SECTION FOUR

Cognition and Cultures of Mapping

4.1

Introductory Essay: Cognition and Cultures of Mapping

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Introduction

Maps are produced and used by people; they are the product of the skills and abilities of individuals embedded in particular cultures and inherently reflect those skills and wider culture. It is now widely accepted that mapping is a cognitive and embodied activity, a set of processes that people engage with in order to make sense of, and connections with, the world 'out there'. For some, mapping is an essential ability; an intrinsic cognitive function of being human (Blaut 1991, excerpted as Chapter 4.4, and Blaut et al. 2003). Regardless of whether mapping abilities are nativist or nurtured, however, maps exist in all human cultures, with maps reflecting everyday subjectivities. Wright (1942, excerpted as Chapter 4.2) explored many of the dimensions of this subjectivity, highlighting that: 'the qualities of integrity, judgment, critical acumen, and the like are as much required in the interpretation of maps as in the preparation of them' (p. 543). Maps that emerge from these subjective and social processes are deployed and enrolled in a myriad of tasks, and therefore it is perhaps unsurprising that the links between people and cartographic practices have been understood in many different ways.

   This section of the book focuses upon people, culture and mapping, and the diverse ways in which scholars have explored the relationship between maps, mapping, individuals and their social contexts and cultural meaning. The most obvious difference between the excerpts is between those scholars who focus upon individuals and their cognitive abilities to understand, produce and read maps, as against those who focus upon the cultural context within which maps are produced and used, and the wider meanings associated with mapping as a whole.

Cognitive approaches to mapping

Over the past four decades environmental psychologists and behavioural geographers have investigated the relations between individuals and their world, and the individual processing of spatial information about that world. Their focus has often been upon the development of individual mapping skills – the ability to understand, process and create maps – or upon experimental investigation of particular and carefully controlled subsets of map reading tasks (Blades et al. 2002; Downs and Stea 1973a; Lloyd 2000, excerpted as Chapter 4.9). Research informed by psychological methods has often sought to establish best practice, either in cartographic design, or in delivering optimal map skills teaching, or in establishing cognitive limits to perception (Montello 2002). Methods have tended towards controlled experiments, which simplify the complexity of real world cartographic practice, so as to build an incremental understanding of map use.

   Cognitive approaches to mapping are grounded in a number of different traditions. On the one hand, there is a body of work centred around cognitive mapping. These scholars proceed on the basis that each individual possesses a 'cognitive map' of the world; that is a mental construct

that allows them to process and synthesise spatial infor- mation and guides spatial decision and choice making. Initially popularised by Tolman's (1948) influential work on the spatial behaviour of rats, the concept remains a powerful influence on the field of spatial cognition (see Kitchin and Freundschuh, 2000, for an overview). Downs and Stea offer the following definition:

'cognitive mapping is a process composed of a series of psychological transformations by which an individual acquires, codes, stores, recalls and decodes information about the relative locations and attributes of phenomena in his everyday spatial environment'

(1973b: 8, excerpted as Chapter 4.3).

Even the most ardent proponents of the idea recognised that the existence of a cognitive map is almost impossible to prove, and treated the concept as a useful tool with which to understand how people dealt with everyday navigational and spatial demands. The notion is firmly grounded in a view of sense-making as being concerned with transmission of information, in a process of communication.

Nonetheless, the relationship between cognitive map- ping and cartography has been pursued at two levels. The first considers how maps can be used to improve a person's understanding of a place and how such information is integrated into a person's cognitive map (Butler *et al.* 1993; Lloyd 1993). The usual approach here is to compare the spatial knowledge of one group of individuals who learnt an area by traversing it with another group that learnt the street layout purely from a map (with studies showing that those who had access to the map had a more accurate and complete understanding). The second is to consider how individuals mentally engage with, understand, learn and memorise cartographic information, with the aim of deter- mining how map design might be improved in ways that make maps easier to comprehend and use. Lloyd (2000, excerpted as Chapter 4.9), for example, explores how early psychophysical experimentation, and, in particular, eye movement studies, sought to make links between percep- tion of particular symbols or parts of maps, and cognitive activity. More nuanced experimentation emerged that was grounded in a more conceptual approach to mapping, brought together in an impressive overview volume by MacEachren (1995), and the tradition continues to this day, for example in recent fMRI research visualising links between activity in different parts of the brain, and different map reading or geovizualisation tasks (Lobben *et al.* 2009).

A second strand of work is grounded in ideas of mapping as visual communication and comes from map design scholarship, in particular the work of Arthur H. Robinson. Montello (2002) suggests Robinson's *The Look of Maps* (1952, excerpted as Chapter 3.3) had a profound influence on research into map design because of the conceptual framework of visual communication that it propounded, and which Robinson's students and colleagues successfully deployed during and after his lifetime. This functional approach to mapping was justified by its theoretical grounding in a particular view of cognition, which encour- aged researchers to focus on cartographic practice as being defined by map reading (also see Morrison 1976, excerpted as Chapter 1.4; Board 1972, excerpted as Chapter 1.6).

Together these bodies of work have encouraged a number of continuing research foci. Montello (2002) sug- gests cognitive approaches to map design research probably peaked in the late 1970s and early 1980s, before the rise of GIS, and before epistemological challenges from social constructivist thought, that came to question the validity of communication as a device for understanding mapping. (See introductory essays for Sections 1 and 2.) A recent resurgence is evidenced by the establishment of a new International Cartographic Association (ICA) Working Group on Map Use and Users, and the publication of theme issues in key cartographic journals (Fabrikant and Lobben 2009; Van Elzakker *et al.* 2008). The notable diversity of new display variables offered by geovisualisa- tion is gradually being investigated (Nivala *et al.* 2008; excerpted as Chapter 4.11), although Fabrikant and Lobben (2009) are rather pessimistic about progress to date. Empirical user testing of digital map interfaces reveals them to be just as poorly designed as were many paper cartographic products investigated in the first wave of cog- nitive research into map designs forty years earlier (perhaps unsurprisingly given the relative lack of collaboration between cartographic researchers and system designers).

An ongoing second strand of research focuses upon map skills and how they are deployed by different groups of people. Here, the focus is not upon how map designs work, but rather upon map reading skills of different social groups. So, for example, children of different ages have received particular attention (see Wiegand 2006 for a useful review of this field). Gendered map use has been investi- gated (Gilmartin and Patten 1984). Mapping skills of different groups of disabled people have been observed and tested (Matthews and Vujakovic 1995; Ungar *et al.* 1997). Mapping skills in different kinds of leisure pursuit have been investigated (see Crampton 1992 on expert and novice orienteers).

Much of James Blaut's career focused on bringing together work of this kind in order to amass evidence for what he termed 'natural mapping' (Blaut 1991, excerpted as Chapter 4.4). He was seeking to establish the universal and human nature of mapping skills as a cognitive process, but also as a cultural universal (disputed by Downs and Liben 1991). Much of this work has a

1 practical or normative rational. By defining existing map
2 skills, ways of teaching improved map skills can be
3 devised.

Cultural approaches to mapping

8 In contrast to cognitive approaches, anthropologists and
9 cultural geographers have tended to focus more upon
10 everyday cultural practices, than upon individual experi-
11 ence and cognition. They have emphasised the role of maps
12 as part of a shared identity and explored the cultural
13 processes through which mapping as a practice, or the
14 cartographic artefact as an object, has come to hold par-
15 ticular meanings. The map is treated not as a neutral
16 representation or functional communication device, but
17 rather as a part of culture, with an influence upon other
18 aspects of life (Perkins 2008). As such, attention has been
19 less on the atomistic and functional elements of the map,
20 and more with the map as an object as a whole, and its
21 real world circulation and enrolling into different
22 cultural contexts.

23 It is only in the last thirty years that cultural approaches
24 to cartography have emerged as a key research field. The
25 differences from cognitive approaches are best understood
26 by referring to two papers that, from their titles at least,
27 might well be grounded in an awareness of cognition.
28 Reeves (1993, excerpted as Chapter 4.6) article, *Reading*
29 *Maps*, explores the practices of map reading in the early
30 modern European world, and the ways these changed over
31 time in different cultural contexts, with almost no consid-
32 eration of the individual cognitive processes implicit in
33 those practices. Instead, she reads changes in the *cultural*
34 practices of map reading, through carefully chosen exam-
35 ples from fine art and literature, to reveal mutability, and
36 the important social roles played by cartographic repre-
37 sentations. Her methodology depends upon historical and
38 literary scholarship, not controlled testing of human sub-
39 jects. The interpretation that emerges is one where map
40 reading depends upon the cultural context, not upon
41 cognition. Women and men read mapping in particular
42 ways, because of cultural roles and interplay of different
43 media, not because their brains dictated a particular way
44 of reading.

45 The second paper, by Orlove (1991, excerpted as Chapter
46 4.7), an anthropologist, also focuses upon *Reading Maps*,
47 and also reaches a strongly cultural conclusion, albeit
48 deploying methodologies sourced from anthropology and
49 indigenous knowledges. Here, the focus is upon the cultural
50 politics of the reading process. Instead of an emphasis on the
51 signs and symbols on the map and an investigation of what
52 they signify, as if meaning is fixed in individual processing of

information, Orlove focuses upon the social and cultural
processes through which the map reading process comes to
fix certain interpretations. Different social groups deploy
mapping in ways that reinforce their own interpretations:
instead of focusing upon the neutral fixed meaning in the
mapping, the task of the researcher becomes one of unpack-
ing the social processes around which meaning coalesces
(often contested and political in the case of Lake Titicaca
reeds; see also Chapter 5.1). There is a real world concern for
exploring how maps are deployed, instead of a narrow focus
upon the cognitive processes underpinning any reading (see
Perkins and Gardiner 2003 for an examination of the limits
of cognition). Orlove's paper was one of the first to adopt
this kind of positioned and ethnographic approach. It
reflects a growing academic concern with indigenous map-
ping practices (Peluso 1995, excerpted as Chapter 5.6;
Sparke 1998, excerpted as Chapter 5.7; Wood 2010) and
with mapping as a process (Rundstrom 1991).

This emphasis upon mapping practices echoes moves
across the social sciences towards post-constructivist
thought. Anthropological ways of approaching carto-
graphic practices now involve immersion and participatory
approaches, instead of distance and objectivity. And the
object of study is increasingly mapping practice, instead of
the fixed form of the map as a representational object.
These trends can be seen in a number of practical initiatives
and empirical studies (for example, Grasseni 2004 on the
co-construction of ideas of landscape in Italian local map-
ping initiatives; Parker 2006 on the empowering potential
of community mapping in Seattle; Perkins 2007 on the
cultural context of community mapping initiatives in
Britain). Crouch and Matless (1996, excerpted as Chapter
4.8) focus on the ambiguities of community-led local
mapping initiatives using in a Deleuzian reading of the
Common Ground Parish Map Project, with case studies of
how mapping speaks for but also responds to contested
notions of place. The changing relationships that emerge
from the interplay of aesthetics, politics and situated
mapping are all embedded in cultural contexts and
embodied practice that must be interpreted to gain real
understanding of their meaning.

These trends towards community-based and local
mapping reflect more than just intellectual fashion. They
also indicate a significant democratisation of mapping,
dating from the last decade of the twentieth century,
but with roots that can be traced back to pioneering
work by William Bunge in the 1960s and subsequently,
(Colour Plate Six, page xx) and artistic encounters with
mapping even earlier (Bunge 1971; Peluso 1995;
Wood 2010 on the rise of 'counter-mapping', participatory
GIS and artistic mapping; Pinder 1996 for an analysis of the
Situationist artistic encounter with mapping). The rise of

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community-oriented mapping reflects power perhaps shifting away from the nation-state, towards other and everyday mappers (Goodchild 2007, excerpted as Chapter 4.10).

One of the most interesting recent trends in this context has seen the rise of Web-facilitated 'crowd sourced' mapping. Instead of a centrally controlled and institutional authored cartographic product, the Web offers an infrastructure through which many people can collaborate in a shared, participatory endeavour (Surowiecki 2004; Sui 2008). These changes focus attention on the processes through which mapping emerges in complex technologically mediated systems and, together with other locative technologies (Section 2), have been designated 'neogeography' (Haklay et al. 2008). Goodchild (2007, excerpted as Chapter 4.10) is one of the first to delineate the likely impacts of these trends on mainstream cartography. His notion of volunteered geographic information reflects the GI industry perception of the trend, in so far as it discusses the potential for using peoples' data, rather than the potential for crowd sourcing to create new mapping opportunities for people that are out of the control of 'old' institutions. Initiatives like OpenStreetMap offer a new model for people to become involved in making and deploying maps, and are already approaching the data quality of many state and commercially produced maps (Haklay 2010). (Colour Plate Five, page xx.)

Research has also started to address how people relate to maps and the mapping process in a cultural and emotional sense. As a part of visual culture, maps have a uniquely affectual role to play. They evoke emotions and carry inherent connotations with them. People tend to believe what they see on a map. The medium evokes an authority, making a link between places and things that happen in those places (Wood Fels 2008 provides a discussion of the ways in which mapping of nature evokes different feelings about the natures being represented). But mapping can also have different tones, evoking pleasure (Wood 1987), arousal (Nold 2009), ambivalence (Hawthorne et al. 2008) and humour (Caquard and Dormann 2008). The affect of mapping is an emerging research focus (Aitken and Craine 2006, excerpted as Chapter 3.10; Kwan 2007, excerpted as Chapter 5.9). Harley (1987, excerpted as Chapter 4.5) describes one map sheet within the frame of which various biographies have been played out. The people making the map, the histories of the place, and indeed personal biographies of the author are all charted and reflected in the collected artefact (Perkins 2008 gives an exploration of the motivations behind map collecting). Instead of a cognitive analysis of mechanisms of map reading, this kind of research is exploring the narrative potential of mapping (Pearce 2008).

Conclusions

Both the cognitive and cultural approaches to cartography provide rich insight into the relationship between people and maps. After a brief hiatus between the mid 1980s and mid 1990s, cognitive research into reading maps and geovisualisations has continued apace, providing insights into how people learn from maps and how maps might be designed to improve their legibility and comprehension. In addition, researchers from across the humanities and social sciences have created a detailed understanding of the role of culture in the production and reading of maps and their effects on the societies in which they are used. In the second decade of the twentieth century we can expect further refinement of ideas as rapid technological changes such as Mapping 2.0 (Crampton 2009) encourage an increasing focus upon the human processes of mapping, in all their cultural diversity, along with a progressive improvement in knowledge of how affective geovisualisations might work as crafted designs.

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