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Geographic Information Systems

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Geographic information systems (GIS) are computer-based programs designed for the storage, visualization, analysis, and display of data that contain spatial components (Chang, 2005). This chapter is devoted to discussing how GIS has been used to conceptualize neighborhoods and how it can be utilized to increase our understanding of neighborhoods' role in the ecological context of individuals, groups, and communities. I will be conceptualizing the current GIS mapping approaches on a number of dimensions, with the goal of guiding our approaches to neighborhood research, and then presenting several methodologies as exemplars of how these dimensions manifest in the extant literature.

INTRODUCTION TO GEOGRAPHIC INFORMATION SYSTEMS

The software for GIS allows for the visual layering of geographic detail (imagine one layer with city streets, another layer with locations of neighborhood watch programs, and a third layer with locations of crime) to assist in better understanding the relationships between spatial variables (Renger, Cimetta, Pettygrove, & Rogan, 2002). The data generally take one of three forms: points (e.g., the exact location of the crime), lines (e.g., the city streets), and polygons (e.g., the neighborhood watch area) (Chang, 2005). These categories contain some flexibility, however, because one could provide crime information in the form of a polygon (e.g., the number of crimes that occur in a specific area).

GIS also has numerous analytic tools to extract information concerning the spatial variables. Among the more basic of these are the capacity to analyze the distance and area of any geographic variable (e.g., the square mileage of neighborhood watch programs). More complex analytical operations involve *querying*—searching selected spatial variables for locations where specific criteria are met (e.g., selecting only neighborhood-watch programs where members have met in the past year and ignoring the other watch programs). By conducting queries for different spatial variables, areas of spatial correspondence can be located and analyzed (Chang, 2005).

The extant literature using GIS to study neighborhoods reveals two general approaches for neighborhood variables. The first approach focuses on using GIS to generate quantitative variables that are then incorporated into other analytical approaches, such as multiple regression or hierarchical linear modeling. The geographic variable in question is gleaned from the broader geographic data through queries and imported into a statistical software program where they are then analyzed. Demographic, consumer, health, or crime statistics within a geographic area are examples of variables that are often studied in this way, and GIS-calculated variables may be incorporated in the same fashion (e.g., commute distance, neighborhood geographic area). In this regard, GIS is often used for the production of quantitative variables.

The second approach is more qualitative, and it is some of these methodological approaches that will be summarized next. In the context of neighborhoods, these approaches seek to discern the nature of residents' understanding of and experience with their neighborhoods. Generally, they attempt to understand the meanings of neighborhoods for their inhabitants and how those residents generate that meaning through their interactions. This would include neighborhood boundaries, with the focus on their contexts and the social and

spatial qualities that produce the social dynamics of neighboring and the significance of the spaces and relationships contained therein.

WHAT IS A NEIGHBORHOOD?

There has been concern for some time as to how to conceptualize neighborhoods accurately. Sweetser (1942) called attention to how neighborhoods provide a research challenge because they tend to be compositionally unique and spatially discontinuous. Since then, attempts at understanding the nature of that compositional uniqueness comprising neighborhoods has increased significantly, with the amount of research growing, presumably in part due to the accessibility of research tools such as GIS (Lohmann & Schoelkopf, 2009). At its most fundamental, the dimensions of neighborhoods can be broken down into the following factors: physical design (e.g., type of housing and architecture, streets and parks, geographic identity); social composition (e.g., psychological sense of community, familiarity, relationships and social support, identity); experiential (e.g., neighboring behaviors, shopping, playing); and symbolic, defined primarily based on the institutional connections or the shared meaning of the neighborhood (e.g., a neighborhood identification or history) (Aitken, Stultz, Prosser, & Chandler, 1993; Chaskin, 1997; Galster, 2001; Haeberle, 1988; Hunter, 1974).

In defining neighborhoods, the social and the spatial interact. Such geographic features as walls, railroad tracks, and main roads (Grannis, 1998; Lee, Tagg, & Abbot, 1975; Lynch, 1960) may act as barriers between neighborhoods, separating them not only spatially but also socially. Yet no definitive answer exists as to how these qualities contribute to an optimal operational definition of neighborhood. The reason for this is that local contexts—how the residents define their neighborhoods—may play the most crucial role (Cummins, Macintyre, Davidson, & Ellaway, 2005; Entwisle, 2007).

By way of example, in my own research (Lohmann & McMurran, 2009), the residents in two areas of a city were compared. One area that displayed the greatest consistency in defining itself as a neighborhood is a retirement community for former religious ministry members. The qualities of architecture, walkable streets, open spaces, geographic identity (i.e., clear demarcations of being in the neighborhood), and social components in that neighborhood are easily recognizable. On the other side of town, a residential area with no notable demographic differences from the first (other than age) possesses the same housing homogeneity, walkable streets, open spaces, and geographic identity and yet is clearly not a neighborhood (as described by the residents). Given that both areas comprise residents who chose to live there, and both have administrative entities (i.e., the retirement community administration and homeowners' association), it is notable that several in the second community referred to their administrative entity as "Big Brother." These two areas—in adjacent census block groups—appear to value differently the dimensions of neighborhood.

Ultimately, neighborhoods are at their core social-spatial entities (Cutchin, Eschbach, Mair, Ju, & Goodwin, 2011), a complex mix of geography and relationships that appears to vary with the demographic and psychological aspects of the residents and the built space. Changes in the built or the social environment may lead to changes in how residents define their neighborhoods (e.g., Lohmann & McMurran, 2009). Also, although obvious alterations in the built environment or demographics are easily identified, other changes—such as changes in social expectations, needs, or contexts as residents grow older—may be subtler.

NEIGHBORHOOD RESEARCH DIMENSIONS

It may be helpful to begin with a general framework in which to think about how neighborhoods are defined in community-based research. Given that neighborhoods are a blend of both social and spatial aspects, different methodological approaches seem to place differing emphases on the social versus the spatial. At one end of the spectrum, greater weight has been assigned to the phenomenological experiences of residents to formulate neighborhood boundaries, whereas, on the other end, neighborhoods are defined using pre-established and often administratively grounded boundaries, frequently taking the form of census tracts or block groups (hereafter referred to as census units). Other administrative units include school districts, also referred to as educational catchment areas (ECAs). We can conceptualize these two approaches as end points on a spectrum of operationalization (see Fig. 10.1). Given that administrative operational definitions of neighborhoods are by far the most

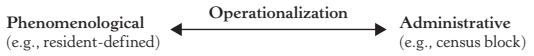

FIGURE 10.1: Spectrum of operationalization.

commonly used in research, this chapter focuses on the nonadministrative approach, highlighting the equally important but less often used phenomenological methodologies.

This tension between phenomenological versus administrative research approaches reveals the deeper dilemma that pervades neighborhood research, namely, the meaning of neighborhoods. To the degree that neighborhoods are social entities, the focus needs to be on the contextual settings as relevant to the residents—the symbols, neighborhood narratives, and interpersonal relationships that are considered crucial components in neighborhoods. In other words, most of the neighborhood-based research using GIS has been top-down and grounded in rational positivism (Aitken & Michel, 1995; Gauvin et al., 2007; Talen, 1999). These are the *etic* approaches, wherein definitions of neighborhood are established by researchers or entities outside the community. Less common are the *emic* approaches to defining neighborhoods, wherein the neighborhood boundaries are determined in a bottom-up approach, with the boundaries of the neighborhoods grounded in what they mean to the residents. This second approach could not only elucidate neighborhood dynamics that may not be captured using an etic approach but may also contribute to greater neighborhood interaction, depending on the means of data collection (see Parker, 2006; Sieber, 2006; Talen, 1999, for examples). Therefore, we may also consider the extant literature upon a second spectrum (see Fig. 10.2).

There are pragmatic methodological issues that need to be accounted for when engaging in neighborhood-based research. For example, should one opt to take a more phenomenological approach, he or she should be aware of the methodological challenges of disparate and potentially overlapping areal boundaries in the data. However, it is also quite possible that individuals living adjacent to

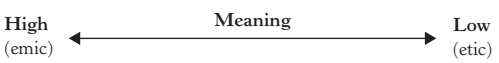

FIGURE 10.2: Spectrum of meaning.

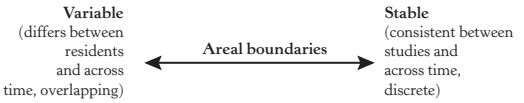

FIGURE 10.3: Spectrum of boundaries.

each other would not identify themselves as living in the same neighborhood. This is not to say that stable, discrete boundaries (e.g., census units) are adequate surrogates for neighborhoods, but rather that overlapping neighborhoods create unique analytic challenges (see Fig. 10.3). For example, if one considers the impact of the spatial area on a resident living on the edge of a census unit as compared to one living in the center of it, it may be that the adjacent census unit, discretely defined but methodologically ignored, has more impact on the resident on the perimeter than on the one in the center (Hipp & Boessen, 2013).

The context in which residents are asked about their neighborhoods also manifests here: How people define their neighborhood in the context of their social networks of neighbors may indeed differ from their spatial definition when considering municipal public policy, which may differ when considering shopping and other commercial activities. This variability may also impact the capacity to study neighborhoods longitudinally because the spatial dimensions of the neighborhood would change given changes in the population; the sample or residents selected; and perceptions, relationships, and geographic environments of the long-term residents in these neighborhoods. In other words, even if one were to perform longitudinal research, tracking individuals over the years who lived at the same address, their neighborhood boundaries may indeed change, which may complicate analyzing data and providing reliable conclusions about the neighborhood. The benefit of defining neighborhoods from an administrative approach is that they are consistent and stable over time.

Perhaps the most significant reason why administratively defined spatial entities are so frequently used to define neighborhoods is the availability of data. The wealth of demographic data grounded in census units, ECAs, and others makes it a very attractive source for researchers and, given the expense and labor involved in conducting research, it is understandable that researchers would be attracted to the available demographic data to generate their research strategies. In contrast, when

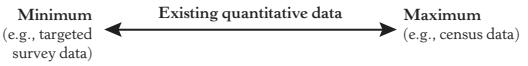

FIGURE 10.4: Spectrum of existing data.

researching from a contextual, phenomenological approach, the challenge is to find a functional means of defining neighborhood, incorporating meaningful resident perspectives, and collecting the data for analysis (see Fig. 10.4).

Why Not Just Use Administrative Neighborhood Definitions?

Although there are several benefits to using administrative units in neighborhood research, such usage is also problematic. A major concern is one of construct validity, that is, the degree to which an operational definition measures the concept it was intended to measure (Cook & Campbell, 1976). If you consider your current neighborhood, do you define it as the census unit in which you live, or rather is it a complex interaction of geographic space and social relationships that shapes its boundaries? The challenge facing the researcher involves making claims about neighborhood effects, as opposed to geographic effects. This tension between neighborhood and geography has been addressed repeatedly, with many suggesting (Brooks-Gunn, Duncan, Klebanov, & Sealand, 1993; Burton, Price-Spratlen, & Spencer, 1997; Cummins et al., 2005; Darling & Steinberg, 1997; Duncan & Aber, 1997; Entwisle, 2007; Korbin & Coulton, 1997; Mayer & Jencks, 1989; Sampson, Morenoff, & Gannon-Rowley, 2002) and several in fact demonstrating (Coulton, Korbin, Chan, & Su, 2001; Grannis, 1998; Lee, 1973; Lohmann, 2007) that the areas residents consider to be their neighborhoods appear to be both qualitatively and quantitatively different from administratively defined neighborhoods. Ultimately, a space may be a neighborhood only if the residents define it as a neighborhood.

For example, in his analysis of metropolitan areas, Grannis (1998) examined the impact of tertiary (that is, residential) streets on resident interactions and behaviors. Whereas the larger urban context did impact notions of neighborhood, it was the street networks—those "who lived down the street" (Grannis, 1998, p. 1531)—that appeared to be one of the driving forces that explained the racial segregation manifest in the urban areas. There is every reason to believe that the impact of those "who lived down the street" would be significantly greater on defining neighborhoods than those "who lived on the other side of the census unit." Yet the presence and effects of tertiary roads are generally ignored.

Therefore, the question we are left with is this: Do the operational definitions that we use for neighborhoods in our research actually do the job of defining neighborhoods and describing neighborhood effects? When closely examining the relevant variables, there is reason to believe that there often exists a significant degree of systematic error manifesting itself in our results. Given that the literature makes numerous conclusions about neighborhood impacts on residents (e.g., children, pregnant mothers, couples, elderly, those with serious mental illnesses), if we are systematically committing error in operationally defining the primary independent variable (i.e., neighborhoods), then, logically, the conclusions also probably possess systematic error. Without a solid means to operationalize neighborhood, our capacity to present quality inferences based on our findings is weakened (Mueller, 2003).

Given the noted shortcomings of geographically based operational definitions of neighborhoods, a brief synopsis of four alternative, GIS-based approaches will now be presented. They have been selected not for the results that they have produced but rather as illustrations of resident-oriented context-based approaches toward conceptualizing neighborhoods.

GEOGRAPHIC INFORMATION SYSTEMS CONTEXT-BASED APPROACHES TO CONCEPTUALIZING NEIGHBORHOODS

Resident-Defined Neighborhood Mapping

When it comes to assessing neighborhoods phenomenologically, perhaps the most direct approach is to ask residents to draw their neighborhoods. This approach has taken two forms, either (a) having residents draw the neighborhoods freeform (Appleyard, 1981; Appleyard & Lintel, 1971; Lynch, 1977) or (b) providing residents with maps of the local area and having them outline what they consider to be their neighborhoods (Coulton et al., 2001; Lee, 1973, Lee et al., 1975; Lohmann &

McMurran, 2009; Smith, Gidlow, Davey, & Foster, 2010). This is a methodology that has been particularly productive in the study of children and their construal of their neighborhoods. This freeform approach has been used to tap into how children perceive the excitement or stultification of neighborhood environments, as well as its relative safety (Hart, 1979; Lynch, 1977; Moore, 1990).

The discrepancy between resident-defined neighborhood boundaries and census tracts manifests itself in two ways: shape and size. As has already been suggested by the areal boundaries dimension, although there are some shared borders between the two geographic areas (e.g., major thoroughfares), resident-defined neighborhoods show much more interindividual variance. First, because neighborhoods incorporate meaningful social relationships, these social connections may differ even between people who live adjacent to each other. Indeed, residents living next door to each other may provide differing neighborhood boundaries (Chaskin, 1997; Lee, 1973) and may report neighborhoods that do not overlap at all (Lohmann, 2007). Part of the reason for this is that residents do not necessarily place their home in the center of their neighborhoods. Although some resident-defined mapping research has found a trend to locate the home near the centroid of residents' neighborhood polygon (Hipp & Boessen, 2013), others have found no such trend. In the research that produced the findings in Lohmann and McMurran (2009), residents placed the location of their home on the perimeter of their neighborhood polygon as frequently as its centroid (although most respondents locate their home at some point between these two extremes). Second, although there appeared to be general agreement on some boundaries of neighborhoods (e.g., major roads, parks, storm water causeways), there appeared to be differing interpretations as to the geographic features that constituted neighborhood barriers: Significant numbers of neighborhood boundaries ignored geographic features that are commonly considered neighborhood boundaries.

Behavioral Approaches

Instead of assessing the neighborhood from a predominantly cognitive perspective, others have attempted to extrapolate neighborhood boundaries using a behavioral approach by asking residents to describe their behavior within their local community. This activity spaces approach focuses on the interaction of individuals with identifiable places in their vicinity on a regular basis, that is, the locations where they shop, visit, and hang out and that are important to them (Gesler & Albert, 2000). The theoretical premise is that those areas frequented more often and for longer periods are more familiar to the individual and therefore more likely to be incorporated into his or her notion of neighborhood.

Residents are asked to either draw freehand maps or mark on a preprinted road map the places they frequent. These locations are geocoded, and from these points activity spaces are generated, often by creating an ellipse around the points of activity using a standard deviational ellipse method. This analytical tool available in a GIS calculates an areal shape that will include a specified proportion of the activity places (e.g., one standard deviation would include 68% of the points; two standard deviations, 96% of the points). Generally, it is recommended that one standard deviation be used (Sherman, Spencer, Preisser, Gesler, & Arcury, 2005). In this way, residents' range of repeated behaviors can be determined. Some findings suggest that larger spaces are positively associated with greater life satisfaction but negatively associated with a sense of community (Townley, Kloos, & Wright, 2009). It should be noted that activity space size is highly dependent upon the geographic dynamics of an area: Communities with meaningful spaces proximal to each other will naturally produce smaller activity spaces. Hence, there will likely exist different-sized spaces for urban, suburban, and rural residents.

The strength of this approach is its focus on behavior and on the conceptualization of neighborhood within the physical interactions one has with one's local surroundings. However, one weakness is that it does not provide clearly defined demarcations for neighborhoods. Additionally, its behavioral focus does not directly incorporate notions of social connectedness, instead focusing on interaction with spaces.

An approach that synthesizes social ties with behavior in generating neighborhood maps incorporates network analysis with GIS. By geocoding the social ties of adolescents, accounting for both location and frequency of contact with friends, Hipp, Faris, and Boessen (2012) identified network neighborhoods that showed greater agreement between adolescents and their parents regarding

perceptions of crime, physical and social disorder, and collective efficacy compared to the use of census tracts. Interestingly, the research also suggested the potential for individuals to belong to a second, noncontiguous neighborhood.

All these approaches share the same conceptual foundation as qualitative neighborhood-based research using participatory photo mapping (PPM; Dennis, Gaulocher, Carpiano, & Brown, 2009). Similar to photovoice and photo-narratives, PPM has participants photograph those spaces that have meaning to them (in this case, the neighborhood context), either positive (places they like, engage with, or consider an asset) or negative (places they dislike, avoid, or deem a liability). However, residents could also be directed to photograph what they consider to be the boundaries of their neighborhood and to provide narratives to explain why they selected those locations. Those photographed locations could then be incorporated into a GIS to establish the boundaries of neighborhoods and the underlying rationale from the residents' perspectives.

For activity spaces, much of the research is still quantitative in nature—examining the distances that children can travel (e.g., Veitch, Salmon, & Ball, 2008) or the size of the activity space area. However, there is considerable potential for more qualitative analyses, such as examining the degree to which the activity space facilitates movement through social contexts and the subsequent impact on the development and maintenance of social relationships. Additionally, mapping activity and social ties could be incorporated into notions of *home range*, that is, the area around the home where the child engages in unsupervised activities, shaped by the child's age and disposition, neighborhood qualities, and parental permission (Gaster, 1995).

Experience Sampling Method

One approach toward defining neighborhood that has promise in providing geographic insight into neighborhood boundaries builds on the textually rich experience sampling method (ESM; Hektner, Schmidt, & Csikszentmihalyi, 2007). This approach often uses portable technologies that participants carry with them, prompts them to provide information regarding their thoughts, behaviors, and emotions at random times throughout the day (e.g., "As you were beeped, where were you?" "What else were you doing?" "Who were you with?") (Hektner et al., 2007). The data provide a daily ecological record of behaviors and feelings, and the rhythm of one's day can then be analyzed.

The ESM has been used to examine neighborhood effects. In seeking to understand the role of structured and unstructured activities outside of school hours for African American youth growing up in neighborhoods with differing crime rates, Bohnert, Richards, Kohl, and Randall (2009) collected behavioral and affective information from middle-school students seven times per day at random intervals. They examined whether unstructured activities led to higher rates of delinquency or depressive states. However, in that research, neighborhoods were operationally defined using ECAs and not neighborhoods as defined by the youth themselves. Incorporating a more phenomenological approach potentially leading to a better understanding of neighborhood boundaries and dynamics could certainly be done with very little additional effort. The questionnaire could ask whether participants felt they were in their neighborhood, as well as their assessment of crime rates in their neighborhood. If smartphones were used, the geographic position of the respondent could automatically be collected and imported into GIS. Although this approach would not provide a definitive geographic boundary for the neighborhoods, it certainly could provide both qualitative and quantitative richness to explain the experience of neighborhood. It would combine many elements of the behavioral approach with numerous emotional and cognitive perspectives of the residents.

Grid Methods

Grid approaches seek to merge phenomenological and administrative perspectives. These techniques generally begin with aerial photographs of the geographic area of interest and then break the area down into smaller units based on any number of (usually geographic) characteristics. Sometimes these units are identical squares, as if overlaying a sheet of graph paper over the map. One example of this approach examined residents' familiarity with the area around their home (Aitken et al., 1993). Overlaying a grid on aerial photographs of a community, residents reported their familiarity with each specific block-grid and how often they had been in that block-grid in the past week (other than driving). GIS then allows for residents' phenomenological neighborhood experiences on

a block-by-block basis. The greater the reported familiarity with each cell presumably corresponded with areas that residents considered to be part of the neighborhood.

A variation of this approach—the socio-spatial neighborhood estimation method (SNEM)—involves a sequential strategy of taking an aerial photograph; creating a general grid, using compact geographic blocks that take into account street patterns, housing types and density, and parks and other natural and built barriers; and then engaging in field observations to confirm the validity of the boundaries established in the previous step (Cutchin et al., 2011). In follow-up surveys of the residents in each of these SNEM-generated neighborhoods, it was found that residents within each had greater agreement with each other with respect to sense of community, neighborhood satisfaction, and perceived crime (but not social embeddedness) compared to either census tracts or block groups.

Compared to the other methodologies considered in this section, such grid methods move the approach of neighborhood conceptualizing closer to the administrative side by establishing stable, discrete boundaries that incorporate more of an etic, top-down approach toward defining neighborhood. However, they still attempt to recognize the importance of resident perceptions in defining neighborhood. The issue of discrete boundaries, though, remerges with this approach. One variation that uses grids while avoiding discrete neighborhood units uses circular buffers of a fixed distance (1/4- to 3/4-mile radius) around each city block's center point. This creates patterns of overlapping neighborhoods, or *egohoods*, that manifest like "waves" throughout a geographic area, with each neighborhood/block impacting adjacent ones, with decreasing influence as distance increases (Hipp & Boessen, 2013). In their study, egohoods were better than either census block groups or tracts in predicting crime (Hipp & Boessen, 2013).

CASE STUDY

In our effort to examine the impact of a newly built freeway on sense of community (SOC) and neighborhood size in Claremont, California, we (Lohmann, 2007; Lohmann & McMurran, 2009) conducted a 6-year longitudinal study wherein we asked respondents to outline their neighborhoods on a map provided to them and to define their SOC within their neighborhood. The neighborhood outlines were entered in a GIS as polygons (essentially outlines), transformed into shapefiles (converting the outlines into solid shapes), and the individual resident SOC assessments were then assigned to the respective neighborhood shapes. The shapefiles of all the respondents were then aggregated and SOC scores averaged for every point on the city map. The resulting map displayed geographic hot and cold spots in the overall city for SOC.

There was significant contraction in the size of neighborhoods that abutted the newly built freeway such that they shrank 41%. They also exhibited a statistically significant drop in SOC that was visually recognizable using the maps. The maps allowed for the qualitative identification of areas of agreement on neighborhood boundaries and changes in patterns across space and time. In our analysis, the merging of resident-reported neighborhood areas with the corresponding SOC produced a map that was examined similarly to how one would view a medical magnetic resonance imaging (MRI) scan of the brain. Given the variability of neighborhood sizes, we found that the neighborhoods needed to be stratified based on size (smallest 25%, smallest 50%, smallest 75%, and then all neighborhoods); otherwise, smaller-sized neighborhoods could not be effectively analyzed. The maps were then analyzed, seeking changes or patterns of resident agreement or disagreement in neighborhood boundaries, both across and between geographic layers and over time (see Lohmann & McMurran, 2009, for a more detailed description).

The results highlight some of the strengths of this resident-defined approach to studying neighborhoods. First, the neighborhoods themselves may serve as meaningful variables beyond the quantitative data they provide. Some of the neighborhoods were quite contextually rich in and of themselves. Respondents on occasion reported neighborhoods with multiple polygons (e.g., one small circle around the home and a larger one around the local colleges), and yet others had unusually shaped polygons (e.g., a circular area around the home, a narrow corridor encasing the main road through the city, and a quite large circular area around a sizable nature preserve located to the north of the city). These unusual polygons suggested valuable data concerning the respondents' life, interests, and behaviors. Some neighborhoods

were drawn with great precision, with evident care in including and excluding various parts of the surrounding area, and others were more haphazard, perhaps indicating a perception of neighborhood not specifically confined to a clear area with clearly conceptualized borders, but rather one more emotionally based and more generalized within a larger geographic context. Of course, more investigation of this approach toward neighborhood definitions needs to be conducted.

Lastly, and most interestingly, it appears that this methodology observed the "emergence" of a neighborhood. An area where in 1998 (the first data collection point) residents had little geographic agreement and low SOC, by 2004 had some of the highest SOC in the city, as well as more agreement by residents as to their neighborhood boundaries. It appeared that the cause of this change over the six years of the study's duration was the city's proposal to build an affordable housing complex in the vicinity of their neighborhood. This galvanized the residents to lobby against the housing plan and included a rather intense grassroots lobbying effort, including the development of a Web site. What is important to note is that when the same data were analyzed using census block groups instead of resident-defined neighborhoods, the resulting map showed no evidence of this neighborhood coming together across the same time period (Lohmann, 2007).

CONCLUSION

Given the dimensions discussed at the start of the chapter, a dilemma in neighborhood research becomes clearer. The greater the focus on defining neighborhoods in stable, concrete geographic terms, the more the social and relationship component of neighborhoods is sacrificed in the operationalization. Conversely, the more emphasis placed on experiential meaningfulness in defining neighborhoods, the more difficulty is created in analyzing and reporting the results in definitive ways, especially longitudinally. In the end, the dilemma focuses on the balance one strikes between these competing approaches.

It makes sense that researchers try to have as much congruence as possible in the operationalizing of neighborhood and the focus of their research question. Research examining the neighborhood impacts on academic achievement should define neighborhood using educational catchment areas. Studies interested in the impact of social relationships and neighborliness should rely on resident-defined neighborhood. Research questions oriented around behavioral integration among neighbors and local community-based action should consider conceptualizing activity spaces as neighborhoods.

It is evident that the most commonly used methods for conceptualizing neighborhoods, namely census units, produce spatial areas that are lacking in cognitive, emotional, and behavioral meaning to the residents who reside in them. The data also suggest that they appear to be too spatially large. The alternative, phenomenological approaches to conceptualizing neighborhoods have some traits in common. First, the distribution of neighborhood sizes, although exhibiting great variability, tends to be notably clustered, with the number of smaller neighborhoods far outnumbering the larger. For the resident-defined neighborhoods described earlier (Coulton et al., 2001; Lee, 1973; Lohmann & McMurran, 2009), the square mileage ranged from less than .01 to more than 25, with the majority of neighborhoods ranging from .15 to .35, and comparable census entity sizes ranging from 55% to 400% larger. Hipp and Boessen's (2013) egohoods were most predictive at roughly .44 square miles. In other words, the more emic methodologies produce neighborhoods significantly smaller than the census units that are often used in their stead. Therefore, if meaningful neighborhoods are smaller, and the geographic areas being studied are larger, the results manifesting in the smaller neighborhoods could likely be analytically "washed out" across the greater geographic space that is treated as the operational definition of neighborhood, thereby making it more likely that notable effects would not appear in the analyses when in fact they do exist (Hipp, 2007).

It is doubtful that there exists a "Holy Grail" of neighborhood conceptualization (Galster, 2001)—an operational definition for a concept that everyone knows exists and can identify but that behaves on the empirical level. Even if the residential population and the physical environment were unchanging (and they are not), and even if the impact of context was consistent (and it is not), the inherent variance in human relationships that generate the schema of what comprises a neighborhood is far too complex to account for all the permutations.

Hence, researchers are left with developing tools to understand neighborhoods contextually.

Each neighborhood methodology, even the ones grounded in administrative definitions, provides valuable insight into the question of how the social-spatial environment impacts people's lives. Ultimately, for neighborhoods to be studied effectively, there needs to be more methods blending the context-based methodological approaches with the wealth of data that exists in the more administrative spatial units. The lure of big data is not going away, nor is the growing evidence of the validity of the smaller, more phenomenological neighborhoods, as suggested by the converging evidence from multiple methods.

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