

Twenty-Five Years of COSIT: A Brief and Tasty History

Daniel R. Montello

Departments of Geography and of Psychological & Brain Sciences,
University of California Santa Barbara, USA
montello@geog.ucsb.edu

Abstract

In this talk, I offer a few thoughts in celebration of COSIT '14, said to be the 25th anniversary of the Conference on Spatial Information Theory.¹ I reminisce about some of the many interesting and entertaining people who have participated in COSIT over the years, and wax nostalgic over many of the incredible memories it has engendered, from Pisa to L'Aquila, and now Regensburg. Many fascinating and truly interdisciplinary explorations have occurred, and continue to occur, at this international meeting of the minds and bodies and symbol systems. I specifically touch on three of the 'curious concepts of COSIT' in my talk: *cognitive maps*, *qualitative reasoning*, and *ontologies*.

2012 ACM Subject Classification General and reference → Surveys and overviews

Keywords and phrases History of COSIT

Digital Object Identifier 10.4230/LIPIcs.COSIT.2019.20

Category Invited Talk

1 Cognitive maps

Cognitive map is a concept typically attributed to the rat psychologist Edward Tolman, and it appears he did coin the term [6], but the concept had been around for some time. In his 1913 paper, C.C. Trowbridge [7] called them 'imaginary maps'. But the concept certainly goes back long before that. Here is a quote from a Roman military commander [1], circa 300 CE:

In the first place, a commander should have itineraries of all the war zones very fully written out, so that he may thoroughly acquaint himself with the intervening terrain, as regards not only distance but standard of roads, and may study reliable descriptions of shortcuts, deviations, mountains and rivers. In fact, we are assured that the more careful commanders had, for provinces in which there was an emergency, itineraries that were not merely annotated but even drawn out in colour (*picta*), so that the commander who was setting out could choose his route not only with a mental map but with a constructed map to examine (pp. 236–237; translated from Vegetius '*De re Militari*' [Military Institute of the Romans]).

In any case, the meaning of the concept as mostly used by environmental psychologists, geographers, and planners/landscape architects treats 'map' as a broad metaphor [5], being neutral as to the specifics of its form and geometric sophistication, but insisting that people have beliefs (knowledge) in their mind about the layouts and contents of environments in a variety of formats, including pictorial, verbal, numerical, etc. In contrast, nonhuman animal behaviorists and many perceptual/cognitive psychologists, and now neuroscientists, reserve the term for what I would call a 'survey' or 'configurational' map. In other words,

¹ The entire list of COSIT meetings appears below.



© Daniel R. Montello;

licensed under Creative Commons License CC-BY

14th International Conference on Spatial Information Theory (COSIT 2019).

Editors: Sabine Timpf, Christoph Schlieder, Markus Kattenbeck, Bernd Ludwig, and Kathleen Stewart;
Article No. 20; pp. 20:1–20:3



Leibniz International Proceedings in Informatics

Schloss Dagstuhl – Leibniz-Zentrum für Informatik, Dagstuhl Publishing, Germany

in the broad sense I was schooled in, a route map or even a list of landmark images is still a cognitive map. Of course, no one can be said to have a map in the cartographic sense of a comprehensive, fully covering, metrically accurate, and consistently scaled geospatial representation – in fact, not even cartographic maps really fit that description!

2 Qualitative Spatial Reasoning

This is something that behavioral/cognitive scientists such as myself first heard about at early COSIT meetings, and discussions I had with formal modelers/computer scientists at those early COSIT meetings provide for me a stark example of the challenges of interdisciplinary communication. Part of my struggle was that the concept as used by computational modelers (e.g., [3]) seemed to me to conflate two properties of spatial information: the degree or nature of quantification of spatiality (as opposed to nonquantitative expression), and the precision or resolution of the information. After all, if I am expressing distances to the nearest 100 km, then it is both quantitative and accurate to say that any distance from 450 to 550 km is ‘500 km’; but it is relatively vague in many contexts. Also, the term *metric* typically refers to spaces – geometries – that follow the axioms of metric geometry (which, by the way, it is trivially easy to demonstrate human spatial knowledge violates regularly). At the same time, *metric* is also used to refer to metric scales or levels of measurement, which are either interval or ratio. It is in the latter sense that I insist we should describe human spatial knowledge as metric rather than nonmetric, albeit of relatively vague resolution and often relatively inaccurate.

3 Ontology

Finally, we come to the ‘O-Word’. Philosophically, this is the issue of describing the nature of that which is, that which exists. But in the 1970s, it came to mean the expression of ‘reality’ as instantiated by a computational model or information system [2]. Then that was quickly enough applied to models of reality as expressed by individual and group cognition [4], often in linguistic form; this usage gained some currency even though we already had perfectly fine terms for it like ‘conceptual system’. In my talk, I clarify the use of *ontologies* (in the plural) as a spatial-information concept by recounting a conversation between Farmer Smith and Farmer Mark.

4 All Meetings of COSIT

COSIT 0	1992 <i>Pisa</i> , Italy	COSIT 1	1993 <i>Elba</i> , Italy
COSIT 2	1995 <i>Semmering</i> , Austria	COSIT 3	1997 <i>Laurel Highlands</i> , USA
COSIT 4	1999 <i>Stade</i> , Germany	COSIT 5	2001 <i>Morro Bay</i> , USA
COSIT 6	2003 <i>Kartause Ittingen</i> , Switzerland	COSIT 7	2005 <i>Ellicottville</i> , USA
COSIT 8	2007 <i>Melbourne</i> , Australia	COSIT 9	2009 <i>Aber W’rach</i> , France
COSIT 10	2011 <i>Belfast</i> , USA	COSIT 11	2013 <i>Scarborough</i> , UK
COSIT 12	2015 <i>Santa Fe</i> , USA	COSIT 13	2017 <i>L’Aquila</i> , Italy
COSIT 14	2019 <i>Regensburg</i> , Germany		

References

- 1 O. A. W. Dilke. Itineraries and geographical maps in the early and late Roman empires. In J. B. Harley and David Woodward, editors, *The History of Cartography, Volume 1: Cartography in Prehistoric, Ancient, and Medieval Europe and the Mediterranean*, pages 234–257. The University of Chicago Press, Chicago, 1987.
- 2 Andrew U. Frank. Spatial ontology: A geographical information point of view. In Oliviero Stock, editor, *Spatial and Temporal Reasoning*, pages 135–153, Dordrecht, The Netherlands, 1997. Springer.
- 3 Christian Freksa. Using orientation information for qualitative spatial reasoning. In Andrew U. Frank, Irene Campari, and Ubaldo Formentini, editors, *Theories and Methods of Spatio-Temporal Reasoning in Geographic Space*, volume 639 of *Lecture Notes in Computer Science*, pages 162–178, Berlin, Heidelberg, 1992. Springer.
- 4 Werner Kuhn. Core concepts of spatial information for transdisciplinary research. *International Journal of Geographical Information*, 26(12):2267–2276, 2012.
- 5 Daniel R. Montello and Scott M. Freundschuh. Sources of spatial knowledge and their implications for GIS: An Introduction. *Geographical Systems*, 2:169–176, 1995.
- 6 Edward C. Tolman. Cognitive maps in rats and men. *The Psychological Review*, 55(4):189–208, 1948.
- 7 C. C. Trowbridge. On fundamental methods of orientation and “imaginary maps”. *Science, New Series*, 38(990):888–897, 1913.