From maps to neo-cartography

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Abstract
In the developing field of neo-cartography, new ways of both representing and communicating geographic information are changing the relationship between medium and consumer. Map users may now be defined as prosumers, thanks to their participation and non-expert communication in the creation and dissemination of maps. The current interactive generation of geo-referenced data and services ('mashups'), collaborative mapping ('crowd sourcing'), real-time information concerning mobile activities ('tracking') and individualized authoring of routes and places ('blogs') are all examples of this development.

The central issues are: What impacts on perception and behaviour can be identified for single users or social communities (with regard to spatial cognition and mental maps)? In what ways are these neo-cartographic map services influencing people with regard to spatial behaviour? Is consciously- and unconsciously-volunteered geographic information taken into account?

Keywords: neo-cartography, Map Morphology, Web 2.0, Prosumers, map impacts, communication

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1   Introduction

Traditional definitions of the term *map* generally encompass georeferenced and graphic representations (i.e. paper maps), with maps serving in the storage and procurement of geospatial knowledge. However, many modern maps no longer take these conventional topographic, geographic or thematic forms nor use traditional sign systems. An increase in the use of screens and mobile devices, e.g. Smartphone, has been particularly noticeable in recent years (Gartner 2009) and for which an abundance of map applications, many temporary in nature, have been developed. This paper outlines some possible patterns in the impact of new map media and their implications for the terms and definitions of neo-cartography as well as their social influence.

2   Map Morphology

In cartography, a diversification and change in map media has occurred during the last few decades: from paper maps over GIS, the appearance of dynamic and interactive Internet services and in a mobile context, up to the development of Web 2.0 applications (such as OpenStreetMap). This diversification process is not static, but is itself continually evolving.

An associated significant development (and this is not new) is that maps are no longer created only by professional cartographers. Representatives of other occupational groups (e.g. designers, computer scientists) and laymen have been involved in the practise for decades, using Desktop Mapping Systems or online GIS on Demand programs. This dynamic development has accelerated in the last few years thanks to the increasing availability of appropriate Internet technologies and mobile applications, as well as the strong penetration of the Internet to a broader population of users.

In the meantime, map users can become map producers with the assistance of new technologies in the surrounding field of Web 2.0. This change from being only map consumers to a combination of map producer *and* consumer has created so-called *Prosumers*. Even without the use of the portmanteau word, cartographers have discussed and dealt with this phenomenon in principle since the change from analog to digital cartography, as well as since the diffusion of GIS from the 1980s onwards (e.g. Bollmann 1996, Harbeck 1996 & Heidmann 1999). Discussions picked out as central themes include changes in map production and communication, new use situations of maps and analyses of the role of cartography in the present and in the future.

Technological advancement is constant. Using Web 2.0 applications, Prosumers can today make their own georeferenced data and information ('Mashups') as well as personal descriptions of routes and places (in 'Blogs')

available to a broad public user base, while contributing to corporate map production (via 'Crowd Sourcing') and the communication of real time information about mobile activities ('Tracking') (Strobl 2009).

Even during the heyday of the paper map, the term *map* itself had a variety of meanings, which varied strongly according to the context of its use. Today it seems as if it is no longer possible to talk about only *the map* - the map media landscape seeming to have become almost too heterogeneous.

A further substantial aspect in the context of map morphology is the development of maps as mass media, a characterization of maps which goes back forty years (Witt 1970). The penetration of maps within a broader range of social classes since this time has been the result of technological innovation in the printing process.

The innovations of recent years, led by the field of Web 2.0, are also characteristic in the development of maps as mass media. Maps on the Internet or those developed for mobile devices reach a further variety of social classes and more than ever can shape the behaviour and attitudes of individuals or communities, as well as opinion former. Additionally, maps can be characterized in these new use environments by their temporary nature; they vary constantly and can be adapted and removed by the Prosumers at any time.

This ephemeral character, as well as the fast and far-reaching diffusion processes of maps, has widened the human propensity for iconic representation as well as substantially increasing the storage and transmission of visual information (Gabler Publishing 2010).

This process of transformation is by no means a peculiarly cartographic phenomenon. Media systems have become so complex that to talk about one individual medium in isolation seems inadequate, while their relationship with each other is itself difficult to explain. The media industry is not by any means exclusively reserved for well-known and profitable companies or institutions; *YouTube,* for instance, animates and stimulates laymen and professional producers alike. In effect, the industry has become almost obsolete, the commercialization chain imploding with the simultaneous availability of all kinds of free channels (Leschke 2010).

Current developments in cartography in the context of *Web 2.0* have resulted in the coining of the term *neo-cartography*. This recognises recent changes in the interdependent processes of map use and production and combines "[…] neo-geographic characteristics with ubiquitous cartography and geo-media techniques. Beside a time- and space-independent access to maps and modification of geospatial data, neo-cartography takes the characteristics of transmitting media, the impact of information-content and user needs for the presentation of geospatial information into account. The new aspects of neo-cartography indicate the possibility to directly access mental imagery by using user inputs. The ubiquitous existence of maps and a public participation develop a social imagery of space that should be used for the abstracted and simplified presentation of space." (Jobst 2009, p214).

All the above describes the development of processes based upon pure observation of the past and present, with a particular focus on changes in map use, production and communication processes. Whether these changes influence individual and collective perceptions and concepts of space will be explored in the following section.

3   Examination of potential map impacts

The changing characteristics of maps that are driven by technological developments (especially their temporary nature, production by prosumers etc.) behave interdependently with changes in user behaviour. This applies particularly to user access to, and affinity with, new media - qualities embedded in everyday technology and media use. For instance, a question arises as to the effects of maps, either currently released or in production. Concepts used in media-impact research seem to be well-suited for adaptation to research into the effects of cartographically-motivated media. Here, (cartographic) communication is seen not as a complex process, but rather as a process composed of different phases of communication (see Table 1).

Table 1: Spectrum of potential map impacts (modified according to Bonfadelli 2004, Faby and Koch 2006 & Koch and Faby, in print).

Phases	Scope	Old and new questions
Pre-communicative phase *Why*, *when* and *where* does map use occur?	**Media attention**	When are maps used (daily routine, time structure)? Is it possible to distinguish between infrequent and frequent users? Are Web-based maps complementary to or competitive with paper maps? Where (in which meta medium[1]) are maps suspected or expected?

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[1] Meta medium = "application shell / shell themes" for maps, such as tourism-focused internet applications.

Phases	Scope	Old and new questions
For the production of empirical data quantitative methods appear to be suitable, particularly those of survey research.	**Motives of the media and map attention**	How purposeful is the map use? Is there a difference between the use of professionals and home users? What particular needs lead to the use of cards? How far are the needs of users met by map offers?
Communication phase This phase relates to actual communication with maps; a traditional domain of Empirical Cartography (Bollmann 2001 & Koch 1993).	**Attention & Understanding**	How is the user guided in terms of information services, which include maps? How are maps produced by Prosumers judged in terms of reliability and objectivity?
	Effects	Are there emotional media effects (e.g. by acoustic maps used in car navigation)?
Post-communicative phase What effects are triggered after map usage? Possible empirical approaches are named in the text.	**Agenda Setting**	Do (public) maps influence opinions and actions? Have certain use and topic priorities developed with the production and use of particular map offers?
	Knowledge divides	What is the extent of usage patterns of cards in different social settings? Has the "Digital Divide" led to unequal access to maps and an education gap? Do certain factors inhibit or promote the uniform spread of knowledge about maps?
	Media reality	What is the relationship between everyday, cartographic media and social realities? What is the influence of maps on the perception of everyday reality and the construction of social reality? What impact does the use of Virtual Reality have?
	Changes in stance and use	Do maps have an influence on the climate of opinions (stability vs. changes of stance)? Has the use of Web 2.0 applications (mobile maps / Location Based Services) displaced use patterns of the paper map? Does neo-cartography change cognitive maps? Does the constant use of new media (Internet, PDA) have an effect on competence in reading and understanding maps?

All these questions ask to the impact of maps. There is certainly not just one single map impact, but rather many different areas of impact, with associated effect phenomena. The methodological approach should therefore focus on the phases of the map communication process in order to distinguish these areas and associated phenomena.

Methodologically, the Post-Communicative Phase is certainly less accessible than the preceding one. Multilevel research designs appear promising, using the following: (a) Triangulation of methods, meaning a combination of the qualitative and quantitative, (b) longitudinal surveys (such as use of a long-term panel for time series analysis) to take account of the time course of map impacts, (c) multi-level surveys for the linking of personal data at the level of groups or various social subsystems.

4   Conclusion

Maps have always been models of an area and never simply a reflection of a perceived space. This is true even for today's map media landscape. They complement perceived spaces around components that would not have been perceived without maps; subjective perceptions of space are thus supplemented by different spatial structures and spatial experiences which they integrate into their own. These processes apply equally to all maps.

However, do maps created by prosumers in Web 2.0 applications (particularly those associated with virtual and social networks - especially location-based (mobile) social networking), have some distinctive features when compared to those produced by professional cartographers? How authentic, sincere or credible are they? How do these maps influence the understanding of space, or the spatial structure and behaviour of media consumers?

These questions lead to a more central question: do maps have the potential to recreate rooms as intermedia imagination matrices? It is clear that maps may be used as instruments and tools with which to invisibly influence visualization - which may well mean that through their embedding in virtual spaces, the supposedly neutral position of these spaces is negated. As a consequence, these media have the potential for both prosumers and consumers of media to support a critical reflection of the perceived.

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