the top-down discourses. Research on housing preferences may bring such groups and their wants out (cf. Coolen and Meesters 2009; Dol and Boumeester 2012).

In this paper I will start with describing several important aspects of current approaches to measuring housing preferences. Subsequently, I will reflect on the usefulness of these methods given several developments and trends with respect to the housing market, which seem to make a more individualized approach necessary. Finally, I will set out to develop a more user-oriented approach to measuring housing preferences, which is based on the theory of affordances.

Main Characteristics of Current Methods for Measuring Housing Preferences

Housing preference has been studied from different theoretical perspectives and with a great variety of methodological approaches. It is an area of interest to researchers in fields such as economics, social geography, housing studies, and environment-behavior studies (Timmermans et al. 1994; Jansen et al. 2011). Apparently, what dwelling people prefer can be measured in many different ways.

Although the approaches to measuring housing preferences are different, they also have certain aspects in common. First, they all assume that houses can be described and evaluated in terms of a bundle of attributes, each of which has a limited number of levels, often two or three. Second, they all assume that people derive some satisfaction from each of the attribute levels, and in some approaches this satisfaction is expressed in terms of a part-worth utility. Third, all the approaches assume, albeit some implicitly, that people combine the satisfactions for the different attribute levels into an overall preference for a dwelling, but they may differ in the specification of the combination rule. Furthermore, preliminary to every approach is the determination of the salient housing attributes and the relevant levels of these attributes.

There are also several dimensions on which the different approaches differ from each other. With regard to the measurement of housing preferences, the main distinction is between stated and revealed preferences. Stated preferences are expressions of people's evaluations of houses, when a choice still has to be made, and may concern real or hypothetical houses. In contrast, revealed preferences are based on actual housing choices, that is, actual behavior, in real housing markets, and the preferences are inferred from the actual choice. Since in choosing a house, the choice will always reflect the joint influences of preference, market conditions, regulations, and availability, one may wonder whether a choice really reflects one's preferences. This paper only deals with stated preference.

Another important distinction is the one between compositional and de-compositional approaches. In compositional approaches people provide an evaluation or indicate their preferred level for each housing attribute separately, while they may also provide an indication of the importance of the various attributes. The weighted evaluations or preferences can be aggregated into an overall evaluation of the dwelling. De-compositional approaches, on the other hand, are based on the measurement of people's evaluations of housing profiles. Each profile consists of a combination of housing attribute levels, one for each housing attribute. People indicate their preference for each profile, and statistical models may be used to derive evaluations for the separate attribute levels. The affordance-based approach presented in this paper is of the compositional type.

The most important methods for measuring housing preferences are the descriptive method, the meaning structure method, the decision plan nets approach, the multi-attribute utility method, and the conjoint approach. These methods have been described extensively in the housing literature and the interested reader is referred to the book by Jansen et al. (2011).

Some Reflections on Stated Housing Preference Methods

In several countries the period after World War II is characterized by building dwellings in mass production in order to bring the supply in line with the increasing housing demand. As a result, little attention was paid to societal trends and actual user wants. Since then several trends and developments with respect to housing can be identified. First, it has been noticed that households have become smaller, the variation in household types has increased and society has become multi-cultural leading

to a broader variety of housing preferences (Clapham 2005). Second, there is an increasing demand for more quality in the dwelling and residential environment (Heins 2002; Downs 2008). Third, due to current land policies a switch is expected from large scale greenfield new housing projects to small scale inner city housing projects (Tiesdell and Adams 2004). And fourth, due to the current financial and economic crisis it seems that in countries such as The Netherlands and the UK there is a tendency towards less moving up in one's housing career, which implies that inhabitants remain longer in the same dwelling. These trends seem to make a more individualized approach to the development, design and building of dwellings necessary. In such an approach a thorough understanding of the objectives and activities of inhabitants is required.

But how can we explore these objectives and activities? We lack a structured set of instruments that can be used by policy makers, architects, developers and builders to map out a detailed record of user wants. Although there are many methods for the elicitation of housing preferences, as was indicated above, these methods are not satisfactory for this purpose. Most methods are product and supply oriented and elicit information that is too general or insufficient from a planning and design point of view. Many methods also do not allow for freedom of attribute choice by the respondents. This means that most of the methods only inquire about dwelling characteristics that are imposed by the researcher. Thus, important aspects might be missed. The determination of user-oriented preferences asks for methods that allow residents freedom of choice with regard to choosing aspects of the dwelling that are important to them. Moreover, many methods focus only on a limited set of attributes of a house without taking the house as a whole into account. Furthermore, most prevailing methods for determining housing preferences only focus on *what* people want while ignoring *why* they want it. This is understandable since most of these methods were developed in a supply oriented market and in such a market the focus is on the good and its main features. As a result, information on the use of the good is only needed in general terms so that the good provides certain basic functions to all. But in a user-oriented approach the emphasis shifts, in first instance at least, from the good and its features to the use the inhabitants make of it. Instead of the house as a physical entity that provides elementary functions the focus is now on the dwelling process, on the objectives and activities that motivate people to prefer a certain dwelling. In such an approach the house is not an end in itself, as it is in a product-oriented approach, but it is a means to an end. Starting point for the elicitation of housing preferences are now the inhabitants' objectives and activities with respect to the dwelling, and the final design consists of a dwelling that affords the users' objectives and activities associated with the dwelling process as much as possible. This requires a fundamentally different research approach to the measurement of housing preferences. Before giving an outline of such an approach, which will be based on the concept of affordances, Gibson's theory of affordances will be introduced.

Affordances

One of the central tenets in environment behavior research (EBR) is the reciprocity of people and their environment (Gifford 2001; Rapoport 2005). Human beings

use and change the environment, and their experiences and behavior are influenced by the environment. A theory that has been put forward to grasp the mutuality of people and environments is Gibson's theory of affordances. According to Gibson (all emphases are his): "The affordances of the environment are what it offers the animal, what it provides or furnishes, either for good or ill. The verb to afford is found in the dictionary, but the noun *affordance* is not. I have made it up. I mean by it something that refers to both the environment and the animal in a way that no existing term does. It implies the complementarity of the animal and the environment." (Gibson 1979:127). Some examples of affordances are: a terrestrial surface affords support, air affords breathing, unimpeded locomotion, and visual perception; solids afford various kind of manufacture (Gibson 1979).

Affordances are characterized by several properties. According to Gibson affordances imply the complementarity of the animal and the environment. This property defines the relational character of affordances. Affordances are relationships between certain animals and certain things in the environment. Moreover, affordances are relative to specific users. Environmental features can afford different behaviors to different users. The polarity of affordances was also indicated by Gibson. Positive affordances are potentially beneficial to the user, while negative affordances are potentially harmful. Any part of the environment may also possess a multiplicity of affordances. For instance, water affords drinking, pouring, washing, and bathing. According to Maier and Fadel (2009a) even if an environmental feature possesses an affordance, there is still room to describe how well this feature affords a specific use in terms of quality. Some seats afford sitting on better than others. Finally, Maier and Fadel indicate that affordances are form dependent. By definition, it is the form, i.e. structure, of environmental features that determines what they afford to specific users. This is an important difference with the concept of function, since functions and functional decomposition are form independent (Maier and Fadel 2009a).

Gibson's theory is a general one in which the environment refers to the surroundings of all organisms that perceive and behave, and in which affordances always express a complementary relationship between the environment and such an animal. In the context of housing research we can view the environment as the built environment and consider the typical animals in them to be human beings. Moreover, our focus here will be on the dwelling. With respect to dwellings some simple examples of affordances are: dwellings afford shelter, concealment, storage, comfort, privacy; a kitchen affords cooking; a bathroom affords personal hygiene; a private garden affords casual leisure outside.

Outline of Affordance-Based Housing Preferences

Most prevailing methods for determining stated housing preferences focus on the dwelling and not on the dweller, and consequently only elicit what people want while ignoring why they want it. However, in a user-oriented approach the emphasis shifts, in first instance at least, from the good and its features to the users' objectives and activities. Instead of the house as a physical entity that provides elementary functions the focus is now on the dwelling process, on the objectives and activities that motivate people to prefer a certain dwelling. Starting

point for the determination of housing preferences are now the use people intend to make of the dwelling and the objectives they try to achieve through it.

This idea of focusing, at least in first instance, on people's objectives and activities is very much in line with the affordances-based relational model for design called the DAU-system (Maier and Fadel 2009a). This model elaborates the reciprocal relationships between the threesome Designer - Artifact - User (DAU). Fundamental in the DAU-model is the property of affordances that they express the complementarity of the artifact and the user. Artifacts are used by users, but it is the affordances of the artifacts that determine how the artifacts can be used, this is the A-U relationship in the DAU-model. Designers create the artifacts and thus the affordances that they possess, which is indicated by the D-A relation. Finally, there is the D-U relationship which signifies that designers must ascertain from users which affordances an artifact must possess in the first place. So, the DAU-model, by using the concept of affordance, entangles the relationships between designers, artifacts and users. Moreover, the model makes clear that effective design of an artifact is not very well possible without designers ascertaining from users a target set of affordances that the artifact must possess.

Combining certain aspects of the relational DAU-model with the measurement of housing preferences leads to an affordance-based procedure for determining housing preferences. This procedure proceeds in several stages:

1. Motivation for (re)developing housing
2. Determine relevant target group(s) of inhabitants
3. Interview participants to determine positive and negative affordances
4. Prioritize positive and negative affordances
5. Create Affordance Feature Matrix.

The affordance-based determination of housing preferences begins with the motivation for (re)developing housing, for instance the inner-city development of a small housing project for families might be such a motivation.

The next step involves the determination of the relevant target group(s) for which the housing project will be developed. The potential inhabitants might be recruited through advertisements in all kinds of media. Although this might be an open procedure, one has to realize that certain constraints, such as income conditions, may apply.

Given the motivation and the target groups the third step is to determine the affordances that the dwellings must have and not have by interviewing potential inhabitants. Although it has been argued (Maier and Fadel 2009b) that this should not be too difficult from a psychological point of view, since according to ecological psychology people perceive their environment in terms of affordances, one may wonder whether this is also the case for more complex artifacts such as houses. Dwellings have a great multiplicity of affordances (Tweed 2001) and one may have to support participants by providing them with lists of possible affordances which are validated on the basis of previous research. These may be free-format lists, but one can also imagine categorizing the affordances in terms of, for instance, domains of life such as shelter, personal care, domestic activities, accommodating external activities, accommodating social contacts, and so on. An useful tool in this stage may be the Generic Dwelling Affordance Template (cf. Maier and Fadel 2009b), see figure 1. The purpose of

Figure 1. Generic Dwelling Affordance Template.

this tool is twofold. First, to guide researchers and inhabitants as to what affordances in general the artifact is supposed to provide. And second, to detect and include affordances that might otherwise be missed. In this context one can think of affordances with respect to aesthetics, building, maintenance, and so on. In the case of a dwelling one might think of more or less 'obvious' affordances as concealment, security, lighting, heating, ventilation, plumbing and the like.

Because of the polarity of affordances both positive (what the dwelling should afford) and negative affordances (what the dwelling should not afford) must be identified. Furthermore, because of the complementarity of affordances different potential inhabitants must be identified and interviewed in order to get a good overview of the variation in desired affordances. The outcome of this stage is an unordered list of positive affordances as well as an unordered list of negative affordances. Both lists are annotated in such a way that they document for each affordance who suggested it and for whom it was suggested. A short list of examples of positive and negative affordances for the dwelling is presented in table 1.

The fourth stage involves the prioritizing of the affordances. This prioritizing should reflect the inhabitant's preferences but may be adapted by information from the researcher. This may be done by prioritizing the long list of individual affordances or by classifying the affordances into categories on the basis of their relative pertinence, as was also suggested above for stage 3.

The final stage of the affordance-based determination of housing preferences involves relating the

affordances to the physical structure of the dwelling at the conceptual stage. This is done by means of an Affordance Feature Matrix (AFM) (cf. Maier et al. 2007). The rows of the AFM contain the different types of positive and negative affordances, and the columns represent the components of the physical structure which in case of a dwelling are its features. An example of an affordance feature matrix is shown in figure 2. An 'x' in a cell of the matrix indicates a relationship between the corresponding affordance (row) and dwelling feature (column), i.e. the specific dwelling feature provides the indicated affordance. The column totals of the AFM represent for each housing feature the number of affordances it affords, and the row totals indicate for each affordance by how many features it is afforded. So, the row and column totals direct attention to important affordances and important features of the physical structure.

Positive affordances: (The dwelling must afford ...)	Negative affordances: (The dwelling must not afford ...)
Sleeping	Injuring inhabitants
Cooking	Injuring guests
Eating	Bad maintainability
Family life	Degradation of (parts of) the dwelling
Entertaining guests	Health risks
Relaxing	
Working at home	
Personal care	
Recreation	
Maintenance of the dwelling	
Being outside	

Table 1. Examples of affordances for a dwelling (annotations omitted).

	Living room	Other room(s)	Kitchen	Balcony	Bath room	Toilet	Garden	Attic	Garage	Cellar	Construction materials	Architectural design	Fence	Electronic alarm	
Sleeping		x													
Cooking			x												
Eating	x		x												
Family Life	x	x	x				x								
Entertaining guests	x		x				x								
Relaxing	x	x	x	x			x								
Working at home	x	x	x												
Personal caring		x			x	x									
Recreating	x	x													
Experiencing nature							x								
Being outside				x			x								
Storing away								x	x	x					
Hobbying	x	x	x					x	x	x					
Barbecuing							x								
Privacy	x	x	x												
Nicely looking												x			
Durable living											x				
Feeling secure													x	x	
.....															

Figure 1. Example of Part of An Affordance Feature Matrix.

The result of this stage is a set of housing features and their relationships with the affordances. This set of housing features represents the affordance-based housing preferences, since the housing features are inferred from the affordances. In contrast with the traditional approaches for measuring housing preferences in which only housing features are measured, the affordance based approach focuses in first instance on the user's objectives and activities and subsequently relates this requirement type of information to aspects of the physical structure of the dwelling. The requirement type of information that the affordance based approach yields goes beyond the requirement information of the traditional approaches to housing preferences. For instance, in the latter affordances such as cooking, eating, sleeping and personal caring are only implied by such functional features as the kitchen, living room, bedroom and bath room. But affordances such as privacy, nicely looking, feeling secure, durable living and experiencing nature will seldom be implied by the functional requirement information of the traditional approaches, not even implicitly. Since the affordance based approach brings out the affordances first and subsequently relates these to the physical aspects of the dwelling it embodies the complementarity of the dwelling and the individual, because it relates the objectives and activities of the individual to the relevant features of the dwelling. A good example is the kitchen. Almost every house has a kitchen. In traditional housing preference research it is often assumed that people want a kitchen and they are not even asked for it. If it is asked they may sometimes choose between an open and a closed kitchen and it is assumed that the kitchen will be used for cooking, eating, cleaning dishes and cooking utensils, and that it has enough space for a refrigerator, dish washer and kitchen cabinets, even in

the case of houses that still have to be built. From inspecting the AFM in figure 2 we learn that in addition to traditional affordances such as cooking and eating this person also wants the kitchen to afford entertaining guests, family life, relaxing and working at home (cf. Busch 1999). It seems to me plausible that taking these affordances also into account may lead to a different design of the kitchen than in the case where these affordances are not reckoned with. So the AFM makes explicit how people prefer to interact with their dwelling, it shows the richness of the people-dwelling relations instead of assuming a limited standard set of behaviours and features as is the case in the traditional approaches to measuring housing preferences. One might expect that taking all, and not only the more functionally oriented, affordances into account in developing and designing dwellings leads to a higher housing satisfaction, because in the end more objectives of dwellers will be fulfilled.

The measurement of affordance-based housing preferences may be considered as the first step in an affordance-based design process (Maier and Fadel 2009b). Given the affordance feature matrix this process would subsequently involve the development, design and building of the affordance-based dwellings. During this process it may turn out that the dwelling project under consideration cannot provide all the affordances elicited from the target group. In that case, focusing on the people's objectives and activities and subsequently associating adequate dwelling features, and the layout of the dwelling, with these objectives and activities, makes it possible to develop alternative designs with similar affordances, consider the consequences of these designs, also in terms of costs, and presents a much clearer picture of the trade-offs to be made than in a tra-

ditional product-oriented approach. The affordance feature matrix plays an important role in this context.

Conclusion

In this paper I have presented an outline of an approach for determining affordance-based housing preferences. In this approach the focus is, in first instance, on the objectives and activities – affordances – that people want to realize through their dwelling. Subsequently, these affordances are related to the housing features that afford them. In other words the emphasis is initially more on dwelling (verb) and less on the dwelling (noun). This is in contrast with most current approaches to measuring housing preferences, which only focus on housing attributes. The approach described here is still an outline and needs further elaboration. For instance, validated lists of housing affordances, based on empirical research, may be compiled to assist inhabitants and researchers in the elicitation of affordances (cf. Heft 1988; Clark and Uzzell 2002).

Further, a dwelling is a complex artifact and one may wonder if for such a complex artifact a more hierarchical approach might be necessary. Since a dwelling can be described as a system of settings in which certain systems of activities take place (Rapoport 2005), the focus in determining housing preferences could initially be on the relationships between affordances and separate settings, instead of on the dwelling holistically. Subsequently, the focus could shift to the dwelling as whole based on each of the subsystems. This second phase is itself also an interactive and reciprocal process involving inhabitants, because it is not self-evident that the aggregation of the subsystems leads to a conceptually unequivocal dwelling. Further research is needed to clarify this aspect.

The involvement of inhabitants in the affordance-based approach also raises some other issues. According to Clapham (2005) housing is consumed by households, where a household may consist of one or more persons, so the basic unit of analysis for housing is the household, despite the problems inherent in using the concept of a household. This immediately raises the question of who is to be interviewed when eliciting affordances. Should this be the individual members of the household followed by some form of aggregation of the individual affordances, the household as a group leading to a household list of affordances, or a combination of both perspectives. Another issue with respect to user involvement concerns their level of commitment. Are the selected users only potential inhabitants who intend to live in the dwellings once they are built, or may this group be broader and also consist of interested people who want to think along about the housing project.

As indicated in the previous section the affordance feature matrix may be considered as the make-up for an affordance based development and design process. In this follow-up process there is a role for different types of professionals such as developers, architects and builders, and also for inhabitants. These different types of stakeholders have to be incorporated in some way in the affordance-based design process. The design process sketched by Maier and Fadel (2009b) focuses to a large extent on one motivating actor, but design processes in the built environment are characterized by a multitude of actors and stakeholders. The affordance-based design process must be elaborated and extended in order to facilitate the involvement of different stakeholders and professionals.

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Author(s):

Henny Coolen
TU Delft /
Faculty of Architecture and the Built Environment
OTB – Research for the Built Environment
Building 8, Julianalaan 134, 2628 BL Delft
Postbox 5043, 2600 GA Delft
The Netherlands
Email: h.c.c.h.coolen@tudelft.nl