

In Maps We Trust

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Abstract:

Perhaps the most famous adage in cartography is that “all maps lie” (Monmonier, 1991). Yet, even highly-trained cartographers can fall for a map’s veil of objectivity that obscures the numerous contexts in which they are shaped by and imbued with power. What is it about maps that makes them so easy to trust? Why are certain individuals more persuaded by a particular map? In a post-truth society where science communication is contested on many political fronts, understanding these questions is more vital than ever (Iyengar and Massey, 2019). Maps play a huge role in shaping public opinion on some of the most pressing and contested issues humanity face today, including climate change, inequality, and population growth. On the one hand, maps can be an asset to communicating science when they are accurate and trusted. On the other hand, maps have the potential to mislead people and can be used to weaponize false information. Despite the clear relevance and need to understand how and why people trust maps, recent empirical work on trust within cartography is scarce at best (Griffin, 2020). This paper helps pave the way for future empirical studies on trust and maps by surveying the literature within cartography, information visualization, human-computer interaction, and media studies on trust. I seek to answer four research questions:

1. How has trust been operationalized in cartographic research?
2. What study designs and methods have been used to study trust in maps?
3. What are the major findings of experiments that have studied trust and maps?
4. What gaps exist in the cartography/GIScience literature on trust?

To answer these research questions, I conduct a narrative literature review on works related to trust and maps. Since empirical work on trust within cartography is limited, this review also surveys publications in sibling disciplines of cartography including information visualization, human-computer interaction, and media studies.

An initial corpus of works is generated through Google Scholar searches using thematic keyword searches (e.g., trust, map, visualization) and subject areas (e.g., cartography, information visualization). These articles are then filtered based on the following set of inclusion and exclusion criteria. Publications must explicitly study trust as it pertains to maps and/or have tangible applications to cartography. This is determined by reading the abstracts of all found publications. Publications must also be peer reviewed and written in English. After filtering through this initial corpus, I use regular and backwards snowballing to find research that cites publications from the filtered corpus and research that is cited in the filtered corpus. I then filter the snowballed publications based on the aforementioned inclusion and exclusion criteria. The final corpus (Figure 1) is analyzed through systematic reading of the literature to answer my research questions.

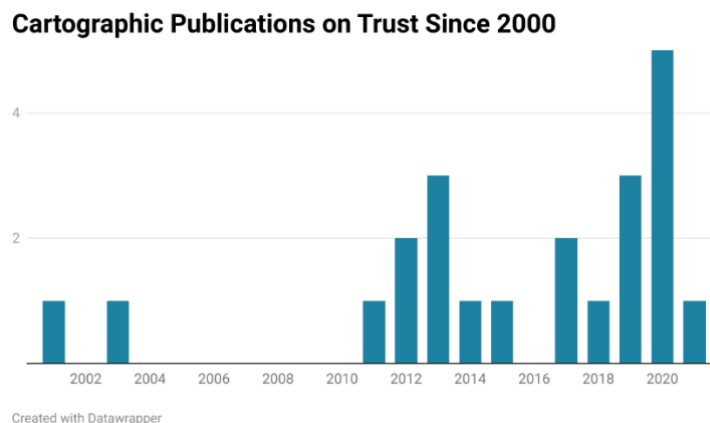


Figure 1. Publications on Trust and Cartography/GIScience per Year Since 2000

Initial results indicate that trust is largely defined as an individual's belief that a map is truthful (Kent, 2017). An interesting tension here is to examine what constitutes something as being truthful. Is something truthful if it supports prevailing ideologies at the time (Del Casino and Hanna, 2005)? Does truth mean something different to each map reader? These questions make it difficult to conceptualize and capture trust. Another set of definitions revolve around an individual's belief that the map shows what is true to reality (Muehlenhaus, 2012). In other words, does the map succeed as a referent for particular geographic phenomena. For each of these sets of definitions, trust is not explicitly defined; rather, the definition is implied through the text. Therefore, a salient gap in the literature is the lack of a consistent and robust definition of what trust means. Previous literature also fails to explore whether trust should be distinguished for thematic and reference maps. Trust in thematic maps entails believing that the pattern shown on the map reflects reality whereas trust in reference maps entails believing that something is located where it is shown on the map.

In previous research, trust has been measured using self-reporting via single-item Likert scales (e.g., how much do you trust this map) (Muehlenhaus, 2012). Single-item Likert scale items are a crude way to measuring such a complex and multifaceted concept like trust. Future research could adapt multi-item measures that capture multiple variables that constitute trust (e.g., accuracy, bias). For example, the Kohring and Matthes Scale measures trust in journalism and can be modified to study trust in maps (Kohring and Matthes, 2007). This scale consists of four factors—three of which that are relevant in cartography—selectivity of facts, accuracy of depictions, and journalistic assessment. Each of these factors has four sub-factors that are evaluated on a Likert scale. For instance, the accuracy of depictions factor has a sub-factor, *The reports recount the facts truthfully* that can be modified to: *The map depicts the phenomenon truthfully* to study trust in maps.

Overall, most of the surveyed articles did not conduct experiments on trust and maps. More empirical research on trust and maps needs to be conducted to begin to uncover the mechanisms behind trust in maps and the connections to cartographic design literature. The few experimental works on trust and maps suggest that trust may be mediated by different forms of rhetorical map styles (Muehlenhaus, 2012). Also, trust in interactive maps may be improved by including legends, providing information about data quality, and making the map frame larger (Skarlatidou, Cheng and Haklay, 2013).

Following the literature review phase of this work, experiments should be conducted that assess measures of trust in maps and whether certain design techniques affect trust in maps. Future work should analyze the effectiveness of measuring trust in maps using a modified Kohring and Matthes Scale. Evaluating the role of specific cartographic design techniques including color manipulation on trust in maps is another needed avenue of work. Finally, the concept of trust should be explicated further by other cartographic scholars.

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