Cartography and the Reality of Boundaries

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Boundaries lead a dual life: they are described as "imaginary lines," often with no physical presence except on a map, but they also have very "real" effects on people, nature, and territory. Scholars of borderlands have shown repeatedly that the empirical features of the world often do not align with the tidy lines of political or administrative borders, but just as often, arbitrary lines drawn on a map have been shown to transform places and peoples in profound ways.[1] Given this fluidity, is it helpful to separate the imaginary from the real? How would the map-maker's task change if we took cartography not as an act of representation, on the side of the imaginary, but a as a kind of hybrid agency which participates equally in the imaginary and the real?

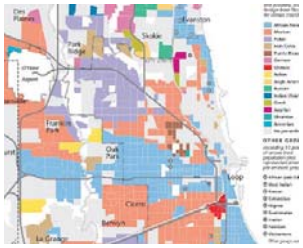
If nothing else, boundaries could no longer be seen as a neutral graphic convenience. They carry too much conceptual baggage; they provide answers that are too easy. But searching for cartographies that don't rely exclusively on borders is not just a question of deleting some lines. What's needed is deep engagement with massive amounts of data: discovering variations in space becomes a design problem in itself, where the challenge is to navigate between the hopelessly simple and the hopelessly complex.

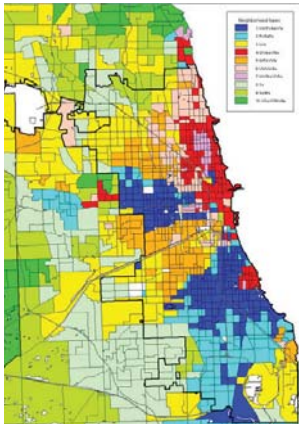
Fig. ~~01~~: Detail from *Social Base Map of Chicago*, prepared by the University of Chicago Local Community Research Committee, 1926. This research into ethnic areas and infrastructure led to the creation of Community Areas a few years later.

The large maps here are my analysis of the official "community areas" of Chicago. These neighborhood boundaries were first drawn in the 1920s by the famous sociologist Ernest Burgess to define "natural" areas of ethnic identity that could be used for urban-planning purposes. One of the basic questions about these areas has always been whether they are real or not; that is, whether they correspond to any distinguishing cultural-economic characteristics of the people who live there. Yet this is a problematic question, since Burgess's work has always inhabited the blurry space between analysis and design. Burgess is known to have made selective use of his interviews and field work when naming and delimiting his seventy-five community areas, and over time, the lines on his map have demonstrably influenced how the city is administered and experienced.[2] This close link between mapping and intervening, however, means that asking whether community areas are real ought to be as much a graphic question as it is a sociological one.

The typical critique of Chicago's community areas misses this crucial point. Geographers and sociologists have often complained that the boundaries are not accurate, especially since they have remained fixed over time for the sake of statistical uniformity, even as the city has changed dramatically. Since the 1960s, there have been many proposals, both official and unofficial, for changing the boundaries or multiplying the number of neighborhoods; one such map from the early 1970s labeled 198 distinct areas within the city. But even the most sophisticated alternatives take a similar approach to Burgess, with neighborhoods being treated like miniature nation-states, internally coherent and perfectly delimited (compare, for example, Figure 1 with Figures 2 and 3).

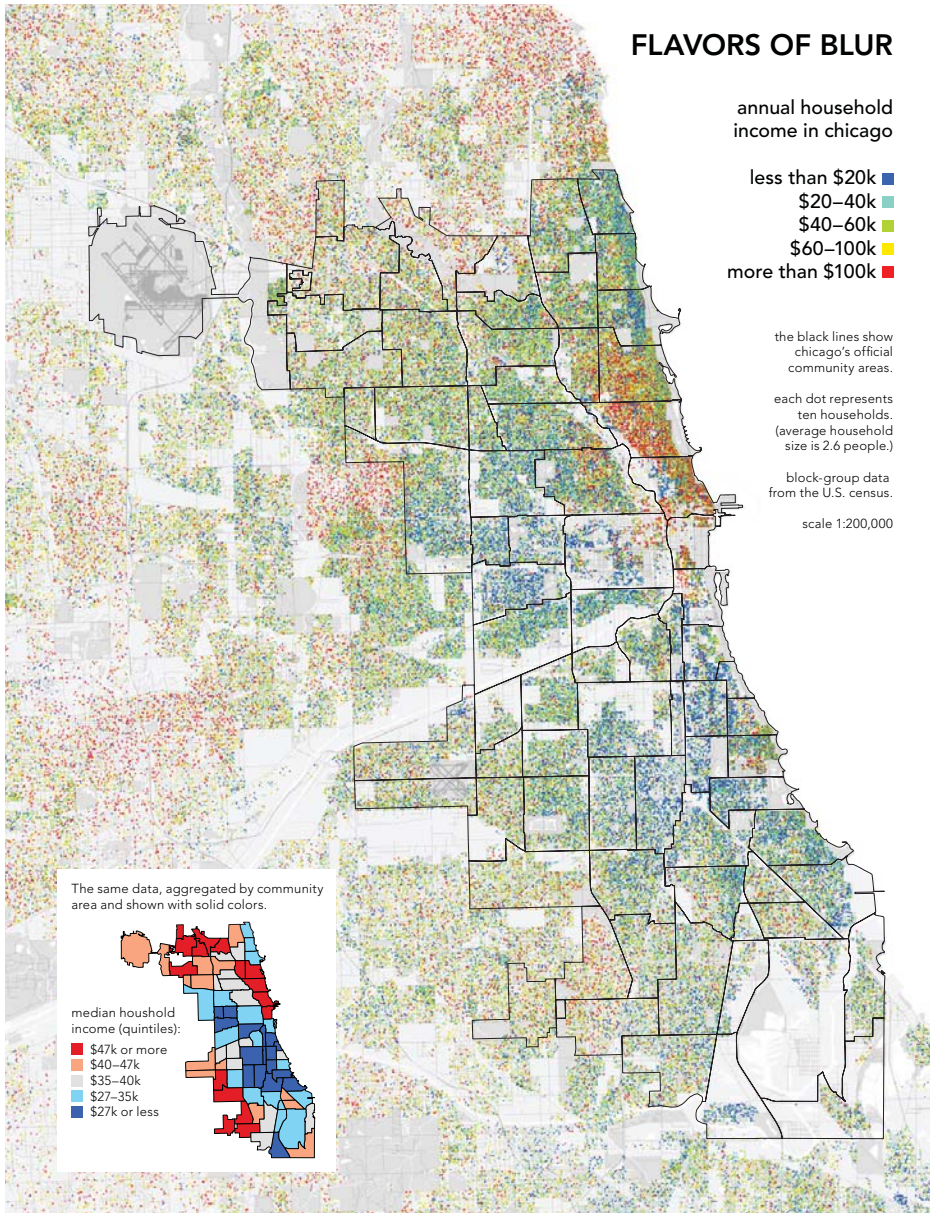
Much of this logic is built into modern mapping tools – both census data and GIS databases rely on boundaries – but changes in data (or in the world) do not occur only at stark discontinuities between homogeneous areas.





Top: Fig. ~~02~~: Detail from *Chicago's Ethnic Mosaic in 2000*, by Michael Conzen for the Encyclopedia of Chicago, 2004. Although based on census data instead of field work, this map takes a similar approach to its 1926 predecessor.

Bottom: Fig. ~~03~~: *Neighborhood Types by Census Tract, Chicago and Vicinity, 2000*, by Robert Dean of the University of Chicago, 2002. A statistical analysis of thirty-four socio-economic variables led to the creation of ten "neighborhood types," each shown with a solid color.



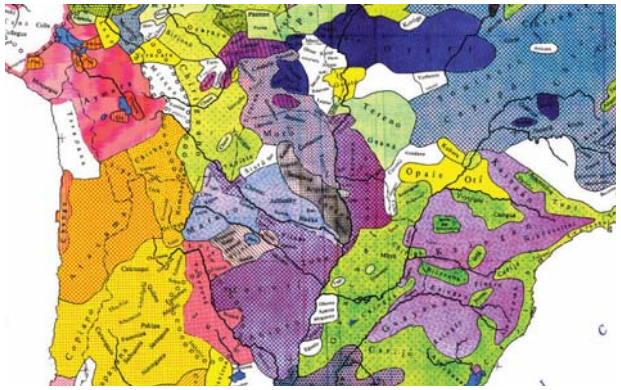


Fig. 04: Detail from *Ethno-Linguistic Distribution of South American Indians*, by Čestmir Loukotka, Czechoslovakian Academy of Sciences, 1967.

There are at least two other kinds of dishomogeneities as well: the gap and the gradient. These alternatives do not suggest any radical rethinking of urban space, but finding ways to show them graphically can indeed radicalize the map. Instead of reinforcing ideas of absolute territoriality, a map can provoke slippages, overlaps, and multiple kinds of diversity.

Pointillist maps, for example, show both gaps and gradients quite clearly, and they give a very different understanding of Chicago's spatial fabric from those maps that rely on borders. Perhaps most surprising is that there sometimes *are* very sharp lines of change, especially of racial and ethnic identity. But it is also clear that no redrawing of boundaries could ever create coherent demographic areas, even if we took "internally diverse" as one of our categories. This is especially true for income: no area is perfectly homogeneous, and the local distribution of income changes just as much as per capita or median values (in poor areas, most everyone is poor, but in rich areas, not everyone is rich). This is not just a question of the difference between lines and gradients. Continuities of income and employment simply do not align with those of race or ethnicity, and the graphic micro-fragmentation necessary to show all possible combinations would inevitably obscure large-scale patterns.

Seeing space as layered, sometimes changing abruptly and sometimes gradually, is not just an important lesson for urban sociologists. The cartography of bounded homogeneous areas is found in nearly all kinds of maps, from maps of religious, linguistic, or ethnic divisions to maps of land use, weather, or elevation (Figure 4). It's usually clear that the sharp edges of topographic contour lines or meteorological isopleths just mark one value in a smooth continuous datafield, but most boundaries are much more ambiguous. With land use, for example, are the edges of forests sharp or blurry? Does change between tribal language areas occur through density or absence? These kinds of questions can't be answered using typical statistical maps.

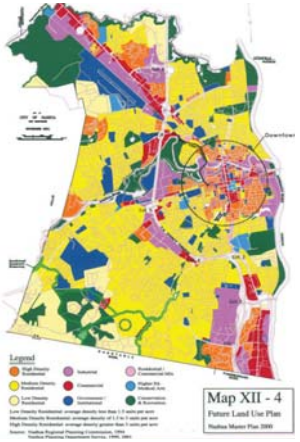


Fig. 05: Master plan for Nashua, New Hampshire, by the Nashua Planning Department, 2000.

These problems of simplification and under-determination become acute once we see cartography as a hybrid practice. Maps are tools for changing space just as much as they are for describing it, and often – as with Burgess and Chicago – the same maps do both at once. For zoning control, planning districts, or even programmed spaces in individual buildings, does the use of sharp boundaries indicate fantasies of rigid order, or has there simply been no attempt to use more nuanced cartographic techniques? What would it mean to design with the same graphic tools used to confront vast multidimensional datasets? Shouldn't we see the Nashua master plan as no less simplistic than the cartoon map of East German land use (Figures 5 and 6)?

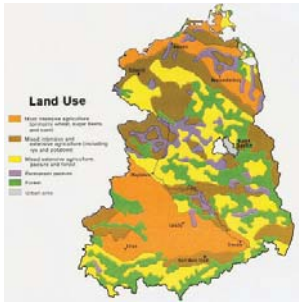


Fig. 06: East German land use, by the Central Intelligence Agency (map #504708), 1981.

Certainly there is a limit past which visual complexity simply becomes chaos. But this is not just a question of legibility; it is also a question of trust. For better or worse, legible maps are seen as authoritative, and most people simply accept Chicago's community areas as facts. But this means that legible maps which manage to push existing analytic and graphic conventions can advance rather sophisticated arguments without much notice: they can resist singular, reductivist interpretations and provoke more questions than they try to answer. The reality effect generated by a good map can make the world seem simpler and more conquerable than it actually is, but it can also be used to give complex systems their due.

1. For a recent encapsulation of empirical and theoretical questions of boundaries see Juliet Fall, *Drawing The Line: Nature, Hybridity And Politics In Transboundary Spaces* (Burlington VT: Ashgate, 2005)
2. The history of the community areas is told in Sudhir Venkatesh, "Chicago's Pragmatic Planners: American Sociology and the Myth of Community," *Social Science History* 25, no. 2 (Summer 2001).