Connecting Visitors to Exhibits through Design: Exploring United States census data with CoCensus

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Abstract: This study presents preliminary results from a design-based research program examining ways to engage museum visitors in free-choice inquiry with geo-referenced census data, focusing on affording connections between “big” narratives about ancestry and migration, and “little” narratives about neighborhoods and personal identity. Preliminary findings have revealed affordances and tradeoffs in key design decisions that can be incorporated into ongoing iterations of the display.

Introduction
Designers of museum exhibits can benefit from attending explicitly to the ways visitors might connect their own life narratives (“little narratives”) to particular larger, social – or “big” – narratives, through the activity that occurs in the exhibit space (Rowe, Wertsch, & Kosyaeva, 2002). We are engaged in iterative design and study of a digital exhibit for a small history museum in Chicago, which plots tract-level census data onto interactive geographic information system (GIS) maps. Maps, especially small-scale local maps, afford connections to personal narratives – locating where we live, where we were this morning, places we recognize. The map’s design plays a large role in determining the extent to which these connections are afforded. In this paper we describe some of the design decisions we have made and how they relate to the conversations visitors have had around the display in initial testing. For each decision we discuss approaches and tradeoffs considered and how they can be further iterated to support visitors’ connections between big and little narratives.

Prior Work
Some work has been done to investigate users’ interpretations and learning around complex data maps, finding that design considerations for GIS maps in educational environments affect users’ interpretations (McCabe, 2009). We build off the assumption that museums are “potentially ideal public spaces where personal, private, or autobiographical narratives come into contact with larger-scale, collective, or national narratives in mutually animating ways” (Rowe et al., 2002). Our project explored embodied interaction as a means to join these narratives (Cafaro et al., 2011), but this work focuses on visualization design.

Methods
The first round of testing took place in situ at the Hull House Museum in the spring of 2011. Ten interviews of groups ranging from 1-3 visitors were conducted. Participants were asked for the one or two ancestry categories that best represented them, and were shown two different digital maps (described below) of that ancestry data plotted on Cook County. Visitors were asked open-ended questions about what they saw in the maps and what, if anything, they found surprising or confusing. They were also asked which map they preferred. Interviews were transcribed and open coding was conducted to characterize the nature of the discussions. The first round of coding revealed phenomena of interest, and a second round of coding was conducted with a small subset of codes in order to target issues for design of ongoing iterations. Questions of interest include: How do people interpret the display and different variations of it? How does the display mediate the noticing and exploration of patterns, the connection between big and little narratives, the construction of new narratives and/or activation of existing narratives about themselves, a place, and others?

Design Consideration - Ancestry Categories
A review of GIS and design literature (e.g. Krygier & Wood, 2011) led us to use graduated symbols to represent quantities (census tract populations) and hue to represent categories (ancestries). To constrain the number of categories to a scope reasonably distinguishable on the display, we joined ancestries of smaller populations (fewer than 45,000, or roughly 1% of the 2009 population) according to the United Nations Statistical Division’s regional categories. Some visitors struggled to make sense of the categories. For example, Ashley (all names are pseudonyms) initially struggled between choosing Western and Northern European. She stated she was Irish and German, adding, “But, uh, I’m more than just that, so… Those are just smaller portions of my ancestry.” This “which box to check” confusion led to frustration about how or whether Ashley was represented. Another visitor, Elliot, stated that his father’s family was from Poland and was Jewish. Very knowledgeable about Chicago demographics, while observing the Polish data he commented, “the Catholic Poles distribution
was very much different from the Jewish Polish,” a distinction not representable with the ancestry data set. Cultural distinctions problematize the representation, potentially invoking additional “little” narratives that allow visitors to question the “big” narrative. The next design needs to balance the need to make the categories more intuitive against the desire to leverage the inherent contradictions of historical categories to prompt valuable conversations about identity.

**Design Consideration - Anchors for Place Identification**

Another design concern was the extent to assist visitors with place identification. The displays tested here included bodies of water and city and township boundary lines in the county but no other landmarks for reference. Viewing ancestry data on this map, visitors were able to identify parts of the region, including the downtown area and the suburbs, and some specific places, like Chinatown. Including the transit lines on the second map, gave participants additional orientation assistance. Interestingly, the addition of transit lines increased another phenomenon – visitors generating hypotheses. In one case, Paige stated, “Well you can see on this where people, where people moved to more, like along the lines of transportation and (inaudible) ... where all the jobs are and everything.” In contrast to the first map, now she moved beyond general characterizations of the data to connect to the lived experiences behind the data, forming theories about settlement. Future iterations, therefore, will explore how different reference points afford orientation and hypothesis generation, balanced against spuriously obscuring the thematic data.

**Design Consideration - Data Scaling**

Extreme variations in size and population of census tracts posed complicated questions regarding data symbolization. We tested two options: one with seven class breaks, one with 32 equal interval classes (see Figure 1).

![Figure 1. Natural breaks map (left) and equal interval map (right) displaying Polish population.](image)

Participants’ responses revealed inherent tradeoffs. Some preferred the natural breaks map, saying it was “more appealing to the eye” (Paula) and easier to identify patterns, but some felt it obscured the geography and other data sets. Elliot succinctly expressed his concern: “You know the (natural breaks map) kind of smacks you in the face, but I’m not sure whether smacking you in the face is something that’s misleading or not.” Preference for the equal interval map seemed rooted in its preservation of the geographic features, but the small range in bubble size also led to complaints that data patterns were hard to detect. The comments suggest that a hybrid design might be called for – using natural breaks or perhaps logarithmic scaling to separate classes but with smaller, less overlapping bubbles.

**References**


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