THE RECTANGULAR STATISTICAL CARTOGRAM

Erwin Raisz
Institute of Geographical Exploration, Harvard University

THE idea of the statistical cartogram occurred to the author when he had occasion to prepare maps of the United States showing the distribution of various economic units, such as steel factories, textile mills, power plants, banks, etc. These maps were far too crowded in the northeast to be useful, while elsewhere, for the most part, they were relatively empty. If a way could be found to increase the scale of the northeastern region and reduce that of the west, distribution could be shown more clearly. Simple distortion of the map would be misleading, but, if we go a step farther, discard altogether the outlines of the country, and give each region a rectangular form of size proportional to the value represented, we arrive at the rectangular statistical cartogram. For purposes of comparison it is essential that a definite system of construction should be followed and identical arrangement should be used whatever values are represented. The system here used starts always with the larger divisions and by "proportionate halving" arrives at the smaller ones.

It should be emphasized that the statistical cartogram is not a map. Although it has roughly the proportions of the country and retains as far as possible the relative locations of the various regions, the cartogram is purely a geometrical design to visualize certain statistical facts and to work out certain problems of distribution. Examples of these cartograms are given in the accompanying figures. The division into regions follows the usage of the United States Census Bureau, because only from this source are data available. If natural geographic regions could be used instead, the cartograms would be still more instructive.

THE CARTOGRAM ILLUSTRATED

Figure 1 shows the land area of the United States. Each rectangle is equal in area to the census division for which it is named. This cartogram is included here only for comparison with the other cartograms and to show the general scheme followed in the construction. The United States is represented by a rectangle, 1 by 1½ in proportion, to which New England and Florida are attached. The three main north-south divisions are defined by lines representing roughly the western border of the Appalachians, the Mississippi River, and the Rocky Mountain front.

The second figure shows the same system of divisions, but the size of the regions is proportional to their population. The picture we get is radically different from the preceding figure. The mountain

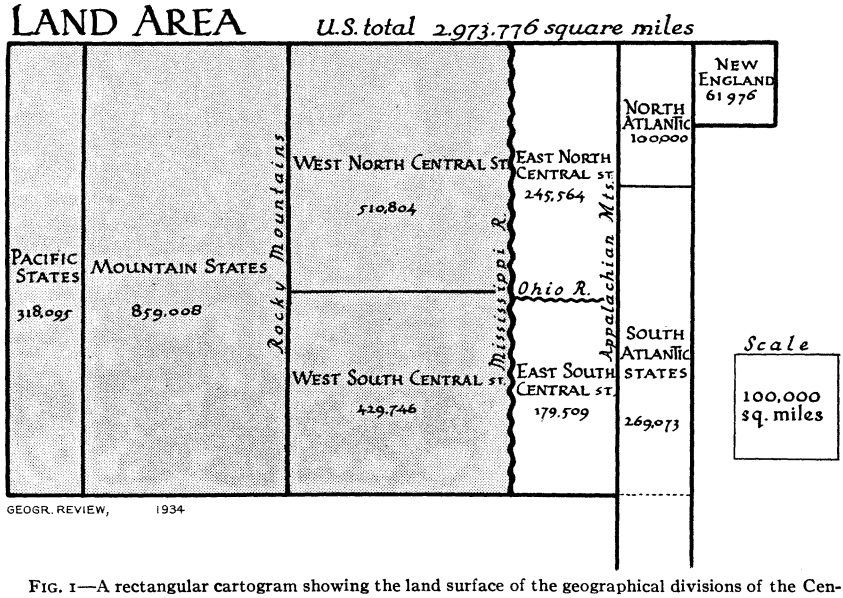

FIG. 1—A rectangular cartogram showing the land surface of the geographical divisions of the Census. This figure is intended for comparison with the following cartograms.

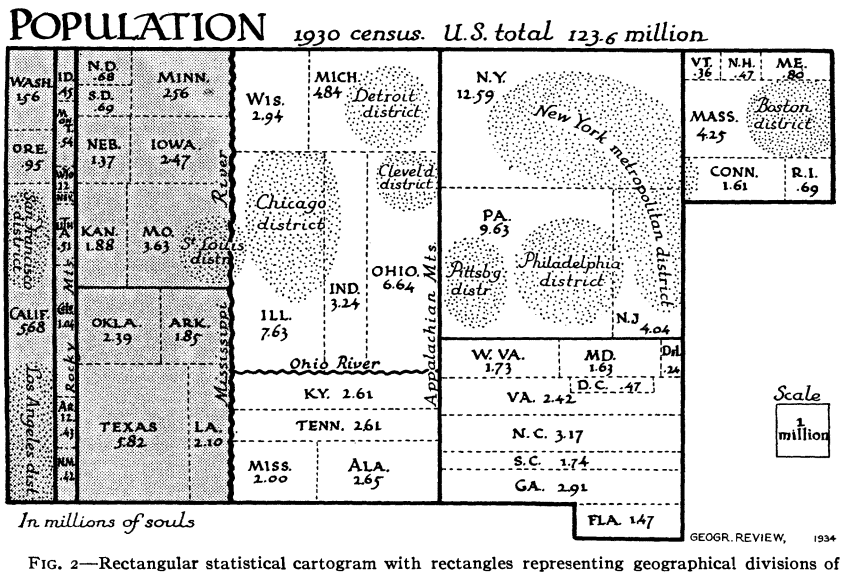

FIG. 2—Rectangular statistical cartogram with rectangles representing geographical divisions of the Census and states proportionate in size to their population. Note the position of the Mississippi River (the area west of the Mississippi is shaded in all of the cartograms).

The metropolitan districts of the largest cities (Census Bureau) are shown by a dotted area also proportionate in size to their population.

states—largest in area among the census divisions—dwindle into insignificance. The North Atlantic states grow enormously, and the Mississippi River is shifted far into the western half of the cartogram. For the purpose of more detailed studies, the regions are subdivided

into states, and our greatest metropolitan districts are also shown in proper proportions.

For an economist, a cartogram made proportional to the national wealth is useful. Figure 3 is very similar to the population cartogram, the main difference being a further reduction of the size of the South,

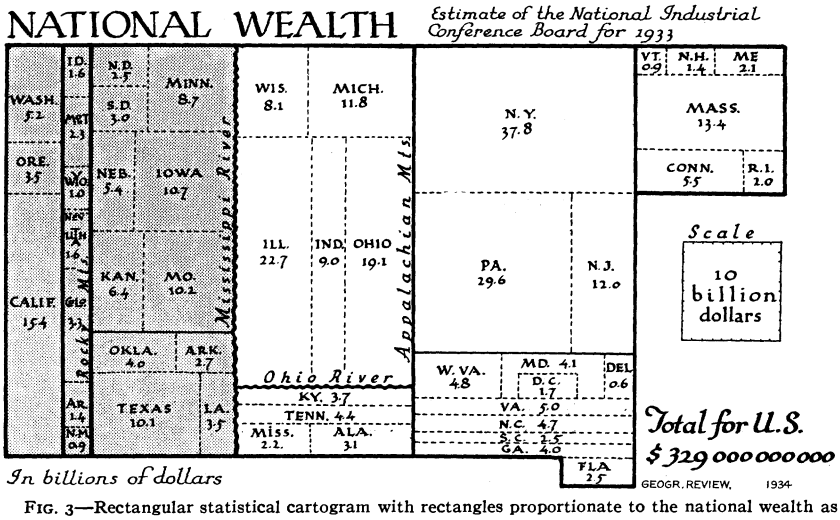

FIG. 3—Rectangular statistical cartogram with rectangles proportionate to the national wealth as distributed among the states. Note the similarity, except in the South, to the cartogram of population, Figure 2.

the big negro population of which is a lesser producer than the western ranchers. The position of the Ohio River should be noted.

Figure 4 shows the distribution of the main lines of economic production in the United States—manufacturing, farming, and mining—in separate cartograms on a uniform scale. The cartograms represent 1929 values because only those were available, so their absolute value is out of date at present, but the relative proportions have changed little. Many interesting facts can be read from these cartograms. It may be somewhat of a surprise to see that the manufacturing of New York state is worth almost the same as all manufacturing west of the Mississippi River and that the farming of one of our greatest farming states, Iowa, does not exceed in value the manufacturing of so recently industrialized a state as North Carolina. A comparison of the proportions of the mineral wealth of our western states and the coal of Pennsylvania is also illuminating.

EDUCATIONAL AND ECONOMIC VALUE

The purpose of the rectangular statistical cartogram is twofold—for educational uses and for the facilitation of business planning. Its educational value is not limited to the schools: it may serve to set

right common misconceptions held by even well informed people as to the importance of the various parts of the United States.

It is hard to escape the question whether or not division of the western mountains and plateaus among seven states is justified when

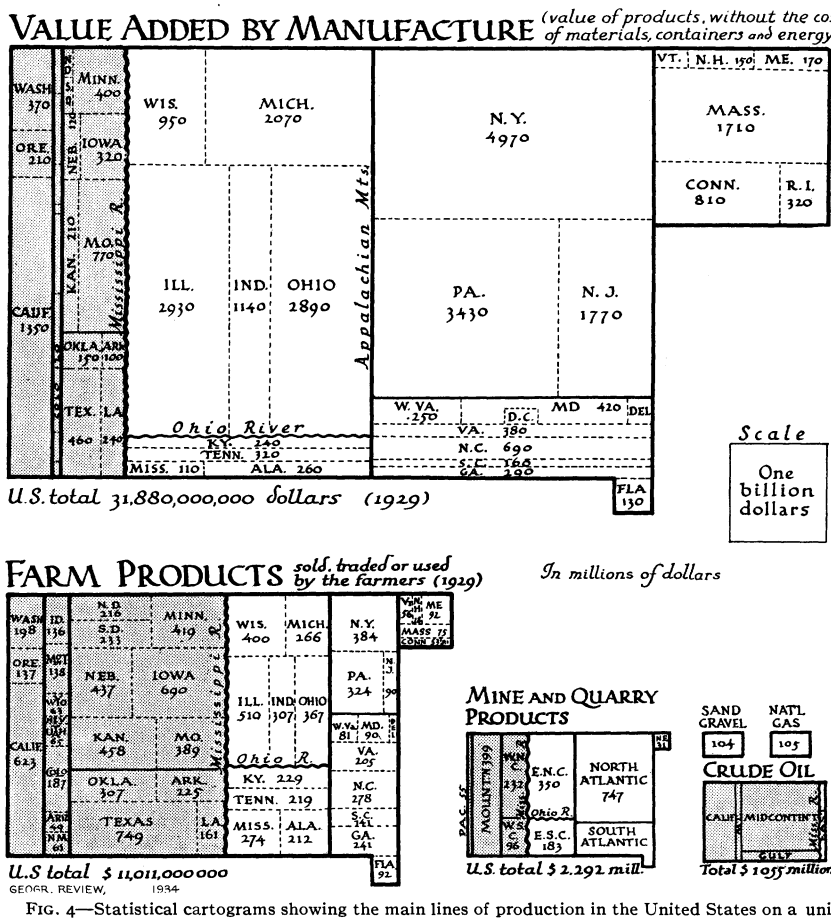

FIG. 4—Statistical cartograms showing the main lines of production in the United States on a uniform scale. Note the concentration of manufacturing in the northeast and the more even distribution of farming activities. The figures are taken from the Fifteenth Census of the United States and represent values of 1929.

one sees so clearly what an insignificant portion of the country, for instance, is represented by the senators of Nevada. Surely it would be a good thing if our political leaders in Washington always had before them a clear picture of the relative values of farming and manufacturing, the relative economic importance of East and West, and the like.

For business planning, cartograms of this type can be used in various ways. The management of a nation-wide chain store wanting to show the location of its branches, business districts, and sales districts

will have difficulty in doing so on an ordinary map. The New York district will probably have more stores than several states in the West, as chain stores are located according to population rather than according to area. There will be no difficulty, however, in putting the pins with colored heads in a population cartogram and discovering blank spots or overcrowded areas. It would be instructive to prepare for each business a cartogram showing the distribution in which it is interested; for example, for a company producing dairy machinery, a cartogram showing the distribution of milk production.

Banks and insurance and real-estate companies will find the cartogram of national wealth correspondingly useful. Nation-wide educational, social, and religious institutions may also map their activities intelligently on a cartogram.

It is expected to prepare in the future similar rectangular statistical cartograms of Europe, America, and the world, and of other economic and social factors in the United States.