

Social Math: A Method to Make Complex Data Meaningful

by Victor Yocco and Ashley Pulli

How We Create Meaning

EDITOR'S SUMMARY

Social math presents numerical data as a compelling story about a social issue to inspire an active audience response. The approach simplifies complex statistics by reframing them within more familiar contexts. Visual images reinforce the comparison and message, surpassing simple data presentation to offer a meaningful and informative story. Organizations seeking to stimulate response to social problems by citing powerful statistics often turn to social math. The impact of social math is strengthened by reference to numbers that are familiar, understandable and small and by alluding to dramatic events. Examples illustrate social math being used effectively and ways to improve the presentations. Key guidelines for social math include clearly defining the issue and specific focus, using reliable data, customizing the comparison to the audience, having a clear visualization and a strong call to action.

KEYWORDS

numeric data	data presentation
visual information display	information impact
images	social aspects

Victor Yocco, researcher and author at a Philadelphia-based digital design firm, is the author of more than 20 articles on research and on psychology as it applies to digital design. He has written for *A List Apart*, *Boxes and Arrows*, *Model View Culture*, *Smashing Magazine*, *UX Booth*, *User Experience Magazine* and more. He is the author of the forthcoming Manning Publications' book, *Design for the Mind*. He regularly presents at conferences on topics related to psychology and design and addressing the culture of alcohol use in design and technology.

Ashley Pulli has been a UX designer at a Philadelphia-based design firm since graduating from Tyler School of Art, Temple University, with a BFA in graphic and interactive design. She has worked on several interactive projects, ranging from tablet applications to responsive websites. She values simple, effective design that incorporates effective data visualization and that serves a strategic purpose. Pulli has presented workshops on the use of social math at a number of design-focused conferences.

Note: Portions of this article appeared in the June 2015 edition of *User Experience Magazine (UXPA)*.

Complex numerical data can be difficult to present in a way that is both meaningful and understandable to your audience. What exactly does the number of calories in a Big Mac mean to your daily caloric intake? Why exactly should you care about the amount of garbage the average U.S. citizen produces in a day? Often, design teams are tasked with making this type of data meaningful to a broad audience. Social math provides a method and a means to make data on social issues, such as water conservation (Figure 1), visually meaningful to laypeople.

What Is Social Math?

Social math is a way of using data to tell a story. Social math makes statistical and numerical data more approachable to your audience. You can use the numbers to tell a compelling story or relate them to concepts that people find more familiar. For example, think about the calories and fat in movie theater popcorn. If you wanted to explain the health impact of eating a large buttered popcorn while watching a movie, you could state the facts:



FIGURE 1. Loch Ness Water Gardens uses social math to make it immediately clear that a lot more water goes into a cup of coffee than is sitting in the cup. Replacing one cup of coffee a day with tea leads to dramatic annual savings in water use. (Credit: Loch Ness Water Gardens, www.lochnesswatergardens.com/pondblog/how-much-water/)

YOCCO and PULLI, continued

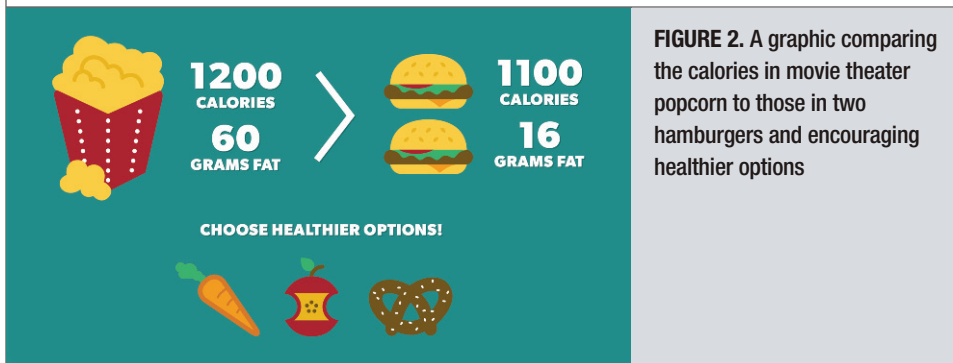


FIGURE 2. A graphic comparing the calories in movie theater popcorn to those in two hamburgers and encouraging healthier options

Eating a large buttered popcorn while watching the latest superhero-based movie at Regal Cinemas causes you to consume **1,200 calories and 60 grams of saturated fat**. This example relies on the user understanding daily caloric and fat intake. There is no easily accessible anchor for the reader to understand what 1,200 calories in one sitting really means. Is this good or bad, and why should the reader care? Can he or she have a soda with that?

You could use social math to reframe the message by saying: “The calories and fat in a large buttered movie theater popcorn are higher than the calories and saturated fat found in **two Big Macs**. You have healthier options than eating the equivalent of two Big Macs during a movie.” Most people will instantly understand that eating two Big Macs as a snack during a movie is not a healthy thing to do; neither is consuming an entire large popcorn.

Adding a visual helps communicate this information (Figure 2). The visual presents to the viewer the significant calories in these two foods, and it encourages the audience to eat healthier by recommending alternate snack options: carrots, apple or pretzel.

Visualizing social math moves beyond a simple infographic. Most infographics present data, but social math tells a story with data. Stories help explain the unfamiliar or abstract concepts that numerical data tell. Additionally, social math asks people to engage in some behavior to promote a cause. Any crafty designer could think of 10 different ways to visually display the information we presented above in a way to motivate readers to think more about their health before downing a tub of buttered popcorn. According to the **U.S. Centers for Disease Control**:

“Social math helps messages resonate with the target audience by referencing or comparing the issue’s numbers to

- Familiar numbers or costs (e.g., cost of car payment)
- Dramatic events (e.g., the number of residents displaced following Hurricane Katrina)
- Costs that are smaller and understandable (e.g., the program would cost less than the cost of a cup of coffee each day)
- Current numbers from other issues (e.g., it’s more than one-third of what we spend on prescription medication each year).”

You can see in the bullets above that the social math story must be both relevant to the data and familiar to your users. It would not be a good idea to relate something complex and vague to another thing that is complex and vague. For example, you would not want to compare the calories in movie theater popcorn to the number of rotations Mars makes as it circles the Sun. That comparison doesn’t make sense to most people.

Who Uses Social Math?

Nonprofit and political organizations have championed social math as a potential cure to the ills of difficult-to-frame numerical data. This approach makes sense; these types of organizations must meaningfully convey statistical facts about the issues they champion. Also, these organizations advocate specific stances on issues. A nonprofit organization seeking to eradicate hunger does not just want to raise awareness of issues related to hunger; it wants to motivate behavior such as donating money to provide food for the hungry or participating in food drives. Social math has the potential to be very evocative, particularly when combined with effective visual design.

Examples of Social Math

Let’s look at a few examples of visual designs using social math.

The North Carolina Justice Center, which focuses on eradicating poverty in North Carolina, uses social math to raise awareness and start a conversation around poverty. The illustration does all of that thinking for you. You don’t need to understand that 18% is 1 in 5 people. We do think the call to action here should be stronger, telling people to talk about poverty,

YOCCO and PULLI, continued

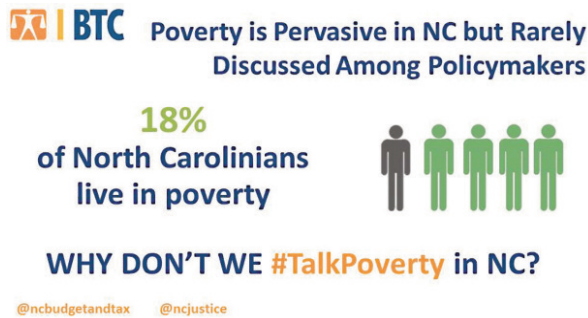
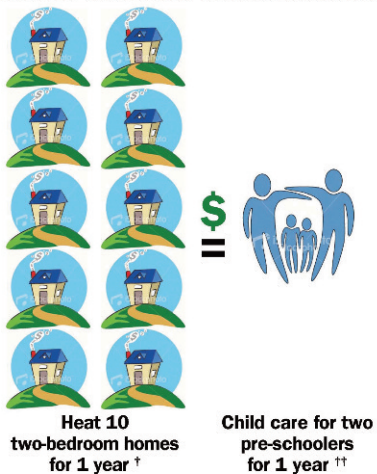


FIGURE 3. Graphic for North Carolina Justice Center's Budget and Tax Center visually displaying that poverty affects one in five North Carolinians

rather than relying on the Twitter hashtag and asking why North Carolinians don't talk about it. This leaves out non-Twitter users. Is Twitter the only place North Carolinians should discuss poverty? The visual design

FIGURE 4. Screenshot comparing the cost of heating 10 two-bedroom homes for one year with childcare expenses for two preschoolers for one year (credit: <http://conversations.marketing-partners.com/2010/10/changing-minds-social-math-stories-and-framing/>)

Math for Vermont's Working Families

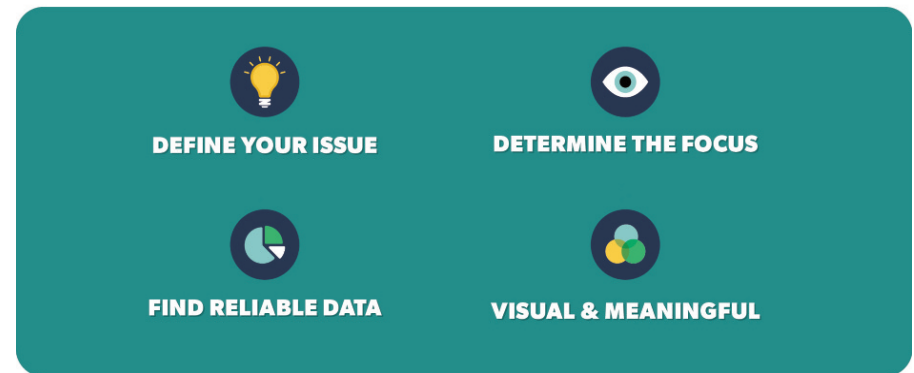


is clean and simple for viewers to take in the message. In this case, though, the effectiveness of the graphic is lost in the ambiguity of the call to action.

We found this infographic (Figure 4) for Vermont's working families cited as an example of social math on a few different websites and blogs. The visual provides a powerful message around the cost of childcare. Unfortunately, there is no call to action, and there is no easily identifiable information about which organization created the graphic. People who encounter this poster in a hallway might walk away thinking it is a passive aggressive attempt to convince them not to have children – they sure cost a lot. Again, an interesting and compelling graphic goes to waste without an effective call to action or any context for the reader to understand the purpose of the message.

There are many other examples you can find searching *social math* on the internet. We did not come across very many to effectively combine both a call to action and a visual design. This incompleteness makes sense: the history of social math is in the written message (think health care pamphlets provided at health clinics). There are many examples of how to create good messaging, including the Center for Disease Control's guide we cited earlier. These resources give us the ability to create effective messages and graphics using social math as a technique.

Let's discuss this a bit more.



How to Design With Social Math

Use the following guidelines, shown in Figure 5, to ensure your visual design creates the most effective message possible using social math:

- **Define your issue.** First you need to understand the topic you are creating your message to address.
- **Determine the focus of the data you will use for your story.** Narrow down your issue to one specific topic, so that your message is as focused as possible. Keep it simple. For example, if your issue is childhood obesity, your next step is to decide if your message will focus on nutrition or exercise but probably not both in the same call to action.
- **Find reliable data.** Use verified data from a reliable source. There are many places that you can access data, but not all of these places are

using correct data. It is up to you to research the way numbers were determined, and ultimately, you need to make a judgment call that you will stand behind the numbers someone else is reporting. Cite your sources unless you do the research yourself or create the statistic from data your organization has collected.

- In the movie theater popcorn example, the information for calories in a large Regal Cinemas' popcorn came from WebMD, which cited statistics from the Center for Science in the Public Interest. The Center for Science in the Public Interest states they sent the popcorn to independent labs for analysis. We found the information on calories in a Big Mac in an article from *The Washington Post*, which reported data provided by McDonald's.
- **Identify a meaningful comparison for your audience.** The story you tell must be familiar and relevant. If you were talking about nutrition to six-year-olds, it would not make sense to reference a concept they would be unfamiliar with such as reducing their medical expenses over time by consuming fewer calories. It would make perfect sense to reference art supplies, books, games or pets (things six-year-olds are familiar with). Think of a message about walking your dog or playing games or sports involving running as topics six-year-olds can easily relate to.
- **Tell your audience what you want them to do or think.** Don't just spin a good yarn with your social math; inspire some type of action: Learn more, donate money, volunteer. Our earlier examples showed that even well done visuals are ineffective without a strong call to action. Reinforce the call to action with your visual.
- **Double-check your facts.** Now that you've found your facts, identified your comparison and created a message, double-check your facts. Always find another source to verify your information, because if you don't someone else will. A 2005 [article](#) from the Frameworks Institute highlights examples where fact checkers found politicians were engaging in fuzzy social math. You do not want your employer or client to go from riding the high of a successful campaign using

social math-based data visualization to being the goat found using incorrect data in these same visualizations.

- **Turn your story into a visualization.** Once your facts are verified, make the information meaningful and effective beyond the facts. Find creative ways to communicate your message. Use the hierarchy of the visual to emphasize the key facts. Cater to your audience with the appropriate visual style, and they will be quickly drawn in to the overall message.

In the movie-theater popcorn/Big Mac comparison, a greater-than symbol defines the connection between the calorie totals for each item. This comparison draws the viewer into the facts, but follows up on this comparison with a call to action to try healthier options and even gives examples of these options. The visual is playful and bright and illustrates common food items a viewer can associate with. The alternate food options seem positive.

- **Refine the story.** Focus on the social math, but don't crowd your message with less important numbers or statistics.

The Takeaway: Go Forth and Social Math

Statistical data can be confusing to laypeople. You can use social math to alleviate confusion and motivate behavior. Design teams have many opportunities to reach their audiences using social math. We have given you these steps as a guideline for ensuring you cover the basics of social math. Be creative in constructing and designing your visual and message, as long as your facts are solid. These steps can serve as a checklist to make sure you won't miss anything vital before releasing your social-math-based design to the world.

Resources for Data

Climate data online: www.ncdc.noaa.gov/cdo-web/

U.S. Census data: www.census.gov

U.S. federal, state and local government data: www.data.gov

World Bank economic data: <http://data.worldbank.org>

Health data: www.healthdata.gov/dataset/search ■