(A) Nice Work!

Geography 806

Ethics Paper

In this paper, I am considering the ethical issues involved in using an arbitrarily scaled proportional circle map to display the geographic pattern of out-of-wedlock births to teenage mothers in metropolitan areas of the United States. The researcher plans to exaggerate differences in values by exaggerating differences in circle areas. The goal is to create a more striking display of the geographic pattern. The map is to be created for a major national newspaper, the New York Times.

Consider two map values, 12 and 6. On a map scaled strictly mathematically, the circle representing the value of 12 will have twice the area as the circle representing 6. On a map scaled to eliminate human perceptual errors, the circle representing 12 will have more than twice the area of the circle representing 6, but cartographic research suggests that it will appear to a map reader to have twice the area of 6. If (a) a proportional circle map is scaled perceptually, and (b) the map reader assumes that the circles are mathematically scaled, and (c) the map reader underestimates differences in circle areas to the degree suggested by cartographic research, then the map reader will interpret the larger circle (representing 12) as representing a value twice that of the smaller circle (representing 6). As long as assumptions (a), (b), and (c) are met, the map reader will properly interpret ratios among mapped values from the ratios among circle areas.

The problem with an arbitrarily scaled map is that, when combined with assumptions (b) and (c) above, it creates an outcome in which the map reader improperly interprets differences in values across the map. In the case of the out-of-wedlock map, in which the researcher plans to exaggerate differences (to a degree greater than suggested by cartographic research for correcting perceptual error), the map reader will overestimate ratios between mapped values. On this arbitrarily scaled map, the circle representing our hypothetical value of 12 will appear to have more than twice the area of the circle representing 6. The map reader will of course think that the larger circle represents a value more than twice the value represented by the smaller circle, when it in fact does not. If the researcher wishes to provide an honest representation of the ratios between values, the arbitrarily scaled map is not an appropriate option when assumptions (b) and (c) above are met.

The researcher could take steps to manipulate assumptions (b) and (c), however. Assumption (c) would be quite difficult to discount, because it is very unlikely that the researcher could alter human perception of circle areas. Assumption (b) might prove more flexible, though. In fact, this assumption is based on convention. A map reader is likely to assume that the ratio between two circle areas is equal to the ratio between the two represented values only because of knowledge of the proportional symbol map method, either through training or through experience reading other proportional symbol maps. There is no guarantee then that every map reader will expect mathematical scaling. What is unknown, of course, is how much of the New York Times audience will make this assumption. In the absence of an explicit measure of this unknown fact, the researcher probably must assume that NYT readers will expect mathematical scaling.

If the researcher assumes that NYT readers will expect mathematical scaling, there are some steps that could be taken to break the map readers away from that expectation. A prominent legend with several sample circles is already included and is a step toward revealing the arbitrary scaling. For example, the fact that the circle representing 13.0 in the legend is obviously more than twice the size of the circle representing 8.2 should suggest to map readers that the ratios have been manipulated. To be more explicit about the arbitrary scaling the researcher could additionally provide a note in a prominent position in the map space that indicates that the circles are arbitrarily scaled and tells how their areas were determined.

good point

Even with the precautions listed above, the arbitrarily scaled map is likely to provide a less accurate portrayal of differences among map values than a conventional mathematically or perceptually scaled map. If the researcher publishes the less accurate map when a more accurate portrayal had been possible, there will be negative consequences. The researcher should keep in mind that the newspaper has an obligation to provide accurate information to its readers, and when it does not, its reputation and integrity are damaged. Even if the average reader does not recognize the inaccuracy, experts (either in cartography or in teenage pregnancy) might recognize it and their esteem for the newspaper could drop. This would affect the reputation of the researcher who prepared the map but also other journalists and researchers who publish in the newspaper.

Reputations of certain regions of the country and of particular metropolitan regions might be affected as well. To map readers who consider teenage pregnancies and births to be significant concerns, metro areas with large circles will appear to have larger

relative problems in this regard than they really do. It might make people less likely to visit or move to these cities. It might also make people more likely to visit or move to cities with smaller circles on the map, even when the differences between the actual values are much less dramatic than suggested by the map.

In addition to the long-term reputation damage and integrity issues outlined above, there might also be more tangible consequences to the misinterpretation of the pattern shown on the map. For example, policymakers in a metropolitan area such as St. Louis, which is represented by a relatively large circle, might conclude that they have a significant problem with teenage pregnancies that is not present in nearby metro areas such as Kansas City, Omaha, Indianapolis, or Des Moines. Such an interpretation might lead to unwarranted policy changes that might require higher taxes or improper redistribution of funds away from programs and departments that are focused on other (possibly more important) problems. The researcher must keep in mind that the interpretation of this map could have serious negative effects on people in these metropolitan areas.

It is important, however, to examine the researcher's impulse for using arbitrary scaling in the first place. If we assume that the only reasons the researcher would exaggerate regional differences on the map was to make the map and article look more important than they really were, or to make the map look nicer, or to save ink, the approach is certainly not reasonable. It seems, though, that the researcher is really concerned about the fact that a mathematically (or perceptually) scaled map, while preserving the proper ratios between pairs of values, fails to show a general pattern that the researcher knows to be true. The researcher might argue, in fact, that the

mathematically scaled map might breed complacency about what many would see as a major problem in areas where it really does need more attention. Perhaps the researcher thinks that places such as St. Louis, Milwaukee, New Orleans, or the cities in the Ohio Valley really do need to reassess their policies and budgets in regard to this problem, and that only the arbitrarily scaled map will effectively portray their relatively high numbers. In this case, the researcher might actually feel obligated to produce the arbitrarily scaled map, because it seems to represent more accurately the problems the researcher is keenly aware of due to experience with the problem. The researcher might feel that a mathematically or perceptually scaled map would in fact be a disservice to the people living in these metropolitan areas. Essentially, the researcher might feel that the ratios between values do not directly correspond with differences in the magnitude of the problem.

interesting discussion

The primary moral principle that should guide the researcher in making the decision about how to scale the circles is honesty. I have already pointed out how an arbitrarily scaled map does not honestly portray ratios between mapped values. But I have also pointed that the researcher might think that an honest portrayal of ratios between values does not directly correspond with an honest portrayal of differences in the severity of the problem. If this is the case, the researcher should think about redefining the variable to be mapped. It could be that out-of-wedlock births to teenagers as a percentage of all births is not the variable that best represents the pattern. Maybe the researcher knows that some of the metro areas with high numbers of births to teenagers also have much higher numbers of children in poverty and this is the reason a mathematically or perceptually scaled map did not seem dramatic enough for the

researcher. If that was the case, the researcher might consider mapping child poverty levels instead and maybe include a statistical analysis of the correlation between births to teenagers and child poverty. This, of course, is just one example of an alternative map that might satisfy the researcher's instincts about the topic. Another alternative I discussed was using the arbitrarily scaled map and being very explicit about how the circles were scaled. This option is still less honest though than a proper mathematically or perceptually scaled map. I think the researcher needs to use a conventional mathematical (good) or perceptual (better) scaling or needs to rethink the variable to map altogether. These are the only two appropriate options.

Another interesting idea

In conclusion,