Visual and Functional Components of the Built Environment: A Case Study of Urban Residential Neighborhoods

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ABSTRACT.—The hypothesis that visual and functional characteristics of neighborhoods influence the psychological well-being of residents was tested. An informal test by a survey of advertising strategies for selling real estate was first used. Second, data from a variety of published sources were used to identify some of the underlying dimensions of residential neighborhoods. The dimensions were used as independent variables to predict three different measures of psychological well-being in former mental patients. The results partially supported the hypothesized relationship by demonstrating that neighborhood type appeared to influence the patients' recuperation.

MY CONCERN IS the relationship between physical setting and human well-being in residential neighborhoods. It will be argued that an individual's neighborhood has a significant influence, both visually and functionally, on his or her psychological well-being. Background for these assumptions has been assembled in a variety of sources (*Angrist 1974, Peterson 1967, Smith 1975*), which have made important contributions to burgeoning disciplines such as behavorial geography and environmental psychology (*Proshansky et al. 1970, Downs and Stea 1973, Amadeo and Golledge 1975, Zube et al. 1975, Lang et al. 1974*). To substantiate these assumptions, I will describe a study designed: (1) to characterize some of the underlying visual and functional dimensions of residential neighborhoods, and (2) to test for a relationship between those dimensions and the psychological well-being of the residents.

I attempted to investigate characteristics of residential neighborhoods by analyzing the sales strategies adopted by realtors. It is reasonable to assume that sellers of residential units describe to potential customers the benefits they will realize if they choose to live in a particular neighborhood. We can also assume that the buyers expect to realize at least some of these benefits.

RESIDENTIAL NEIGHBORHOOD AND PSYCHOLOGICAL WELL-BEING

A city exists primarily to concentrate services for a large population in a relatively small area, and one of the most important of these services is providing people with a place to live. The residential unit and its adjacent neighborhood invariably become the spatial domain of the modern western person. Most of us spend at least two-thirds of our lives in and around the home, and some spend considerably more. Thus, although the neighborhood provides shelter, it may do much more; in fact the neighborhood can make us feel good or bad in varying degrees. A neighborhood may be pleasant to look at, it may be a happy place, and it may have a strong sense of community. On the other hand it may be ugly, anonymous, or sad.

It is convenient to class neighborhood characteristics into visual and functional components. Thus a neighborhood is first something we look at; and when we look, we may see features which please or displease us. We tend to look for trees, or hills and streams;

but often we see only factories, parking lots, and cars. At the same time, we interact with our neighborhood in other nonvisual ways. We live in a certain spatial unit, we move around in it, socialize in it, and breathe its air. Obviously the physical layout of the neighborhood, the amount of vehicular traffic, and its social composition, among other things, will influence the way we feel these interactions. In other words, the neighborhood may help or hinder our everyday functioning and the way we go about taking care of our needs.

Robert Sommer *(1974)* has recently developed this argument, at a more general level, in a book titled "Tight Spaces". Sommer described two distinct types of physical settings, one which is "hard" and unresponsive to human needs; and another which is "soft" and more likely to "welcome and reflect the presence of human beings."

VISUAL AND FUNCTIONAL COMPONENTS OF NEIGHBORHOOD: SOME IDEALIZED STATEMENTS

When a real-estate agent advertises a property, he tries to enhance the good points and minimize the not-so-good. Much of his selling strategy is concentrated on the residential unit, but often the neighborhood characteristics are included. In these cases, the information provided may be spatially bounded, to describe, for example, the view from the kitchen window. In other cases the information is aspatial in nature, for example, to describe the security or the type of neighbors one might expect to find. The information varies with the type of unit being sold, the income and age group of the prospective buyers, and the location of the property.

Nevertheless, by looking at the descriptions used in advertising residential property, we can get some indication of the ways the realtors expect the property to enhance the quality of an individual's life. Although the descriptions represent an idealized picture, as is the case in most advertising, we must assume they are based on some elements of truth, embellished in varying degrees by subjective evaluations.

Method

The Sunday newspapers of nine cities in the United States were analyzed for 4 consecutive weeks. They included a range of sizes and locations: New York, Los Angeles, Detroit, Dallas, Atlanta, Tulsa, Oklahoma City, Ann Arbor, and Norman. All advertisements in the real-estate pages were subjected to a content analysis, but only statements pertaining to the neighborhood were considered. No attempts were made to define "neighborhood" specifically, but it became apparent that any information that did not relate specifically to the residential unit or the apartment complex, should be considered.

In general, the search was for the adjectives and phrases used to describe the area in which the units were located. From the content analysis, a list of descriptive neighborhood features was generated, and a small sample of them is reproduced in table 1. It was evident that the descriptions were related to a variety of needs and desires that would appeal to the potential buyer, and some of these are suggested.

To organize the list of features and their related needs, the information was categorized heirarchically along the lines suggested by Abraham Maslow *(1968)*. Obviously it was not possible to defend rigorously the categorization shown in table 1, and there is no hard evidence to link the items with any of Maslow's needs. Similarly, each of the described features could be related to the satisfaction of more than one type of need. The table was constructed solely as a mnenomic device, and as a way to make some sense out of an extremely diverse set of needs and desires.

In selling a neighborhood, we can assume that the realtor believes, and would like the buyer to believe, that

Table 1.—Selling neighborhoods according to human needs*

	Examples of neighborhood descriptions in advertisements	Related needs and desires	Maslow's needs
1.	"Finest shopping close to Detroit" "Competitive rents" "Only 42 minutes from New York City via New Jersey Turnpike" "Save a fistful" "On a clear day you can see Big Boy"	Economy, accessibility, spaciousness, recreation convenience	Physiological
2.	"Fox Briar Estates is trees, trees, trees . . . is Edmond Schools . . ." "Great place to bring up the kids" "Safe streets, safe neighborhood" "To keep you from turning green a 24-hour security patrol and staffed gatehouse"	Security, safe for children, privacy	Safety
3.	"A unique community, friendly neighbors" "Creeks and wooded cliffs" "Rambling stone walls and open meadows . . . Canadian Geese and clear skies" "Rustic elegance . . . On a Sunday afternoon you see more horses than cars"	Sense of community neighborliness, friendship, trust, close to nature, esthetics	Love and belonging (natural and human)
4.	"Prestige living in the fashionable sixties" (New York City) "We only look expensive" "Quality . . . and then some" "Dream neighborhood . . . luxurious"	Luxury, quality status, elegance, excitement	Esteem
5.	"Live in a real townhome community, in town . . . in Dallas' prestigious eclectic neighborhood" "Avoid houses built in patterned conformity" "The best of everything" "Where you would like to spend the rest of your life"	Individuality, distinctiveness	Self actualization

*Needs are categorized according to Maslow's heirarchy (see text). No attempt is made to justify the categories—they serve only as an illustration of the types of needs neighborhood characteristics might be related to. Many of the descriptions could be related to more than one need category. It is particularly difficult to relate statements to the higher levels of need: esteem and self-actualization.

living in a certain neighborhood will be beneficial in a number of ways. To substantiate his claim, he appeals to some of the needs that might be satisfied if the buyer chooses to live in his property (table 1). Thus, he actively sells the neighborhood even though he may only own one or two of the residential units.

The appeal to different types of needs was recently investigated in another study in which a number of real-estate agents were asked to describe the sales tactics they would normally use in selling two identical houses in different parts of the city. The results of the study indicated that sales tactics are based, at least in part, on a subjective evaluation of how the neighborhood will cater to the needs of the potential buyer. It was interesting to note that significantly different strategies were adopted for selling urban fringe properties compared to within-city properties, a result that suggests that buyers on the urban fringe expect their house and neighborhood to cater to different types of needs, and also that sellers are able to perceive such differences in needs.

From the investigations made thus far, there is reason to believe that neighborhood is bought and sold on the basis of its contribution to the need-satisfaction of the potential residents. When we buy a property, we also get a piece of a neighborhood. We expect to like living in the neighborhood and we hope to benefit from it.

Residential neighborhoods can potentially cater to needs at many different levels. Some neighborhoods may satisfy only what Maslow called "low" level

needs such as safety and security, whereas others may also offer "higher" level need satisfaction, such as an esthetically pleasing environment and the opportunity to enhance one's individuality.

Theoretically at least, a neighborhood catering to a wide range of needs, particularly those "higher" on Maslow's heirarchy, would provide a more therapeutic and humane living environment. Unfortunately, to test such a hypothesis it would be necessary to find out whether the neighborhoods live up to the buyer's or the seller's expectations. In many cases we would find that the seller exaggerated the benefits and the buyer underestimated the shortcomings. Thus a real-estate agent might describe some neighborhood features very favorably. For example, a subdivision outside Ann Arbor might be described as ". . . a paradise somewhere west of Detroit"; and an apartment complex in Norman might feature ". . . beautiful lots—surrounded by large trees and rolling hills . . ." It is interesting how one can characterize the stunted black oaks and the flat plains of central Oklahoma! Realtors are usually skillful at turning something unpleasant into something that at least sounds tolerable. An apartment complex in Dallas, for example, at the intersection of two interstate highways, can be described as ". . . conveniently located with four-lane access in every direction . . ."

The buyer may find that the advertisements were illusions; that the neighbors are not so friendly after all; and that the view is not nearly so nice when the sun isn't shining. For reasons such as these, neighborhood selling tactics are, at best, only an approximation of the actual benefits one might find from living in a particular location. Nevertheless, they provide an informal guideline and some insight into the types of visual and functional attributes of residential neighborhoods.

VISUAL AND FUNCTIONAL COMPONENTS OF NEIGHBORHOOD: AN OBJECTIVE STUDY

Data were collected from a variety of sources to describe the visual and functional characteristics of a sample ($n = 102$) of residential neighborhoods in southeastern Michigan. It is important to point out at the outset that the visual and functional characteristics are not always entirely independent. For example, a high incidence of vehicular traffic would inhibit human functioning by preventing interaction and creating noise pollution, but at the same time the traffic would present a visual stimulus. In general, the variables were selected to describe visual and functional characteristics; in other words, they were chosen to describe (1) what could be seen in and around the neighborhood, and (2) any other features that might be related to human functioning and the satisfaction of needs in the neighborhood.

With an individual street address in the center, two data cells were constructed to represent each neighborhood. The first unit was a square cell 1,200 feet on all sides, which was intended to be a visual neighborhood, an area adjacent to the individual house and visible from the house. The size of the cell was determined in a pilot study as an average estimate of the distance visible from any given house. A larger unit, measuring 3,600 feet, was constructed to represent a largely nonvisual, but within-walking distance neighborhood surrounding the immediate neighborhood on all sides. Using these two cells, it was possible to collect data describing neighborhood character at different scales. This would be an advantage if the immediate neighborhood were not entirely representative of its surroundings. The 55 variables collected were intended to represent some of the visual and functional neighborhood characteristics for an individual residing at the center of the two data cells.

The variables were then used to identify some of the underlying characteristics of the residential neighborhoods in the sample. Using a combination of multidimensional scaling techniques described elsewhere *(Smith 1974)*, I identified 10 dimensions and named and described each one (table 2). As far as possible nonconnotative names were selected for the dimensions.

It was hypothesized that the dimensions describe at least some of the characteristics that would make a neighborhood more or less pleasant or stressful as a place to live in. To test such a hypothesis, it would be necessary to investigate a sample of individuals living in different residential neighborhoods. For every individual, scores could be assigned for each of the 10 dimensions; and those scores could subsequently be used as independent variables to predict psychological well-being.

Method

As a first step in testing this hypothesis, the dimensions have been used to investigate the effects of the residential environment on the psychological well-being of a group (n=71) of former mental patients discharged from hospitals. From the medical records and from questionnaires, it was possible to construct three surrogate measures of well-being for the former patients:

1. *Recidivism/nonrecidivism.* — Their ability to stay out of the hospital for a period of 12 months.
2. *Good adjustment/poor adjustment.* —From a follow-up questionnaire completed 3 months after release, a

Table 2.—The dimensions of residential neighborhoods

Dimension names	Items
Commercial/Industrial	Percentage of nonresidential structures
	Percentage of commercial/industrial land use
	Percentage of transportational land use
Recreational	Percentage of designated recreation
	Distance to nearest recreational facility
	Percentage of open space
Close to water	Distance to nearest water
	Percentage of cell covered by water
Arboreal	Hilliness—number of contours
	Percentage tree cover (individual trees)
	Percentage tree cover (in stands)
Low housing density	Distance between houses (side)
	Percentage of residential structures
	Space per house
	Percentage agricultural and vacant land
	Space per person
	Distance between houses (back)
	Distance between houses (front)
Black overcrowded	Percentage of black individuals
	Percentage of overcrowded units
	Percentage of female heads of household
Expensive real estate	Average unit value
	Average number of rooms per house
	Diversity of unit and street layout
Transience	Amount of through vehicular traffic
	Percentage of houses with boarders
Low unit density	Percentage of individuals over 65 years old
	Persons per unit
	Percentage of one-person units
Single-family uniform housing	Variety of residential building sizes
	Percentage of houses owned
	Variety of residential unit types
	Percentage of individuals
	Percentage of predominant land use
	Number of different land uses

composite measure of adjustment was constructed from items describing the interpersonal, social and recreational, family, employment, and community adjustment of the former patients. The mean score on this measure was used as a cut-off point.

3. *Low stress/high stress.* — Again from the follow-up questionnaire, this item was measured from the incidence and seriousness of stressful events encountered by the patients in the first 3 months after release. In a separate study a scoring mechanism was devised to assign weights to reflect the stressful nature of the different events. Again the mean score for the whole sample was used as a cut-off point. The construction of the scales was discussed in detail in Smith *(1974)*.

For each patient a profile describing his or her residential neighborhood was developed by assigning a score on each of the 10 residential dimensions described earlier. The profile was used in a discriminant analysis model to predict recidivism, adjustment, and stress in the former patients.

Prediction of Recidivism/Nonrecidivism

Scores on 3 of the 10 dimensions, Commercial/Industrial, Low Unit Density, and Transience — predicted outcome correctly for 46 (65 percent) of the 71 patients in the sample (table 3).

Although the prediction of return to the hospital is not remarkable, the results indicated that the type of neighborhood predicts correctly in nearly two out of every three cases which patients will return to the hospital. This is an interesting and encouraging finding, especially when compared to the actual rate of recidivism in the sample, which was over 50 percent. The implication, which is made extremely cautiously and perhaps even a little flippantly at this stage, is that a geographer, with information only on where in the community the patients live, can predict outcome significantly more accurately than the hospital staff.

The patient's neighborhood predicts staying out of the hospital more accurately than returning (25:10 as opposed to 21:15). One can suggest cautiously from this finding that some patients are able to compensate for, or to ignore, the negative and stressful effects of living in an unpleasant neighborhood — for example one with high scores on the Commercial/Industrial dimension or the Transience dimension. On the other hand, the positive benefits of living in a more pleasant setting appear to be substantial. The implication that the pleasant is therapeutic but that the unpleasant can be inhibited or shut-out is irresistible.

It is important to make some statement concerning the Low Unit Density

Table 3.—Residential dimensions selected to discriminate return/nonreturn to hospital

Dimension	Percent correct prediction	d^2*	f statistic	Significance
Commercial/Industrial	53.5	0.21	3.77	0.05
Low unit density	64.8	.46	3.97	.02
Transience	64.8	.65	3.71	.01

CLASSIFICATION OF RETURN/NONRETURN

	No return	*Return*	*Total*
Correct group	25	21	46
Incorrect group	10	15	25
Total	35	36	71
Correct classification	46/71=65% p>95%		

*Mahalonobis distance function—a measure of the amount of discrimination between the two groups (see *Smith 1974*).

dimension, which describes neighborhoods with a high proportion of old people and people who live alone. The discriminant model indicated, somewhat surprisingly, that the patients who lived in neighborhoods with high scores on this dimension are more likely to stay out of the hospital than patients who lived in other neighborhoods. A tentative conclusion from this finding is that loneliness and a lack of social contact are not related to recidivism and nonrecidivism in former mental patients. It is possible that neighborhoods of this type are very familiar to mental patients, and that they provide a low-key setting in which the community makes few normative demands.

Prediction of Good Adjustment/Poor Adjustment

Two dimensions — Low Housing Density and Recreational — were selected as discriminators of adjustment (table 4), but the discrimination was not significant at the 95 percent level. It is interesting to note, however, that neither of these dimensions was included as a predictor of recidivism, which indicates that adjustment and recidivism are fairly independent of one another. This finding seems, at first, a little surprising because one would expect patients who adjust poorly to return to the hospital, and vice versa. On the other hand, it may be that recidivism rates do not reflect actual adjustment in the community. Patients living with their families, for example, may live a very sheltered life. They may not be required to adjust to community life in the broadest sense, but they do not return to the hospital because their family provides the necessary support.

The Low Housing Density and Recreational dimensions predict good adjustment much more accurately than poor adjustment (20:7 as opposed to 22:22). This too would indicate that the characteristics of some neighborhoods offer a substantial positive benefit. In this case, the results suggest that spacious neighborhoods may offer more room for people to move around in, more privacy, more opportunities for recreation, and so on.

Prediction of Low Stress/High Stress

The prediction of scores on the Stress index was the highest of the three well-being measures, with four dimensions selected as significant predictors (table 5). Arboreal, Commercial/Industrial, Low Unit Density, and Transience, together predicted the stress scores accurately for 49 of the 71 patients (69 percent). Three of these dimensions are the same as those selected to predict recidivism, which indicates that stress and return to the hospital might be closely related (and conversely, low

Table 4.—Residential dimensions selected to discriminate good adjustment/poor adjustment*

Dimension	Percent correct prediction	d^2	f statistic	Significance
Low housing density	53.5	0.23	3.59	0.06
Recreational	59.2	.41	3.08	.05

CLASSIFICATION OF GOOD ADJUSTMENT/POOR ADJUSTMENT

	Good adjustment	*Poor adjustment*	*Total*
Correct group	20	22	42
Incorrect group	7	22	29
Total	27	44	71
Correct classification	42/71=59.2%	p<95%	

*The mean score was used as a cut-off point; patients with scores below the mean=good adjusters and vice versa.

Table 5.—Residential dimensions selected to discriminate low stress/high stress

Dimension	Percent correct prediction	d^2	f statistic	Significance
Arboreal	59.2	0.21	3.04	0.08
Commercial/industrial	60.6	.48	3.50	.03
Low unit density	64.8	.68	3.25	.02
Transience	69.0	.86	3.02	.02

CLASSIFICATION OF LOW STRESS/HIGH STRESS

	Low stress	*High stress*	*Total*
Correct group	20	29	49
Incorrect group	9	13	22
Total	29	42	71

Correct classification = 49/71 = 69% p>95%

stress is related to nonreturn to the hospital). It is reasonable to assume that the people who encounter a large number of stressful events and are unable to cope with these events, will be the ones most likely to return to the hospital. The inclusion of the Arboreal dimension in the overall prediction suggests that there are some positive benefits accruing to patients who live in hilly neighborhoods with tree-lined streets. Again, only a positive influence of the Arboreal dimension was detected.

For all three well-being measures, the results indicated that neighborhood characteristics predict outcome significantly in a sample of former mental patients. Some tentative explanations were provided, but one should proceed with great caution in suggesting cause and effect relationships. In another study the author has shown that the predictions made by the residential dimensions were almost as accurate as those made from a series of social and psychological variables collected in the follow-up questionnaire. In this exploratory study we concluded that the hypothesis relating the visual and functional character of residential neighborhoods to the satisfaction of human needs and psychological well-being, has been partially supported.

In ongoing work I am attempting to provide further support for the hypothesis by testing it in a normal population group.

SUMMARY AND CONCLUSIONS

The characteristics of an individual's residential neighborhood could contribute positively or negatively to his or her psychological well-being. An investigation of the advertising used to sell houses and apartments indicated that neighborhood is bought and sold at least partly on the basis of its ability to enhance the quality of life of the potential resident. To test the hypothesis, an empirical investigation was conducted, using a sample of residential neighborhoods in southeastern Michigan. Data describing the visual and functional characteristics of the neighborhoods were collapsed into 10 underlying dimensions, using a variety of multidimensional scaling techniques. With the scores on the 10 residential dimensions as independent variables, psychological well-being was predicted for a group of mental patients recently released from a large state hospital. The results showed that several of the residential dimensions could predict significantly the patients' scores on three measures of psychological well-being: recidivism, adjustment, and stress level.

Although the results should be interpreted with great caution, they at least indicate that certain neighborhood characteristics may offer a setting that is pleasing, relatively stress-free, and conducive to recuperation in former mental patients. The results suggested that positive and pleasant characteristics

provide a therapeutic environment, but in most cases unsightly and negative characteristics were shown to have only a weak influence. At this stage it is not clear to what extent these findings are applicable to a normal population group, but research in this area is being conducted. One should beware of putting too much emphasis on the findings, bearing in mind the particularly powerful arguments against making ecological inferences of this type. The results suggest certain trends in the data, but it may be unwise to go beyond the most exploratory statements.

On the other hand, this study is an encouraging start, and has moved in an intuitively satisfying direction. The results and the methodology described point to both the feasibility and the desirability of attempting to measure some of the humane dimensions in the physical world. It is to be hoped that in further studies researchers will be able to characterize more clearly those elements of the built environment that are related to the enhancement of psychological well-being and the quality of human life.

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