USAGE OF INDOOR AND OUTDOOR SPACES OF THE HOUSE: ARCHITECTS' AND DWELLERS' PERCEPTIONS.

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ABSTRACT

It is often claimed that architects rely on their own experiences of space usage when designing houses for others. If so, architects who use houses in ways that differ from non-architects are likely to produce designs that are not representative of their client's lifestyles. An experiment was carried out to evaluate the nature of the differences between architects and non-architects in their space usage patterns. The two groups (10 in each) were asked to rate the likelihood of occurrence, for both day and evening usage, of 15 behaviours in 15 spaces (indoor and outdoor) of a house. An INDSCAL analysis produced an interpretable 4-dimensional solution: I - Motor/Expressive Activity; II - Intimacy of Social Interaction; III - Activities Associated with Eating; IV: Verbal/Expressive Activity. Architects placed a heavy emphasis on the first two dimensions, non-architects attaching more importance to dimensions III and IV. The relative importance of the dimensions depended on time of day for architects but not for non-architects.

Introduction

It is often claimed that architects, when designing houses for their clients, use themselves as a yardstick. Indeed a number of architects in one study (Edwards, 1974) admitted that it was the only way they could design, that it was very difficult designing for people whose background differed considerably from theirs. The admission is even made by many of the great names in architecture and sometimes takes on very explicit forms: "It has been said that were I three inches taller than 5'8½" all my houses would have been quite different in proportion. Probably." (Frank Lloyd Wright, 1954, P.33)

To what extent Frank Lloyd Wright's own lifestyle characteristics were represented in his designs for clients is difficult to determine. However, if the values and lifestyle characteristics of his clients were similar to his, there is a greater likelihood that the designs would be representative of this clients' lifestyles. One post-occupancy evaluation study provides some evidence of this similarity (Streich, 1972). Virtually all of the present occupants of Wright-designed houses appear to be highly satisfied with their dwellings, although some have made minor alterations as a result of changes in lifestyle patterns over time.

When a client's values and lifestyle characteristics are unknown to, and/or do not resemble those of the architect, the design is unlikely to be an appropriate representation of his/her client's lifestyle. For example, in Le Corbusier's Pessac housing development, numerous alterations to the houses have been made by the occupants presumably to make them a more accurate expression of their functional (and aesthetic) requirements (Boudon, 1972).

An important factor in the representativeness of house designs therefore seems to be the similarity in values and lifestyle characteristics between architects and dwellers (Deasy, 1974). Activity patterns reflect lifestyle characteristics (Rapoport, 1977) and are often used as the basis for design (Mueller, 1979a). The present study examines the activity patterns of architects and dwellers. The aim is to gain a more precise understanding of the differences in space usage between the two groups.

It can be argued that although similar space usage patterns between an architect and client increases the probability of a more representative design for the client, there is another important factor that may still produce conflict between architect and user. It is quite possible that the actual designs produces may communicate different meanings to the client(Payne,1969; Hershberger,1972) or produce unintended effects (Rosow,1961). Architect and client may agree on the intentions, but not the product. The present study, however, does not address itself to this separate, but equally important, issue.

Method

Two architecture students enrolled in a course on architectural psychology at the Western Australian Institute of Technology, Jamie Clark and Paul Jones, collected the data for the present study as

part of their project work. They contacted 10 practising architects who owned and lived in single storey houses. These were matched with 10 lay people at a similar socioeconomic level who also owned their single-storey houses.

The participants were asked to rate, on a 10-point scale, the likelihood or probability of occurrence of 15 behaviours in 15 spaces (indoor and outdoor) of a house. Each person carried out the task twice. The first dealt with using of the house during the day, the second dealing with patterns of evening usage.

Table 1, contains a list of the behaviours and spaces included in the study. Most of the behaviours were selected from those used by Price (1974) in his study on the appropriateness of behaviours in various situations.

Table 1 List of behaviours and spaces

Behaviours				Spaces	
1.	Converse	9.	Relax	1. Front Garden	9. Study
2.	Shout	10.	Sleep	2. Entry	10. Bathroom
3.	Curse	11.	Eat	3. Lounge	11. Toilet (WC)
4.	Argue	12.	Play	4. Family Room	12. Laundry
5.	Whisper	13.	Read	5. Kitchen	13. Garage
6.	Laugh	14.	Fight	6. Dining Room	14. Back Verandah
7.	Belch	15.	Kiss	7. Bed 1 (Parents)	15. Rear Lawn
8.	Jump			8. Bed 2 (Childrens)	

The final data consisted of a 20 (participants) X 2 (time of day) X 15 (behaviours) X 15 (spaces) matrix of likelihood ratings. Three INDSCAL analyses (Carroll and Chang, 1970) were performed on the data, each one involving the collapsing of at least one data mode:

A - participants X spaces
B - behaviours X spaces (day)
C - behaviours X spaces (evening)

The aim of analysis A was primarily to look at architect - lay person differences. Analyses B and C provide information about the interrelationships between behaviours and spaces (cf. Mueller,1979b).

Results

For each of the three INDSCAL analyses, a 4-dimensional solution appeared to be appropriate accounting for between 62% and 66% of the variance.

A - Participants X Spaces

Figures 1 and 2 (see appendix) contain plots of the 15 spaces on the four dimensions of the INDSCAL solution. The following labels are offered as descriptions of the dimensions: I - Degree of Motor/Expressive Activity; II - Intimacy of Social Interaction; III - Eating and Associated Activities; IV - Degree of Verbal/Expressive Activity.

The first two dimensions are obtained in all three INDSCAL analyses. Dimensions III and IV seem to be somewhat context dependent: the distribution of spaces along these dimensions depends somewhat on which data mode is collapsed. The interpretation offered here for the third and fourth dimensions is a compromise of the slightly different interpretations possible across the three INDSCAL solutions.

Some interesting differences between the architects and non-architects emerged. Figures 3 and 4 contain plots of the 20 participants' weights on the four INDSCAL dimensions. Time of day information is included. It is readily apparent that the weighting patterns differ appreciably for the two groups. Architects appear to attach more weight to Dimensions I and II whilst more non-architects, comparatively speaking, have higher weights on Dimensions III and IV. Table 2 contains

(a) average weights on the four dimensions for the architects and non-architects and for day and night usage (b) a frequency tabulation of the dimensions having the highest loading for each data matrix supplied by the participants.

Table 2 (a) Average loadings on INDSCAL dimensions

		Dimension			
		I	II	III	IV
Architect	Day	.56	.26	.14	.10
	Evening	.27	.44	.23	.18
Non-Architect	Day	.25	.24	.30	.27
	Evening	.22	.17	.32	.31

Table 2 (b) Frequency tabulation of dimensions with highest loadings

		Dimension			
		I	II	III	IV
Architect	Day	9	1	0	0
	Evening	3	5	0	2
Non-Architect	Day	4	2	2	2
	Evening	3	1	3	3

The relative importance of the first and second dimensions for architects is a function of day and evening usage of the spaces. For day usage, Degree of Motor/Expressive Activity is the dominant pattern underlying the likelihood ratings of various behaviours in the 15 selected spaces. External spaces (Rear Lawn and Back Verandah) and large internal spaces such as Family Room and Lounge allow very active motor/expressive actions such as Jumping and

shouting. Small internal spaces like the Toilet, Bathroom, Laundry and Entry place considerable constraint on gross movement patterns.

For evening usage, Intimacy of Social Interaction is a more important dimension. Opportunities for such intimacy increase as one progresses from the Laundry, Entry and Front garden through to the Family Room, Lounge, Study and Main Bedroom.

Non-architects appear to weight all four dimensions fairly equally. However, Dimensions III and IV are more important for them than for architects. That is, a number of non-architects attach a good deal of importance, in their likelihood ratings to Opportunities for Eating and associated activities such as Drinking and Relaxing as well as to the Degree of Verbal/Expressive Activity.

B - Behaviours and Spaces - Day Usage Patterns

When the data for day usage of spaces is collapsed across participants, the INDSCAL solution provides plots of spaces on dimensions (Figures 5 and 6) and weighting patterns for behaviours on the same dimensions (Figures 7 and 8). The plots of the spaces are quite similar to those of Figures 1 and 2 and the same labels have been retained.

The advantage of having information about the behaviours in the form presented in Figures 7 and 8 is that it not only allows for a more precise interpretation of the dimensions but also that the perceived relationships among behaviours and among spaces can be discussed in terms of the same vocabulary. That is, the variability in behaviours and in the spaces can be discussed in terms of the same underlying dimensions. (see also Mueller, 1979b).

The first dimension has been labelled as Degree of Motor/Expressive Activity, Behaviours loading high on this dimension are Jump (.87), Shout (.75), Play (.59) and Fight (.50) all of which were rated as more likely to occur in the rear external spaces (e.g. Rear Lawn)or large internal spaces (e.g. Family Room).

The second dimension is more accurately labelled as "Degree of Sleeping/Relaxation" rather than Intimacy of Social Interaction since Sleep, Read and Relax load highly on this dimension, followed by Kiss and Play. Appropriate spaces for these activities are, in order, Main Bedroom, Lounge and Family Room.

The Verbal/Expressive dimension has Converse, Laugh, Kiss, Whisper and Shout loading fairly high on it whilst Eat, Argue, Relax and Read load on the fourth dimension, Eating and Associated Activities.

C - Behaviours and Spaces - Evening Usage Patterns

Figures 9 to 12 provide the same type of information as Figures 5-8, the former dealing with evening usage patterns. Some interesting differences between the two sets of figures emerge. Incidentally, note that the numbering of dimensions differs: Dimension I for the day usage data is now IV for the evening data: II is the same; III is now I: IV is now III. So the relative importance of the dimensions depends on time of day usage of the spaces although

clearly there are subtle but important variations in the interpretations of the dimensions as a function of time of day usage. The Motor/Expressive dimension accounted for most of the variance in the day data, but is the least important of the four dimensions for the evening data. The Eating dimension has replaced it as the most important dimension for the latter data.

On Dimension II, Read and Relax still load highly, indeed much higher than the day solution, but Sleep no longer has an important loading on it. Eat (.47) has become a more important component on this dimension. This suggests that the concept of Sleep in day usage patterns probably means a light doze and can occur in conjunction with reading and relaxing in rooms other than the bedroom (particularly during the week when only one member of the family has rooms such as the Lounge and Family Room to him/herself). With Sleep being replaced to some extent, by Eat on this dimension and Read and Relax having very high loadings the ordering of spaces on this dimension correspondingly alters: Lounge and Family Room move further towards the pole of dimension II, Bedroom 1 has moved down and the Study and Dining have moved up appreciably.

For evening usage, Sleep now loads with Whisper and Kiss on Dimension III (instead of with Relax and Read on Dimension II) and the dimension is obviously Degree of Intimate Interaction. Not surprisingly, therefore, Bedroom 1 is clearly on its own at one end of the dimension with Bedroom 2 having a smaller scale value. The W.C. followed by Laundry and Garage load as the inappropriate spaces (and therefore more unlikely settings of intimate behaviours) at the other end.

Shout has a much smaller loading than formerly on the Degree of Motor/Expressive dimension no doubt because of social norms for evening usage rather than the appropriateness of the spaces per se.

Dimension IV for the day usage data was a fairly simple Eating dimension compared to its roughly equivalent but far more complex Eating and Verbal Interaction Dimension I with the evening usage pattern, reflecting the far greater importance of the evening meal as a group event.

Discussion

It is clear that a meaningful dimensional structure can be imposed on the data obtained in the present experiment. An interpretable four-dimensional INDSCAL solution provided a plausible account of the architects' and non-architects' ratings of the likelihood of occurrence of the 15 behaviours in the 15 spaces inside and outside the house.

The architects appeared to differentiate behaviours and spaces more on (a) the degree to which Motor/Expressive Activities could be carried out and (b) the Intimacy of Social Interaction. Although some non-architects also made similar differentiations, comparatively more relied on (c) Eating and Associated Activities, the latter depending on time of day: and (d) Degree of Verbal/Expressive Activity.

It is an interesting exercise to speculate, in simplistic terms, on the possible design implications of the results. The two dimensions important to the architects could perhaps be handled more easily in design terms than the other dimensions. Size and volume of spaces are probably important in dealing with Motor/Expressive Activity. Sight and sound screening are obviously critical in the physical representation of privacy gradients. (Alexander et al, 1977).

The design implications for the other two dimensions, however, are certainly not very clear, although their importance is often recognised. For example, "conversation pits" are now beginning to replace lounges in some architect-designed Australian homes. However, the design appears to betray a lack of understanding of the context required to allow conversations to be spontaneous and simultaneously occur with other activities, the type of activities depending on the time of day and probably the number and type of people involved and so on.

The Eating dimension is deceptively complex. Designing a space simply to optimize the activity of eating is a strictly behaviourist interpretation of how designs represent activity patterns (Lerup, 1977). The overall social purpose of the Eating setting has to be taken into account (Zeisel, 1974). It would not be surprising if one of the appropriate design representations for certain social groups may in fact be to create a deliberately congested area for the Eating setting with a good deal of physical contact in a small noisy space. Such a criterion for design is somewhat contrary to one of the favourite criteria in the curriculum of the design studio: ease of circulation.

There are some strong resemblances between the findings of the present study and those of Edwards' (1974). In an altogether quite different study he found that the major criteria architects used for locating furniture in the living room of a particular public housing design were (a) ease of circulation and (b) the division of a room into activity zones. In terms of clarity and possible design implications, a case could be made for a resemblance between the way architects in the present study use spaces of the house and the way Edwards' architects actually manipulated the furniture of living rooms to represent anticipated behavioural patterns of the actual tenants of the housing development. The critical point of the argument here is that the British architects were attempting to predict how dwellers would arrange their furniture, but used criteria that they would use in arranging the furniture had they been the dwellers, and the present study shows that architects follow different patterns of house usage from non-architects.

Edwards (1974) also found that the criteria used by the dwellers often involved (a) the symmetrical arrangement of the furniture about the hearth, which made circulation difficult, and (b) the living room was not partitioned into activity zones. Occupants therefore tended to create "static" furniture sets intended to have aesthetic effects. The more complex, undifferentiated structuring of the space tends to resemble the more diffuse nature of the dimensions considered important by the non-architects in the present study.

If many architects rely on their own experiences and life styles when designing for others, and if their background differs appreciably from their clients', it follows that these architects cannot produce designs representative of their clients' lifestyles. Architects who do share similar values and lifestyles are more likely to produce designs that are appropriate. Perhaps similarity of backgrounds is one criterion clients use when choosing their architect.

Some architects whose backgrounds differ from their clients undoubtedly have the ability to become familiarised with the essential aspects of their clients' lifestyles and produce the appropriate design representations. If there are a significant number of architects without this ability, then either various degrees of user participation are required (Negroponte, 1975) or the designs have to be under almost the total control of the user (Negroponte, 1975; Alexander et al, 1975; Turner, 1976).

Future research may be profitably directed at the question of specifying the circumstances under which the users (rather than the architects) are capable of producing house designs representative of *their lifestyles, particularly in settings characterised by powerful* governmental, financial and technological constraints. Preliminary steps in this direction appear very promising (Lawrance, 1979; Alexander et al, 1975; Corbett, 1973)

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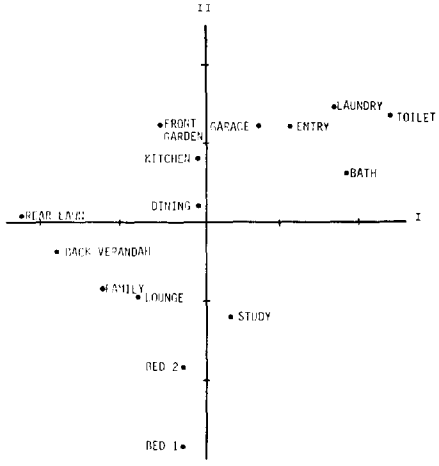


Fig. 1

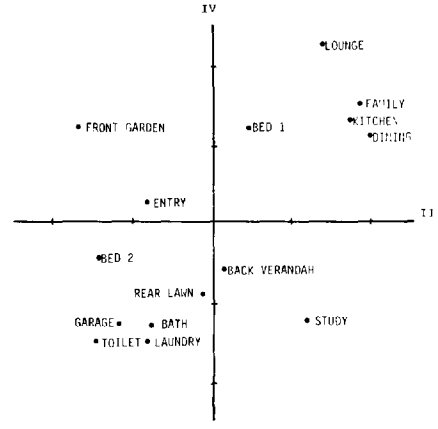


Fig. 2

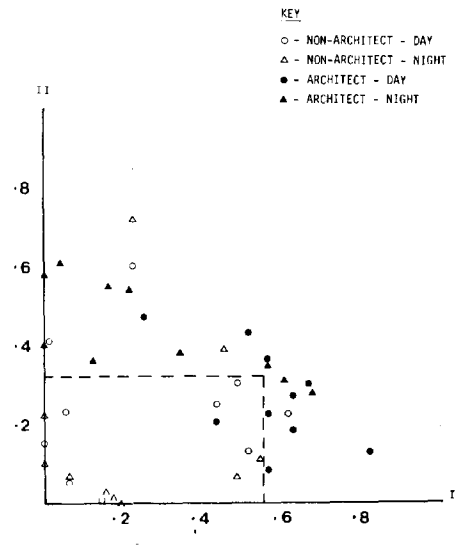
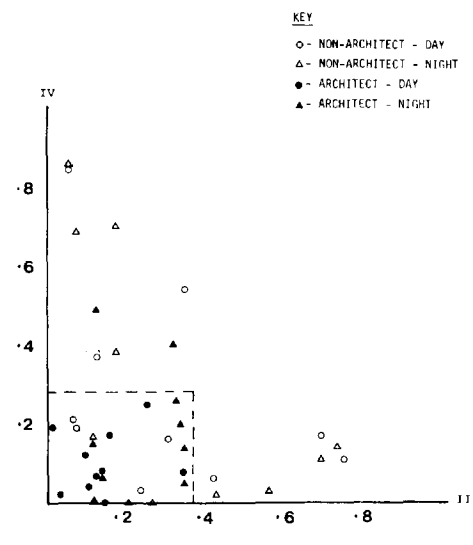


Fig 3



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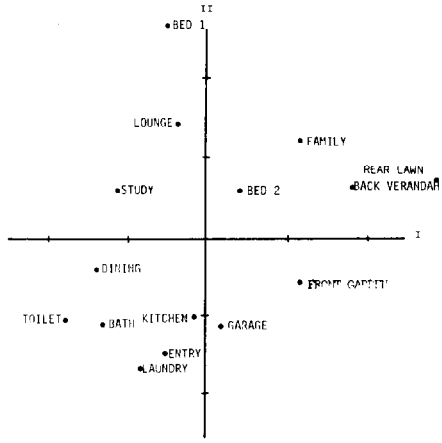

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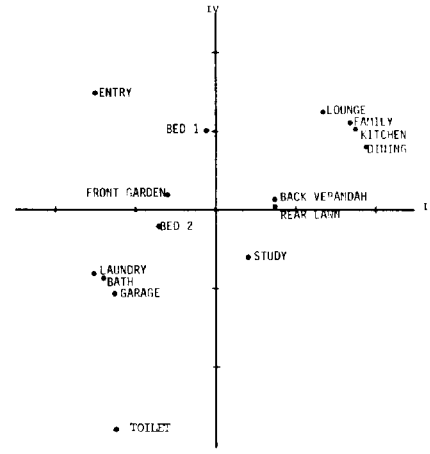

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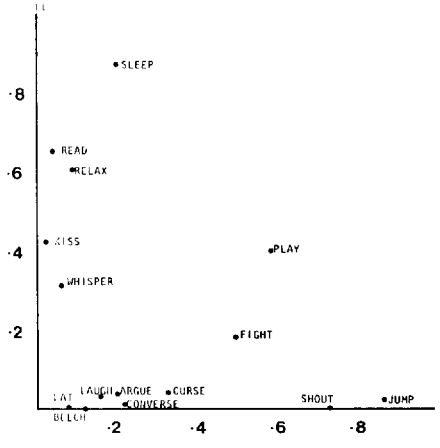

Fig. 7

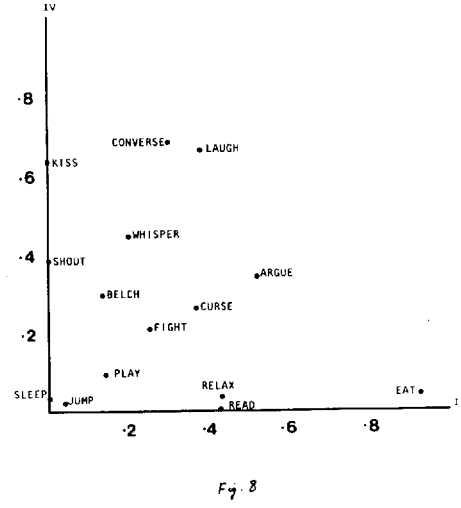

Fig. 8

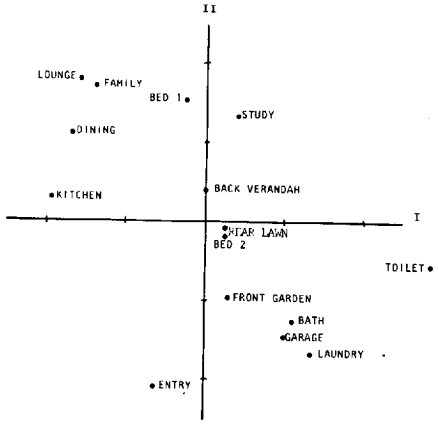

Fig. 9

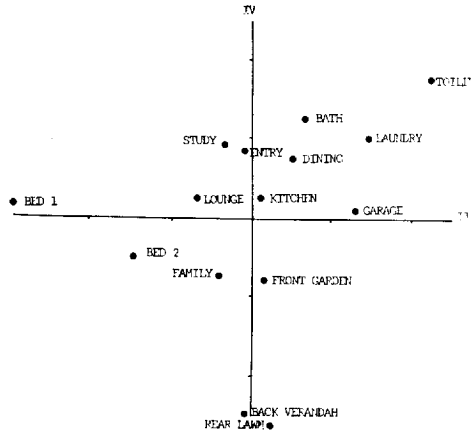

Fig. 10

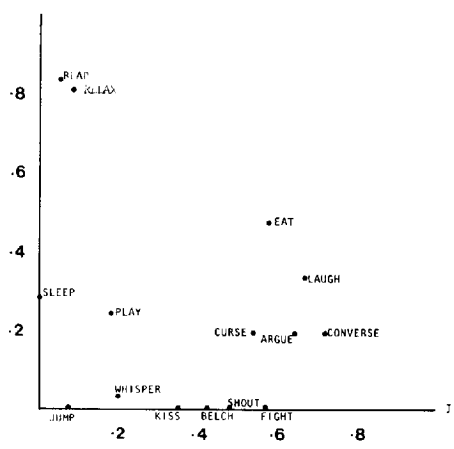

Fig. 11

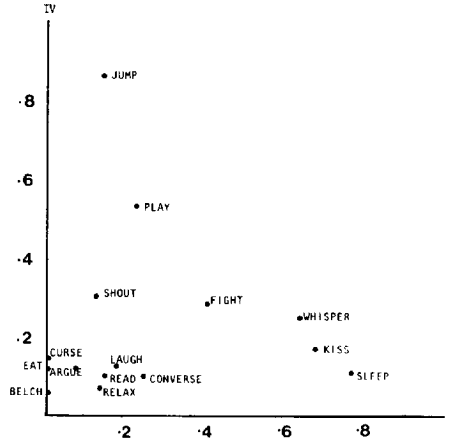

Fig. 12