L. Hamilton   November 12, 2008
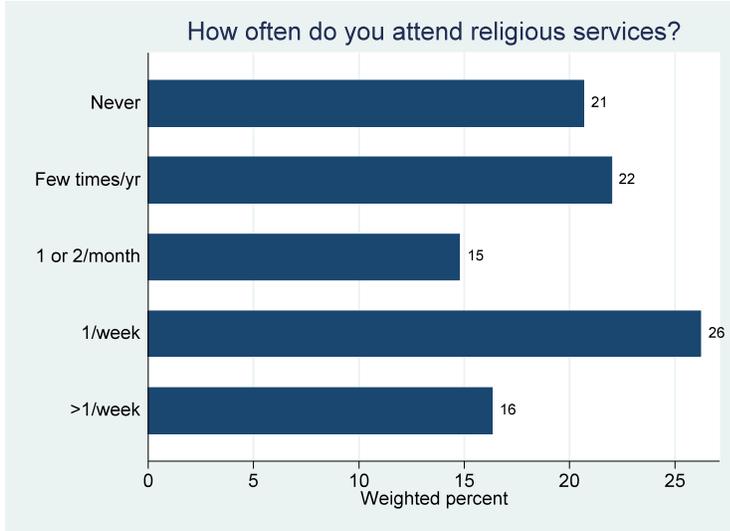Carsey Institute, UNH
CREATIVE GRAPHING

Figure 1: Frequency of religious-service attendance reported by Community and Environment in Rural America survey respondents (CERA).

Simple bar graphs often present just a few numbers (5 in this example). They do not depict relationships between variables, or invite much study.

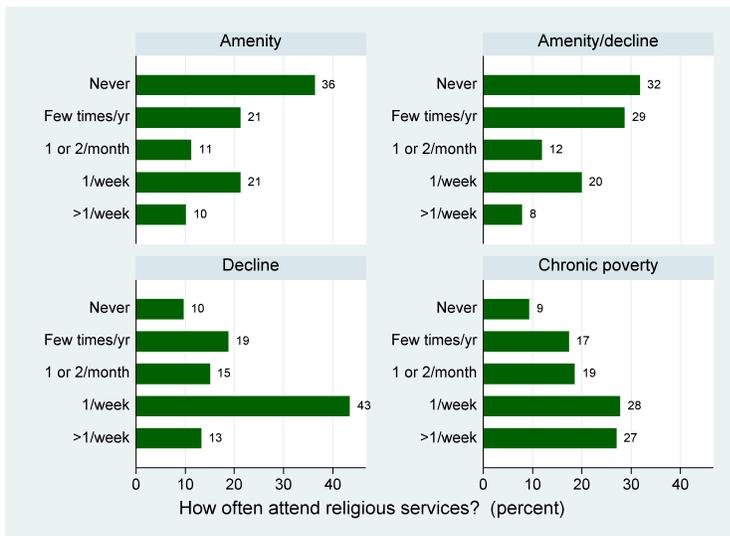The same information could be presented as clearly, and more briefly, in a simple table.

Figure 2: Frequency of religious-service attendance broken down by rural community type (*Amenity*, *Amenity/decline*, *Decline* or *Chronic poverty*).

Bar graphs become more interesting when they include two or more variables, inviting readers to make their own comparisons and observe relationships between variables.

Respondents in *Decline* and *Chronic poverty* areas were more likely to regularly attend services. Those in the *Decline* areas (Kansas farm counties) appear particularly homogeneous in their once-a-week attendance.
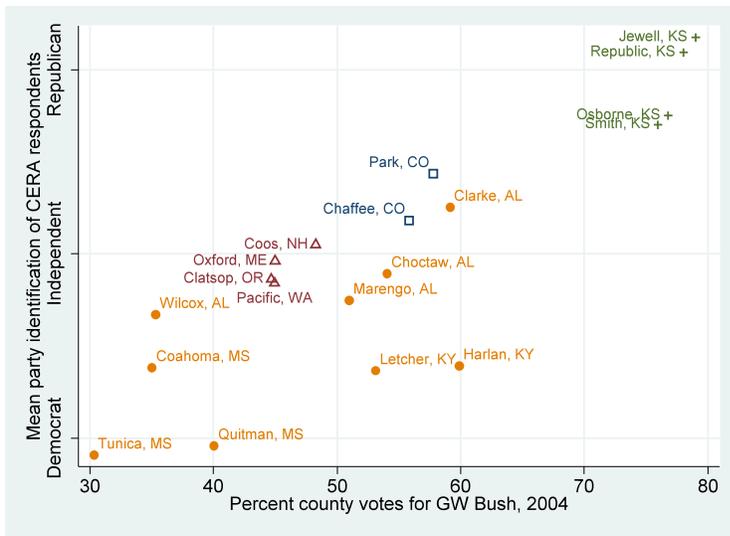
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Figure 3: Scatterplot showing mean political party identification of CERA respondents, vs. percent of that county's votes going to G.W. Bush in 2004. Symbol shapes identify county "type" (+ signs for *Decline*, hollow squares for *Amenity*, triangles for *Amenity/decline*, and solid circles for *Chronic poverty*).

Scatterplots display relationships between two measurement variables. In this example, we see a positive correlation that supports the validity of CERA survey results.

Individual points can be identified in scatterplots to add more information.
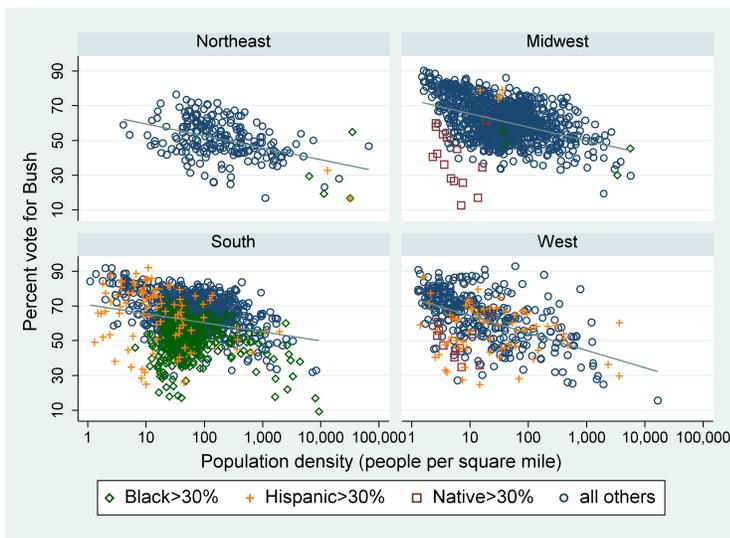

Figure 4: Each data point represents one U.S. county, graphing percent vote for G.W. Bush vs. population/mile^2 (on a logarithmic scale). Four plots ("small multiples") visually compare the vote/density relationship across regions. Color and shape of symbols identify counties with large black, Hispanic, or Native American populations.

Regression lines summarize the negative relationships. Bush received higher support from rural counties, and less from urban or high-density counties. The more complex pattern in the South, where many rural counties have substantial black populations, departs from this general rural-to-urban effect.

The scatterplots in Figure 4 visualize 7 variables across 3,000 counties — about 21,000 numbers.
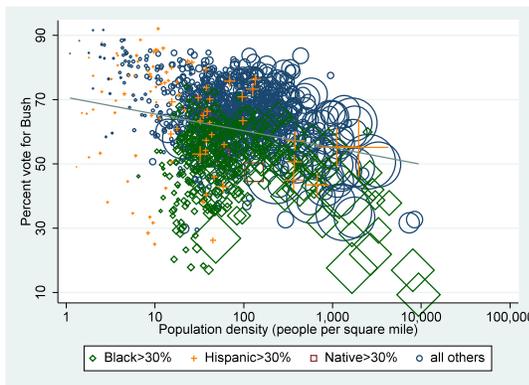

Figure 5: A closer view showing only the Southern counties (lower left scatterplot) from Figure 4. This version includes still another variable: the size of plotting symbols is made proportional to county size, or the total number of votes cast in each county.
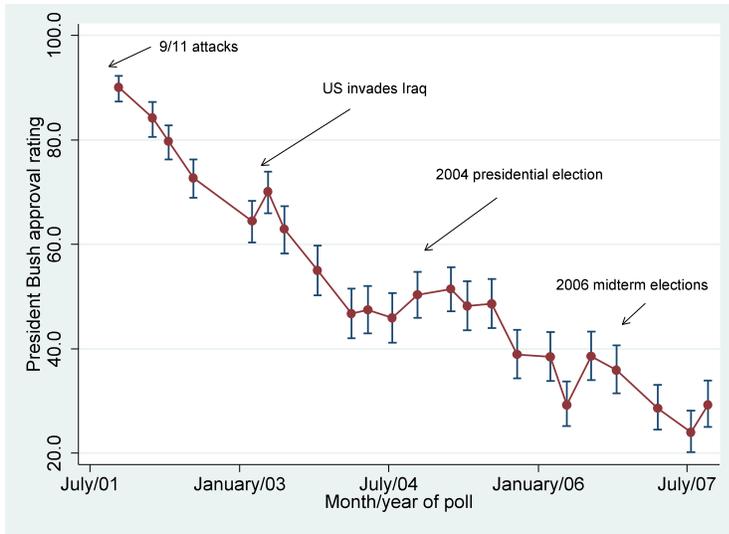
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Figure 6: Time plot showing New Hampshire residents' approval of President Bush, from a series of Granite State Polls (2001 to 2007). 95% confidence bars indicate the sampling uncertainty of each poll.

In social science, time plots work particularly well as quantitative "picture frames" within which we can tell a more qualitative story. Key events, policy changes, and so forth can be marked directly on the plot.

After July 2007, Bush's approval probably declined even further, but the Granite State Poll shifted its attention to candidates for 2008.
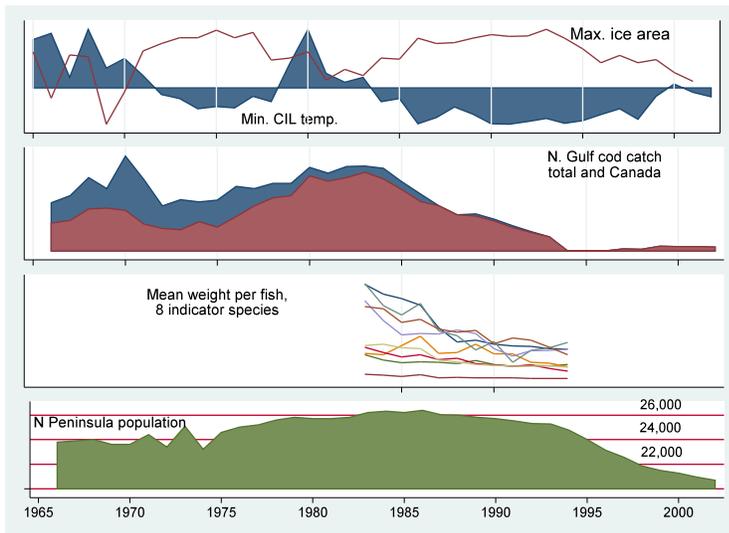

Figure 7: More complex plots can use the time dimension to integrate variables with different scales, or even from different disciplines, showing how they changed together.

This graphic depicts changes in sea temperature, ice cover, fish catches, ecosystem health and the human population around Northwest Newfoundland and the Northern Gulf of St. Lawrence, 1965–2005. Climate, ecosystem and human communities were closely linked during the early-1990s collapse of cod stocks in this fisheries-dependent region. Like Figure 4, Figure 7 compactly summarizes thousands of data points.

How to draw and edit graphs using Stata
Hamilton, L.C. 2009. *Statistics with Stata*, updated for version 10. Pacific Grove: Cengage.

For the stories behind these examples
Hamilton, L.C., R.L. Haedrich and C.M. Duncan. 2004. "Above and below the water: Social/ecological transformation in northwest Newfoundland." *Population and Environment* 25(3):195-215.
Hamilton, L.C., C.R. Colocousis and S.T.F. Johansen. 2004. "Migration from resource depletion: The case of the Faroe Islands." *Society and Natural Resources* 17(5):443–453.
Hamilton, L.C. 2006. "Rural voting in the 2004 election." Fact Sheet No. 2, The Carsey Institute, University of New Hampshire. http://www.carseyinstitute.unh.edu/documents/RuralVote_final.pdf
Hamilton, L., L.R. Hamilton, C.M. Duncan and C.R. Colocousis. 2008. *Place Matters: Challenges and Opportunities in Four Rural Americas*. Durham, NH: Carsey Institute, University of New Hampshire. http://carseyinstitute.unh.edu/publications/Report_PlaceMatters.pdf