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At the Intersection of Mobile Thematic Cartography and Data Journalism

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Abstract:

Mobile devices are increasingly used in every part of daily life. Individuals are more likely to read the news on mobile devices than on paper or on desktop devices. Maps, too, are common both in mobile apps and browsers, necessitating design considerations specific to these devices (Abraham 2019). However, most research on mobile map design has focused on reference maps, particularly those used for navigation (Lee et al. 2022). Mobile thematic maps, despite their wide use in data journalism, are understudied in academic cartography, and are typically designed using principles from web or print cartography. While responsive design that considers both web and mobile is important, I argue for the need to make mobile-first design a priority in research (see Bartling et al. 2022 for a related call to action on mobile design).

Here, I present a literature review on mobile thematic cartography as it intersects with data journalism. I define data journalism as a field that uses infographics and related digital content to inform, guide, or compose news stories (Gray et al. 2012). In addition to developing a literature review at this intersection of topics, a range of potential cartographic research questions deserve further attention:

1. How do cartographers currently design mobile thematic maps for news stories?
2. What challenges do cartographers face specific to mobile thematic map design?
3. How do users interact with mobile thematic maps in news stories?
4. What cartographic practices are best suited to the design of mobile thematic maps for news stories?

In future work I will study the intersection of these areas because news stories are one of the most common ways the public encounters thematic maps on mobile devices. In this review I characterize the major challenges associated with designing thematic maps for mobile storytelling: responsive design, post-WIMP (windows, icons, menus, pointer) environmental factors, screen size and orientation, and accessibility. I end with a brief real-world example demonstrating adaptations to these constraints.

Responsive design: Most research in web cartography has focused on maps that are viewed on desktop devices, leading to design recommendations that take advantage of large screens accessed with a mouse or trackpad (Muehlenhaus 2013). However, with increasing use of mobile devices to access internet browsers, cartographers began to design for mobile as well, leading to the need for responsive design that can work across screen sizes and orientations (Ricker and Roth 2018). Despite an increasing focus on responsive web map design, many maps are still designed primarily for desktop viewing, leading to reduced functionality on mobile screens. Since mobile devices have more limitations than desktop devices, it may make sense to implement mobile-first design that can be adapted for desktop, rather than the reverse.

Post-WIMP environments: The way users engage with maps and other news stories differs between desktop and mobile platforms. On a desktop, users may use a trackpad or mouse to scroll down the page as needed, often pausing to hover over or click on features of the maps and graphics (Muehlenhaus 2013). However, mobile devices are post-WIMP environments with different functionality. First, users are used to constantly scrolling with their fingers, similar to interaction with social media apps, and usually at a faster speed than on desktop (Holcombe 2009). Second, users can tap on elements, but not hover, meaning there are fewer methods to share additional information with users, and users must be alerted that it is worthwhile to click (Abraham 2019). Mobile users may process less information at faster speeds than desktop users, and cartographers must design for these differences.

Screen size and orientation: In addition to the different ways users interact with mobile versus desktop screens, there are different physical components of these devices. Mobile devices are typically smaller than desktop devices, though size across mobile devices varies too. The size differences may mean mobile-first design includes less detail than could be included if a cartographer was designing for desktop-only. Individual data points must be large enough to be read, while also fitting on the screen with all other relevant information (Abraham 2019). Second, mobile devices are typically used in a portrait orientation, as opposed to the landscape orientation of desktop devices. Orientation is particularly important

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for map and graphic design; while text can easily adapt to different screen sizes, graphics may need to be designed twice, each for differently oriented screens, in order to be readable (Lee et al. 2022).

Accessibility: Accessibility should always be considered in map readability, but is particularly important on mobile devices. First, phones often have reduced computing power in contrast to desktop computers, meaning complex graphics may drain the battery on mobile or present other complications for loading (Chittaro 2006). Additionally, these stories are sometimes accessed on phone provider data networks rather than via personal wireless access, so they should not include unnecessarily complex graphics that waste data, especially for users with limited plans. Even for users with larger data plans, access to the internet is not always reliable, and complex graphics may be difficult to view when cellular services are limited. Finally, in general cartographers should design high contrast maps that are colourblind friendly; however, these design decisions are particularly important for map readability when users may be outside or lower their brightness to save battery (Loeffler et al. 2021). Additionally, as storytelling becomes increasingly visual, cartographers will need to plan to make the content accessible to blind and vision impaired audiences.

To exemplify some of the mobile thematic map design considerations discussed above, I turn to an example from the South China Morning Post (Figure 1). Here, the cartographers have created a simple map of the location of biosafety level 4 laboratories in the world. In a desktop view, the data are displayed on a map to show the 20 countries with at least one laboratory. However, in the mobile view the map collapses into a bar chart displaying only the countries with data, rather than the entire world, an effective responsive design decision that considers screen orientation and size. Additionally, in both the map and chart, the data is reduced to only the most essential information, meaning it is easy to quickly read the content of the map and come away with a clear message, even on smaller screens. Finally, the cartographers chose to display the data in a static map due to the simplicity of the data, rather than overcomplicating the information with an interactive graphic, making the information more accessible to individuals with slow connections or less powerful devices.

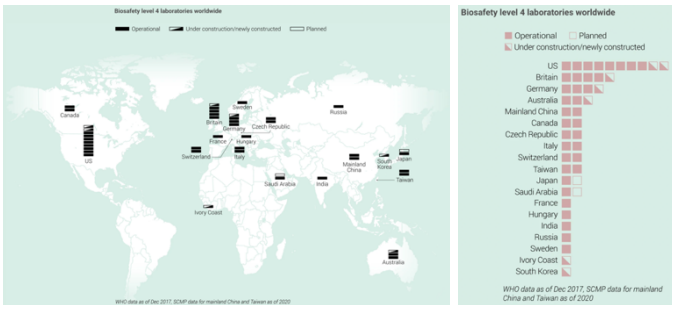

Figure 1. Data displayed for desktop (left) versus mobile (right) from the South China Morning Post (Baptista et al. 2020).

This literature review helps summarize the state of thematic mobile cartography as it intersects with data journalism. As a next step, I intend to conduct semi-structured interviews with cartographers and data journalists employed at news organizations to add to the body of knowledge on thematic mobile cartographic design, to highlight current best practices, and to reveal research challenges. Through this work, I hope to expand the academic and industry discussion on the intersection of data journalism, mobile cartography, and thematic mapping. Mobile map use only continues to increase, therefore it is important to revisit cartographic best practices with mobile-first design in mind, as well as propose novel techniques specific to mobile devices.

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