

Cognitive Research in Geographic Information Science

Daniel R. Montello

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ABSTRACT

An area of research that has emerged within the new field of geographic information science (GIScience) concerns the cognition of geographic information. Cognition concerns knowledge acquisition, storage, and use; it includes perception, thought, memory, reasoning, problem-solving, and language. Cognitive research in GIScience thus involves cognition with and about representations of human and natural earth phenomena, with the goal of understanding those phenomena and using that understanding to solve practical problems. In other words, cognitive GIScience is the application of the multi-disciplinary cognitive sciences to problems of geographic information and the geo-sciences. Cognitive research is relevant to many issues involving geographic information: data collection and storage, graphic representation and interface design, feature identification, spatial analysis, interoperability, decision-making, geographic education, the societal context of GIS, and more. Additionally, to provide more equitable and effective access to geographic information, it must be recognized that users of geographic information are not all the same. Some of these variations among users include differences in perceptual and cognitive styles, abilities, and preferences—differences which may be grouped according to age, sex, education and training, disability, culture, or other variables. In this talk, I will overview and critique major areas of cognitive research in GIScience, including research on individual and group differences, cartographic perception and use, spatial and temporal cognition and reasoning, geographical concepts and categories, ontology and ontologies, reasoning with uncertain information, animations and multi-modal interfaces, and navigation systems. Finally, I will attempt to justify the belief promoted by cognitive GIScience researchers that many aspects of geographic information system usability, efficiency, and profitability can be improved by greater attention to cognitive research.