Representations of an Urban Ethnic Neighbourhood: Residents' Cognitive Boundaries of Koreatown, Los Angeles

CRYSTAL JI-HYE BAE and DANIEL R. MONTELLO

The neighbourhood has long been studied in fields such as geography, sociology, political science, and urban planning as a meaningful unit of analysis, with deep connections for residents, but an ever-shifting form. This study expands on foundational research about geographic regions (particularly informal or cognitive regions), sense of place, and environmental cognition, taking as its focal area the neighbourhood of Koreatown in Los Angeles (LA). We conducted in-person surveys, including a drawing task, to assess residents' cognitive boundaries of Koreatown. Using two approaches, we evaluate ways in which respondents' cognitive boundaries of Koreatown align with and differ from otherwise established definitions of Koreatown. Survey data are supplemented with socio-demographic data from the Census and field observations to contextualize these findings by looking at residential ethnic composition in the neighbourhood and in the greater LA region. This research contributes to our understanding of urban neighbourhoods by extensively analysing a unique ethnic enclave in one of the United States' largest metropolises from the perspective of local residents. By surveying residents about their concepts of this neighbourhood region, we elucidate how ideas about neighbourhood fit into theories about sense of place. This work also demonstrates the value of surveying residents about vague concepts of local regions and explores ways to measure and express these ideas.

The dense physical and social landscapes of cities form a rich platform for understanding how people influence and are influenced by their built environment. This research addresses the measurement of urban residents' cognitive boundaries at the neighbourhood scale. How residents define the boundaries of a neighbourhood may reflect their connection to the community and their interaction within it, and these boundaries may in turn affect residents' identification with and behaviour within the neighbourhood.

As our cognition of the world shapes our behaviour in it, our beliefs about our environment influence the way we attach personal meaning to place. As we act in the world, we carve out our own place in it, adopting certain regions as our own while feeling disconnected from others. Administrative boundaries (borders) attempt to delineate where one region ends and another begins, for purposes of administration and various forms of 'official' control. Yet these lines are drawn artificially sharply when contrasted with how people typically understand informal cognitive regions, where concepts such as 'downtown' are fuzzy or vague (Montello *et al.*, 2003). Furthermore, disputes arise over the name and limits of one's neighbourhood, as with Koreatown's boundaries in Los Angeles (LA). Although there is ongoing research on cognitive mapping in the

fields of spatial cognition and behavioural geography, examining features in specific, real-world environments and their role in the formation of cognitive boundaries further illuminates the role of mental representations in lived experience and place identity.

This study contributes by exploring the connection between residents' concepts of neighbourhoods and official neighbourhood designations, elucidating how ideas about neighbourhood fit into theories about sense of place and gauging how well formal designations fit with residents' informal concepts. It also demonstrates the usefulness of surveying residents about vague concepts of local regions and explores ways in which to measure and express these ideas. Regionalization has an important role in geographic thought, as this cognitive process of spatial categorization organizes our knowledge about the world around us (Montello, 2003). Categorization is universally characteristic of human thought and activity, allowing us to minimize cognitive effort in applying structure to the perceived world (principles outlined in Rosch's categorization theory, 1978).

Like categorization generally, regionalization has important utility for people, simplifying complex spatial patterns and internal variations into a series of general rules rather than attempting to represent precisely all available information. In Montello's (2003) taxonomy of geographic regions, *administrative regions* have boundaries that are sharply-defined or at least can be made precise if needed; all places contained within an administrative region are completely and equally members of the region (uniform membership). In contrast, *thematic, functional*, and *cognitive (perceptual) regions* have vague boundaries and non-uniform membership functions. The challenge of defining the boundaries of these region types is that their boundaries are often intrinsically and fundamentally vague, not vague simply because of measurement error, changes over time, or disagreements among interested parties. For instance, individuals may con-sider some internal sub-areas within a cognitive region more representative of that region than other sub-areas, even when all are considered parts of the region. This relates to Wittgenstein's family resemblance, which has been applied to cognitive concepts of cities by Portugali (2000). It can certainly also apply to regions within cities, wherein there are certain exemplar areas which better represent the region than others. This supports the idea of variation within the boundary of a neighbourhood in terms of representative-ness, as well as vagueness in its boundaries. Unlike administrative regions, people's beliefs about the location of cognitive boundaries cannot generally be considered right or wrong, only more or less widely held by others. We focus in this study on the boundaries of Koreatown as an informal cognitive region, as understood by local residents.

Our research aims to determine where residents in and near Koreatown, LA locate the boundaries of that neighbourhood. We compare these boundaries with both the official boundaries designated by the LA City Council (LACC) and a popular, crowd-sourced definition introduced by *The Los Angeles Times* (MappingLA) to see in which ways they align or differ. To compare different region boundaries systematically, we use a novel method of summarizing polygons as well as an existing method based on raster overlay, examining the relative merits of each method. Next, we closely examine the physical and social factors that appear to provide a basis for residents' understandings of the boundaries. The Koreatown neighbourhood of LA lends itself well to exploring how ethnic enclaves – where residents of a shared ethnic background are more clustered – play into individual and social understandings of a place.

Neighbourhood-Level Sense of Place

The concept of *place* includes more than just location, spatial properties, and material setting. It also includes intangible, subjective

properties such as meaning and emotion. How place is subjectively experienced by people is referred to as 'sense of place'. Sense of place has been identified by geographers and other social scientists and humanities scholars as describing the experiential connection between people and their surrounding environment; it has been qualitatively and quantitatively assessed by many (Tuan, 1974; Jorgensen and Stedman, 2001; Cresswell, 2004). Like neighbourhood, place is a type of cognitive region. It exists at different levels of understanding; hence, sense of place is not only personally held but also varies by geographic scale, as shown by Shamai (1991) in comparing residents' sense of place at the city, provincial, and national levels (see also Cresswell, 2004).

At the city scale, Lynch (1960) explored the physical elements in the environment that shape residents' cognition of the city. Though Lynch focused on the collective image of the city, he recognized that a collective image was constructed of many individual experiences of the city. Lynch's typology of urban elements relevant to imageability provides us with a basis for identifying features to include in our field assessment of the Koreatown environment. *Place identity*, in particular, deals with the parts of self-identity that relate to the physical environment (Proshansky *et al*., 1983). Orleans (1973) built upon Lynch's work in his study of differences between cognitive maps of the city among LA residents of different social groups. He found that these mental representations differed not only by physical location, but as a function of group characteristics like ethnicity and socioeconomic class. This led us to consider ethnicity in trying to understand variation in both cognition and behaviour at the group and individual levels. Our aim in this study is to expand our understanding of those aspects of the local environment that contribute to residents' sense of place at the neighbourhood scale, as well as looking at how ethnicity may play a role in the special case of the ethnic enclave.

In the urban context, 'neighbourhood' is an important concept that is nearly universally held, but has taken on different meanings. These range from a vernacular understanding of the collection of people constituting a local community, to formal mathematical definitions based on spatial range, distance, or topology. Residential urban neighbourhoods are understood to comprise not only a spatial region but also its residents and the social properties that tie them together (Bell and Boat, 1957). Broadly, neighbourhoods serve important functions for residents, promoting social life, providing public surveillance, and forging links to outside resources, as well as facilitating resource exchange within them (Schoenberg and Rosenbaum, 1980, p. 33). Urban residents identify strongly with their neighbourhoods, an aspect of local identity that shapes their interactions with the city and its people (Ahlbrandt, 1984). Furthermore, neighbourhoods are dynamic, emerging from a variety of historical, political, economic, and cultural processes. We acknowledge the difference between a personal 'home' neighbourhood and a broader 'shared' neighbourhood understood by many. For the purposes of this study, respondents were asked to comment on the borders of Koreatown, which may or may not correspond to their idea of their own 'home' neighbourhood.

As a social structural system, the neighbourhood provides economic, emotional, and communication links to broader outside systems. Neighbourhoods are established and rep-resented through the efforts of organizations such as neighbourhood councils, to varying levels of success. Chaskin (1997) reviews definitions of neighbourhood proposed by these groups and finds a wide range of ways in which neighbourhoods have been defined, building off of school catchment areas, other existing administrative units, residents' cognitive maps, and neighbourhood characteristics. Giving neighbourhoods official names and boundaries to mark their status can bring about more

outside recognition, better planning and development, and increased investment in the local economy; it can also encourage residents to engage in more civic participation (Chaskin, 1998; Jun, 2007). The shared urban neighbourhood, and in particular the residential ethnic enclave, is the focus of this study.

Ethnic Enclaves and Segregation in Urban Neighbourhoods

Ethnic enclaves provide prominent examples of the social and organizational functions of neighbourhoods for their residents, like those cited above. Traditionally, the ethnic enclave has been identified by the clustering of residents sharing a common ancestry and culture (Chaskin, 1997). Early theories of urban assimilation describe immigrant enclaves as stepping-stones for new immigrants to the US who become familiar with the English language and with American culture before eventually transitioning out of the enclave; alternatively, they are characterized as an isolating trap from which immigrants do not have the financial means to leave. Such urban residential enclaves are not considered permanent places of settlement. Zhou (2009) argues, however, that the enclaves of today's cities do not easily fit the model of functioning either as a springboard or a trap for immigrants; instead, Zhou approaches the issue from the perspective of forming resources and social capital within these neighbourhoods.

Though residential segregation in cities is often based on ethnicity and/or social class, there are many causes as well as many impacts of residential segregation (Massey, 2001). Segregation itself can be considered both a process and a state since it is a process of formation and a state of experience for residents. Though outright housing discrimination is illegal in the United States, residential segregation still exists due to the lasting effects of historical practices that impact equal access to housing today,

informal discrimination practices such as racial steering towards or away from certain neighbourhoods, and also in part to voluntary self-segregating residential decisions. Theories about causes of segregation discuss direct and indirect racial discrimination, economic inequality due to minority groups earning less income, and ethnic group preferences toward living within close proximity of those in one's own group (Kaplan and Holloway, 1998, pp. 69–94). Schelling demonstrated in his agent-based model of housing choices that even a slight preference towards living with others of a similar group identification can result in strong spatial segregation, with 'self-forming neighbourhoods' resulting from an emergent, self-organizing process (Schelling, 1978, pp. 147–155). This has also been demonstrated in further simulations to result independently of intent in decision-making (Portugali, 2000). Residential segregation results from as well as contributes to greater identification with the ethnic group, and an increased maintenance of the boundary between group members and others.

In this research, we use a working definition of the ethnic enclave as a region of the city within which there exists a concentration of residents who either identify as sharing a common ethnic background or are largely identified by others as constituting the same ethnic group. Ethnic enclaves can be differentiated from their surroundings on both a functional economic level and on an aesthetic level. Functionally, they can provide social benefits, such as a stronger shared place identification (Oberle, 2006), as well as economic benefits, through the 'enclave economy' (Zhou and Cho, 2010), to their inhabitants. Aesthetically, physical features of the built environment are predicted to influence residents' construction of their boundary ideas, and – in the case of Koreatown – drawn boundaries may relate more to the visual presence of Korean businesses and landmarks than to the actual spatial distribution of Korean residents in the area.

Koreatown, Los Angeles

The Koreatown neighbourhood of Los Angeles, California holds the distinction of being one of the most dense and diverse areas of the city, a multi-ethnic area with large concentrations of Korean, Mexican, Salvadoran, and other residents (Zhou and Cho, 2010). The Koreatown study area, only 5 square miles (13 km²), contains over a fifth (21.8 per cent) of the entire Korean population in LA County, meaning it is an important residential concentration of Korean residents in the region. Though only about 20 per cent of the residents within the study area list their ethnicity as Korean, according to the American Community Survey (ACS) 2013 estimate (U.S. Census Bureau, 2013*a*), this is a significantly higher than the proportion of Koreans in the entire LA urban area (2.3 per cent).

Thus, although Koreatown has an important concentration of Korean residents, it is home to many more non-Koreans. Kim (2011) reported that more than half of all residents in the Koreatown neighbourhood are Hispanic, confirmed by the ACS 2013 5-year estimates to be 52.9 per cent in the study area, of which the most represented groups were Mexican, Salvadoran, and Guatemalan residents (U.S. Census Bureau, 2013*b*). The proportion of Hispanic residents in the study area is in fact higher than the proportion of Hispanic residents in the entire LA area (48.7 per cent). Overall, Koreatown is ethnically more Korean but also a little more Hispanic than the rest of the LA area.

The commonly referenced and popularly understood name *Koreatown* identifies the neighbourhood as an ethnic enclave. This name is marked by street signage such as the Koreatown sign at the Normandie Avenue exit on the Santa Monica Freeway, first erected in 1982, and the two traditional Korean-style gates on Olympic Boulevard at Vermont Avenue and at Western Avenue (Kim, 2011). The City of Los Angeles (2015) has additionally posted blue neighbourhood street signs intended to mark the boundaries of its neighbourhoods (see figure 1). However, there is inconsistency between the location of these street signs, the highway signs, neighbourhood landmarks such as the stylized Korean gates, and popular understanding of the Koreatown neighbourhood.

Streets in the Koreatown area are laid out in a grid pattern oriented relative to the cardinal directions, generally running north–


Figure 1. Photograph by the first author of blue 'Koreatown' neighbourhood signposted at Normandie Avenue and Wilshire Boulevard.

south and east–west with small internal divergences from the grid. However, the street pattern of Koreatown is not orthogonal to the street pattern of the historic core of downtown LA to the east, which diverges by an approximately 30-degree clockwise rotation. This contrast between two street grid orientations (see figure 2) may serve as a notable boundary in the mind of Koreatown's residents. The architecture and general appearance of most buildings in Koreatown does not significantly differ from that of the surrounding area, although there has been at least one serious attempt in the past to 'Koreanize' the visual appearance of the neighbourhood by replicating traditional Korean architectural design (Quinones, 2001; Hawthorne, 2014).

Los Angeles has historically served as a significant port of entry for Koreans to the United States of America. The Immigration and Nationality Act of 1965 substantially increased the flow of Korean immigrants to the United States, with families largely settling in LA (Kim, 2011). This most recent movement, from the mid-1960s on, is referred to as the 'Third Wave' of Korean immigration

to the US, following the earlier waves of migration in 1885–1924 and 1950–1965. According to Yu (1985), 'Koreatown' LA, as understood in today's context, was referred to at least as early as the 1970s. Following discussion by community leaders and city officials, Koreatown was given formal boundaries by the LA City Council in August 2010 (Villacorte, 2010), although signage proclaiming the existence of 'Koreatown' had been posted by the city of LA prior to that. Zhou and Cho (2010, p. 91) state that in LA, 'Koreatown owes its name to the dominance of Korean-owned businesses and ethnic social structures, not the number of Koreans living there'. In our study, we address the question of whether this is echoed in the thoughts of its residents.

We defined an appropriate extent for our study area by overlaying and then buffering two regions: one captured by the crowd-sourced estimate of Koreatown boundaries published by *The Los Angeles Times* 'Mapping LA' project (MappingLA) and the other marked by the boundaries of Koreatown as designated by the LA City Council (LACC). Our sampling region encompasses a quarter-
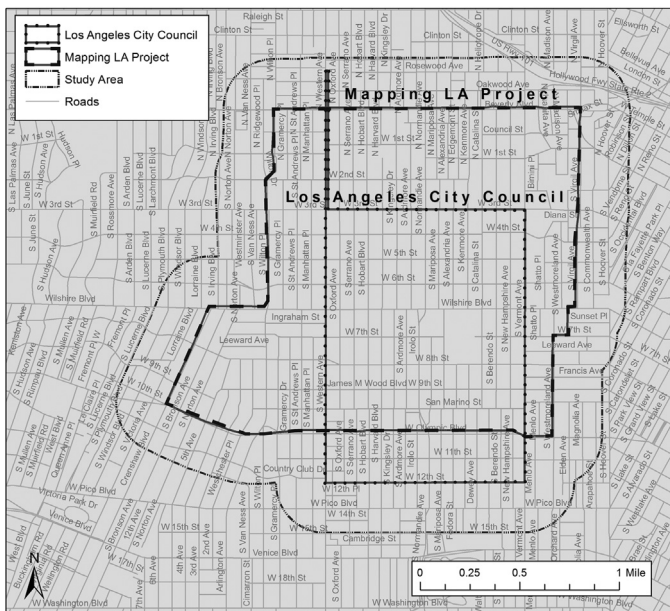
Figure 2. Map of study area overlaid on two sets of Koreatown boundaries, as published in *The Los Angeles Times* Mapping L.A. project ('Mapping L.A.: Koreatown', 2009) and as defined by the LA City Council. The study area is approximately 5 square miles (13 km²).

mile (400 m) buffer around the overlaid areas to include more residents who may consider themselves living outside or on the edge of the neighbourhood, thereby allowing for contrast with those who consider themselves as residing within Koreatown. Figure 2 shows a map of the resulting study area, approximately 5 square miles (13 km²) in area.

The MappingLA boundaries of Koreatown, drawing on locals' popular knowledge of LA, include a greater spatial extent than the boundaries defined by the LACC. Because the MappingLA definition includes the collective contributions of residents from across the greater LA region, it may include residents who live further afield yet still identify with the Koreatown neighbourhood. The MappingLA definitions of neighbourhood areas were determined by the Data Desk team at *The Los Angeles Times*, who created a first proposal of neighbourhood boundaries in LA by merging together Census tracts based on pre-defined principles; they then revised the neighbourhoods based on input from LA residents and other readers of *The Los Angeles Times* (2010). As of the June 2010 revision, the MappingLA project totalled 272 neighbourhoods in Los Angeles County.

The LACC approved a designation of the Koreatown community's boundaries in 2010 as: 'Olympic Boulevard from Western Avenue to Vermont Avenue on the south, Vermont Avenue from Olympic Boulevard to Third Street on the east, Third Street from Vermont Avenue to Western Avenue on the north, Western Avenue from Third Street to Olympic Boulevard, including a business corridor along Western Avenue from Third Street to Rosewood Avenue situated inside the East Hollywood area on the west' (Krekorian, 2010). This definition resulted from City Council meetings with input from stakeholders such as Korean business owners, local government representatives, and other public participants. We include this official LACC boundary in our determination of the study area because the act of naming this area may have influenced residents'

understanding of the region. The LACC definition of Koreatown includes a smaller northern stretch of Western Avenue included as part of the business corridor (a 'one-dimensional' extension) and additional area to the south that is not already included in the MappingLA definition. In our study, we investigate how well the officially designated boundaries match the boundaries in the minds of residents.

Data and Methods

Respondents

A total of 50 respondents, residents living in and around the Koreatown neighbourhood in LA at the time of the study (September through December 2014), were selected from the study area specified above using a systematic spatial sampling method. Households were selected by a process of placing regularly-spaced points along the street grid within the study area, followed by on-the-ground estimation of the nearest residence to each point. The first available adult resident willing to respond from each of the selected households was asked to respond to the in-person survey. This sampling method leads to more regular spatial coverage of the entire study site than other approaches such as convenience or snowball sampling methods. To increase the response rate among those not comfortable understanding or answering the survey in English, a version of the survey in Korean or Spanish was administered as needed (the first author speaks Korean and the research assistant speaks Spanish).

The 50 survey respondents ranged in age from 19–82 (mean = 49.6), and 56 per cent of respondents (*n* = 28) were female. The average length of residence reported in their current neighbourhood – whether or not they self-identified as a resident of 'Koreatown' – was 16.7 years. Respondents' racial or ethnic identification is presented in table 1, and work status is summarized in table 2.

Table 1. Respondents' ethnic/racial identification.

Category	Frequency	Percentage
Hispanic or Latino/a	24	48%
Caucasian or White	14	28%
Asian	9	18%
African-American or Black	2	4%
Not Provided	1	2%

Table 2. Respondents' work status.

Response	Frequency	Percentage
Full-time employed	15	30%
Unemployed	9	18%
Retired	9	18%
Part-time employed	7	14%
Self-employed	5	10%
Disabled	3	6%
Student	1	2%
Other	1	2%

Procedure

We administered an in-person survey to collect data. This method enabled us to collect information that would be more difficult or less reliable to collect through phone or online surveying methods. In-person surveying also generally results in higher response rates than other methods (Fowler, 2009); the response rate to our survey was between 40 and 50 per cent. We interviewed people at their front doors, as this allows for more thorough and thoughtful responses than surveying on the street (Singleton and Straits, 2010).

The survey consisted of five components: (1) demographic questionnaire; (2) boundary-drawing map task and open-ended description of the drawn boundary; (3) estimate of the proportion of different ethnic groups in Koreatown; (4) self-reports of identification and interaction within Koreatown; and (5) neighbourhood assessment, conducted both concurrent to and following survey data collection.

1. *Demographic Questionnaire*. After agreeing to participate in the research study, respondents were asked a series of demographic questions concerning their address, year of birth (age), gender, self-identified race or ethnicity, primary language spoken at home, and occupational status.

2. *Boundary-Drawing Map Task*. For the boundary-drawing task, respondents were provided with a printed base map showing a street map of the study area (without specifying the study area) with an additional 2 miles (3.2 km) extent on each side. Streets and highways were displayed with their names labelled. Respondents were shown the base map and asked to indicate on it where they believed the Koreatown neighbourhood was located, by drawing a line containing the neighbourhood in whatever shape they deemed appropriate. Respondents were allowed (but not prompted) to revise their boundaries by changing their original drawing before continuing the survey. Following the boundary-drawing map task, respondents were asked to explain in an open-ended question why they considered the area they indicated on the map to be 'Koreatown'.

3. *Perceived Ethnic Composition of Koreatown*. In this task, residents estimated the percentage of Koreatown residents belonging to each of the following ethnic or racial categories: 'Hispanic', 'White', 'Black', 'Korean', or 'Other Asian'. Although estimates were checked at the time of administration to confirm they totalled 100 per cent, in a few cases, they did not total 100 per cent and were recalculated on a 100-point scale post-survey, to allow for comparison to block-level data from the 2010 Decennial Census (U.S. Census Bureau, 2010) on resident ethnic and racial composition.

4. *Identification with and Interaction within Koreatown*. Additional survey questions asked respondents how long they had resided in their current neighbourhood, whether they identified themselves as living within 'Koreatown' (if not, the neighbourhood they identified with), whether they currently worked in Koreatown (if not, the neighbourhood they currently worked in), the average number of times they shopped in Koreatown per week, and whether they visited places in Koreatown in their free time (if so, for what purposes). These questions were targeted towards understanding respondents' level of identification with and their general level of interaction within the neighbourhood.

5. *Neighbourhood Field Assessment*. Along with the survey described above, we conducted neighbourhood observations to create an inventory of elements in the surrounding environment, noting street and building signage, blocks of primarily retail or residential units, landmarks and vistas, appearance and usage of streets and open spaces, and so on. This field assessment, conducted concurrently with and following survey administration, helped create an inventory of elements to inform later analysis, especially in coding respondents' boundary descriptions.

Boundary Aggregation Methods

Survey respondents provided many different boundaries in the boundary-drawing map task (see figure 3). Two different aggregation methods were used to summarize the drawn boundaries. The first method, *radial intersect*, is a new approach to averaging regions that
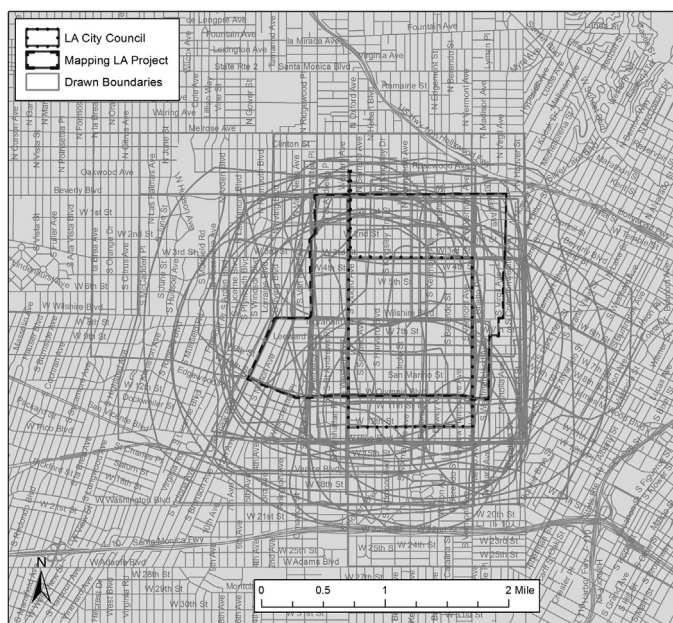
Figure 3. All drawn boundaries of 'Koreatown' collected from survey respondents, overlaid on a single map.

aggregates the drawn boundaries as borders or bounding lines measured from the centre of their drawn neighbourhood. The second method, *raster overlay*, is a well-established approach to obtaining an aggregated 'area of agreement' using multiple input polygon areas (described, for example, in O'Sullivan and Unwin, 2010). The two methods are expected to complement each other, treating drawn regions both as bounding lines and as filled areas.

1. *Radial Intersect Method for Aggregating Polygons*. The first method for summarizing the boundaries drawn by respondents is a novel approach to aggregating data from multiple polygons to generate one averaged polygon representing the shape, location, and extent of all the input polygons. We call this the *radial intersect* method. It is inspired by a similar process described by Dalton (2007, p. 8), which generates an average boundary from a single common centre. Unlike his data, however, our regions contain no single common centre; in fact, some of our region centres lie entirely outside other regions. Our radial intersect method averages regions of varying shapes and locations, which nonetheless exist in a common absolute geographic space (i.e. they are located within a common latitude-longitude coordinate system).

The method selects the centroid (mean centre) of each of the individual input polygons as the centre for each radial calculation. It then draws evenly-spaced lines radiating from the centroid of each polygon and intersecting its boundary. Of course, a greater number of radial lines creates a mean boundary with greater resolution. In addition to choosing a number of radial lines that would represent adequate resolution, however, we also preferred to use a multiple of 4 radial directions, respecting the likely relevance of cardinal directionality in this particular context. We therefore opted to use 16 lines, considered sufficiently high resolution to capture all or nearly all of the variability of interest in drawn boundaries. The intersection of the radial lines with each respondent's region boundary generated 16 point locations for each respondent's region. Across all respondents, we averaged the x-y coordinates for the points corresponding to the same angle from the centroid – for example, all points at the intersection of the boundary and the respective 0° lines from the centroid for all of the respondents' polygons. This resulted in the average intersection location across respondents for all of the 0° radii, all of the 22.5° radii, all of the 45° radii, and so on for all 16 radii directions. We connected these averaged points by a line to approximate an average boundary across all respondents. See figure 4 for a visual diagram of the workflow for this process.

2. *Raster Overlay Method for Aggregating Areas of Agreement*. The second method, a raster overlay of the areas drawn by participants, focuses on the areas contained within the regions rather than their boundaries; it lends itself well to the computation of areas of agreement between all respondents. This method first converts the digitized boundaries into polygon areas, overlaying a raster grid of cell size 10 × 10 feet (3 × 3 m) and representing each area as a separate layer. It then overlays the raster layers and assigns a value of n to each cell where n equals the number of respondents who included that cell within their region. Just as the number of radial lines one uses for the radial intersect method expresses resolution, the size of grid cells used expresses resolution in the raster overlay method. We considered cells of size 10 × 10 feet to be adequately high resolution for our purposes, given the assumption that our respondents' conceptions of the neighbourhood are almost certainly no more precise than that, and mostly less.

Results

Measuring Cognitive Boundaries

We first examine the boundaries of Korea-
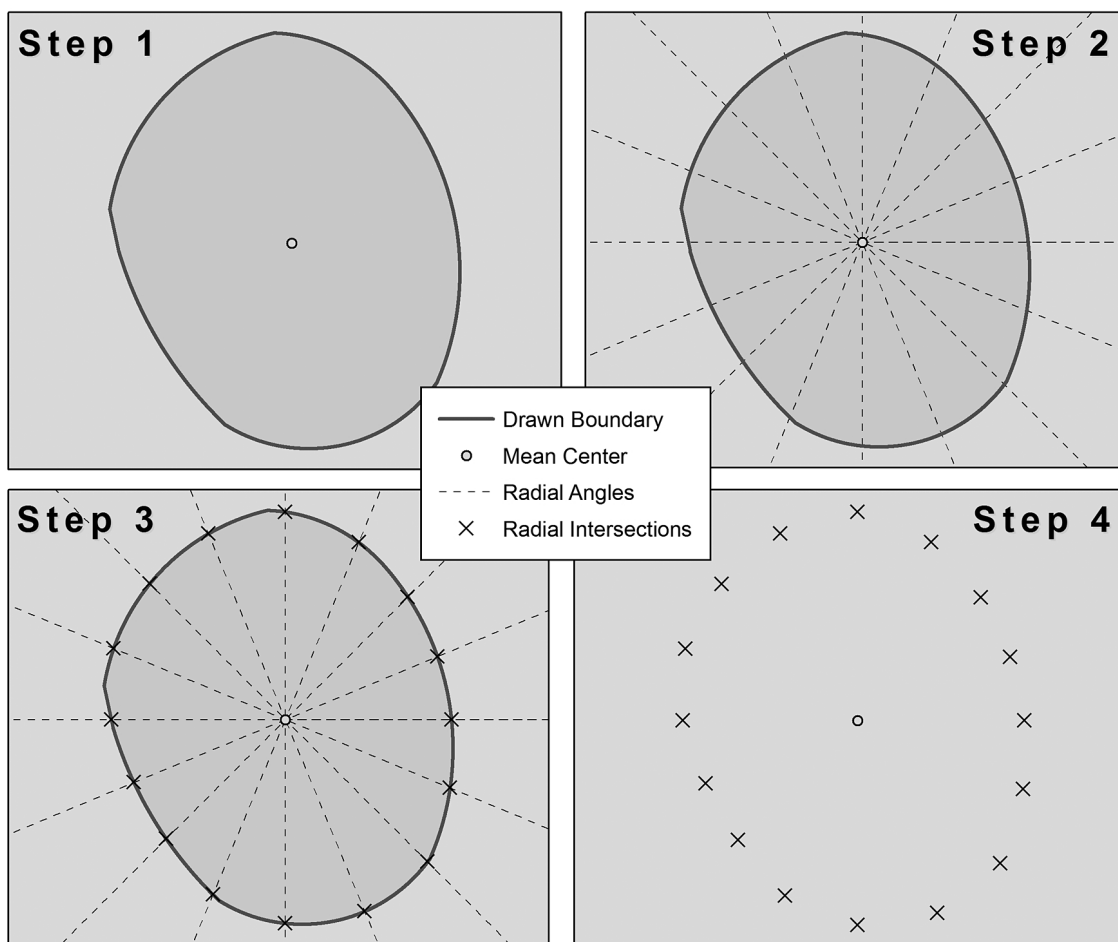
Figure 4. Visual depiction of the workflow involved with the radial intersect method. Step 1 shows the digitized polygon, represented as a line, and the spatial mean centre (centroid) of the polygon. Step 2 generates 16 radial lines at evenly spaced angles, drawn to extend outward from the mean centrepoint. Step 3 shows the intersection points of the polygon boundary line with each of the radial lines. Step 4 displays the radial intersection points for this polygon, which are averaged with those from all respondents' polygons.

town drawn by individual survey respondents with respect to the location, extent, and shape of their neighbourhood concepts. A total of 48 of 50 respondents drew a boundary for this task; again, individual drawn boundaries are shown in figure 3. (One respondent did not comprehend the task, and another was unsure where to locate Koreatown but verbally described it as 'where all the Korean businesses are located'.) We digitized and georeferenced each drawn boundary from the paper maps, allowing

for area, location, direction, and distance calculations, as well as comparisons between drawings and with official designations of the neighbourhood's boundaries. Drawn boundaries were aggregated using the two methods mentioned above, the radial intersect method and the raster overlay method.

Radial Intersect Method for Aggregating Polygons

The resulting shape of our average region
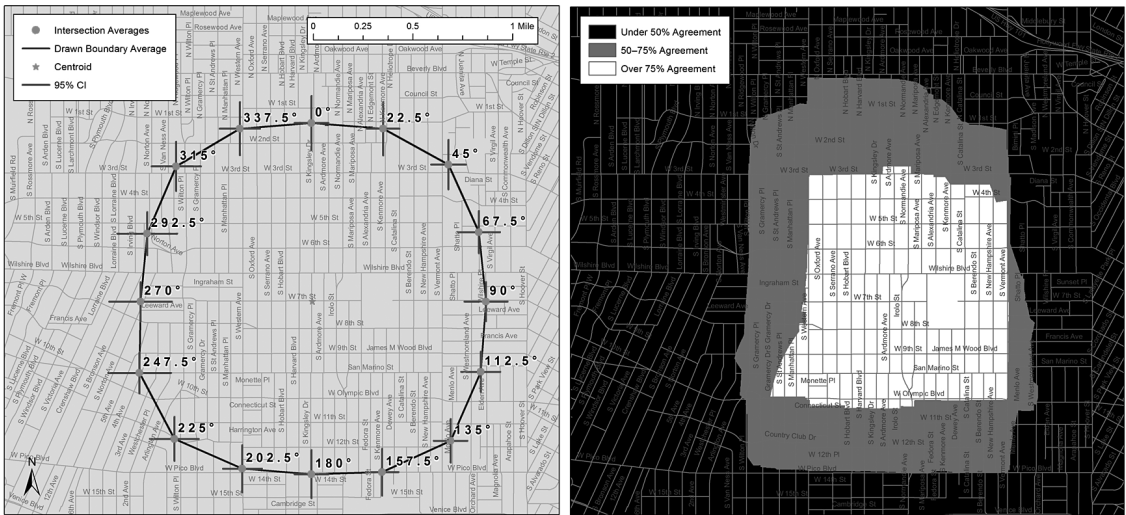
Figure 5. (*a*) Average of drawn boundaries resulting from the radial intersect method. The averaged location of each of the intersection points that meet the specific radial angle (labelled in degrees) is shown, starting with 0° at north and moving clockwise in 22.5° steps, for a total of 16 intersection points. The crosses at each intersection point depict variability in terms of the 95 per cent confidence ranges around each point, in the x- and y-directions. (*b*) Areas of agreement among respondents about the boundary of Koreatown, as calculated using the raster overlay method. The central region, coloured white, is the area of greatest agreement (>75 per cent). The grey-coloured area indicates at least 50 per cent but no more than 75 per cent agreement. The black-coloured area indicates less than 50 per cent agreement among respondents' drawn areas.

derived from the radial intersect method is shown in figure 5*a*. It is generally circular, though it appears flatter on the north, east, south, and west sides. This flattening is an effect of many respondents tending to draw along the street grid and thus drawing rectangular shapes for their boundaries. Of the individual boundaries drawn by respondents, 28 can be characterized as mostly rectangular, 8 appear circular, and 12 cannot readily be characterized as either circular or rectangular. The average boundary is quite symmetric north–south and east–west, measuring 1.75 miles (2,816 m) east to west and 1.74 miles (2,800 m) north to south.

This regularity in the resulting shape, however, is not just an artefact of the radial intersect method. Therefore, we also examine variation of respondents' boundaries along the two main directional axes that correspond with the orientation of the street pattern and with the dominant perspective shown in these map responses. We calculated the

standard deviation along the east–west and north–south directions for each of the 16 radius-boundary intersections across all respondents. Figure 5*a* shows the variability around each of the averaged intersections as 95 per cent confidence intervals around each point in the x- and the y-directions. There is fairly homogeneous variation around the perimeter of the polygon, with only a modest difference among the averaged intersection points. The most variability occurs in the east–west (x) direction along the western boundary of the neighbourhood, with the least certainty in the southwest part of the boundary and more certainty moving north, in a systematic way. The standard deviation in the east–west direction of these averaged intersection points is 0.39 miles (0.628 km); in the north–south (y) direction, it is 0.41 miles (0.66 km). We calculated the difference in variation in the north–south and east–west directions for each of the angular intersections across all respondents; they are

not significantly different based on a one-sample t-test, $t(15) = 0.73$, $p = 0.478$.

Raster Overlay Method for Aggregating Areas of Agreement

Figure 5*b* shows the aggregated area of agreement from the raster overlay method. To facilitate interpretation, the figure depicts areas of >75 per cent agreement, 50–75 per cent agreement, and <50 per cent agreement (i.e. the entire area of less than 50 per cent agreement is the surrounding land we do not consider part of Koreatown). The >75 per cent agreement area for Koreatown is about 1.2 square miles (3.1 km²) and approximately bounded by West 3rd Street on the north, Vermont Avenue on the east, Olympic Boulevard on the south, and Western Avenue on the west. This area is approximately rectangular except where it includes a small portion of the area west of Western Avenue in the southern part of the area. The area of 50–75 per cent agreement is approximately bounded by West 1st Street on the north, Vermont Avenue on the east, Pico Boulevard on the south, and South Wilton Place on the west, and has a size of about 2.6 square miles

(6.7 km²). The simple fact that these areas are different indicates uncertainty about the extent of Koreatown.

How Do the Drawn Regions Compare with the Official and Crowd-Sourced Definitions?

We compare the averaged regions resulting from the two methods described above to (1) the definition of Koreatown according to the LACC and (2) the crowd-sourced definition from the MappingLA project. Figure 6*a* overlays the definitions of Koreatown by the LACC and the MappingLA project onto the average polygon created with the radial intersect method. The radial intersect boundary clearly extends beyond the edges of the rectangular LACC region definition, excepting only the narrow proruption of the business corridor that extends along Western Avenue. The size of the area contained within the radial intersect boundary (approximately 2.6 square miles [6.7 km²]) is larger than the LACC region (approximately 1.4 square miles [3.1 km²]). The difference in shape between the boundary averaged from respondents' drawings and that defined by the LACC is also notable, as several respondents had
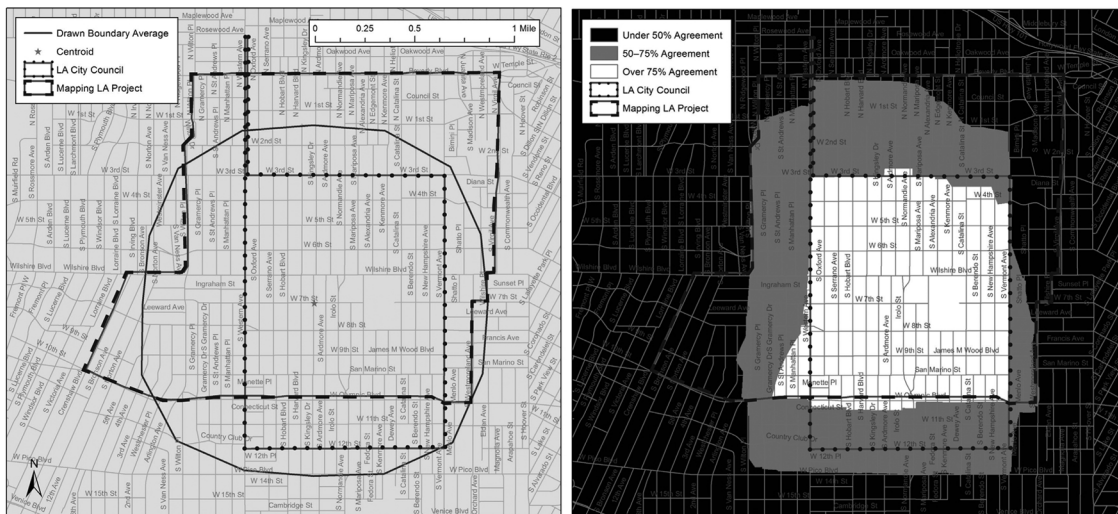
Figure 6. (*a*) Average of drawn boundaries from the radial intersect method (figure 5*a*) with overlaid definitions of Koreatown from the LACC and MappingLA projects. (*b*) Areas of agreement among respondents (figure 5*b*) with overlaid definitions of Koreatown from the LACC and MappingLA projects.

defined a circular region in their drawings, contributing to the roundness of the overall boundary created by averaging the individual boundaries. Both versions of Koreatown, however, are centred around locations less than a third of a mile (0.54 km) apart, near the intersection of South Kingsley Drive and 7th Street.

The radial intersect polygon appears to be more similar in size to the MappingLA region than to the LACC region, but it is more different from the MappingLA region in shape and location. The radial intersect and slightly larger MappingLA definitions of Koreatown only differ in area by about a tenth of a square mile (0.5 km²). The shape of the MappingLA region, however, is irregular, mostly rectangular with a protrusion in its southwestern portion and some irregularity along the boundary as it follows variation in the street grid. The radial intersect boundary is further south than the MappingLA boundary, with its north–south placement nearer to the LACC definition. The radial intersect and the MappingLA regions appear to cover a similar east–west extent, with the centroid of the latter definition also located approximately at South Kingsley Drive.

Turning to the raster overlay (figure 6*b*), the area of >75 per cent agreement closely matches the LACC definition on the western, northern, and eastern sides. It does not stretch as far south as the LACC definition, which goes all the way to include 12th Street rather than stopping at Olympic Boulevard, and fails to match the prorupt arm of the business corridor in the LACC definition. Noteworthy is that the >75 per cent agreement area (and to a lesser extent the 50–75 per cent agreement area) nearly shares the same eastern extent with the LACC definition, stopping at Vermont Avenue as a visible edge to the neighbourhood. The 50–75 per cent agreement area extends symmetrically approximately 0.3 to 0.4 miles (0.5–0.6 km) (beyond the edges of the >75 per cent area, except for on this eastern side, where it appears there is more reliable agreement

about Vermont Avenue as that edge.

When we compare the raster overlay region to the crowd-sourced MappingLA definition, we see places where the MappingLA definition extends beyond the 50–75 per cent areas of the survey respondents. The MappingLA definition includes a protrusion on the southwestern part of the area that is not depicted in the raster overlay boundaries, though perhaps hinted at by the small stretch of the southwestern part of the ≥75 per cent agreement area. The northeastern part of the MappingLA definition also captures more area than our respondents depicted in their drawn boundaries of Koreatown. However, the 50–75 per cent area among our respondents does extend as far south as Pico Boulevard, which is further south than either the MappingLA or the LACC definitions reach.

To compare further individual survey respondents' cognitive regions to the LACC and MappingLA regions, we compare the size of each respondent's drawn region of Koreatown to both of those definitions. We calculate the percentage overlap between two regions by dividing the area of the intersection between the two regions by the area of the union of the two regions:

Percent overlap = Area of intersection/Area of union

In these comparisons, the MappingLA region (average 42.1 per cent overlap) corresponds better overall to respondents' drawn regions than does the LACC region (average 34.7 per cent overlap).

How Do the Two Aggregation Methods Compare to Each Other?

What can we identify as the relative strengths and applications of the radial intersect and raster overlay methods of measuring respondents' drawn regions? The area created by the radial intersect method is located with its centre at West 7th Street and South Kingsley Drive, the furthest northern extent between 1st and 3rd Streets, the eastern

extent between Vermont Avenue and Virgil Avenue, the southern extent between 12th Street and Pico Boulevard, and the western extent between Irving Boulevard and Van Ness Avenue (figure 5*a*). The averaged area appears quite circular, though there is a visible flattening of the 'sides' corresponding to the north, east, south, and west cardinal directions. This method clearly produces a more compact representation of Koreatown than does the raster overlay. We believe the radial intersect as a general method will typically do this 'compact smoothing', but further research would be informative here. The raster overlay apparently captures better some of the irregularities of shape that the official and crowd-sourced versions represent. However, neither method picks up the north-extending business corridor in the LACC version, suggesting that its inclusion in that representation is not faithful to people's conceptions but is motivated by other considerations.

The raster method of aggregation allows for a different comparison of respondents' mapped boundaries. The 50–75 per cent agreement area is larger in area than the >75 per cent agreement area by about 1.4 square miles (50–75 per cent region = 2.6 square miles; >75 per cent region = 1.2 square miles). Though the boundaries specified by the two analysis methods are quite different in shape and appearance, the total area contained within the 50–75 per cent region from the raster overlay matches the area of the 'average' polygon generated by the radial intersect method (2.6 square miles). Taken all together, it appears that the crowdsourced MappingLA designation of Koreatown corresponds better with the areas included by individual respondents (shown in the previous section as percentage overlap), as well as with the radial intersect aggregation of the respondents' regions. The raster overlay aggregation also shows that the MappingLA definition is more similar to the >50 per cent agreement region, while the LACC definition is more like the >75 per cent agreement region.

Features Mentioned to Explain Cognitive Boundaries

We coded responses to the open-ended prompt, 'Please explain why you drew your boundary line of Koreatown where you did', to identify salient features influencing respondents' ideas about the boundaries of Koreatown. Forty-eight completed responses contained meaningful content and were coded. The transcribed explanations were segmented into semantic units ranging from a single word (for example, a street name) to a short phrase (a descriptive comment). Survey respondents expressed a wide variety of reasons for the placement of their boundary. These explanations were coded into one of three main categories: physical features, socio-cultural features, or other features. We developed the coding system via an iterative process, basing initial categories on the research questions and prior work on cognitive regions, as well as potential features identified during the environmental assessment of the area. The final coding system consisted of eight sub-categories grouped into three main categories (shown in table 3). Items categorized as 'physical features' included visible paths, barriers, and landmarks, particularly street names, businesses, and signage. 'Socio-cultural features' were mentioned by a group of people, such as by ethnicity or language, or social characteristics of people in the neighbourhood. 'Other features' included residents' descriptions of adjacent neighbourhoods, memories or events associated with the neighbourhood, or sense of identity and community connection.

We extracted a total of 150 semantic units from the 48 coded responses. We coded each semantic unit into exactly one sub-category (thus, exactly one main category). However, many respondents expressed more than one semantic unit that was coded, so total counts across main categories exceed 48. These categorized units are summarized in table 3, including the number of respondents whose explanation mentioned at least one of

Table 3. Features mentioned by respondents to explain boundary placements.

Feature Type	Number of Respondents[1]	Number of Mentions[2]
Physical	*39*	*66*
Presence of businesses (e.g. stores, restaurants, offices)	21	28
Streets mentioned by name	16	26
Presence of signage	12	12
Socio-cultural	*30*	*61*
Presence of groups of people, named by race or ethnicity	24	42
Social characteristics of individuals or groups	12	19
Other	*12*	*23*
Events or memories related to Koreatown	8	10
Other neighbourhoods mentioned by name	6	10
Use of external aids (e.g. maps, online sources)	3	3

1. Number of respondents for whom we coded at least one semantic unit into a category. Because a single respondent's units can be coded into multiple main or sub-categories, the total of sub-categories need not equal the total for their main category nor do any of the category totals need equal 48, the total number of respondents.
2. Number of semantic units which we coded into a category. In this case, the sum of sub-category counts of features must equal the count for their main category.

the feature types listed in each of the main categories and sub-categories. Table 3 also presents counts of the number of semantic units mentioned within each of the feature categories and sub-categories.

Physical features are most commonly mentioned in these open-ended explanations, with a total of 39 respondents mentioning at least one physical feature. Many respondents (n = 21) mentioned the presence of Korean businesses or other establishments as one reason for their placement of the Koreatown boundary. Others named specific streets (n = 16) or signage (n = 12). Commonly referenced streets were Olympic Boulevard, Western Avenue, and Vermont Avenue. When compared to the prominent streets in respondents' boundary drawings in the previous section, these streets clearly stand out as important features for the basis of many peoples' cognitive maps of Koreatown. Olympic Boulevard is a large thoroughfare running east–west and is visible in many respondents' drawn boundaries as the southern extent of Koreatown (especially as shown by the >75 per cent agreement area of the raster overlay, in figure 5*b*). The north–

south running Western Avenue is notable as a common western boundary of Koreatown, and the north–south running Vermont Avenue is shared by most respondents as the eastern boundary.

Socio-cultural features were also important in respondents' explanations. These responses reflect an understanding of Koreatown's location based on the presence of a Korean population, reinforcing the concept of the neighbourhood as a Korean ethnic enclave. A total of 30 respondents mention these socio-cultural features, which include social or ethnic groups (n = 24) or the characteristics of groups or individuals (n = 12). As expected, the presence of Koreans in Koreatown is strongly felt by respondents and is mentioned by all of the 24 respondents who mention at least one ethnic group in their explanation. But respondents also mention a variety of other ethnic or racial groups, often using generic terms like 'other Asians' or 'Hispanics' to name these groups. The mention of other ethnic groups reflects the recognition that the neighbourhood is a non-homogenous social space shared by a variety of people. Ethnic or racial categories

mentioned included Korean, Filipino, Salvadoran, Guatemalan, Bengali, Thai, African-American, Caucasian, and others.

By including statements about characteristics of groups or individuals, respondents attribute personal meaning to what the presence of certain people might mean to the community. These statements included contrasting themes: one view depicts Koreans as community members who improve the neighbourhood financially and aesthetically through economic growth; an opposing view depicts Koreans as isolated, exclusive business people who mainly look out for their own. Several responses also touch on the theme of Koreatown's shifting nature, recognizing the changing demographics of the area's residents. One respondent specifically notes social differences between first-generation and second-generation Korean immigrant neighbours, suggesting that patterns of immigration shape the social character of the neighbourhood.

Features categorized as 'other' are mentioned less frequently. Memories of events that stood out to respondents in defining the boundaries of Koreatown reflect a sense of 'ownership' or community involvement, such as the occasion of a local Korean cultural festival. Some respondents mention neighbourhoods other than Koreatown in the context of bounding Koreatown's edges. One states, 'Outside of this area [indicated on the base map by the respondent], it is not really Koreatown anymore. North of 3rd Street, you're getting closer to Hollywood. South of Olympic Blvd, more Pico-Union'. This statement recognizes the wide boundary between one neighbourhood and the next, a transition zone between neighbourhoods where a person may not be entirely inside only one place. Finally, some respondents mention external aids to understand the boundaries of Koreatown, such as knowledge of demographic data, maps, or online sources.

Respondents' Estimates of Residential Ethnic Composition

Respondents' estimates of the residential composition of Koreatown range widely. A total of 48 respondents answered this part of the study (2 declined to answer). Estimating percentages of residents proved difficult for respondents, who frequently required multiple prompts before they understood the task and were willing to give an estimate. The means and ranges of estimates of Koreatown's ethnic composition are presented in table 4, broken down by the categories we presented to respondents in our survey. At the Census block level, however, the Census does not distinguish among types of Asians, so we combine 'Korean' and 'other Asian' together for comparison to Census data.

To compare perceived versus 'actual' residential composition (recognizing that actual composition is ever-changing), table 4 pre-

Table 4. Respondents' estimates of ethnic composition compared to Census counts.

Category	Respondent Estimates[1]	MappingLA Percentage[2]	LACC Percentage[2]
Hispanic	37% (15–78%)	47% (–10%)	48% (–11%)
Korean	39% (0–75%)	–	–
Other Asian	7% (0–73%)	–	–
Total Asian	46% (10–80%)	39% (7%)	40% (6%)
White/Caucasian	11% (0–33%)	7% (4%)	6% (5%)
Black/African American	7% (0–30%)	5% (2%)	5% (2%)
Other	–	2%	2%

Notes: Percentages are rounded and may not sum to 100 per cent.
1. Mean estimate (range).
2. Percentage (difference from respondents' mean estimate).

sents the residential composition calculated using block-level data from the 2010 Decennial Census (U.S. Census Bureau, 2010) for both the MappingLA definition and the LACC definition of Koreatown. It also shows (in parentheses) the difference between these numbers and the average estimates from survey respondents. Compared to the MappingLA region, respondents under-estimate Hispanic residents by 10 per cent but overestimate Asian residents by 7 per cent; they overestimate the other ethnic groups by smaller percentages.

Discussion

This study of residents' conceptions of the informal cognitive region of Koreatown in L.A. focuses on where people locate the boundaries of the neighbourhood, and what people think and know about the neighbourhood and its extent. We also explore the uncertain connection between the neighbourhood as officially designated and the neighbourhood as understood by its residents. Comparisons of the boundaries drawn by survey respondents living in the study area with the boundaries set by the City Council and with those set by a more general LA audience expose differences in the concept of Koreatown, emphasizing the neighbourhood as a rich and varied social environment. It also shows similarities between these boundary definitions, supporting the idea that residents and visitors have shared mental representations of the neighbourhood, with common themes emerging from the urban landscape, either through its visual or other sensory attributes, or through features such as verbal labels or political designations. There is a multitude of processes that shape people's relations to and comprehension of the urban 'neighbourhood', and certainly also many ways in which we may learn about these representations. This work extends our understanding of how people think about vague cognitive regions more generally, and about the particularities they associate with

ethnic enclaves at the neighbourhood scale more specifically.

The sample of respondents included in this study is fairly representative of the population of Koreatown as measured by the Census, which differs from the population of LA more broadly. However, Asian residents are underrepresented in the survey, which can be attributed to our observation in the field that many Korean residents in the study area live in gated apartment buildings or complexes, to which the door-to-door sampling method does not allow access. Block-level data from the 2010 Census confirm that areas within the study area with the highest concentration of Asian residents indeed largely consist of controlled-access apartments. Unemployed and retired residents may also be overrepresented in the sample due to a greater likelihood of being home at survey times, which were largely during the afternoon and early evening.

Boundary Agreement and Disagreement

Koreatown is a prominent ethnic enclave in the city, recognized for its residential and commercial concentration of Koreans while being shared as a home by many other groups of people. Respondents living in the local area show individual variation in where they draw boundaries of Koreatown. Their regions vary in location, extent, and shape, yet also show notable levels of agreement. Using two different methods of averaging the Koreatown boundaries drawn by respondents, the radial intersect method and the raster overlay method, we demonstrate the outcome of applying different methods of analysis to understanding the uncertainty around a cognitive region. In this case, a common centre area emerged from both calculation methods.

We also compare respondents' drawn boundaries to Koreatown boundaries defined by the LACC and MappingLA projects. There are important differences in the purpose, methodology, and communication of the

definitions of Koreatown by the respondents to our survey, as compared to the LACC members and the MappingLA respondents. The two definitions of Koreatown we use for comparison differ in who they represent: while the LACC definition includes opinions from elected representatives, stakeholders, and other politically-involved community members in attendance at the council meetings about Koreatown and its adjacent regions, the MappingLA project invited the entire newspaper readership (all of LA and well beyond) to share their thoughts on where the boundary stood for all LA neighbourhoods. Our sample of respondents is clearly more representative of average Koreatown residents than contributors to either of these projects. Both the LACC and MappingLA boundaries are compromises. The LACC reached a compromise about Koreatown's boundaries after discussions and revisions in a formal process that included opportunity for public input (Krekorian, 2010). The MappingLA neighbourhood boundaries were instead created by a team of staffers at *The LA Times*, and revised after receiving over 650 user-drawn maps and comments from readers. Notably, the Koreatown boundary presented in the MappingLA project was created concurrently with many other neighbourhood boundaries in LA, rather than Koreatown in isolation. This suggests that bordering neighbourhoods influenced the placement of Koreatown's boundary, which may also partially explain its irregular shape in this project (figure 2). Although we expect that people do recognize the presence of nearby neighbourhoods when defining an individual neighbourhood, requiring them to consider explicitly the placement of surrounding areas may force them to push contested boundary or transition areas towards the 'more' representative neighbourhood. For instance, an area of higher uncertainty which may be included when asked about Koreatown may not be included if it more clearly 'fits' another neighbourhood.

An important methodological contribution

of our study is the development of a novel radial intersect method to summarize polygons, which we find to be appropriate for analysing cognitive boundaries. Its comparison to a raster overlay method shows that the two methods produce somewhat different results. The radial intersect method seems to have produced a better aggregate estimate of the boundary shape. The raster overlay method, on the other hand, paints a picture of the areas commonly included by respondents. We believe the area generated by the raster overlay of 50 per cent agreement among respondents may better express the 'average' boundary of Koreatown since it more closely matches the shape generated using the radial intersect method.

The similarity in size between the polygon resulting from the radial intersect method and the MappingLA boundary suggests that these two definitions more generously estimate the area included in 'Koreatown' than the city's definition presented by the LACC. The LACC boundary of Koreatown, which necessarily reflects a push and pull from elected representatives and community stakeholders invested in the economic and social success of their neighbourhoods, may be a compressed version due to the political influence of surrounding neighbourhoods. This is clearly reflected in the compromises reached by the Council, such as allowing for the inclusion of the business corridor of Koreatown, which runs along Western Avenue 'from Third Street to Rosewood Avenue situated *inside the East Hollywood area* [emphasis added] on the west' (Krekorian, 2010).

Vagueness about the boundaries of Koreatown is not only revealed by respondents' drawn regions but also by individual expressions of uncertainty in respondents' descriptions of the reasons for their boundary location. These variations can be partially attributed to differences in respondent attributes such as ethnicity, work status, length of time living in the neighbourhood, and so on. A larger sample would allow us to

explore further whether there are significant differences among groups of people in where they locate boundaries.

Visual Indicators of 'Koreanness'

Respondents' open-ended explanations for their placement of Koreatown's boundaries are compelling because they provide evidence for why people believe the boundaries lie where they do. Examining these explanations, we find that Korean business establishments and Korean-language signage are both salient in peoples' mental images of Koreatown. Businesses and signage are closely related in this context, as the recognition of businesses as Korean is often attributed to the Korean-language signs outside them, although clientele or owners of the business may play a role too. Businesses recognized by residents and visitors as 'ethnic' or 'ethnic-serving' are signals to the presence of that ethnic community within the area. Therefore, the spatial extent of visually-marked Korean institutions should relate to the spatial extent of residents' cognitive boundaries. The use of a separate language (and in the case of Korean, even a separate script, *Hangul*), meant to facilitate communication and cohesion amongst those who share it, sets a group of people apart when viewed from outside. Interestingly, the economy of Koreatown is not tied solely to its local clientele but extends into the surrounding suburbs, where there is a large presence of Korean residents, and has global links as well. Serving as a node to the larger and wider community, Koreatown's area of influence is much broader symbolically than its spatial area. Looking at ethnic Korean business ownership in the area would further supplement this investigation.

In addition to business signage, respondents point to other signage, most notably the small blue 'Koreatown' neighbourhood signs present in the area (figure 1). These signs may indicate that the neighbourhood is a formal administrative region, though this is not the case in LA (nor are neighbourhoods in other cities typically formal administrative regions). Other than Koreatown, the neighbourhoods of Historic Filipinotown, Little Armenia, Wilshire Center, and others are present in the surrounding area's signage. Some of these adjacent neighbourhoods are even partially or wholly contained within the 'borders' of Koreatown. However, there is no mandated or consistent basis for determining the placement of these neighbourhood signs: requests for posting new neighbourhood signs are reviewed on a case-by-case basis, often uncoordinated with other efforts by city officials or organizations to define boundaries of the neighbourhoods. However, neighbourhood signs are only one piece of the puzzle. Even though they explicitly name neighbourhoods, the signs are less salient to people than the Korean-language business signs – most likely due to the overwhelming imbalance in quantity, with small blue neighbourhood signs posted at the occasional street intersection versus a multitude of storefront signs written in Hangul script.

The importance of streets to cognitive boundaries of the Koreatown neighbourhood is also clear in these survey responses, as they serve both as a physical barrier to activity and as a psychological dividing line between regions. For instance, Olympic Boulevard is a major, highly-trafficked road, and at seven lanes across, it is difficult to cross from smaller arterial streets on foot due to infrequently marked crosswalks – and even risky to cross by car except at signalled intersections. In a very real sense, it acts as a barrier to north–south movement. This contributes to its role as a commonly shared boundary, though it is unclear from the scale of the drawn boundaries whether residents mostly think of Koreatown as *including* Olympic or merely going up to Olympic. One reason Olympic Boulevard may be included as part of the region is because it serves as a major commercial corridor, with large retail stores, fast food restaurants, and smaller businesses; it has numerous buildings and plazas with a significant presence of Korean

signs written in the Hangul script. This relates to the question of whether people think of Koreatown as more of a residential or retail area, or as both. Would the definition of Koreatown as a residential enclave be different from its definition as a business district?

There is limited prior research assessing the physical and social elements that relate to the cognition of a place as an ethnic enclave. Cognitive geography is interested in the intersection between the built environment and the mental conceptions that people form of a place. This study suggests several factors that influence the relationship between salient features within the environment and individuals' reasons for what defines a 'place' such as Koreatown. Physical cues such as foreign-language signage in the neighbourhood seem to be more salient indicators of an ethnic enclave than the actual demographic makeup of the neighbourhood, though people clearly use the presence of Korean people as an indicator of place as well. Sociocultural attributes mentioned by respondents are not limited to those describing the residential population, as the visibility of Korean shopkeepers and the daytime population of Koreatown also plays a role in their boundary ideas. Therefore, a person's work schedule may importantly influence respondents' ideas of Koreatown: those who reside in Koreatown, as compared to those who visit Koreatown for social or other activities, are likely define its extent differently, see different functional purposes in it, have different emotional ties to it, and travel to different places within it.

Misconceptions of Residential Ethnic Composition

Cognitive scientists recognize that our internal representations of a place are also importantly related to the misconceptions we hold, which cause distortions in our mental maps (Tversky, 1992). Based on survey respondents' estimates of the residential composition of Koreatown, impressions that

people hold about who lives in the neighbourhood are likely to be inaccurate. As reported in table 4, respondents underestimate the proportion of Hispanic residents in Koreatown but overestimate the proportion of Asian residents. Although at the block level the Census does not report Koreans as a category separate from Asians, we note that our respondents estimate Koreatown to have a mean of 39 per cent Korean residents. Since the Census reveals that about 39 per cent of Koreatown's residents are 'Asian', it must be the case that our respondents specifically overestimate the percentage of Koreans residing in Koreatown. We cannot determine the exact percentage of this bias, but the 6 or 7 per cent overestimation of Asian residents by our respondents must be largely or even entirely an overestimation of Korean residents. Taken together, these patterns of estimates converge on the conclusion that our respondents' estimates reflect classic biases of social/regional categorization (e.g. McGarty, 1999) by exaggerating the degree to which Koreatown is inhabited by Koreans. This accounts for a corresponding underestimate of non-Koreans to maintain estimates that total 100 per cent. Given that Hispanics make up the largest portion of non-Koreans, statistical reasons alone suggest that Hispanics would be the most underestimated group of non-Koreans. But given that Hispanics are underestimated even more than Asians are overestimated, it is likely that more than biased statistical reasoning accounts for the substantial underestimation of Hispanic residents. This may be, in part, due to the quickly changing demographics of the area. According to the U.S. Census Bureau, Hispanics made up 61 per cent of the residents of Koreatown (defined by MappingLA) in 2000; in 2010, the proportion of Hispanic residents in the same region was close to 50 per cent. The Asian population in Koreatown during the same period grew by almost 10 per cent. These misconceptions of the residential ethnic composition of Koreatown that area residents hold are likely

to influence their perceived spatial extent of Koreatown.

Conclusion

Taken together, our comparison of individual residents' boundaries to other boundary definitions and our exploration of residents' explanations for their boundaries demonstrates that a neighbourhood is a multifaceted concept that people think about and act within in complex, interwoven ways. This study provides insight into ways in which we can measure and understand vague cognitive regions, the physical and social features that people associate with an ethnic enclave, and the link between cognitive, crowd-sourced, and official boundary definitions of informal regions. This study of residents' cognitive boundaries of the Koreatown neighbourhood in LA demonstrates the value and the challenge of defining neighbourhood regions, in this case a widely recognized, economically and socially influential, and culturally heterogeneous ethnic enclave.

REFERENCES

Ahlbrandt, R.S. (1984) *Neighborhoods, People and Community*. New York: Plenum.

Bell, W. and Boat, M.D. (1957) Urban neighborhoods and informal social relations. *American Journal of Sociology*, **62**(4), pp. 391–398.

Chaskin, R. (1997) Perspectives on neighborhood and community: a review of the literature. *Social Service Review*, **71**(4), pp. 521–547.

Chaskin, R. (1998) Neighborhood as a unit of planning and action: a heuristic approach. *Journal of Planning Literature*, **13**(1), pp. 11–30.

City of Los Angeles (2015) *LADOT: Neighborhood Signs*. Available at: http://ladot.lacity.org/WhatWeDo/Operations/NeighborhoodServices/Neighborhoodsigns/index.htm.

Cresswell, T. (2004) *Place: A Short Introduction*. Malden, MA: Blackwell.

Dalton, N.S. (2007) Is neighbourhood measurable? *Proceedings of the 6th International Space Syntax Symposium*, Istanbul.

Fowler, F.J. (2009) *Survey Research Methods*, 4th ed. Thousand Oaks, CA: Sage Publications.

Hawthorne, C. (2014) Koreatown's cool old buildings point to L.A.'s future. *The Los Angeles Times*. Available at: http://www.latimes.com/entertainment/arts/la-et-cm-koreatown-immigration-architecture-20141130s-story.html.

Jorgensen, B.S. and Stedman, R.C. (2001) Sense of place as an attitude: lakeshore owners attitudes toward their properties. *Journal of Environmental Psychology*, **21**(3), pp. 233–248.

Jun, K. (2007) Event history analysis of the formation of Los Angeles Neighborhood Councils. *Urban Affairs Review*, **43**(1), pp. 107–122.

Kaplan, D.H. and Holloway, S.R. (1998) *Segregation in Cities*. Washington, DC: Association of American Geographers.

Kim, K.Y. (2011) *Los Angeles's Koreatown*. Charleston, SC: Arcadia Publishing.

Krekorian, P. (2010) Communication from Chair, Education and Neighborhoods Committee relative to an application to name a community Koreatown. *Communication to Los Angeles City Council*. Available at: http://clkrep.lacity.org/onlinedocs/2009/09-0606_rpt_en_8-11-10.pdf.

The Los Angeles Times (2009) Mapping LA: Koreatown, Available at: http://maps.latimes.com/neighborhoods/neighborhood/koreatown.

The Los Angeles Times (2010) About Mapping L.A. Available at: http://maps.latimes.com/about.

Lynch, K. (1960) *The Image of the City*. Cambridge, MA: MIT Press.

Massey, D.S. (2001) Residential segregation and neighborhood conditions in U.S. metropolitan areas, in Smelser, N.J., Wilson, W.J. and Mitchell, F. (eds.) *America Becoming: Racial Trends and Their Consequences*. Washington, DC: National Academy Press, pp. 391–434.

McGarty, C. (1999) *Categorization in Social Psychology*. Thousand Oaks, CA: Sage.

Montello, D.R. (2003) Regions in geography: process and content, in Duckham, M., Goodchild, M.F. and Worboys, M.F. (eds.) *Foundations of Geographic Information Science*. London: Taylor & Francis, pp. 173–189.

Montello, D.R., Goodchild, M.F., Gottsegen, J. and Fohl, P. (2003) Where's downtown? Behavioral methods for determining referents of vague spatial queries. *Spatial Cognition and Computation*, **3**(2/3), pp. 185–204.

Oberle, A. (2006) Latino business landscapes and the Hispanic ethnic economy, in Kaplan, D.H. and Li, W. (eds.) *Landscapes of the Ethnic Economy*. Lanham, MD: Rowman & Littlefield, pp. 149–164.

Orleans, P. (1973) Differential cognition of urban residents: effects of social scale on mapping, in Downs, R. and Stea, D. (eds.) *Image and Environment*. London: Edward Arnold, pp. 115–130.

O'Sullivan, D. and Unwin, D.J. (2010) *Geographic Information Analysis*. Hoboken, NJ: Wiley.

Portugali, J. (2000) *Self-Organization and the City*. Heidelberg: Springer-Verlag.

Proshansky, H.M., Fabian, A.K. and Kaminoff, R. (1983) Place-identity: physical world socialization of the self. *Journal of Environmental Psychology*, **3**(1), pp. 57–83.

Quinones, S. (2001) The Koreatown that never was. *The Los Angeles Times*. Available at: http://articles.latimes.com/2001/jun/03/magazine/tm-5877.

Rosch, E. (1978) Principles of categorization, in Rosch, E. and Lloyd, B. B. (eds.) *Cognition and Categorization*. Hillsdale, NJ: Lawrence Erlbaum.

Schelling, T.C. (1978) *Micromotives and Macro-behavior*. New York: Norton, pp. 147–155.

Schoenberg, S.P. and Rosenbaum, P.L. (1980) *Neighborhoods that Work: Sources for Viability in the Inner City*. New Brunswick, NJ: Rutgers University Press.

Shamai, S. (1991) Sense of place: an empirical measurement. *Geoforum*, **22**(3), pp. 347–358.

Singleton, R.A. and Straits, B.C. (2010) *Approaches to Social Research*. New York: Oxford University Press.

Tuan, Y. (1974) *Topophilia: A Study of Environmental Perception, Attitudes, and Values*. New York: Columbia University Press.

Tversky, B. (1992) Distortions in cognitive maps. *Geoforum*, **23**(2), pp. 131–138.

U.S. Census Bureau (2010) *2010 Census Summary File 1 – California* [machine-readable data files]. Prepared by the U.S. Census Bureau, 2011. Available at: https://www.census.gov/mp/www/cat/decennial_census_2010/summary_file_1_1.html.

U.S. Census Bureau (2013a) DP05: Demographic and housing estimates. *2013 American Community Survey 5-Year Estimates*. Available at: http://factfinder.census.gov.

U.S. Census Bureau (2013b) B03001: Hispanic or Latino origin by specific origin. *2013 American Community Survey 5-Year Estimates*. Available at: http://factfinder.census.gov.

Villacorte, C. (2010) Koreatown, Little Bangladesh get actual borders. *NBC News*. Available at: http://www.nbclosangeles.com/news/local/Koreatown-Little-Bangladesh-Communities-Named-101185344.html.

Yu, E-Y. (1985) 'Koreatown' Los Angeles: emergence of a new inner-city ethnic community. *Bulletin of the Population and Development Studies Center*, **14**, pp. 29–44.

Zhou, M. (2009) How neighbourhoods matter for immigrant children: the formation of educational resources in Chinatown, Koreatown and Pico Union, Los Angeles. *Journal of Ethnic and Migration Studies*, **35**(7), pp. 1153–1179.

Zhou, M. and Cho, M. (2010) Noneconomic effects of ethnic entrepreneurship: a focused look at the Chinese and Korean enclave economies in Los Angeles. *Thunderbird International Business Review*, **52**(2), pp. 83–96.