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Beyond naturalism: the cartographic ontology visualizer

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Abstract:

The discipline of cartography is at the center of Western science and political philosophy. Its modern practitioners' methods and knowledge have historically aligned with a worldview that rationalizes space and classifies its features according to scientific views (Harvey, 2004). This legacy of cartographic thought has carried on in contemporary mapping practices with the rise of the information age and the expansion of geographic information systems. A critical perspective emerging in cartography and spatial data science has gained traction since the 80s, putting these aspects into question (Weissenrieder, 2023). The technical tools of mapping and spatial data systems have been democratized and used by marginalized actors to provide new views to the field. Nonetheless, adding these new perspectives has not resulted in deep transformations in how space is conceptualized and represented at the fundamental ontological level, which deals with the philosophical grounds of the nature of reality. Cartographies elaborated from the critical angle have mostly integrated alternative worldviews and subjectivities within standard visualization methods and data structures. In that sense, the practice of cartography remains anchored in a perspective that views material space as an external objective reality composed of spatial features (a natural realm) which is opposed to the domain of human life (a cultural realm); anthropologists have conceptualized this ontological stance under the term *naturalism*. This research project will explore cartography's possibilities beyond conventional naturalistic depiction by exploring other ontological perspectives.

This goal will be accomplished by using experimental methods in geo-visualization to create a new way of mapping. The developed cartographic tool would allow users to approach the complex nature of reality beyond the boundaries of traditional map-making. It will do so by highlighting the main difference between naturalist ontology and the others, which is the extension of human-like qualities into other actors, such as landforms, animals, and plants (Descola, 2014). In views other than naturalism, these elements are more than features; they are living beings with a human-like presence and agency to influence the world around them. Other ontologies perceive a world populated by different kinds of subjects, while in naturalism, a human subject is surrounded by objects. This is the crucial aspect that would be portrayed by the visualization tool; by using modern graphics technologies, particularly in animation and interactivity, it is possible to re-imagine traditional map objects into active subjects and express a different view of the environment. Maps elaborated by people who hold other ontologies, such as Indigenous communities, already succeed at depicting the world through a completely different understanding than traditional cartography. Nonetheless, these maps are incomprehensible for people not belonging to these cultural backgrounds; they require additional knowledge and context to understand their meaning. For this reason, these different viewpoints are inaccessible to Westerners, reinforcing the impression that naturalistic understanding is the only possibility.

This project builds on recent advancements in critical cartography and Indigenous mapping, where the issue of ontology has been brought into focus. Contemporary research emphasizes the importance of Indigenous cartographic practices in challenging colonial narratives and fostering a more diverse and inclusive field for cartographers (Lucchesi, 2018). This initiative brings the historical map-making traditions of Indigenous cultures to the forefront. It also encourages the development of new projects in which these communities can participate as authors and collaborators. Pioneering cartographers like Margaret Pearce (2021) have explored the complexities of integrating diverse ontologies into cartographic language. Through her collaborations with Indigenous groups, she has infused maps with elements of their worldviews, including spiritual stories and the significance of natural features such as light and shadows. Pearce emphasizes extensive dialogue and fieldwork to accurately convey local perspectives on Indigenous territories. Her research uses various media, such as pictures, images, and text, to introduce these diverse ontologies into maps. However, the visualization of geographical space remains influenced mainly by traditional naturalist cartography. The diverse ontological perspectives depicted through text and images are overlaid on conventional base maps in most of her projects.

These efforts inspire the present research, but a distinct approach is taken here. Instead of focusing on direct collaboration, the goal is to leverage existing knowledge about different ontologies to create a new visualization paradigm that opens up cartography to the ontological shift, from map objects to map subjects. The primary objective is to explore

geo-visualization's technical and design aspects, thereby transforming maps' content and graphical foundations. The visualization will be developed and tested in several steps to achieve this goal. First, a literature review will examine the propositions of ontological diversity, particularly from the viewpoint of anthropology. Next, a prototyping phase will experiment with visualization and design to recreate world representations based on these ontologies. Finally, user testing will assess the quality of the tool by engaging both users and experts in the field of ontology, such as anthropologists and geographers.

Contemporary techniques in digital cartography offer innovative tools to re-imagine mapping through the lens of ontological diversity. One significant feature to explore is animation, which allows map objects to shift and change. This dynamic representation aligns well with non-naturalist ontologies, where features are seen as possessing active agency and influence. Such an approach effectively conveys that the elements on a map are not static; instead, they have the potential to impact the world around them. Moreover, interactive actions, such as clicking or tapping, should also be considered essential tools in the project context. By selecting different components on the map, users could reconfigure the visualization and center the view based on their chosen elements. This functionality introduces a flexibility characteristic of non-naturalistic ontologies, in which non-humans are regarded as subjects with unique world perspectives.

The current project addresses the current crisis in the naturalistic paradigm. The turmoil arises from environmental degradation, with climate change becoming a significant concern. Despite widespread awareness of the issues and potential solutions to this ecological emergency, political discussions and actions have progressed slowly. If solutions to these threats are evident but remain unimplemented, the problem lies not in technology but in ideology and politics (Moore, 2015). These areas are closely connected to a fundamental ontological issue. This analysis emphasizes the need to move beyond a strictly naturalist perspective and to consider alternative viewpoints. These perspectives open the opportunity to consider diverse environmental actors and recognize these entities with the same weight as human life. Cartography can play a crucial role in this effort. By harnessing the power of maps to communicate different ways to see the world, they can become an essential tool to think critically about the relationship between societies and the environment.

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