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Measuring the Public Realm: A Case Study

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MEASURING THE PUBLIC REALM: A PRELIMINARY ASSESSMENT OF THE LINK BETWEEN PUBLIC SPACE AND SENSE OF COMMUNITY

Emily Talen

Urban planners are vitally interested in the role, meaning, and use of public space. The recent trend toward building neighborhoods and towns according to the doctrine of new urbanism — a movement which seeks to promote sense of community by adhering to certain principles about the physical arrangement of space — brings the debate about the use of public space and its effect on social life to the forefront. New urbanism stresses the need to resurrect a more civic focus in town planning principles via the provision of public space (Kunstler, 1996; Hochstein, 1994), a view based on the premise that the value of public gathering places in generating a sense of community is paramount (Boyer, 1994; Hayden, 1995).

INTRODUCTION

How can the connection between public space and sense of community be evaluated? This paper asserts that, as a starting point, the measurement of the physical dimension of public space must be accomplished. Conceptually, the translation between public space and building sense of community, here defined as "the sense of belongingness, fellowship, 'we-ness,' identity, etc., experienced in the context of a [geographically based] collective" (Buckner, 1988:773),[1] is seen as consisting of three interrelated dimensions. This paper describes the first dimension, the physical characteristics of public space, by offering a methodology for measuring public space differentials at the neighborhood level. Analysis of public space will thus be facilitated by a better characterization of the public domain: how does one neighborhood have "more" public space than another, constituting what some might view as a superior public realm?

The method offered in this paper utilizes a particular vocabulary designed to measure aspects of the public realm which are seen, theoretically, as contributing to increased resident interaction and sense of community. The method builds on the work of Owens (1993) and Southworth and Owens (1993) to provide a practical measure of the "public realm." The goal is to facilitate the discussion of the use, meaning, and role of public space by delineating, in pragmatic terms, the geographic dimension of public life and how it varies from one neighborhood to the next. The basis of this differentiation are the public space design components embedded in new urbanist theory.

BACKGROUND

Current as opposed to more traditional metropolitan forms are often criticized as fostering an overly privatized world which severely limits the opportunities for social interaction. The standard suburban model in particular is condemned for its failure to provide decent public places (Duany and Plater-Zyberk, 1992). Other critics cite a mismatch between "post-industrial" culture and the current pattern of suburban development as being responsible for, among other things, lifestyles that isolate the elderly and unduly burden working families (Calthorpe, 1993; Kunstler, 1993; Downs, 1994). Specifically, the physical arrangement of life in suburbia is viewed as promulgating extreme privatization and a dysfunctional public life, scattering residents without providing central places that encourage social interaction. Thus the loss of "community" is seen to be largely a function of the failure of metropolitan development to provide a setting for repetitive chance encounters that serve to strengthen community bonds (Achimore, 1993).

Much of the theoretical development about the role of public life in fostering community bonds, and the importance of locating public spaces appropriately, comes from the writings of urban theorists in the design tradition, among them Peter Calthorpe (1989, 1993), William H. Whyte (1988), Dolores Hayden (1984), Leon Krier (1984), and Peter Katz (1994). Inherent in the espoused alternatives to post-war suburban "sprawl," there is a concern for the ability of metropolitan form to create a sense of community (Lozano, 1990), and public spaces are given a central role in its production. The actual (i.e., built) manifestation of these ideas has surfaced in new urbanist developments, following the work of Andres Duany and Elizabeth Plater-Zyberk at Seaside, Florida, and has gained increasing momentum as plans for urban villages, transit-oriented developments, and other variations of new urbanism proliferate (Calthorpe, 1993). In each of these, the fostering of a "living community" is strengthened by the establishment of common open spaces, sidewalks, and other public gathering places (Christoforidis, 1994).

A CONCEPTUAL MODEL OF THE RELATIONSHIP BETWEEN PUBLIC SPACE AND SENSE OF COMMUNITY

The conceptual model used in this paper maintains that the translation between public space and sense of community consists of three interrelated components. This model is presented in order to position the physical characterization of public space.

For clarity, the model is presented as a linear, step-wise progression. In reality, of course, the interaction between the physical and social environment is much more complex, involving reciprocal relationships in which the social environment both affects and is affected by the physical realm. Thus while there are intervening factors in the translation from the physical dimension of public space to the event of social interaction, these intervening variables also have some bearing on the form, content, and spatial arrangement of the physical dimension itself.

For the purposes of this paper, the physical dimension of the public realm provides the overall framework. Within this framework, the social environment facilitates and constrains access to public space. These opportunities and constraints also affect the degree of social interaction that takes place within the public realm if access is obtained. Finally, social interaction occurs within this socially defined or constrained public sphere, which in turn has an impact (according to new urbanist theory) on building sense of community.

The first component is the subject of this paper. It consists of the actual physical measurement of the public realm. Thus public realm is defined here in a physical sense, that is, the spaces in an urban environment that are open and physically accessible to residents, and which provide, at least in principle, opportunity for contact, proximity to others, and appropriate space to interact (Fleming, *et al.*, 1985).

The second component can be viewed as a set of conditioning factors which affect the relationship between public space and social interaction. Such factors can either promote or limit social interaction in public spaces. Factors that affect social interaction include length of residence, gender, home ownership, and stage in the life cycle (age, presence or absence of children). These factors have generally been implicated in research which seeks to demonstrate that a strong sense of community can (and does) exist in suburban, seemingly anti-communitarian neighborhoods. Self-assessment of certain neighborhood-level needs and characteristics has also been implicated, and includes: (a) the degree to which residents require local, neighborhood-level attachments (as opposed to community-wide, work-based or network based attachments), and (b) the degree to which residents feel they have something in common with their neighbors (i.e., self-assessed level of neighborhood homogeneity). These social needs and perceptions can have a defining effect on the relationship between public space and social interaction.

The social environment also includes constraints on access to public spaces, which in turn may affect the type of social interaction which can occur. These constraints are derived from three sources: 1) the qualitative characteristics of public space, which can be subjectively defined (e.g., degradation of the public space environment, perceived safety issues), 2) the match between public space need and public space provision (based on, for example, sociodemographic characteristics), and 3) social constraints on access. The last type of constraint requires some explanation. Recent analyses have investigated the ambiguity of public space, with its racial and gender based restrictions (Mitchell, 1996; Ruddick, 1996), the use of "citizenship" as a means to gain access to public space (Staeheli and Thompson, 1997), and the changing social construction and meaning of public space (Sorkin, 1992). In essence, a variety of socially imposed factors have been shown to limit participation in the public realm, and these constraints must be factored in when attempting to estimate the link between public space and sense of community. The third component in the translation between public space and sense of community is the actual event of social interaction. For public space to ultimately promote sense of community, some form of social interaction must occur within the public realm. This interaction is limited both by constraints on access to public space, as well as constraints on interaction

which may occur once access to public space is obtained. This involves the complex relationship between environment and behavior in public spaces, a relationship which has been treated by numerous researchers (in addition to new urbanists, see Jacobs, 1961; Whyte, 1988; Sorkin, 1992; Rofè, 1995), and which will need to be addressed within the context of building sense of community in future research endeavors.

THEORY

This section identifies how the specific qualities of urban public spaces — intended ultimately to foster sense of community — can be put into a measurable context. New urbanist theory is used as a basis since many of its design prescriptions are predicated on the role of public space in promoting resident interaction and sense of community. It must be emphasized that these theories about the relationship between design and social behavior are to a large extent dependent upon, if not dictated by, social needs and perceptions that work independent of environmental factors. Such factors, as conceptualized in the previous section, should be regarded as prerequisites that determine the ultimate translation between physical dimensions of public space, social interaction, and building sense of community (Figure 1). According to new urbanist theory, there are essentially two ways in which public space can be used to strengthen resident interaction and promote sense of community: 1) integrating private residential space with surrounding public space, and 2) careful design and placement of public space. Taken together, these elements are aimed at promoting two social goals: 1) resident interaction and 2) place attachment. The specific design elements which work to achieve these goals are in one form or another delineated in works by Duany and Plater-Zyberk (*Towns and Town-Making Principles*, 1991), Calthorpe (*The Next American Metropolis*, 1993) and Langdon (*A Better Place to Live*, 1994), among others. While these designers are not always in agreement about the philosophical basis of their proposals (for example, Calthorpe's disdain for the "fiction of small-town America," 1991:57), most of the public space design elements used to promote sense of community are remarkably similar. The elements are discussed in turn below.[2]

Density. Social interaction is promoted by designing residences in such a way that residents are encouraged to get out of their houses and out into the public sphere. This requires a shrinkage of private space: houses may be positioned close to the street and lots and setbacks may be small (Duany and Plater-Zyberk, 1992). Personal space is, in a sense, sacrificed in order to increase the density of acquaintanceship, and this concentration nurtures a "vigorous community spirit" (Langdon, 1994:xiii). The relevant physical dimension to be measured then, is the density of single-family housing structures.[3]

Streets. Streets have an overt social purpose. They are to be thought of as public space — much more than voids between buildings — and therefore must be made to accommodate the pedestrian (Calthorpe, 1993). Streets are designed to encourage street life, since any increase in pedestrian activity is thought to strengthen community bonds and promote sense of place. Streets are to be a place where pedestrians feel safe, so that residents are encouraged to use streets (sidewalks), thereby strengthening the chance for social encounter. Two characteristics of streets can be used to quantify the physical differentiation of public space within neighborhoods: quantity/type of street, and presence or absence of sidewalks. Linkages within the neighborhood should be maximized to accommodate pedestrian travel, and therefore block size should be small, transected by local serving (as opposed to arterial) streets. More streets translates into a larger zone of public/private interaction.

Public space integration. Public space provides a venue for chance encounters, which serves to strengthen community bonds. Neighborhood gathering places give "heart" to the community (Langdon, 1994), and serve as a counter-pressure to community fragmentation which results when communication is privatized. Public spaces in the form of parks and community centers also serve as symbols of civic pride and sense of place which promote the notion of community. Sense of place is created simply by paying attention to sense of space through proper design and placement of public space (Duany and Plater-Zyberk, 1992). Small and frequent public areas are preferable to large

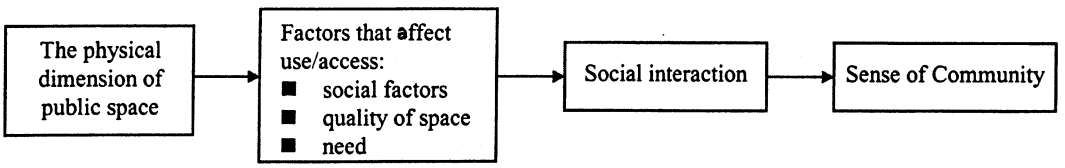


FIGURE 1. Translating the provision of public space into building sense of community.

spaces. Parks, for example, should be well-dispersed throughout residential areas, not aggregated at the periphery (Calthorpe, 1993). The spatial arrangement of public spaces should be integrated as opposed to abrupt in order to maximize contact between residential and public zones. Uses should be arranged at a fine grain: urban environments with some degree of complexity are thought to promote pedestrianism. Measurement of this dimension of the public realm is essentially an access issue. With the exception of streets and sidewalks, the accessibility of all forms of public space can be measured and used as an indication of the degree of public space dispersion.

TABLE 1. Selected 1990 census characteristics for three neighborhoods.

	South Park	Wiles Hill	Suncrest
Population	3,150	2,454	4,545
Households	1,429	1,193	2,108
Median housing value	83,100	62,300	98,800

METHODOLOGY

The basic method for differentiating neighborhoods on the basis of their degree of public space is to identify variables which impact pedestrian and public life and then measure how these vary among different locations. This assumes that the type as well as the location of public space is measurable and meaningful. It also relies on an independent, systematic measure of the physical environment. It should be emphasized that it is not possible to categorize every venue for social interaction that takes place in the public realm of urban areas. In short, the complexity of urban social spaces cannot be completely captured. However, a large majority of facilities and areas that are part of the deliberate, built environment and which make up the public realm can be accounted for.

Data Collection

In this study, public spaces were quantified for three neighborhoods in Morgantown, West Virginia, delineated in Figure 2. The neighborhoods chosen function as bounded, socially identifiable areas; in other words, they represent geographic units within which certain social relationships are assumed to exist (see Anthony Downs' study of neighborhoods, 1981). While all are primarily single-family residential areas, there are differences. South Park is an older, traditional neighborhood, prototypical of the type of neighborhood design promulgated by new urbanists. Wiles Hill is also fairly prototypical of traditional neighborhood design, although it is of more recent construction (early 20th century). Suncrest is an early subdivision built during the 1940s, 50s, and 60s. Selected 1990 census characteristics for the three neighborhoods, listed in Table 1, indicate that there are size differences (based on population and number of households), as well as corresponding variation in median housing values (the larger the neighborhood, the higher the median housing value).

After the neighborhoods were selected, a taxonomy of public spaces was developed. Based on the theoretical functionality of public space discussed above, public spaces which could potentially foster resident interaction (and ultimately sense of community) were identified and built into a geographic information system (GIS). Figures 3, 4, and 5 show the distribution of public spaces within each neighborhood (see also Figures 6A through 8B). The types of public spaces included are listed in Table 2. Public spaces were included only if they were truly public in the sense that any individual

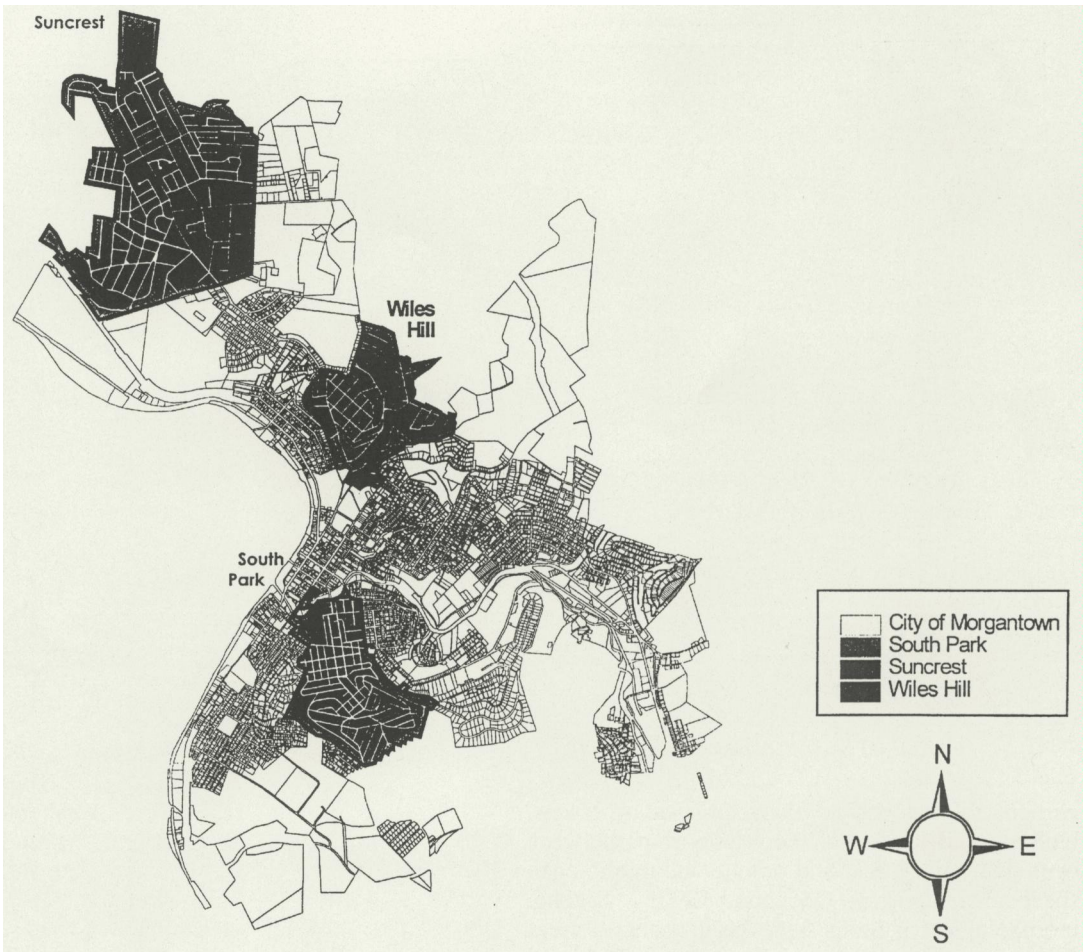


FIGURE 2. Study area — Morgantown, WV.

TABLE 2. Urban public space relevant to Morgantown neighborhoods.

Parks	District park, neighborhood park, vest pocket park
Playgrounds	Playground, schoolyard
Squares/plazas	Central square (publicly owned), corporate plaza
Community facilities	Community center, neighborhood center, recreation center, school, library
Commercial/retail	Downtown retail, neighborhood retail
Quasi-public facilities	Church/synagogue
Streets	Pedestrian sidewalks, pedestrian mall

could, at least theoretically, have access to the facility or space. Quasi-public spaces with specific admission requirements, such as health clubs, were not included. It should be noted that some public spaces which may be relevant in other cities are not found in these neighborhoods and thus were not included in the list (e.g., farmer's markets, memorials, and indoor atriums).

Measuring the Public Realm

The fundamental task in the development of the methodology was to interpret the role public space plays in fostering social interaction in spatial analytic terms, such that the geographic implications of the theories are flushed out. This interpretation was aided by two research traditions. First, researchers working in the urban morphology tradition have documented and analyzed residential form,

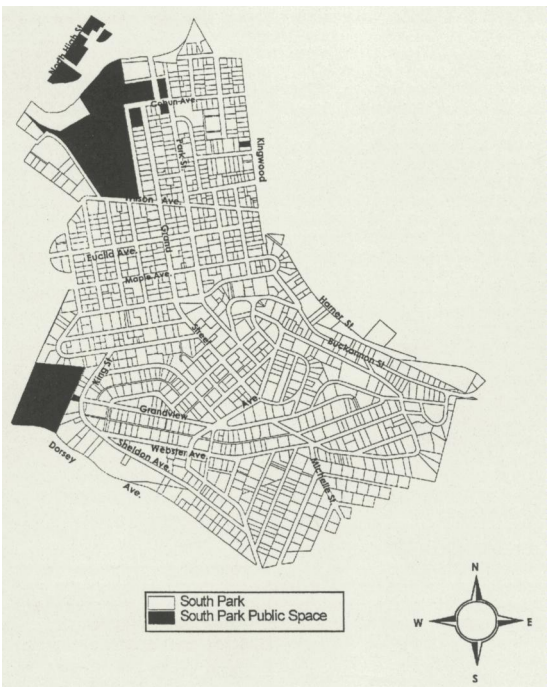


FIGURE 3. South Park public space.

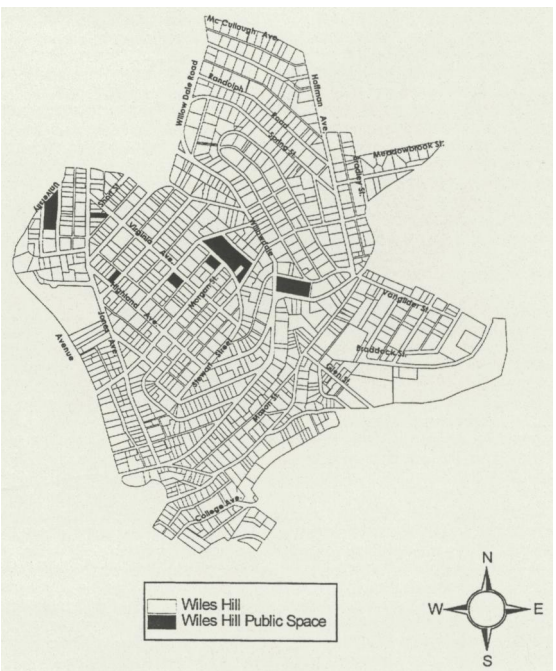


FIGURE 4. Wiles Hill public space.

particularly the design characteristics of streets, building and lot forms, the relationships between open and built space, and private and public open space characteristics (Moudon, 1992). Second, morphological patterns have been analyzed from the perspective of urban designers and landscape architects. Michael Southworth and Peter M. Owens, in particular, have examined neighborhood form in terms of underlying organizing principles (Southworth and Owens, 1993; Owens, 1993; Southworth and Ben-Joseph, 1997; Southworth, 1997). Analyzing patterns of growth, land use, and street arrangement, the authors have developed a spatial typology which can be used to distinguish different types of urban form (Southworth and Owens, 1993). Owens (1993) examined urban characteristics that might influence pedestrian life — zone form, structural scale, boundaries and connectivity — going well beyond differentiation based on density and use (which is often the current practice among urban planners).

The delineation of neighborhood form in this research is primarily intended to strengthen knowledge and understanding of the urban environment. The point of departure for this paper is that the methodological approach is geared toward deriving a measure of the public realm of neigh-

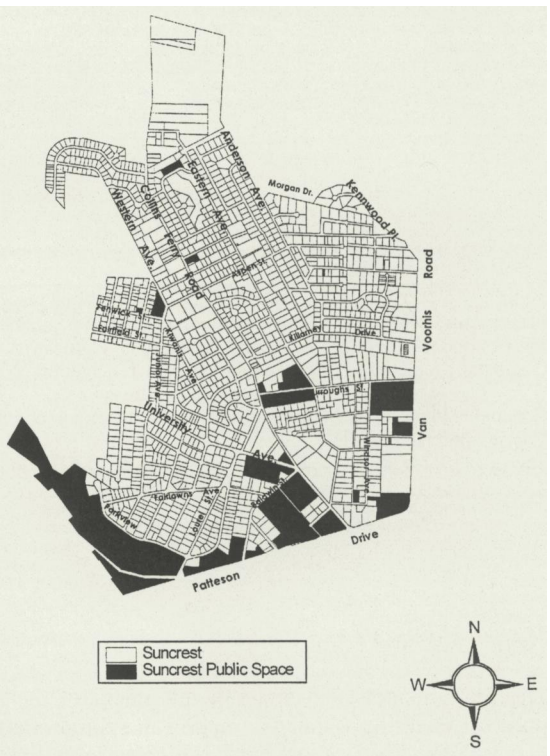
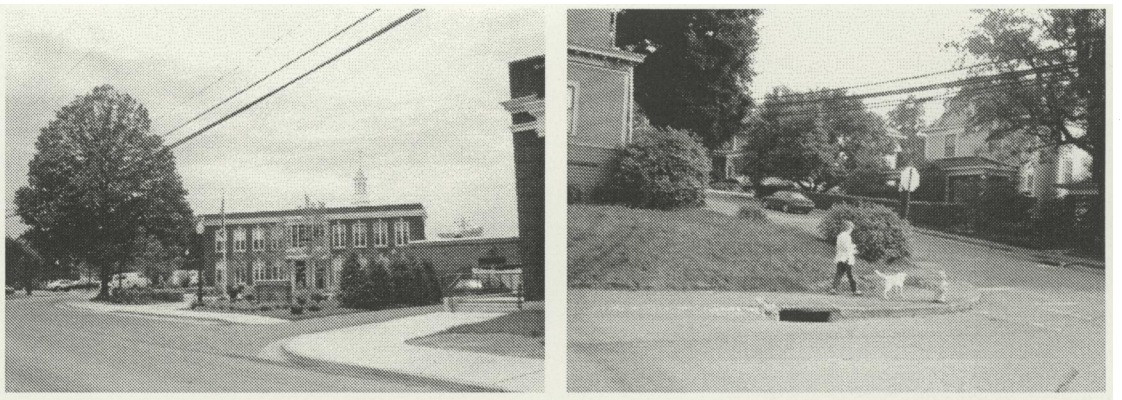


FIGURE 5. Suncrest public space.



FIGURES 6A and 6B. Public space in South Park neighborhood.

FIGURES 7A and 7B. Public space in Wiles Hill neighborhood.

FIGURES 8A and 8B. Public space in Suncrest neighborood.

borhoods specifically. Further, the emphasis is on the quantification of the public realm, which can then be used in conjunction with other types of analyses used in comparative research (e.g., qualitative analysis). The procedures used to measure the various dimensions of public space are laid out in Table 3, measuring the public realm. There are four components of the overall measure: size, spatial

TABLE 3. Measuring the public realm.

Theory	What to Measure — Geographic Implication	Method
SIZE		
Small public zones are better than large monolithic public zones	Size of public zones	Determine size characteristics of public zones
ACCESS		
Maximize access to public space and minimize walking distance; public zones should be well-integrated — dispersed is preferable to concentrated	Distance-based access to public zones	Return access value, by single-family parcel. Use minimum distance to nearest public zone; comparison of distances between single family parcels and public zones gives indication of public zone dispersion
RESIDENTIAL GRAIN		
Residential grain should be "fine" as opposed to "coarse"; this maximizes connection between public and private realms	Parcel size and street length	Determine average number of parcels per area
		Determine block size and length by measuring the number of intersections per neighborhood
		Determine total street length per neighborhood
TRANSPORT ENVIRONMENT		
Transport environment should be pedestrian friendly	Street type	Determine street type adjacent to each block
	Sidewalks	Determine percentage of blocks within neighborhood which have sidewalks

distribution, residential grain, and transport environment, which are discussed in turn below. Again it must be emphasized that these factors are only effective in promoting social interaction and sense of community to the extent that other social factors — e.g., length of residence, stage in the life cycle — are conducive to such outcomes.

Size. First, the "grain" of the public realm and its integration within the neighborhood can be revealed by simply measuring the size of public spaces. Based on the theory that small public areas are preferable to large, monolithic spaces, the median size and areal variance of public spaces per neighborhood can be measured to provide an indication of the physical size characteristics of each neighborhood's public zones. This is a straightforward calculation in any GIS software package.

Spatial Distribution. Quantifying the geographic distribution of public space is accomplished by measuring the access between residential locations and public spaces. Based on the theory that access to public space should be maximized, the distributive goal would be to minimize the distances between residents and public spaces. Interrelated with the theory of maximizing access to public spaces and minimizing walking distance is the theory that public spaces should be well-integrated within the residential fabric. Dispersed spaces are preferable to concentrated spaces. Access and dispersion are simultaneously captured by measuring the accessibility of public space.

In order to avoid subjective predictions of consumer behavior (whereby, for example, distance decay parameters are set), the accessibility to public space can be calculated using the "equity model" (Hodgart, 1978).[4] Here the minimum distance to the nearest public space is calculated for each residential parcel. The analysis is confined to single-family attached or single-family detached dwellings for the sake of consistency (over 90% of the residential parcels in all three neighborhoods are

TABLE 4. Size characteristics of public space by neighborhood.

	South Park	Wiles Hill	Suncrest
Total area of neighborhood	285 acres	267 acres	814 acres
No. of public space parcels	25	9	77
Median size of public spaces	.14 acres	.26 acres	.37 acres
Total public space area	21 acres	3.7 acres	88.3 acres
Public space area as percent of total area	7%	1%	10%

TABLE 5. Minimum distance to public space.

	South Park		Wiles Hill		Suncrest	
Euclidean Distance	No. Parcels	% of Total	No. Parcels	% of Total	No. Parcels	% of Total
<.0015	286	36%	282	39%	519	41%
.0015-.0035	248	32%	281	39%	517	41%
.0035-.0055	113	14%	149	21%	188	15%
>.0055	148	19%	8	1%	28	2%
Totals	795	(100%)*	720	(100%)	1252	(100%)*

*The percentages are rounded.

single-family dwellings). Average distances within each neighborhood, categorized by varying zones of Euclidian distance, give an indication of the degree to which residents must journey before a public space is reached, in turn an indication of the degree of integration of public space within the neighborhood. These Euclidian distances for each neighborhood were calculated using ArcView's Spatial Analyst extension.

Residential grain. Another theory about promoting public interaction in urban neighborhoods is that the connection between public and private space should be maximized by having a "fine" residential grain: avoid large parcels, large blocks, and streets with few links or interconnections. Residential grain can therefore be measured by determining the average number of parcels and total street length per neighborhood. The grain of residential blocks can be measured by determining the number of street intersections per neighborhood.

Transport environment. Finally, promotion of resident interaction via the public realm is promoted by ensuring that the transport environment is pedestrian friendly. Two aspects of the transport environment can be measured: street type, where for the purpose of fostering resident interaction local streets are preferable to major arterials, and sidewalks, where the presence of sidewalks is seen as a way to encourage the link between private and public space and therefore resident interaction and the building of a sense of community.

INTERPRETATION OF RESULTS

The first aspect of comparing the differential public realms — size characteristics — across different urban areas (i.e., neighborhoods) is summarized in Table 4. The comparison is made by analyzing not only the quantity and size of public spaces, but also the percentage of public space within each neighborhood. From these characteristics, several observations can be made. First, the Suncrest neighborhood, which is the newer suburban area, has significantly more public space than the other two neighborhoods in terms of both number of parcels, total acreage, and public space as percent of total area. However, the median size of these public spaces is also significantly larger, and is more than double the median size of the South Park neighborhood. Evaluating these public space characteristics in terms of new urbanist criteria, then, the older more traditional neighborhood of South Park

TABLE 6. Comparison of neighborhood single-family parcel characteristics.

	South Park	Wiles Hill	Suncrest
No. single-family parcels	795	720	1252
Single-family area	117 acres	115 acres	361 acres
Mean size (acres per parcel)	.15 acres	.16 acres	.29 acres
Parcels per acre	6.8	6.3	3.5

TABLE 7. Comparison of neighborhood street lengths and intersections.

	South Park	Wiles Hill	Suncrest
Total street length	13.25 miles	11.64 miles	27.10 miles
Length/area ratio	29.8 per sq. mile	27.9 per sq.mile	21.3 per sq. mile
No. of intersections	127	106	194
Intersection/area ratio	286 per sq. mile	254 per sq. mile	153 per sq. mile

would clearly be ranked higher since its median public space size is significantly small. The Wiles Hill neighborhood would be ranked low in the size category in terms of both its relatively low amount of public space (number of parcels, total acreage, percent of total area), as well as its relatively large median size.

A somewhat different conclusion about public space differentials is reached when the next component is analyzed, namely, the spatial distribution of public areas. Table 5 summarizes the results of a minimum distance analysis for each neighborhood. For four different distance bands, the number of single-family residential parcels falling within those bands were tallied for each area. For the first three distance bands, the three neighborhoods are fairly similar in terms of percentage of parcels within each distance. But because of the clustering of public spaces, the more traditional neighborhood of South Park had the most parcels in a long distance range (greater than .0055 Euclidian distance). Thus 19% of its single-family parcels were in a comparatively far distance from the nearest public space. Clearly, this neighborhood is at a disadvantage in terms of new urbanist public space goals because of the clustering of its public spaces. This lack of dispersion is reflected by the Euclidian distance analysis. The other two neighborhoods were remarkably similar in terms of percentage comparisons. Thus even though the Wiles Hill neighborhood had significantly less public space in terms of total area, its public space geography fairs well when the distributional qualities of public areas are factored into the analysis.

Residential grain is another characteristic affecting the public realm of neighborhoods. Tables 6 and 7 list the specific ways in which this component can be measured. In Table 6, the number of single-family parcels, total single-family area, and parcel size characteristics (acres per parcel and parcels per acre) are listed by neighborhood. The measures indicate a significantly different residential grain between the two traditional neighborhoods, which are very similar, and the new suburban area. The latter neighborhood has a significantly higher lot area ratio, consistent with a "coarser" residential grain characteristic of newer subdivisions. The older, more traditional neighborhoods of South Park and Wiles Hill are clearly more aligned with the new urbanist philosophy about smaller lot sizes and "fine" residential grain.

Table 7 compares street length, length to area ratio, number of intersections, and intersection to area ratio. These measures characterize the residential grain of neighborhoods by quantifying block lengths and interconnections. The results are consistent with the parcel measures (Table 6), and indicate that the more traditional neighborhoods have significantly more streets and intersections than the newer suburban neighborhood. This translates into an intersection to area ratio for South Park which is nearly double that of Suncrest. The fact that the traditional neighborhoods of South Park and Wiles Hill have many more intersections and streets than the newer residential area is not surprising; the measures presented reveal an unambiguous differential.

TABLE 8. Comparison of neighborhood transport characteristics.

	South Park		Wiles Hill		Suncrest	
	No. Parcels	% of Total	No. Parcels	% of Total	No. Parcels	% of Total
Arterial	0	0%	25	3%	28	2%
Collector	225	28%	195	27%	304	24%
Local	570	72%	500	70%	919	73%
Sidewalks	462	58%	98	14%	102	8%

Finally, Table 8 presents data comparing the transport environment of the three neighborhoods. For each of the street types (arterial, collector, or local), the number of single family parcels abutting each type was counted and the percentages of the total number of parcels are given. It can be seen that there is very little difference in terms of percentages for each street type for the three neighborhoods. Not surprisingly, the oldest neighborhood, South Park, has a significantly higher percentage of parcels with adjoining sidewalks. Compared with Suncrest's meager 8%, and Wiles Hill's 14%, South Park's high percentage of parcels with sidewalks (58%) makes a clear public space differential.

SUMMARY AND DIRECTIONS FOR FUTURE RESEARCH

This paper has demonstrated an approach to quantifying the differing public realms that exist in urban neighborhoods. The paper argues that the size characteristics and the spatial distribution of public spaces, as well as the residential grain and transport environment of neighborhoods can be used together to characterize the urban public realm in a quantitative way. It was emphasized that the translation between the design of the public realm and sense of community is predicated on the existence of underlying social factors beyond the control of urban design. The methodology was intended to provide the first element in the translation between public space and sense of community. A conceptual model of how the physical measurement of public space fits into the overall translation between the public realm and building sense of community was presented to put the demonstration of the method into proper context.

Comparison of the quantified measures for the three case study neighborhoods indicated that there were significant differences between the neighborhoods in all measurement categories. But these differences were not always consistent; that is, the newer suburban area fared better than the older, more traditional neighborhoods in two public space categories. While the older, traditional neighborhoods may have yielded a finer residential grain and more streets and sidewalks, their distribution of public spaces was less dispersed than the newer suburban area. This suggests that, when attempting to measure public space differentials, the multi-dimensional nature of public space must be taken into account. If just spatial distribution of public space is analyzed, the differential between neighborhoods may not be accounted for. Further, if comparisons of the public realm, as a physical characteristic of neighborhoods, are to be made, some kind of weighting scheme may be appropriate in order to differentiate between "more" and "less" public space in an overall sense.

In two categories, spatial distribution and transport characteristics, the public realm differential between the older, traditional neighborhoods and the newer subdivision was not as expected. Indeed it is surprising that the newer, suburban neighborhood fared better than the other more traditional neighborhoods in terms of both overall acreage of public space as well as spatial distribution characteristics. In terms of spatial distribution, minimum distance to public space was less for a higher percentage of parcels for the newer suburban neighborhood than for the older, traditional neighborhood (South Park), and similar to the Wiles Hill neighborhood. In terms of transport environment, the three neighborhoods were not significantly different in the kind of street (arterial, collector or local) abutting single family parcels. The more traditional neighborhoods were clearly "superior" — when weighed against new urbanist criteria — in the other public space components such as street lengths and intersections, residential grain and sidewalks.

Much research remains to be done in the investigation of the role of the public realm in promoting resident interaction and sense of community. While urban designers discuss the need to develop a "visible public spatial framework" (Southworth and Owens, 1993:286), planning researchers should be actively involved in assessing that framework and, ultimately, determining its relation to building sense of community. This will not be accomplished easily, since it will entail coming to terms with the complex interaction between environment and behavior. It is hoped that the quantification of the public realm offered in this paper can be utilized as a first step in the investigation. With some understanding of how the public realm might be quantified, future research aimed at assessing the link between public space and sense of community might involve addressing the following types of research questions:

- To what degree is the public realm (i.e., the locational qualities of public space) conditioned by limitations on access (e.g., perceptions of public space quality and safety, issues of need, and social constraints)? How can these limitations be measured? To what degree do sociodemographic characteristics of residents determine or limit the ability of the public realm to build a sense of community? To what degree do access constraints or determinants undermine the effect of integrating public and private space?
- What specific locational characteristics of public spaces are most likely to lead to resident interaction and how does this interaction in turn promote sense of community? How can social interaction be measured within this context?
- How does the existence of non-spatially determined interaction (e.g., social networking) impede the ability of the public realm to promote sense of community?

Each of these questions will require the development of appropriate methodologies. The empirical application of such methods could result in a broadened, muti-dimensional understanding of the role of public space in urban social life, one which could be used to promote the retention and development of a more meaningful urban public realm. It is hoped that the measurement of the public realm offered in this paper will provide a useful first step in this broader analysis.

NOTES

1. Geographically based collective is used here, as opposed to a functionally based collective. For a more complete definition of "sense of community" which is in line with the what new urbanists are striving to promote, see Puddifoot, 1995, or Sarason, 1974.

2. See also the typology set forth in Audirac and Shermyen, 1994.

3. Increasing the density of multiple-family housing presents a different set of interaction patterns, not necessarily conducive to increasing resident interaction. The analysis, therefore is limited to dwellings which have their main entrance at ground level.

4. This is based on the class of locational models which seek to minimize inequality by choosing a location which reduces the longest journey of any consumer to a minimum (see Hodgart, 1978 for further discussion).

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