Location-Adaptive Design for Mobile Maps:

The Case of Languages and Map Labels

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ABSTRACT

This position paper argues that the role of linguistic differences between map readers is understudied yet potentially important for many mobile map use cases. We focus in particular on the design and function of map labels and provide two examples where adaptive design may be helpful.

Author Keywords

Languages; map design; mobile maps

LANGUAGE DIFFERENCES AND CARTOGRAPHIC PRINCIPLES

Cartographic principles are sets of conventions that dictate the way maps are made. Some of these have been developed through common usage as 'convention', such as rivers being blue. In other cases, these have been based on cartographic user studies, for example, to determine the most readable case for a map, such as the best sun angle for hillshading [1].

Traditionally, cartographic principles have been taught as universal, meaning they apply to the majority of the population [2]. This includes design guidelines for map labels and their positions relative to the labeled map feature [2,3]. This set of guides as communicated in English-language and European textbooks, has been based on norms and conventions developed in countries using Latin character systems. However, there is reason to suspect that these

guidelines may not be equally effective across all languages. For example, Hebrew and Arabic scripts are written from right to left, so it would make sense that preference of labelling positions of points should be reversed to the typical cartographic convention.

East-Asian languages use character-based systems, meaning information can be conveyed in fewer characters. For examples, instead of having to use an icon to depict a park, the character for 'park' could be used. The result is that symbols are less critical to depict phenomena, as characters can function as map symbols that do not then need an additional label. In addition mobile maps often have no legend, so it's particularly important to have symbols and labels that need no further explanation.

Although some studies examining cultural differences in map reading abilities exist (e.g., [4]), few explicitly examine the role of language groups on map reading. One might hypothesise that different map label designs (e.g., icons versus characters, label position preferences) will be more or less effective for map readers who are accustomed to reading different languages. Mobile maps are often used in situations where the user is experiencing time pressure or distraction, for example, when wayfinding in an unfamiliar place. They also provide the capability to adapt the map to the map user and the map use context if the user sets their phone's preferred language or the phone senses its location and auto-adjusts the design [5]. However, we don't know what is most effective for map readers from different language groups, so it is difficult to know how design guidelines should be adapted to cope with different languages.

We argue that to improve the user experience for mobile map users, we need to know more about how map designs can be adapted for map readers from different language groups. We demonstrate the potential benefits to design with two map use scenarios where adaptive design might improve the user experience.

PRACTICAL APPLICATIONS

City of Melbourne - Tourism:

Melbourne attracts a wide plethora of tourists from a variety of countries. Currently, Melbourne provides maps to these tourists that are simply translated copies of English-language maps.

If the City of Melbourne were to create a digital map where Japanese-language map labels are positioned in similar ways to what is typically seen on maps in Japan, these maps would likely be more readable to a Japanese audience. In a situation of wayfinding stress, tourists coming to Melbourne would then be able to navigate more comfortably, and on return would tell family and friends "this city was easy to get around and navigate. Maybe you should go there too." The potential flow-on effects of this are clear economically.

Google Maps - Project Dragonfly

Google Maps has been rumoured to be creating a search engine to be used within Mainland China [6]. This would, no doubt, come along with a new government-approved version of Google Maps.

If Google were to release these maps using Western cartographic conventions, the Chinese population may not be able to read these maps as easily as Chinese-made maps, and Google may not achieve the market share they desire.

Instead of just publishing Google Maps in the typical design but using a different script, the potential exists for the company to redesign their maps including in terms of icon placement and colour scheme. These

changes to the core design of their maps could change the ease of readability for a Chinese audience.

By adapting maps using cartographic conventions developed for a Chinese audience, these maps maybe more readable to Chinese users, increasing the likelihood of users sticking loyally to Google Maps and their other products.

REFERENCES

1. Biland, J., Çöltekin, A. 2017, An empirical assessment of the impact of the light direction on the relief inversion effect in shaded relief maps: NNW is better than NW. *Cartography and Geographic Information Science*, 44(4), 358-372.
2. Robinson, A 1995, *Elements of cartography*, 6th Edition, New York: John Wiley & Sons.
3. Krygier, J., Wood, D. 2016, *Making Maps, 3rd Edition*, New York: Guilford Press.
4. Stachoň, Z., Šašinka, Č., Čeněk, J., Angsüsser, S., Kubíček, P., Štěrba, Z., Bilíková, M., 2018, Effect of Size, Shape and Map Background in Cartographic Visualization: Experimental Study on Czech and Chinese Populations. *ISPRS International Journal of Geo-Information,* 7, 427.
5. Griffin, A.L., White, T.. Fish, C., Tomio, B., Huang, H., Sluter, C.R., Bravo, J.V.M., Fabrikant, S.I., Bleisch, S., Yamada, M., Picanço, P. 2017, Designing across map use contexts: a research agenda, *International Journal of Cartography*, 3:sup1, 90-114.
6. Conger, K & Wakabayashi, D 2018, 'Google Employees Protest Secret Work on Censored Search Engine for China', https://www.nytimes.com/2018/08/16/technology/google-employees-protest-search-censored-china.html.