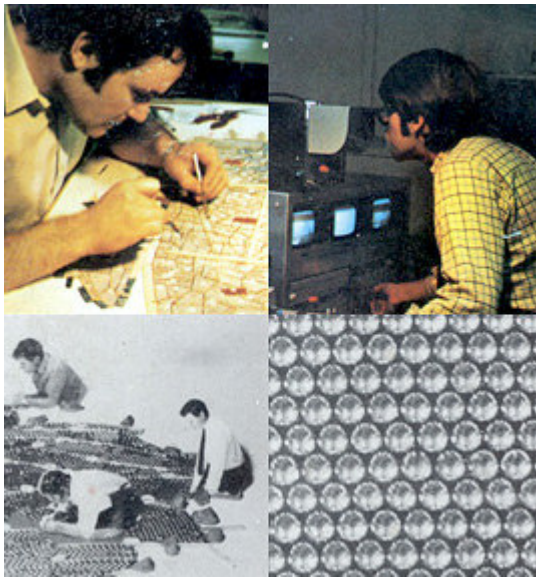
Center for Spatially Integrated Social Science

Lou Skoda and J.C. Robertson: The Isodemographic Map of Canada, 1972.

By John Corbett

Background



The 1960s witnessed a large growth in Canada's urban areas, much like in the United States. Unlike the United States, however, the Canadian population was highly concentrated in the 200 miles closest to the border with its southern neighbor, and mostly within urban areas at that. Traditional map-making methods, with emphasis on space and distance, failed to provide a visually satisfying way of showing population distribution in a large, mostly empty country like Canada. In the late 1960s, two attempts were made at presenting data by making the Canadian map correspond to electoral districts and population rather than area, known as an isodemographic map. The latter attempt, appearing in a 1970 book called *Urban Canada*, was a fairly detailed effort that showed every electoral district, but each of the provinces was shown separately, and the blocky shape of the districts prevented all but the most rudimentary provincial outlines from being preserved.

Innovation

In 1972 Lou Skoda, a cartographer in the Department of Geography at Simon Fraser University, British Columbia, and J.C. Robertson, a research associate in the School of Community and Regional Planning at the University of British Columbia, published an isodemographic map that topped all previous efforts.

Their map not only represented a population-oriented rendering of the 1966 Canadian census divisions, it did so while keeping all of Canada together in a contiguous mass and preserving recognizable division and province outlines.

Perhaps what was most impressive about this isodemographic map was not how it looked, but how it was made. Skoda and Robertson had three options available:

1. They could choose a graphic approach, which was basically a trial-and-error method using lots of paper and erasers. Each demographic unit would be drawn at the correct shape and demographically-correct size, then a lot of drawing and redrawing would be needed to connect the contiguous districts.

2. They could opt for a mathematical approach, which meant the application of computer programming to help determine the size and shape of each district. Although cartographer Waldo Tobler had been exploring computer applications in cartography since the 1950s, computer applications in cartography were still at a rudimentary level in the early 1970s. As Skoda and Robertson put it, "the indications were that the development of a satisfactory computer program would be a task of such magnitude that [we] were reluctant to undertake it if a suitable alternative method could be found." [Editor's note: Readers interested in the historical development of the cartogram concept, may wish to explore publications by Waldo Tobler, listed below, including a 1974 report on computer programs for cartograms].

3. For Skoda and Robinson, the mechanical method became that "suitable alternative." Basically a flexible, physical analog model would actually be constructed that could be modified over time to arrive at the appropriate shape. Once this was done, the model would be traced into the final map.

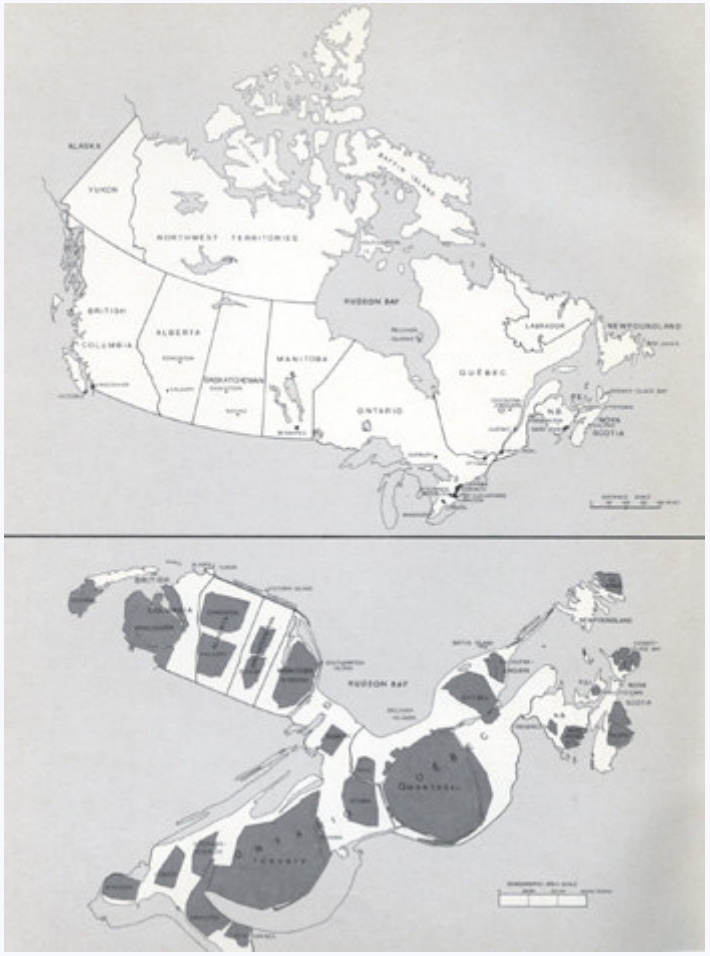
The project started with a large white formica surface on which the model could be moved. The model itself would be built out of metal strips representing census division and province boundaries that could be shaped and moved around on the surface as needed. To enable strips to expand and contract as needed, they were overlapped in the middle and fitted with u-shaped glides. Corners were given hinges made out of mylar base adhesive tape. As the map would be based around population, a consistent but flexible method of dealing with population was solved by using thousands of metal balls 1/8" in diameter. Each ball would represent roughly 140 persons, although since differing types of compression meant that balls would be compressed in several ways, an alternate measure of 4,480 persons per square inch was also used. The balls

would represent a constant area around which the boundaries had to be carefully moved.

The resulting map successfully captured the population of the census divisions, their basic shapes, and their contiguity with other divisions. The area of each division had a small error factor due to the differing compression of the metal balls, mentioned above, but by no more than a couple percent. Shapes were maintained by using only a simplified set of edges and corners for the actual metal strips, with the more detailed boundaries being traced back in to the distorted shapes toward the end of the process. The arrangement of balls and metal strips enabled divisions to be built and shaped separately, and then moved together in later stages.

The final process of making the map visually recognizable was to shape it in along the lines of the traditional Lambert conformal conic projection. The shapes of the provinces would be oriented around preserving the 49th and 60th parallels (the lower and upper boundaries of the main southern provinces) as actually being parallel with one another. The sharp difference in population between several proximate urban and rural areas also required some sharp distortions in order to maintain contiguity.

The Isodemogrpahic Map of Canada was the first truly successful isodemographic map and set the stage for the day when metal balls and mylar adhesive tape would be replaced by computer programs.



Source: Skoda, L. and Roberts, J.C. 1972. Isodemographic Map of Canada. Geographical Paper No. 50. Ottawa: Department of the Environment.

Publications

Energy Resources Map of British Columbia. By Lou Skoda and M. Balodis. *Technical papers of the 12th conference of the International Cartographic Association; Seventh General Assembly; Vol. 1:* 259–274. Perth: International Cartographic Association, 1984.

Related Works

Tobler, Waldo. Cartogram Programs, *Cartography Laboratory Report # 3*,

University of Michigan, Ann Arbor, 1974, 110 pp.

Tobler, Waldo. Cartograms and Cartosplines, *Proceedings, 1976 Workshop on Automated Cartography and Epidemiology, Washington, D.C., Department of Health, Education and Welfare, 1979*, pp. 53–58.

Tobler, Waldo. Pseudo-Cartograms, *The American Cartographer* 13(1): 43–50, 1986.

McGregor, Brian. *Isodemographic Map of North America, 1980–1981*. Kingston, Ontario: Cartographic Lab, Department of Geography, Queen's University, 1984.

Links

Why Use Cartograms?
Isodemographic Map Showing 1997 Canadian Federal Election Results