

Geographic Techniques Seminar (416-650)

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Cartography leaving Geography?!

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*But most of this software is, to use my words, pretty damn dump.
Mark Monmonier about Software for Cartography [9]*

1 Introduction

Gentle reader, please moderate your high expectations about what to learn from this paper. Its origin is a seminar about advances in geographic techniques and their impact on the discipline. Only one idea will be discussed here and most naturally this was not a long research project. Instead this paper draws from the discussions in the seminar and the authors personal opinion.

1.1 Hypothesis

Cartography and GIS software will become increasingly popular with a broad audience. Similar to what happened to the art of typesetting when desktop publishing made its appearance. Scientists need a different quality from maps compared to the majority of users, which leads to divergence.

1.2 Stream of Arguments

This paper will analyze the topic from the perspective of map quality and its change with the advances in computer technology. The analogy to the desktop publishing and its influence on the quality of published paper and the transformations of publishing texts will be lines out.

New forms of maps, especially interactive maps are increasingly used. The industry will focus on that and the creation of computer tools will mostly disconnect itself from the core of geography. Geographers will still have a stake in Cartography and map-making, but it might be beneficial if they let go of the growing field of Desktop Spatial Data Software.

2 Geography as a Science

To write about the future of geography without trying to have at least a working definition about it is, of course, impossible. So exactly what is

Geography? This question is not as easy to answer as it should be. Geography seems to be in a constant identity crisis.

But one thing is sure: Geography deals with space and spatial relationships. It also focuses on spatial systems which are within the scale of a group of humans. For instance geographers will consider neighborhood maps and plant distribution, but they are usually not researching the distribution of things within one room of a building. They also deal with maps of areas up to the size of earth, but they generally stay within the biosphere and do not study the relations of every planet in the solar system. The latter seems to be more an area for physics and the former for living room designers or psychologist.

As a scientific field geography also shares the common denominator of every discipline, the scientific method. Geographers have a history to be busy with problem related more to the real life. Of course they still formulate theories and debate, publish and falsify them.

Maps have always been the traditional tools of geographers as they are the premier mean to write down and therefore conserve spatial relationships. They also aided in analysis, because the human brain can deal very good with spatial problems.

Peter Haggett approaches the present structure of geography 1983 [7] with an integrated classification consisting of spatial analysis, ecological analysis and regional complex analysis. Opposed to this is what he calls an orthodox approach of structuring geography. On page 616 he even gives a map of the subfield of geography as he perceives it.

Valid examples for things done by geographers would be climatic change research, research about urban spread and regional development. Also cultural or physical phenomena and their distribution around the world.

3 Cartography and GIS

So where does the new technology come in? We will look closer at cartography and geographic information systems(GIS).

The International Cartographic Association defines cartography, quoted in [4], as follows:

"The art, science, and technology of making maps, together with their study as scientific documents and works of art. In

this context may be regarded as including all types of maps, plans, charts, and sections, three-dimensional models and globes representing the Earth"

A highly linked site on the world wide web with a definition of GIS is maintained by the USGS reads:

In the strictest sense, a GIS is a computer system capable of assembling, storing, manipulating, and displaying geographically referenced information, i.e. data identified according to their locations. Practitioners also regard the total GIS as including operating personnel and the data that go into the system.

3.1 Analysis versus Display

One way to look at the difference GIS is making in regards of constructing maps, is the tension between displaying spatial features and analyzing them. To make maps is getting more and more easier with modern computers. As it was a massive task to create a map in the past, there was a trend to include the kind of information which is long lasting, suited towards a more universal purpose and a broader audience. The modern tool-set makes it possible to create maps for only a limited number of users and a very specific use. Up to one time interactive maps. They are used for analysis to actually explore and gain new knowledge about the study area and its features. GIS is designed for this task. Cartography traditionally deals with the proper map design for displaying purposes.

3.2 Cartography cubed:

Another method to understand the different types of map uses is MacEachren's concept of "cartography cubed", cited in [3].

The cube extends in three dimensions, namely private-public, interactivity and revealing knowns-exploring unknowns. Traditional cartography dealt with fixed public maps to reveal knowns. Visualization comes more from an analysis point of view and occupies the other corner.

3.3 Spatial Technology

With the upcoming of computer tools someone might better speak of spatial technology and as perceived in [4],p6:

"The distinction between cartography, especially thematic cartography, as a discipline and a geographic information system is increasingly blurred."

The tools allow to make maps and that is what most people want, who ask for a GIS. The ease of use let them create maps in a fast manner.

3.4 Technological Advances

Rather unspectacular is the development of computer technology enabling us for desktop map-creating. The hardware got better and less expensive. With better hardware software also flourished. For spatial application a little bit more memory and processing speed is needed as for textprocessing tasks. Printing and networking technology also progressed. Computer technology is getting universally accessable. It might even rank as household and business appliance.

4 General Computer tool influences

In this attempt to talk about the significance of technology advances in map-making towards geography, we cannot ignore that there have been major impacts on all sciences from the electronic revolution. A distinction between the general influences and the specific ones only relevant for geography is important and not always made.

Next we will just focus on the influence of the availability of modern desktop publishing systems to everyone. The point to be seen is quite simple, so it can be kept short. Basically it had a tremendous effect on the way all people publish texts today.

4.1 The case Desktop Publishing

This is the real life example of a change and a paradigm shift which already occurred and could be considered completed. Nobody questions

the "word processor" or the more advanced "desktop publishing" software and its place in the daily work. But on the other hand the revolution could not have been much greater.

A couple of years back not all mortals were able to just publish some texts. Those readers who actually used a typewriter to prepare a manuscript can tell stories about the difficulties they faced. And then this piece of midnight labour had to get to the right publisher willing to publish it. A typesetter would prepare the text for final printing. (Note that I left out tasks like editing or index creation, image and picture preparation and so forth.) The length of this process also ensured that it was a success in itself to just publish something. When the letters in the end appeared on paper a lot of people already looked over the text and they obviously must have thought that it was worth the trouble to bring it into that form.

Today, no typesetter is needed to create printed matter¹ and no one needs to look at it beforehand. It just comes out of the printer on our desk and might even be published in numbers to fly around in shopping malls.

Now everybody can enter text, even copy text parts from other electronic documents give them some appearance and print it. Typographers would make the argument that the average quality of the typesetting was lower than what could have been done by someone with their education.

One result of this is certainly the sheer amount of published texts. It also reduced the production time to allow for really fast text publishing.

4.2 On Science

No one will doubt that this had a huge impact on the scientific community as their main task is to write and publish about the conducted research. The advent of electronic text processing changed the way scientists communicated with each other. It is much easier now to just write another book or article about the subject and criticizing other people's work and oral scientific debates are a bit less common now. A whole different world of publications emerged, because the costs are so low that it is not necessary to decide as thoroughly about if a paper gets published at all. Access to knowledge and therefore learning is also affected.

¹Or to kill trees as some people say. Funny enough others were dreaming of a paperless office when computers were getting useful for bureaucratic purposes.

The art and discipline of typesetting still exists, but they are not primarily the ones dominating the format of publications or even develop the computer software for it.

4.3 A Glimpse of Internet

It does not take a genius to predict, that the changes the internet brought us will have a similar huge influence on all sciences as the uprise of desktop publishing systems. This revolution is still at its beginning though, and not even necessary to take place for the theory this paper tries to support.

See the introduction in [1] on how writing electronically will affect our understanding of text. The arguments are given for hypertext and the world wide web certainly is the most popular hypertext capable application, though not the best one.

5 Quality of Maps

Spatial data technology and software for map-making is fine, though sometimes you hear complains about the quality of maps produced with this tools and its users by cartographers. If such concerns are expressed, chances are high they are addressed towards maps created for use with the world wide web.

To discuss if these complains have some truth, we have to consider what the quality of maps means. It is done based on [5].

5.1 Absolute versus relative Quality

The more in-depth discussion of quality as influenced by ethics and aesthetics aside a more value centered view of map quality can make the distinction between absolute and relative. The implication of an absolute value leads towards the more idealistic view that an optimal map exists. This map will never be made of course, but we should try to approach it as good as possible in this view. A lot more realistic is to view the quality of the map in relation to time, space and the participants.

If you come to the second conclusion, you know that a map and the quality depends on the person and the purpose a map is used for.

5.2 Examples for New Map Uses

The uprise of technology fostered a great amount of new uses for maps. Marketing departments use it to analyze their spatial customer distribution and the potential to open new branches at certain locations. And this is only one way to apply GIS in business.

Probably on the rise are personal maps. Suited just for the need of one person and only for a limited task. You might create a little driving instructing map, so that people do not get lost, when searching for your party. Or somebody might map the ten shops he wants to go to for Christmas shopping.

Interactive maps bring another aspect to this. They might change within minutes like weather maps. But what about traffic jam maps? Already available.²

5.3 Geographers need different maps

The last section demonstrated that new map uses will probably be quite distinguished from what most geographers need for their scientific research. They will of course use the other maps for private use and even conducting research with it, but their perception of map quality will be significantly different. Comments about lower map quality of certain maps are understandable from their point of view. For other users the new maps the geographers rant about might even have a higher quality.

6 Conclusions

Fragmentation and compartmentalization come at an extraordinarily inopportune time for our discipline because they limit our ability to respond effectively to the growing demand in science and society for a more synthetic perspective, one that identifies creative linkages between the human and natural systems that govern our world.

Patricia Gober [6]

So what does that all mean for the discipline of geography? In spite of the nonexistence of a real good practical theory about predicting the

²I still have to search for an interactive night-life and store map, which shows me how long my favorite locations are open.

future, some arguments still can be made. All which can be said for certain is, that the issues in these areas will be resolved in the future:

- Convergence of Spatial Technologies

As quotes in the section about cartography and GIS already hinted upon, the new technologies will most likely converge [3]. If not for the existing cartographers, but in the eye of the public. As we can see with desktop publishing and typography, most people will not think primarily about cartography, when they think about making a map or visualize spatial information.

- Biggest Map-makers are not interested in science

There are claims [3] that the creators or users for that matter of an interactive mapping site over the world wide web are the "biggest map-makers" if we are talking numbers. These map-makers for the most part get maps which are useful for them, in their concept of map quality. Scientist being a huge portion of map users will become a smaller fraction.

- Divergence of scientific geographers and "tool makers".

If browsing through cartographic publications, you will see that the problems addressed largely deal with communication science or computer science. Compare that to the examples and our working definition of geography in the beginning. If you now add the sheer number of users, the need to create tools for them and focus on their needs, a likely scenario is, that creators of tools and even users of tools are more within their own field as they are integrated within the science of geography. If you look through [8, 2] you will see that technological questions seem to dominate. They have the scientist in mind, but we are only at the beginning of the desktop spatial software system shift.

- A new field might evolve.

When does a new field emerge? It is not easy to say and the author of this paper has not made an attempt to search through the literature for mainstream scientific answers to this question. Of course every science has subfields and supporting field within its own house.

Cartography traditionally belonged to geography for a number of reasons. They will continue to exist at this place.

But what if the room within the discipline is getting too small? Using the "house" analogy a bit longer we could suggest building a bigger house or restructure or to build a complete new one. To feel at home a house shall not grow too big, but you also want to have a couple of friends around where you work.

The author see signs that spatial technology gains from other fields, like communication science within psychology and computer science. As its importance and the demand for it rises it might be better for geography's own identity to let it go and let it form a new discipline.

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