Cartographic Perspectives

Journal of the
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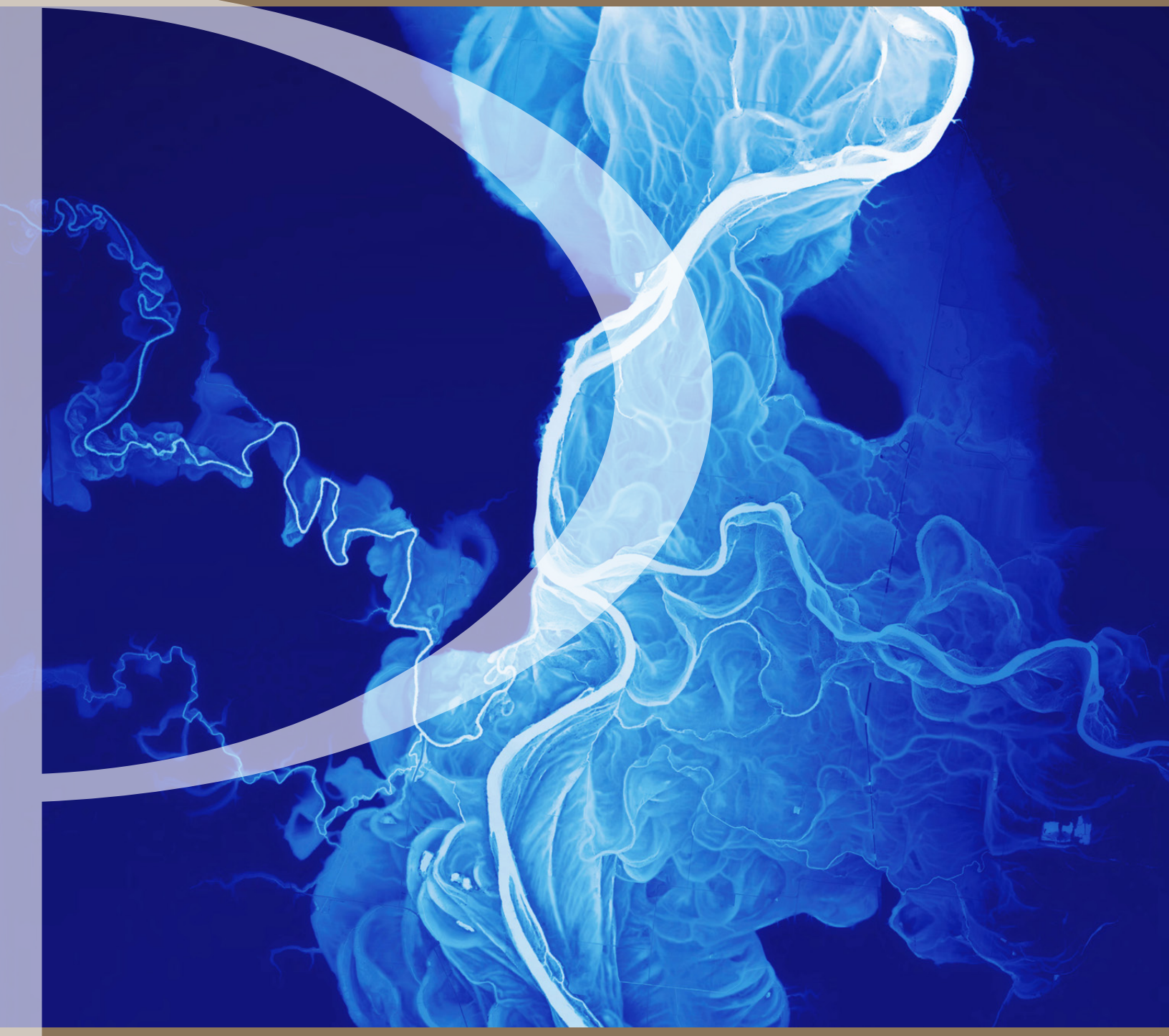
Information Society

SPECIAL ISSUE ON AESTHETICS

Number 73, 2012



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IN THIS ISSUE

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ABOUT THE COVER: Willamette River, *by Daniel E. Coe, Oregon Department of Geology and Mineral Industries. This elevation map, based on lidar data, reveals the many courses Oregon's Willamette River has has taken in recent millennia. For more information, visit http://www.oregongeology.org/pubs/ll/p-poster-willamette.htm*

WORD CLOUDS: *The word clouds featured in this issue were produced using Wordle (www.wordle.net). Complete text from each article was included.*

LETTER FROM THE GUEST EDITORS

The term "aesthetic" derives from the Greek "*aisthetikos*" meaning "sensitive, perceptive," which in turn was derived from "*aisthanesthai*" meaning "to perceive (by the senses or by the mind) or to feel."

> ***"Popularized in English by translation of Immanuel Kant, and used originally in the classically correct sense 'the science which treats of the conditions of sensuous perception.' Kant had tried to correct the term after Alexander Baumgarten had taken it in German to mean 'criticism of taste' (1750s), but Baumgarten's sense attained popularity in English c. 1830s (despite scholarly resistance) and removed the word from any philosophical base. Walter Pater used it (1868) to describe the late 19c. movement that advocated 'art for art's sake,' which further blurred the sense." (Online Etymology Dictionary 2013)***

"Aesthetic" has evolved to relate to "beauty," "pleasing appearance," and "appreciation or response to the beautiful," (Merriam-Webster 2013) and "aesthetics" is currently defined as "the theory or philosophy of taste; the science of the beautiful in nature and art, especially that which treats the expression and embodiment of beauty by art." (Webster's 2013)

These succinct and unambiguous definitions belie the ambiguous and sometimes contradictory usage of the term, in part because of the subjective nature of what is perceived as beautiful, and in part because of the broad application of the term in diverse fields ranging from art, architecture, and gastronomy to mathematics, physics, and computation. Similarly, we find ambiguity and inconsistency in the treatment of aesthetics in cartography, even though most cartographers would agree that aesthetics holds an essential, and even critical, position in the field. This special issue of *Cartographic Perspectives* aims at illustrating the diversity of approaches to the discussion of aesthetics in cartography.

This issue was spawned from a number of activities at the 2012 Annual Meeting of the North American Cartographic Information Society (NACIS), which in turn resulted from a series of informal conversations among cartographers Aileen Buckley and Jaynya Richards (Esri), religious studies professor Lillian Larsen (University of Redlands), and geospatial scientist Steve Benzek (US Army Geospatial Center—US Army Corps of Engineers). This seemingly unlike-

ly congregation of people from such diverse fields is not so surprising when it is revealed that Benzek studied cartography under Buckley at the University of Redlands and collaborated with Larsen while vthere. These four initially came together to discuss maps that Benzek and Larsen had produced together. Their objective was to provide a more accurate representation of the uncertain nature of the Apostle Paul's travels. The group's critiques of Benzek's maps morphed into explorations of how Benzek had capitalized on cartographic design to portray not only the fuzziness of the information actually known about Paul but also a feeling for the substantive and temporal nature of the theme (Figures 1 to 4).

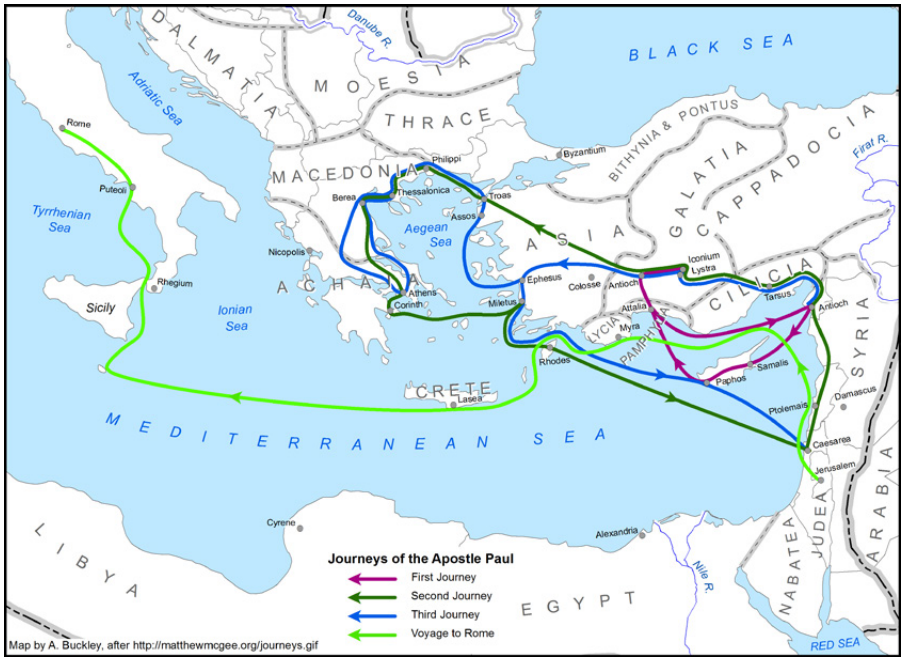

Figure 1: This map of the depicts the Apostle Paul's travels as definitive routes with implied chronology, which is an inaccurate representation of what is actually known about Paul. Map by Aileen Buckley.

Noting that aesthetics was becoming increasingly central to their discussions, the group of four searched for examples of maps that were visually pleasing but also communicated the nature of the data with high fidelity. A bounty was found, often from authors outside the field of cartography. Their desire to discuss this theme with cartographers and others outside the field led the group to approach the NACIS board with a proposal to offer a workshop dedicated to the subject at their upcoming 2012 meeting. Enthusiastic about an opportunity to promote cross-disciplinary discussion and to address the central theme of aesthetics in mapping, the board suggested that the theme be integrated into the existing structure of the conference. With a specific goal of including researchers and developers from outside the field of cartography, financial support was solicited to aid a selection of people who would not normally find themselves at a NACIS conference. Working closely with Neil Allen (the NACIS 2012 program chair), Benzek, Buckley, Larsen, and Richards organized two special forum sessions on the first morning of the conference; these were intended to set the stage for informal conversations over the next day and a half. A wrap-up session was also scheduled that would allow anyone interested in further discussions to reconvene. These activities culminated in a report to all conference attendees at the closing banquet.

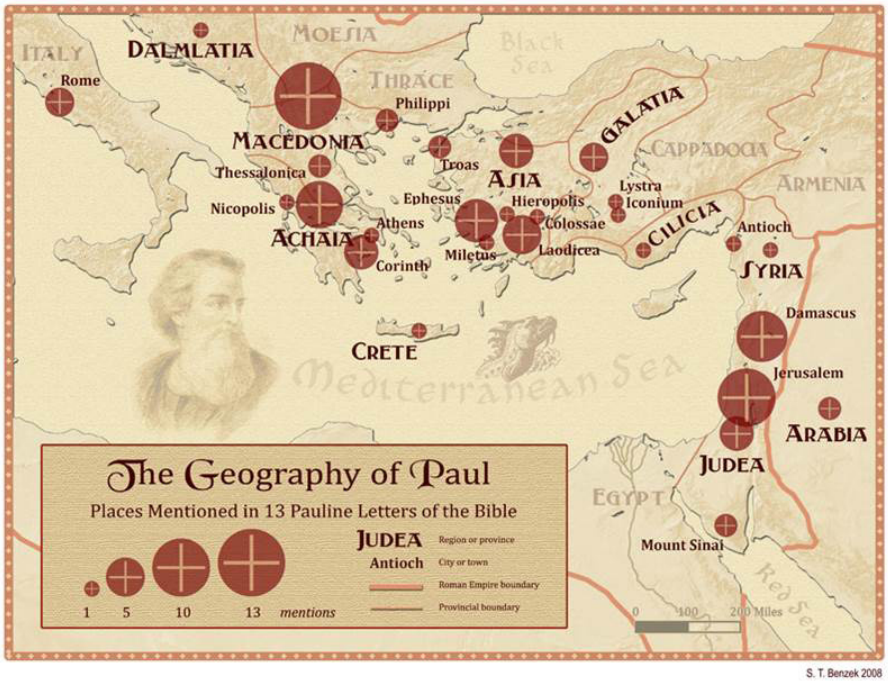

Figure 2: Replacing travel routes with graduated symbols representing citations, this 2008 map by Benzek and Larsen more accurately represents the information known about Paul. At the same time, it imparts a feeling of the historical nature of the subject matter. Map courtesy of Steve Benzek.

Figure 3: Benzek and Larsen's 2009 version of the map was again more representative of the known information and the period mapped, but the addition of the text and table at the right reduced the area for the map on the page and may draw attention away from the map. Map courtesy of Steve Benzek.

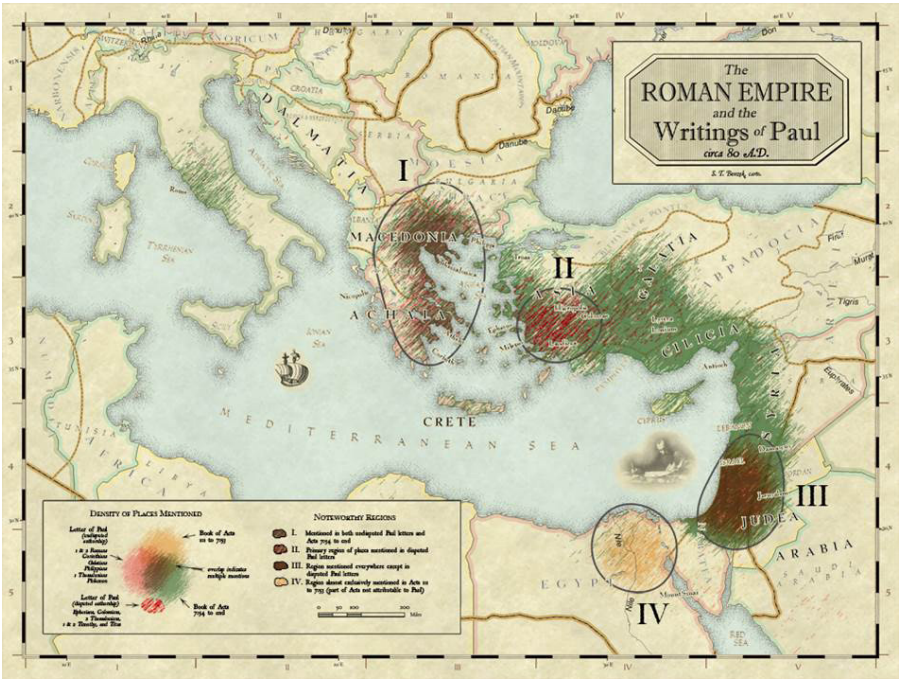

Figure 4: Benzek and Larsen's 2012 map may best represent the fuzzy nature of the information known about Paul's travels, although this became known as "The Scratchy Map" at the 2012 NACIS Annual Meeting. Map courtesy of Steve Benzek.

In the opening session, the forum organizers introduced the theme of "Aesthetics in Mapping" and laid out the agenda for the sessions. As a means of helping participants begin thinking about the subject, they also introduced a number of themes that were central to their prior discussions:

The power of maps as portals and destinations. Just as a novel or work of art can serve to inspire the imagination and transport a viewer or reader to a place, time, or mood, so too can maps.

Design principles. Visual unity, hierarchy, balance, scale, dominance, contrast, and texture are but a few design characteristics considered when creating a map. Conveying complex ideas and emotions—such as pathos, sadness, joy, anger, irony, and satire—can influence the application of these principles and create a powerful visual effect.

Iconography. The branch of art history that studies the identification, description, and interpretation of the content of images: the subjects depicted, the particular compositions and details used, and other elements that are distinct from artistic style. Elements of iconography can convey a message or particular aesthetic; iconography can be applied to improve the message, content, or impact of maps.

Tools, techniques, and technology. Graphics programs, such as Adobe Photoshop and Illustrator, in concert with mapping and imagery software, such as ArcMap, are not necessarily optimized to provide the right tools, techniques, and workflows to incorporate subtle and complex aesthetic characteristics into cartographic products. What changes and improvements could enhance the application of aesthetic considerations in modern mapmaking?

George McCleary, professor in the Department of Geography at the University of Kansas, then presented a keynote address titled "Beyond Map Layout and Design…Aesthetics?" in which he traced the development of studies in aesthetics in art, cartography, and related fields. His research

has led him to consider aesthetics as "unity in design," with the result that the map "looks right" and "works."

Presentations were then delivered from invited participants with three different perspectives from outside the field of cartography. Johannes Moenius, director of the Institute for Spatial Economic Analysis in the School of Business at the University of Redlands in California, presented his work on spatial economic analysis with special emphasis on his application of GIS and visualization to the effects of technical standards on trade flows and the dynamics of comparative advantage. Elijah Meeks, digital humanities specialist at Stanford University, discussed projects that he has worked on that give Stanford faculty access to project design, visualization, and software development oriented toward the creation of digital scholarly media. He demonstrated a number of projects including the Republic of Letters (**republicofletters.stanford.edu**) and Orbis (**orbis.stanford.edu**), a geospatial network model of the ancient Roman world. Larsen and Benzek presented jointly on their project to map the travels of Paul the Apostle.

Stuart Allan, of Allan Cartography and Benchmark Maps, and Nathaniel Kelso, of Stamen Design, then offered commentary on the presentations. Subsequently, the floor was opened for discussion, which was quite lively given the large number of attendees and the interesting topics that had been presented.

After a short break, the session continued with presentations from two longtime NACIS attendees, Mark Denil (National Ice Center) and daan Strebe (Mapthematics, LLC). Denil kicked off the second session with a presentation titled "Style and Taste," in which he defined style as a collection of appropriate choices of graphic elements, which can therefore be "parameterized," whereas taste requires selection and arrangement of the style choices. Strebe followed with a presentation titled "The Impotence of Maps, or Deconstructing the Deconstruction of Their Construction," in which he offered a number of somewhat controversial views, including the decreasing importance of maps and the suggestion that not all maps should be made for all people. These presentations set the stage for an extended discussion with the audience and the presenters. The room was rearranged to support a forum with the invited participants, along with Allan and Kelso, at the front of the room. Audience members were then invited to question the forum participants or offer their own comments and observations.

The afternoon of the second day, an open session for those interested in furthering the discussion was offered in the informal setting of Stanford's Restaurant across from the conference venue. Participants included Benzek, Buckley, Denil, Larsen, McCleary, Meeks, Strebe, Dave Imus (Imus Geographics), Mary Edin (City of Portland, Oregon), Sven Fuhrmann (Department of Geography, Texas State University), Joshua Greenburg (Skagit County, Washington), Iain Crawford (US Department of State), Karen Cook (Spencer Research Library, University of Kansas), and Mark Kumler (GIS Program, University of Redlands). Discussions over appetizers, wine, and beer were lively, and it was clear that the subject of aesthetics and mapping is of great interest to many in the NACIS community as well as outside the cartographic mainstream. There was general consensus that one of the most productive and useful outcomes of the events was the opportunity to bring together members of the NACIS community and participants from outside the field of cartography to discuss a theme of shared interest.

At the closing banquet, Buckley recapped the events and shared a summary of the various discussions, which was challenging given the breadth of topics explored and variety of views held. Recurrent themes included the following:

What does "aesthetics" mean? Does it matter if the term is not defined specifically? This conversation was spurred by many comments from audience members and forum participants, but in particular McCleary's keynote presentation on the historical development of aesthetics in various disciplines, as well as his reference to Leland Wilkinson's definition of aesthetics as "perception."

Is aesthetics akin to informational fidelity? This discussion was sparked by Larsen's view that the "beautiful map" was the one that most accurately depicted the nature of the data and was therefore graphically elucidating. For these types of maps, *what* you are showing is in sync with the *data*.

What role does graphical fidelity play in the consideration of aesthetics? This conversation was triggered by Gordon Kennedy's (Washington State Department of Transportation) comment about making maps that look historical by using techniques that were used at the time. He suggested that *how* you are showing something has to be in sync with *what* you are showing.

There was quite a bit of discussion relating to "The Scratchy Map" (the 2012 map of the journeys of Paul the Apostle by Benzek—Figure 4). A central topic was the use of mapping techniques that automatically allow the reader to perceive the true nature of the data, which are especially useful for "uncertain" or "incomplete" data. There was also discussion of the concept of an "aesthetics slider," which some people found disturbing.

The topic of clarity as a requirement for aesthetic design was also raised. Imus remarked that in his experience, clarity often leads to people finding a map aesthetically pleasing. Furhmann questioned whether "clarity is for map readers who don't have time" and "aesthetics are for people who do have time."

Also discussed was the subject of aesthetics in situations that give the control to the map user. This conversation was spurred by Meeks' presentation on mapping complex data in a compelling and understandable manner using an interface that allows users to control the display. This raised the issue of the effects of multiple perspectives and modular approaches on the aesthetics of the maps.

Participants also discussed the need to get peoples' attention (i.e., "the business case for aesthetics"), which was the theme of Moenius's presentation on aesthetics for maps of economic variables.

The subject of map critique was also raised when Martin Gamache (National Geographic Society) asked about teaching critique methods in schools. Cindy Brewer (Pennsylvania State University) responded that the goal of teaching critiques is to shape students' understanding of what a good map is rather than ask their opinion about good map design because they do not yet know what "good" map design is.

Strebe's presentation "the Impotence of Maps" sparked a lively discussion about the utility of maps. He also questioned the authority of maps and whether cartographers can or should disregard some audiences for some maps.

As a result of these events, this special issue of *Cartographic Perspectives* was organized around the theme of aesthetics in mapping. Bernie Jenny, assistant professor at Oregon State University, offered to co-edit the special edition with Buckley. The result is this timely and timeless collection of papers. Authors for this issue were offered a range of publication formats including full papers,

reviews, opinion pieces, design studies, and more; the result is a heterogeneous collection of formats. The issue also offers a range of viewpoints, reflective of continuing and fruitful discussion around the theme of aesthetics.

The issue opens with a selection of opinion pieces. In "Cartographic Design and Aesthetics FAQ," Alex Kent, Ken Field, Jenny, and Anja Hopfstock provide a "brief introduction to aesthetics and its relationship with cartographic design" through a set of carefully selected questions whose answers are aimed at providing some concise definitions for mapmakers. Nat Case considers what it means to make a beautiful map in "Function and Beauty." Truly beautiful maps are expressions of things that people want and need rather than works that are dressed up to look good to the client. In "A Lay Mapmaker's Perspective on the Dilemma of Cartographic Design," Moenius views aesthetics as the marketing of the map, which must be balanced with accessibility, accuracy, and astounding content—a balance that must ultimately result in a map that meets the consumers' needs. He concludes that "a map should not be designed so that the message it has can be understood, but rather so that it cannot possibly be misunderstood." Strebe re-presents his NACIS talk in "The Impotence of Maps." He reminds us that not everyone needs maps and that maps are no longer central to the acquisition of information. No longer a "primary authority," a map is now "a visual artifact representing information that is encoded elsewhere as digital structures." Given that maps have moved from the center to the periphery, Strebe suggests that giving up the idea that everyone needs a map allows us to focus our map design efforts on those who do need them.

In the next section, four featured articles are presented. In "Understanding Aesthetics in the Mapping and Counter-Mapping of Place" Kent explores the function of aesthetics on the cartographic representation of place. He analyzes the aesthetic value of state topographic maps and suggests that the most effective maps are those that use the aesthetic language of cartography to "express their subject in such a way as to create in the mind of the user an attitude appropriate for engaging with its subject." Sidonie Christophe and Charlotte Hoarau also examine topographic map design in their article "Expressive Map Design Based on Pop Art." Their approach involves the use of inspired sources in select artistic domains, such as Pop Art, to "enhance the expressive and aesthetic properties of personalized maps." Denil revisits his NACIS presentation in "Style and Taste." He explores key concepts, such as aesthetics, clarity, style, design, taste, and what he calls "mapicity." He defines style as "a set of appropriate choices afforded by the schema of mapicity" ("that quality of map-ness that makes a map a map") and taste as "the ability to perceive and distinguish stylistic features and aesthetic dimensions." Together, style and taste have the ability to elevate a map to the position of an "aesthetic benchmark" and thus expand the scope of "mapicity." Fuhrmann takes a practical approach in "Undergraduate Geography Students Define Aesthetic Maps." In his study, naïve map users were questioned about what they found aesthetically pleasing in maps. His results indicated that clarity and "being visually pleasing/attractive" were key, but he also reports on a "possible aesthetic paradigm shift towards mobile and other interactive, web-based spatial representations." In "The Aesthetic of Maps," Anne Cristyne Pereira and Flávio Anthero Nunes Vianna dos Santos review Jan Mukařovský's theory of aesthetics and aesthetic function (existing to be perceived by the senses) as a basis to distinguish between artistic objects and aesthetic objects. They suggest that the use of a map is what will differentiate it as either an aesthetic object (a practical object for which aesthetic function is of secondary importance) or an artistic object (a decorative object for which aesthetic function is of primary importance).

In the third section, *Visual Fields*, Stephan Angsüsser describes the aesthetics of the hand-drawn Beijing-Shanghai high-speed railway map. He uses this map to demonstrate how aesthetics in mapping is partly related to the mapmakers and the map users and their "individual and cultural peculiarities," and he concludes that some "aesthetic codes" are also cultural codes. Imus and Paula Loftin reflect on the relationship between clarity and beauty in "The Beauty of Clear Communication." Using the *Essential Geography of the United States of America* map as an example, they explore how "clarity creates visual harmony." They suggest that users who think a map is beautiful are "unconsciously responding to the beauty of clear communication."

A final article by Field describes the International Cartographic Association's Commission on Map Design, which was formed in part to explore issues of "the value of aesthetics in map design." The goals and related activities of the commission are reviewed, including the commission's support of the NACIS activities that resulted in this special issue of *Cartographic Perspectives*.

In retrospect, a large number of people were involved in the development of this special issue. The four original organizers, Benzek, Buckley, Larsen, and Richards, were instrumental in prompting the series of events that led to compilation of this special issue and for organizing the activities at the 2012 NACIS conference. Financial support, provided by Esri, the University of Redlands Keck Foundation, NACIS, and the International Cartographic Association's Map Design Commission, allowed us to offer travel assistance to 10 participants. NACIS (in particular Neil Allen, Lou Cross, and Susan Peschel) must be thanked for facilitating the collection and disbursement of the funds and for providing the venue and logistical support for the events at the 2012 conference. The invited participants provided the sought-after perspectives from other disciplines and enabled excellent cross-disciplinary discussion. The session presenters, discussants, participants, and audience confirmed the interest in this subject and advanced the discussion.

Jenny was primarily responsible for editing this special issue, from finding reviewers through channeling drafts and reviews between the authors, reviewers, and journal staff to arranging the papers in their final order. Enormous credit must be given to the authors for their efforts and expertise resulting in the exemplary papers in this issue and for their careful revision of the papers as they went through anonymous reviewing and the production process. The anonymous reviewers must be thanked for their thorough critiques, carefully considered comments, and timely responses. The *Cartographic Perspectives* staff was supportive and professional. They must be thanked for their trust in us as guest editors. Editor Patrick Kennelly stoked the fires with a gentle yet persistent hand to keep the process alight. Assistant editors Daniel Huffman, Robert Roth, and Laura McCormick brought the papers to life and made this issue "real."

Thanks finally go to you, the readers, for your interest in this subject and your exploration of these papers. As with maps, we recognize the need for journals to get peoples' attention. For maps, we know that aesthetics helps, so we try to incorporate that into our design. With journals, high quality helps, so we did our best to assure that for this special issue. We hope you will find these articles useful, enjoyable, and thought provoking.

Respectfully,

Aileen and Bernie

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Cartographic Design and Aesthetics "FAQ"

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In this paper, we aim to provide a brief introduction to aesthetics and its relationship with cartographic design. We will not explore the topic in any detail or discuss problems associated with the creation of "rules" of design, but will instead focus on providing some concise definitions for the benefit of practicing mapmakers, especially those who are unfamiliar with the concept of aesthetics. We hope that these will encourage a greater appreciation of this under-researched topic and its significance within cartographic practice.

WHAT IS ALL THIS ABOUT DESIGN AND AESTHETICS IN CARTOGRAPHY AND WHY ARE THEY IMPORTANT?

Maps are created for many purposes, from navigation to nostalgia. If we are concerned with good cartographic design, we are interested in making maps that are more effective in serving their purposes, both in how they function and in how they look. Design is therefore relevant to many general elements of the map, such as color, typography, generalization, visual balance, and layout, as well as the character and shape of the symbols themselves. Simply put, good design is getting the balance of all the graphical elements on a map to work harmoniously. It is also important to consider that function and appearance are intertwined. The function of a map will drive many of the design considerations the cartographer makes, but beyond that there is also considerable scope to address the look and feel of a map. In cartography, aesthetics is about the visual effect of a map—its particular "look"—which is constructed from the interplay of the graphical elements.

Aesthetics is a highly debated issue; opinions are strong and varied and there are no universal rules, even though when we say a map is "beautiful" we believe that others ought to agree with us.

IS THERE A WAY TO MEASURE OR QUANTIFY THE QUALITY, OR EVEN THE BEAUTY, OF A MAP'S DESIGN?

It is notoriously difficult to test the quality of a map's design or beauty with any rigor, let alone establish some concrete, quantitative rules. However, tests in other fields, such as the psychology of face perception, have found that it is possible to identify certain characteristics which people find pleasing across races and cultures (Bruce and Young 1998). There is a huge amount of similar research waiting to be done in cartography. When people look at maps they often reveal their likes and dislikes. It may not be possible to quantify this rough analysis, but seeing how people interact with maps may provide some good indications. Can they find out the map's central theme easily? Do they understand its symbology? Do they show excitement, intrigue and a desire to explore? How people react to and interact with a map usually reveals something about how the map is performing, so there is much to learn from looking at this more closely.

I CREATE MAPS, BUT WHY SHOULD I CARE ABOUT DESIGN AND AESTHETICS? I HAVE ALL MY INFORMATION ON THE MAP, SO WHY SHOULD I WORRY ABOUT WHAT MY MAP LOOKS LIKE?

As most maps are made to be used by people other than their creators, cartographers need to be conscious of the needs of map users. If we want to communicate a particular message through a map, its overall aesthetic can help to convey this message by influencing how users interact with the map and their perception of the information it contains. Understanding how aesthetics influences map reading and perception can help us to design maps that are more effective and engaging. This does not mean that maps have to be regarded as beautiful—they may use a grotesque or even repugnant aesthetic to communicate a theme effectively. Many good analogies can be found in the design of other objects, such as cars, furniture, or buildings. While we might agree that some designs exhibit a higher level of functionality than others, we may not agree that all are aesthetically pleasing. Architecture, especially, frequently challenges our notions of how form and function work together. Some architects have attempted to put form above function with controversial results, while others seek greater a unity of form and function in their designs. Sometimes we describe our own feelings towards designs using emotive language, often with the expectation (however irrational) that others will agree. All of this can only offer a glimpse towards understanding the value of aesthetics in mapping, which not only encourages greater diversity, but also leads to maps that challenge and inspire.

HOW CAN I FIND OUT WHETHER MY MAP IS WELL DESIGNED? HOW CAN I IDENTIFY THE POORER ELEMENTS ON MY MAP THAT NEED TO BE IMPROVED?

Cartographers tend to say that their design "looks right" when they have arrived at a solution, meaning that these decisions are based on intuition (Robinson et al. 1995; Kent 2013). This would suggest that if something doesn't look right, it probably needs to be reconsidered. Of course, reducing a keen sense of aesthetics and good design to "intuition" implies that the process is much simpler than it actually is! Sharing work and learning what works is vital. It is always a good idea to run fresh designs by a friend or colleague—the best maps are usually tempered by external scrutiny. These are helpful first steps, but making contact with cartographers and makers of good maps, or posting work on an online forum, such as CartoTalk (**cartotalk.com**), might yield more valuable advice. They should be able to provide higher quality feedback, pass on some useful tricks, and pinpoint certain aspects of the map that possibly need attention. But aside from cartographers, it is also worth obtaining feedback from potential users, perhaps by conducting a focus group to identify areas for improvement. It is all too easy to design maps for ourselves and neglect our users—we can often be surprised to discover what works for them (and what does not!).

I WANT TO LEARN MORE ABOUT AESTHETICS TO CREATE WELL-DESIGNED MAPS. HOW CAN I GET BETTER AT THIS? (AND DON'T TELL ME TO TAKE A COURSE, GO TO A CONFERENCE, OR HIRE A CARTOGRAPHER!)

By far the best approach is to look at as many maps as possible to see how cartographers wield this "aesthetic language" to help convey a theme or tell a story—look at the techniques they employ. With time, this experience will help you construct a visual compendium of examples that can inspire future mapmaking. A good place to start is the set of examples on the ICA Commission for Map Design's web site (**mapdesign.icaci.org/map-examples**); visual compendia such as Rendgen and Wiedermann (2012) and Field and Demaj (2012), can also be useful. Conversely, look at what others point to as bad mapping and try to understand why people take that view. Learning what not to do with maps is part of the process. But don't just limit this to maps—it is possible to find inspiration everywhere. Looking afresh at nature, especially, can provide a wealth of ideas for considering how, for example, colors or patterns work together to create new effects and help to visualize data. Experiment and enjoy: work out new styles, find some favorite map types, and discover whether their aesthetic can be replicated or developed. Nothing beats trying things out in different ways. Many people follow a very specific path in building their map (usually owing to the particular way in which a piece of software encourages working). Try and break free, and don't dismiss the idea of sketching out some different ideas before getting started. Use them as a blueprint but don't be afraid to modify what is being done. Rather than it being a strict code, there is room for serendipitous discovery when making maps, and often some of the most unlikely changes or modifications bring a whole new aesthetic. Exercising control is also important—there is such a thing as over-designing—but the goal should always be to get the balance right.

HOW CAN CARTOGRAPHERS IN ACADEMIA FURTHER THE UNDERSTANDING OF MAP DESIGN THROUGH RESEARCH ACTIVITIES?

There are many aspects of this huge topic that require research, especially in understanding how different users respond to different map designs. We must recognize that different users have different needs, abilities, experiences, habits, and personalities (see Dodge et al. 2011). Of course, map design isn't restricted to the realm of academia. In many ways the development of cartographic practice is now far more active in industry with large software companies driving technological development. It's important to realize that collaboration between academia and industry is vital. Bridging this gap can only be good for cartography. The work of the ICA Commissions, such as those on Map Design, Art and Cartography, and Use and User Issues, are all actively engaged in research into map design and there are plenty of opportunities to discuss and pursue new activities.

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Function and Beauty (In Defense of Useless Maps)

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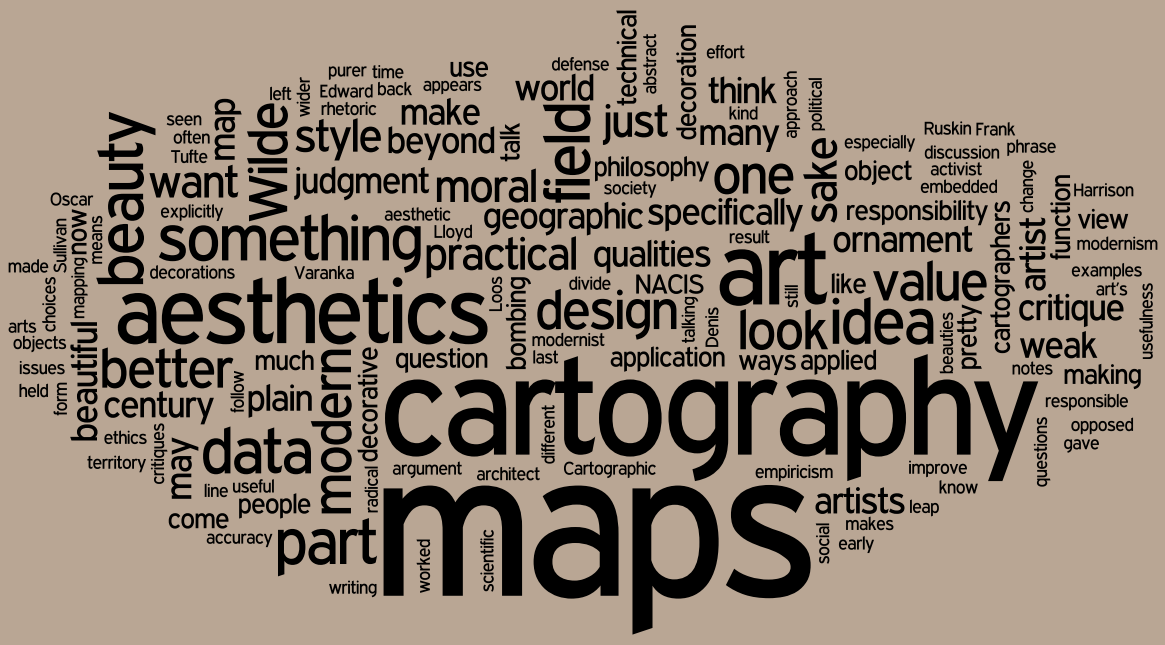

We say we want to make "better maps." But what does that mean?

We can improve accuracy with better data. We can improve clarity with proper use of type and appropriate color and line choices. We can make better choices of projection and more intuitive symbology, and devise new ways of interpreting three-dimensional surfaces as two-dimensional artwork. All of these are topics cartographers have worked over for as long as there has been a field called "cartography."[1]

We can come up with more efficient ways of managing, updating, and rendering geographic data with our computers. As GIS has superseded manual cartography as the core mechanism for turning raw geographic data into visualization, the technical aspects of transforming data into something humans can intuitively understand has consumed us as a field.

But "better" is not limited to technical issues. Critical writing about cartography over the last half-century has focused on ways cartographers and the field as a whole can act as a kind of moral filter, rather than as a service to those who would use maps as a tool for domination of the land and the people who live upon it. Beginning with a focus on the ethics of mapping in the early 1970's spearheaded by J. B. Harley—and expanded to a look of maps as instruments of power, especially in Denis Wood's *The Power of Maps* in 1992—this line of critique continues

1. Which as Denis Wood pointed out, is less then 200 years, as it was initially a Portuguese neologism, invented around 1839 (Wood 2003).

to challenge us to watch what we do not just for accuracy, but for its effect on the world around us.

These critiques often produce discomfort. But I think there's something beyond simple defensiveness in our collective skepticism about jumping on board any of the bandwagons we have been presented with as a field. We know something is wrong, but we feel dissatisfied from the answers we've come up with so far to make things right.

The application of aesthetics to maps is another approach to this question of "better maps." For example, the introduction by editors Timothy R. Wallace and Daniel P. Huffman to NACIS' 2012 *Atlas of Design* argues for beauty as a framework in our practice, zeroing in on the idea that "We care about how the map looks" (Wallace and Huffman 2012).

When we talk about aesthetics, it's inevitable that at some point we will end up talking about art. Some argue that aesthetics is synonymous with the philosophy of art, in which case there's little for us to discuss—our field and the fine arts may have regard for one another, but are clearly different in their approach to even basic questions of value. NACIS approached the broad topic of art and cartography in a special issue of *Cartographic Perspectives* in the winter of 2006. It was a well-intended effort, and it included some excellent resources, but reading the articles today it still feels as though we are talking past each other: the artists continue to talk art-talk, and the cartographers continue to talk map-talk.

I've been interested in this divide for some time now—I addressed it in a paper I gave at AAG in 2006 (Case 2006).What I suggested in that paper is that the divide in question is between a cartographic value of "usefulness" and a fine arts value against practicality. I still think this describes a difference in historical self-definition, but these days it is almost impossible to say anything definitive about the art world without some artist or movement noting that they contradict it. And as Denis Wood noted in his survey of maps in art, there *are* artists like Helen Mayer Harrison and Newton Harrison for whom the practical application of the truths in their art are very much part of what they are about.

When we talk about aesthetics, it's inevitable that at some point we will end up talking about art.

In addressing ourselves to "aesthetics," I believe it will be useful to look back at the first century of modern aesthetics, the period beginning with Immanuel Kant's 1790 *Critique of Judgment* and ending with Oscar Wilde. Kant (contradicting his predecessor, Alexander Baumgarten, who introduced the term "aesthetics" in its modern sense in 1750) held that beauty was *not* inherent in objects but a result of our perception and non-rational judgment of them. He "insisted that a pure aesthetic judgment about an object is one that is unaffected by any concepts under which the object might be seen; and he tried to show that the implicit claim of such a judgment to be valid for everyone is justified" (Budd 1998).

One of the great periods of debate in aesthetics was the last half of the nineteenth century. Broadly speaking, the lines were drawn between critics like John Ruskin, who held that beauty was inseparable from moral and social value, and Ruskin's fiercest opponent, James McNeil Whistler, who sued Ruskin for libel after a review of his *Nocturne in Black and Gold: The Falling Rocket* accused him of "flinging a pot of paint in the public's face." It pitted two different visions of modernism against

each other, one responsible to society and one responsible to nothing but itself (Jones 2003).

Oscar Wilde's philosophy took Whistler's point of view and pushed it further. Explicitly railing against Victorian moralism, Wilde set out to unencumber beauty from all social constraint, to celebrate it solely for its own sake—this is the origin of the phrase "art for art's sake." It's against this point of view that many activist and other "radical" artists have been working for decades now, especially since the 1960's (the narrative thread from Wilde to the present is of course convoluted, and moral and activist art comes in as many flavors as there are political agendas, conservative to liberal and beyond).

…what is our duty to? To the maps themselves, or to a wider moral order?

For a field so devoted to "usefulness" and practical production issues, cartography has its own flavor of "art for art's sake"—call it "maps for maps' sake" perhaps. Many of the contemporary critiques of cartography come from the political and philosophical left: the very idea of "counter-mapping" or "radical cartography" carries a counter-cultural overtone, and is primarily directed at established corporate and state-based mapping structures.[2] Beginning with J. B. Harley's discussion of maps and ethics, we have been asked specifically whether we are comfortable creating maps that are then used for purposes we may or may not be in agreement with. If we are not, then what is our duty to? To the maps themselves, or to a wider moral order?

elin o'Hara slavick gave a passionate critique of cartography in her presentation at the NACIS conference in 2007.[3] In associating cartography directly with modern air and missile-based bombing, she made cartography complicit in mass murder. She is an artist. Her textual critique is ringing, and her paintings are themselves indictments of bombing and of maps' part in that bombing. As an artist, she is calling us out for hiding behind a "maps for maps' sake" defense. She is also, as an artist, firmly making a statement that her art, which is abstract (it is not optically representational, but uses cartographic imagery with painted texture that recalls bombs and their physical results), nevertheless is very much about something, not just about itself.

The look of modern, mainstream cartography appears on the surface to be related to modernist ideas from more than a century ago. Expressed most famously in modern design writing by Edward Tufte, we can trace this idea back to architect Louis Sullivan (and his protégé Frank Lloyd Wright) and his maxim, first stated in an 1896 essay, "form should follow function." This was amplified by Austrian architect Adolf Loos' 1910 declaration that ornament was "criminal." This germ of an idea formed the heart of modernism in architecture and industrial design for the next century.

Loos' argument in *Ornament and Crime*, interestingly, is not that the forms beneath ornament are somehow purer, but that ornament goes in and out of fashion, and that it was wasteful to spend time and effort on something that will be unfashionable within the life of the object (the building). It was left to later modern-

2. For examples, see most of Denis Woods' work, the work of John Pickles' counter-cartographies-collective, and elin o'Hara slavick's work, discussed below. See also: Lize Mogel and Alexis Bhagat, eds. 2008. *An Atlas of Radical Cartography.* Los Angeles: Journal of Aesthetics and Protest Press.

3. Which is repeated in her 2007 book *Bomb after Bomb: A Violent Cartography.* London/New York: Charta.

ists to find fundamental value in purer forms and shapes. Meanwhile, Sullivan's call for form to follow function did not result in his discarding decoration; indeed, his ornate organic decorations are now seen as a signature part of his style, as are Frank Lloyd Wright's decorative details.

While modernist design certainly plays a part in the look of modern maps, the adoption of a simplified style in cartography actually goes much earlier. As Dalia Varanka notes, a change in map aesthetics in early 18th-century England was part of a push by the Royal Society towards an unornamented "plain style" in scientific discourse of all kinds, explicitly a matter of making arguments clearer and less encumbered by irrelevant rhetorical (or decorative) flourishes. Thus cartouches went from imitations of classical stonework to plain engraved boxes, and decorative illustration on maps disappeared.[4]

The plain style was not advocated purely on aesthetic grounds. It was part of the rise of English Empiricism, which emphasized practical application of scientific knowledge over disinterested observation. Varanka notes that embedded in the rhetoric supporting empiricism is a gendered argument that "plain style" rhetoric and specifically cartography invoked "manly" qualities as opposed to "feminine" decorations (Varanka 2005).

I find this interesting because to me it echoes the idea which sometimes appears in geographic data circles, that cartography is about "making maps pretty." The word "pretty" connotes triviality—it's no coincidence that it's an adjective more often positively applied to women and girls than to men and boys. When it's applied to maps, it implies that the underlying data is what is important, and that the aesthetics of the map are secondary, applied qualities—decoration. It relies on the notion of weak femininity.[5]

Is this part of what makes us leap to the defense of the accurate, data-driven nature of our craft? Is what makes us trot out our Edward Tufte references about design revealing the hidden beautiful evidence, the beauties of data? Is it because we don't want to seem weak, and we buy the idea that decoration is weak?

It worked against Wilde and the aesthetes. Gilbert and Sullivan parodied them in *Patience,* and *Punch* magazine lampooned them mercilessly. When Wilde was arrested for homosexual "gross indecency," it only reinforced a public stereotype of Wilde and his followers as weak (i.e., effeminate).[6] His aestheticism faded into the background after his arrest and imprisonment.

As we leap forward into discussion of the aesthetics of maps, we are rocking more than one boat. We are standing up for beauty within a field where the practical

4. I initially heard Varanka offer a history of this at the 2007 NACIS Annual Meeting, in a paper "The Emergence of Plain-style Mapping in Early English Atlases, 1606–1729."

5. For an exemplary discussion of this use of "pretty," see a thread begun by David Medeiros on the Cartotalk forum, at **http://www.cartotalk.com/index.php?showtopic=4462**. I also sometimes refer back to a thread on James Fee's blog, at **http://geospatialblog.wordpress.com/2008/06/09/that-looks-like-a-gis-map/**.

6. In case there is any doubt, let me be clear: I believe that beauty is not weak, and neither are women or GLBT folk. And the equation of women and beauty, and of men and "usefulness" is simply incorrect—still surprisingly pervasive, but wrong.

is embedded as a superior value. We are edging into a territory—the philosophy of art—that itself has been subject to controversy specifically over the question of beauty and other abstract qualities for their own sake vs. those qualities serving the wider world. Most of all, though, we are heading into territory where we can't depend on quantitative analysis to decide what "better" means, and where use and function may not be relevant.

I want to stand up here for useless maps, and defend them from the pejorative "pretty" or its companion "eye candy," a phrase with equally sexist connotations. We all know people hang maps up on their walls or view them in coffee table atlases not just because they are useful, but because they are beautiful. Many of the examples in the *Atlas of Design* are clearly meant not to be read as text, but to be viewed as examples of beauty. Can we help push a cultural change that is already underway, disassociating gender, strength, and attractiveness?

What do maps say as beautiful objects? Do they imply possession of geographic space beyond what our walking-around selves can possess? Do they remind us of the glorious beauties of the world itself, or of our emotional connections not just to what we can see outside our door, but to larger spaces like our city, state, nation, biome, continent, and planet? Do we just want to revel in the idea of *knowing* some piece of the ground we walk on? Is that what maps really represent?

What do maps say as beautiful objects?

It's a kind of responsibility I am nervous of, even more than the moral responsibility the "carto-critique" that I discussed above has made us aware of. But it's a responsibility artists have been figuring out how to navigate for centuries. If we can force ourselves to address what it means to make a beautiful map, beyond the technical questions of dressing it up to look good to the client—if we can really learn to look at maps as expressions of something people want and need, we will, I think, have accomplished something.

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A Lay Mapmaker's Perspective on the Dilemma of Cartographic Design

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ABSTRACT

Aesthetic, accessible, astounding, and accurate—these four adjectives best describe the value drivers of maps from a lay mapmaker's perspective. Aesthetics is the marketing of the map, as an unappealing map will not attract readers. It also needs to be accessible: readers need to understand the message correctly and recognize the locations of their interest, otherwise they will turn away quickly. If the content of a map is astounding, readers will get engaged with the map. Accuracy, which refers to the correctness and precise measurement of the data as well as its visual representation, builds reputation—inaccuracy kills it. Frequently there are trade-offs between these four main value drivers to consider, requiring a dilemma approach to cartography.

KEYWORDS: Aesthetics, Design, Dilemma, Audience Orientation, Choropleth

Recent work by Field and Demaj (2012) explores the relationships between cartography, technology, design, and aesthetics.[1] I would like to add to the insight of those two professionally trained cartographers the perspective of a lay cartographer. I will label lay cartographers[2] like myself henceforth as *mapmakers* for ease

1. The authors also have the main references in their paper, which are therefore left out in this note.

2. Lay cartographers share many of the traits of, say, hobby botanists. A hobby botanist knows something about plant life, but is not a professionally trained expert in the field and does not practice botany

of distinction. As an economist, I have become a mapmaker out of the need to study the geographic distribution of housing prices during the Great Recession (Moenius 2009). Had I had the choice, I would have liked to be simply presented with the maps I wanted, but I had to learn how to formulate my mapping needs so that professional GIS analysts could create what I wanted. As in Field and Demaj (2012), they contributed their knowledge about technology, science, and art, while I remained focused on output, trying to achieve as high marks as possible on the value drivers for our readers. Thanks to the success of our analysis of the housing market, my colleagues and I now regularly produce thematic maps for media outlets. While necessary for all audiences, producing maps for media requires a strong focus on creating value for their viewers. For each map we create, we would like it to be as aesthetic, and its content or message as accessible, astounding, and accurate as possible. We often face trade-offs as we need to sacrifice a little on one value driver to increase the value of another. Thus, I would like to re-emphasize the well-known need for orientation towards the consumer of maps, and add the role that trade-offs play to meet consumers' wants. I will discuss these trade-offs and how to navigate them with an emphasis on the role of aesthetics.

How does one make a great map? As Field and Demaj (2012) point out, following the well-established design principles and ethical requirements for mapmaking is already hard. Creativity and aesthetics are welcome additional features to add value, however, they also add complexity to mapmaking. While technology helps professional cartographers with integrating these different aspects, it has also put mapmaking capability into the hands of lay mapmakers who frequently have little or no knowledge about cartographic design principles. This allows them to infest the World Wide Web with questionable "mapoids": map-like displays that do not deserve the name "map" if one wants to preserve the historical prestige of the word. This may sound like harsh criticism of the group I belong to, but there are also good justifications for our existence; the relevant one for this note is that we are close to the audiences of our maps, so we understand their interests and needs well.

…maps as representations of space and spatial thinking play a more important role in people's lives today than ever before.

Contrary to arguments by Strebe (2013), I claim that maps as representations of space and spatial thinking play a more important role in people's lives today than ever before. Aside from the weather report, I saw few maps in newspapers or on TV during my childhood. Now they are ubiquitous: newspapers regularly publish maps on all kinds of issues, and Google, MapQuest, and others have put maps first on to computers and later on to cell phones, most of which are connected to the Internet, making those maps accessible to almost anyone. The bad news: many of these maps distort the perception of information. Choropleth maps are particularly popular for displaying socio-economic data, but consistently violate Tufte's (2001) first principle of graphical integrity, as their visual representation of numbers is rarely proportional to the underlying quantities. Proportional representation of social phenomena requires each object (e.g., a polygon) that represents information to be proportional in size to the number of people it represents, unless data has been normalized by land area, such as in population densities. In maps, these objects are geographic units such as states or ZIP code areas. In the maps I see, however, social phenomena are almost always displayed in proportion to land area without any normalization. How large an issue of concern this is depends on how frequently—or even systematically—this visual distortion occurs: if area and

professionally. Lay cartographers, however, apply their cartographic skills—or lack thereof—frequently as part of their professional fields, as I apply maps in economic analysis.

population across geographic units are highly positively correlated, there might not be much of an issue. For the United States, however, this is generally not the case; for example, state and ZIP code areas are uncorrelated with population. Census tract areas are even *inversely* related to population (U.S. Census Bureau 2010). Consequently, at least for the United States, visually distorted map images of social phenomena are likely the rule, not the exception. The good news is that the more maps are produced for general audiences the more people will learn how to read, evaluate, and appreciate them. As general audiences improve their map literacy, media outlets need to fear the loss of reputation as quality information providers if they publish low quality maps. Thus, the more maps available and the faster general map literacy advances, the quicker the media will develop professional skills in evaluating maps, and therefore the better the maps distributed by the media will ultimately be. The question, however, remains: what constitutes a good map?

Good maps have high information content, follow established design principles, and are aesthetic. The following exercise illustrates this point: in their companion paper, Demaj and Field (2012) present 39 examples selected by experts to showcase excellent cartography in 13 different categories. Regardless of category, I find that each map scores highly on at least one of those criteria—information content, design, and visual quality—and many of them in all. I would also expect agreement that almost all score high on aesthetics.

For mapmakers concerned with their audiences, meeting this standard turns into a four-word mantra: maps need to be *aesthetic*, and their content *accessible*, *astounding*, and *accurate*—frequently in that order. Aesthetics is the marketing of the map: an unappealing map will not attract readers. Once a map has attracted a reader, accessibility is key to maintaining interest: readers will quickly turn away if they cannot grasp the message of the map and recognize locations of their interest. A map not understood is a map not worth making. Map readers want to find something new: nobody looks at a map for directions if the way is already known. If readers are amazed by what they find on a map, they will engage in it. Accuracy is not only an ethical or academic requirement, it is pertinent for mapmakers who want to be published more than once, as the correctness and precise measurement of the data and their visual representation are prerequisites for being published again—inaccuracy kills reputation.

Including attractiveness of informational content and accessibility should be obvious; the cases for aesthetics and accuracy deserve some more discussion. Let me start with accuracy: Monmonier (1996) claims cartographers to be masters of compromise and tolerance of inaccuracy. This should not come as a surprise as part of his assertion applies to all modelers, including cartographers, who have to make choices about what to include and especially what not to include. After all, modelers want to solve a problem and need to capture only the relevant information. His assertion also has a specific component which is rooted in cartography being a visual art and craft: projections distort area and line features; choice of symbols and the assignment of features to categories as well as presentational choices can be used to alter the perceived message of the data—and many of these choices are entirely unavoidable.

As documented by the flourishing markets for designer products and the large number of galleries, art and design as two manifestations of aesthetics (one would

hope!) have substantial commercial value. Therefore, aesthetics can increase the value of maps not only in terms of individual appreciation, but also in terms of commercial value, establishing a business case for aesthetics. In fact, a beautiful map may draw an audience which may be seduced to study it simply because the audience wants to know where its beauty originates from. Figure 1 shows an example of such a map.

Note that the artist-cartographer chose to leave out all reference points, labels, or place names and only used shades of blue instead of a multi-colored approach, thus compromising on accessibility and (perceived) accuracy in favor of aesthetics. As the example illustrates, map marketing through aesthetics can not only function as a multiplier of the values created by informational content, accuracy and accessibility; it may require to compromise on the latter three to boost the aesthetic component and thus increase the overall value of the map.

Figure 1: Willamette River, Oregon, by Daniel E. Coe (2012).

The example demonstrates the importance of compromises—or trade-offs—for mapmaking, but how should one choose amongst the different trade-offs? Field and Demaj (2012) suggest that map design should be at the center of science, technology, and art. Transforming those three inputs[3] into a visual representation of our four-word mantra, the output of the mapmaking process finds good map design inside a triangular pyramid as in Figure 2.

The corners of this outcome choice pyramid represent the maximum achievable degree for each of the four value drivers. As science, technology, and art progress, higher levels of each value driver are achievable, and the length of the edges of the pyramid may consequently change.[4] The sphere inside the pyramid represents the audience's preferences: in Figure 2(a), the closer towards the center of the pyramid, the higher the valuation of the map by the audience. The spherical segment in Figure 2(b) could represent the preferences of a military audience, which will likely put high value on accuracy and accessibility, close to zero value on being astounding and low value on aesthetics. Generally, there will be unavoidable trade-offs: for example, the choice of scale, projection, color schemes and cut-off values in any map all simultaneously influence accuracy and accessibility. In the case of color-coding and cut-off values, they may simultaneously influence aesthetics and whether the information on a map appears to be astounding. The following three maps illustrate the issue; we start out with a standard choropleth map (Figure 3).

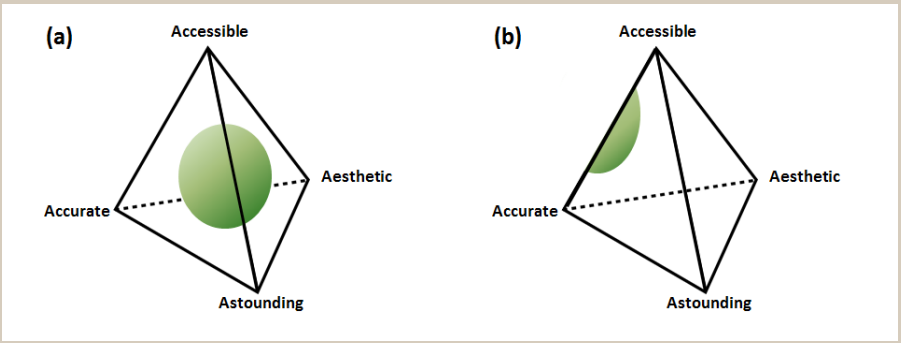

Figure 2: The outcome choice pyramid and audience preference sphere for (a) general and (b) military audiences.

3. Art can be both an input as in artistic capabilities, rules, and knowledge as well as an output: a piece of art. Here I refer to the first interpretation.

4. To see this, assume we start with a perfectly symmetric pyramid. Further assume that there was only technological progress in terms of technology such as LIDAR which predominantly influenced accuracy. This would increase the range of possible trade-offs between accuracy and each one of the three other value drivers. But it would not change the possible trade-offs between those other three value drivers.

The map displays the average share of income households spend to drive to work. Households in the mostly small red areas spend a high share, households in the mostly large green areas a low share of income on driving to work. Without awareness of context and audience, using hue for encoding values is a poor choice because readers cannot associate different hues with different values. On the national level, however, low shares of income spent on gasoline have been historically associated with positive economic growth, while high shares have been associated with negative economic growth. Areas with high shares of income spent on gasoline raise red flags for the economy, and these areas are represented in red color on the map (Moenius 2011). Thus, audience and context—economists and economic growth—may suggest possible departures from standard cartographic choices to increase accessibility for the target audience. Moreover, the association of these traffic light colors with stop, caution, and go highlight how astoundingly large and geographically concentrated areas in the United States are at risk (yellow, orange, and red) for economic slowdown. Arguably, the choice of hue instead of saturation or brightness reduces aesthetic value, but increases how astounding the information presented in the map appears for the target audience.

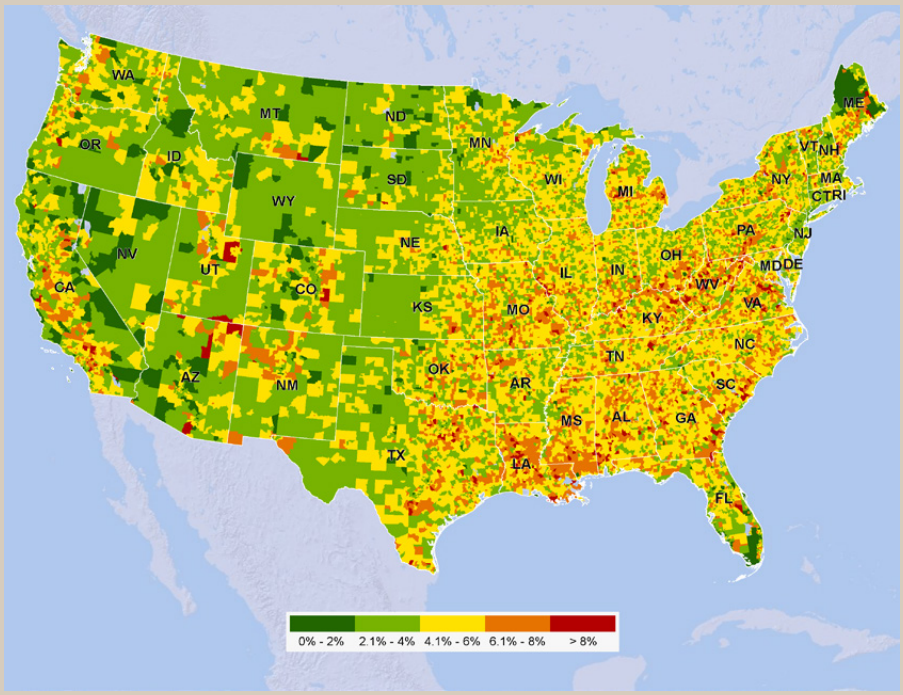

Figure 3: Choropleth map of the average share of disposable income spent on gasoline to drive to work by ZIP code in May 2011. Data source: GasBuddy.com, Esri, U.S. Census Bureau.

Often the large green areas are sparsely populated, thus over-representing the importance of these areas. To address this criticism, we next create a cartogram where ZIP code areas are shown proportionally to the number of households residing in each ZIP code (Figure 4).

The visual impression now is closer to the fact that there are few households that spend less than 4% of their income on gasoline to drive to work. The unusual appearance of the cartogram may invite readers to engage for a longer time with the map. Nonetheless, the downside of this map is that it is harder to access: how can I find my ZIP code in there? Correcting the issue of misrepresenting population-proportional phenomena with land area by changing to a population-weighted land area cartogram makes it much harder to find places on the map and thus reduces accessibility.

The last map offers a compromise, which only partially addresses overrepresentation of less populated areas by using transparency to distinguish between densely populated (more than 500 persons per square mile) and less populated areas (less

than 500 persons per square mile), where the transparency setting comes from census block data.

While the examples illustrate trade-offs within the pyramid, namely between astounding and aesthetic in terms of color choice, and accessible versus accurate in terms of area proportional representation, they cannot explain where we can find good maps in this pyramid, since the answer depends on the audience's preferences as represented by the sphere inside the pyramid. Does identifying the preferences and trade-offs allow us to make a good map? Unfortunately, not always: even if mapmakers were able to perfectly identify their audience's preferences, skills, technology, ethical considerations, time, and budget play an important role in determining the attainable places inside the pyramid. These attainable places may not overlap with the audience's preferences—and may thus determine a map probably not worth making.

Aside from suggesting four often conflicting components of mapmaking, the discussion in this note emphasizes two aspects: first, the need to be aware of the trade-offs in our choices. Improving one value driver of a map may come at the cost of another. Second, the value of a map to its audience is jointly determined by the choices on outcome value drivers as well as audience preferences. In an analogy of what Deidre McKloskey (2000), a well-respected economist and prolific writer requested in her book "economical writing," I would like to suggest that a map should not be designed so that the message it has can be understood, but rather so that it cannot possibly be misunderstood. To escape the dilemma of the trade-offs, electronic media may offer a solution at least for mapmakers

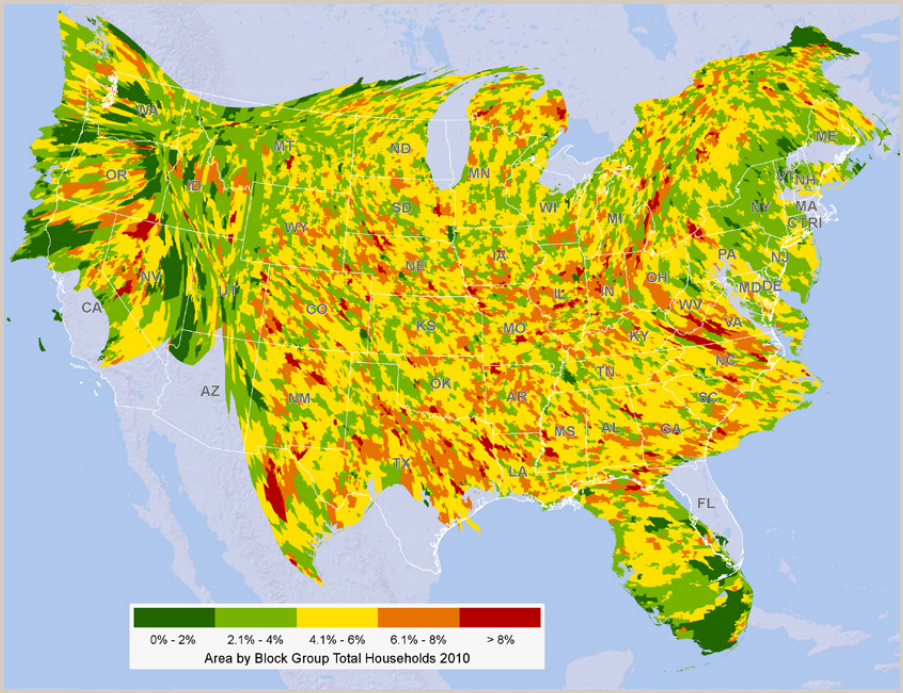

Figure 4: Cartogram of the average share of disposable income spent on gasoline to drive to work by ZIP code in May 2011. Data source: GasBuddy.com, Esri, U.S. Census Bureau.

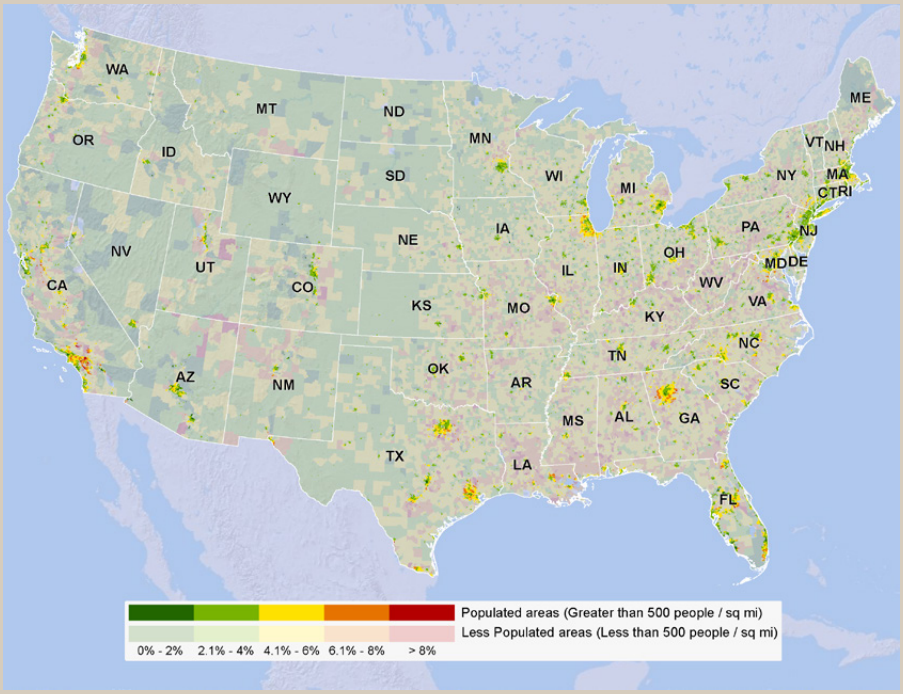

Figure 5: Modified choropleth map of the average share of disposable income spent on gasoline to drive to work by zip code in May 2011. Data source: GasBuddy.com, Esri, U.S. Census Bureau.

that are not on a budget: how about morphing a map into four different versions, each one optimizing only in the direction of one of the four aspects? For example, why not transform a standard choropleth map into a cartogram into an interactive map and finally into a piece of art? Figures 3 and 4 document examples of the first two steps. A realization of the third step can be found in Moenius (2011). My artistic limitations prevent me from accomplishing the fourth—but I would love to see that accomplished in somebody else's work!

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The Impotence of Maps, or Deconstructing the Deconstruction of their Construction

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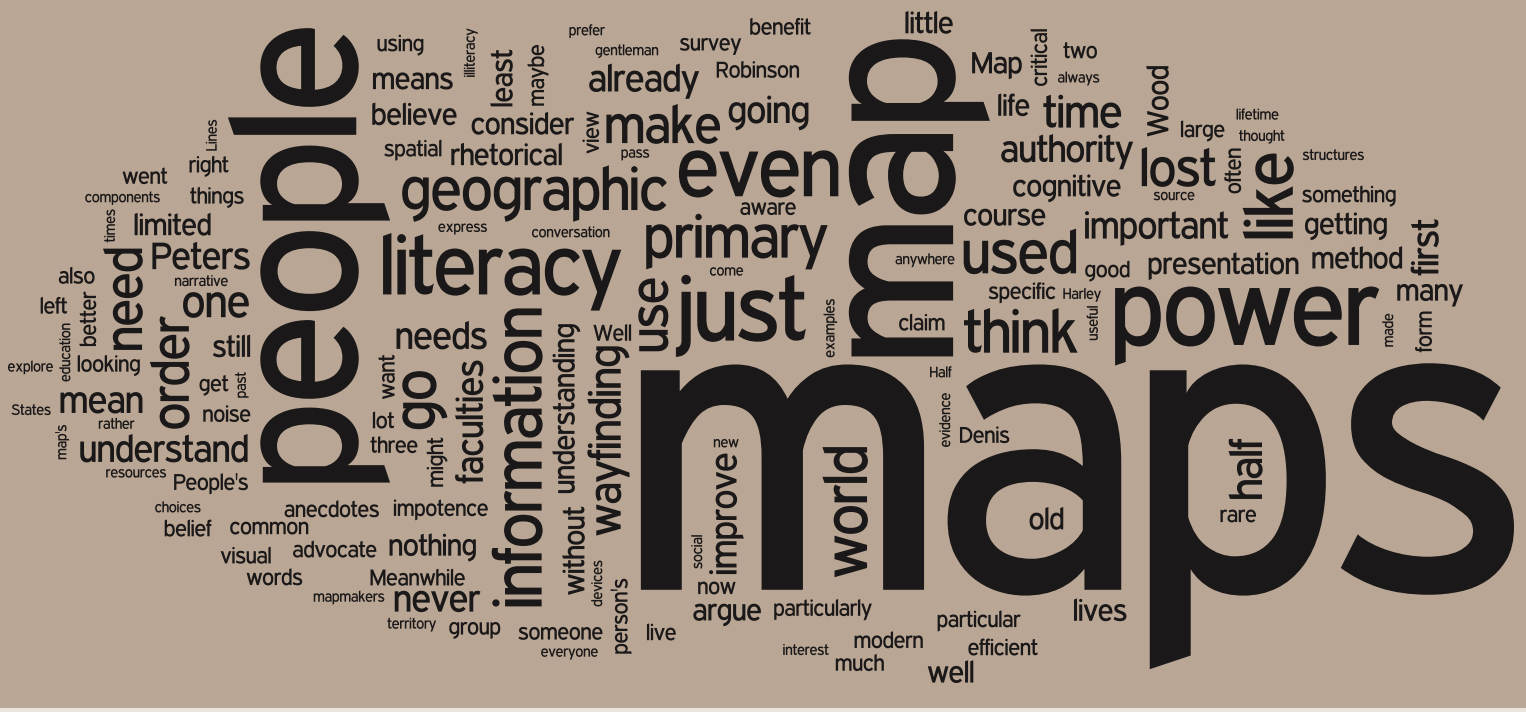

ABSTRACT

As mapmakers we are invested in the importance of our craft. We bemoan the tragic state of geographic and map literacy, and advocate better education. Names like Robinson, Harley, and Wood have asserted the great power of maps. Are we guilty of seeing everything as a nail because we make hammers? In this rhetorical presentation, I argue for humility in our endeavor, recognizing that many people simply do not need maps. They meet their wayfinding needs using other efficient, utilitarian skills and devices. Could we improve our map designs for those who do use maps by disregarding the (non-)needs of those who do not?

To Machiavelli it was all about power. To Adam Smith it was all about capital. To Marx it was all about the proletariat. To Freud it was all about sex. To Skinner it was all about nurture. To Spock it was all about logic. To Mackinder it was all about geography. To Denis Wood it was all about maps. To Arno Peters it was all about map projections (Figure 1).

Well, now. They can't *all* be right, can they?

In order to make sense of a very complicated world, we generalize, we abstract, we categorize. We strip away what we consider to be noise in order to get to *the* heart of the matter. I've given examples of people who, I argue, went too far. They succumbed to the fallacy of single causes. As a community of cartographers, I

think we do the same to an extent. It is perfectly natural for us to use the cognitive faculties that we have developed and honed, in order to understand the world. But these faculties also color our view of the world, filtering out inconvenient information that we prefer to think of as noise because it doesn't fit our modes of understanding. Just to plant a seed, I suggest that what is noise to us is information to some people.

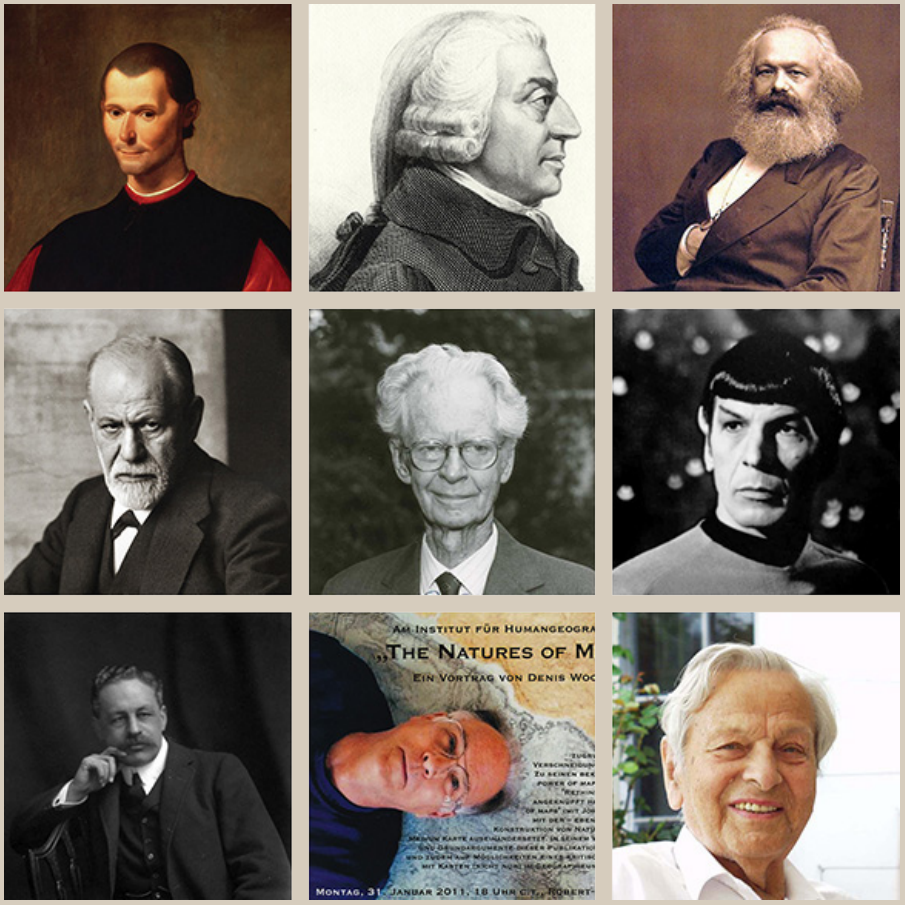

Figure 1: Niccolò Machiavelli, Adam Smith, Karl Marx, Sigmund Freud, B. F. Skinner, Spock, Halford Mackinder, Denis Wood, Arno Peters.

A common belief in our domain is that geographic and map literacy is at a dismal nadir in the United States at least, if not worldwide, and that we ought to be doing more about it, pressing our case and getting educators to understand how they are short-changing the future if they do not improve geographic literacy. We all have and share anecdotes about appalling or amusing misconceptions, misunderstandings, misreadings, or mis-creations of maps. These anecdotes reinforce our belief that something is wrong, something needs fixing, and we have the solution. In order for that belief to be persuasive, we have to document how this illiteracy is detrimental to society at large. But demonstrating just that is nowhere near enough: we have to document that the opportunity cost of remedying the illiteracy does not exceed the gain.

What do I mean by that? People's time is limited. People's interest is limited. People's cognitive faculties are limited. Educational resources are limited. If we improve geographic literacy, it will have to come at a price. Can we demonstrate that the benefits gained by improving geographic literacy are greater than if those resources were used instead to improve computer literacy? Scientific literacy? Conflict resolution literacy? In other words, it's not just a question of whether people could benefit by more geographic literacy. If you strip out the costs and competition, the answer will always be yes. But that's a naïve way to think about the problem. It's really a question of whether, in the mad competition for people's time and money, geographic literacy deserves a larger share than it's already getting. In order to demonstrate that, we have to prove that maps are important, not only in some absolute sense, but *relative to everything else* that competes for attention.

Names like Arthur Robinson, J. B. Harley, and Denis Wood have argued rhetorically for the power of maps, and most of us believe them, but to this date, 2013,

we still have no rigorous studies to inform such a conversation. Meanwhile, when I consider how people really live their lives, I would argue instead for the *impotence* of maps.

Most of you have read or at least know of Mark Monmonier's books, particularly *How to Lie with Maps*. I've found that people familiar with these works commonly presume that because someone has used or misused a map as propaganda, that the subterfuge *succeeded* and therefore that maps are powerful. Not so. A considered reading of Monmonier, particularly of his *Rhumb Lines and Map Wars*, tells you that he does not believe the rhetorical value of maps to be high at all. Most of these attempts at propaganda were flops or made only a marginal contribution to their authors' agendas.

With respect to the seedy affair that inspired Monmonier to write *Rhumb Lines and Map Wars* in the first place, that being the Peters Map and the kerfuffle over it, I point out here, as I have in an essay in a forthcoming volume of the *History of Cartography*, that Robinson and his colleagues at the American Cartographic Association blundered in their handling of the situation. They themselves were so blinded by their conviction that maps carry power that they chose to fight Peters on his own ground, arguing over the merits of specific map projections rather than just denying that any projection has the power to do what Peters claimed. This strategic failure not only left the Peters religion intact, but furthermore left the door open for any quack who wants to start a new crusade. And they do. I hear from them regularly.

Of course high profile uses and abuses of maps crop up now and then. But we are smart people. We should understand that events make the news and stick in our minds *because* they are spectacular, not because they are normal. Meanwhile, deconstructionists like to go on about how maps are tools of empire, how they contribute to the subjugation of native peoples, how they shape thinking, how they insinuate territory and control where there may be little or none. I don't have space to deal with claims like that in a short essay—and in any case, they are not exactly wrong—but let me propose an alternative narrative: even *if* we had no maps, all those things still would have happened. A lack of maps would not have reworked the modern world.

Why? Because maps are just a convenient presentation of underlying information already present. If a map can insinuate something, so can words. So can observing the lay of the land. If a map can express relationships, so can words. We are visual creatures, so maps become a preferred medium to express spatial relationships. Yet nothing novel is brought to bear by their existence. The imperial powers would have done what they did with or without maps. A few details of history would have played out differently, and some endeavors would have taken more effort, but in the large, the world of today would be the same.

How can I claim this? Because earlier cultures that engaged in exploration and imperialism needed no maps. It was other critical technologies and organizational structures that propelled them in their conquests. We have no evidence that the Phoenicians created or needed maps. We are certain the Norse mariners made no maps. The startling achievements of the Polynesian seafarers happened without

anything like what we think of as a map, and though they used intricate stick charts to represent patterns of swells, we have no evidence that those devices were critical to maintaining routes of communication or holding territory, and certainly were useless in moving into new territories. The Mongol conquests forged one of the greatest empires ever, apparently without maps. Therefore I can say with confidence that maps were a convenience to the modern imperial states, but not a necessity.

I'm going to argue for the impotence of maps in two ways. The first is by describing three demographics that have no use for maps:

- The first group is those whose biology precludes the necessary cognitive faculties. These people exist. Not surprisingly, I couldn't find much research on such a sensitive thesis. But they exist, and I predict they are not rare. And no, I don't believe it is just a matter of education. Map reading requires the confluence of many cognitive faculties. If just one of them is diminished, maps are going to be unreadable or too difficult to interpret to be worth the effort.

Maps were a convenience to the modern imperial states, but not a necessity.

- The second group is those who live their lives purely locally. This is a large class of urban people for whom venturing forth either holds no attraction or is economically or medically unfeasible. If they wish to explore, they explore some shop they've never visited or some lifestyle venue. This mapless living is common in rural life as well, where, again, many people never go anywhere except places that they already know. And if it's common here, in the United States, imagine someplace like India, where my guess is that a billion people cannot benefit from maps because they do not and never will go anywhere they are unfamiliar with. Surely local living is the dominant human condition.

- The third group is those whose wayfinding is social. How does this work? There is the old saw about the professor who goes into the backwoods looking for a particular pond to study its particular pond scum. He gets hopelessly lost, and so finds an old gentleman sitting on his porch. "I am lost. I can't even figure out what direction I'm headed. I'm looking for Plessing Pond." The gentleman is happy to oblige: "Well, you get back on the road and go west. A mile before the Baptist church, turn left and go straight for a spell. When you reach the intersection where the old schoolhouse used to be afore it burnt down in '62, then you head right. You'll pass a few lanes into the woods. After you pass the one to Auntie Edith's house, stop and pull over in the next hollow. Then you'll hike through the woods straight toward the county line for 'bout three hundred yards, and there you are!"

Jesting aside, I have noticed that a lot of people do not use maps for their wayfinding even when available. They ask people. That is their method. Now before you go into some disapproving clucking, I am going to claim that this method does not limit them. Why? Because they never go anyplace where there aren't any people. Why? Because going somewhere is a social endeavor for them. If there isn't anyone to ask, then it's just not someplace they want to go! Not only does their method not limit them, their method is efficient, utilitarian, and it gives them a pretext to

converse with people, which is at least as important to them as getting somewhere is. Often they'll protract the conversation with digressions and anecdotes, because in fact that is what is important to them.

These three demographic groups bleed into each other, and of course the biologically constrained faction falls entirely within the other two. That aside, I will point out that those who live stationary lives do not necessarily feel any aversion to using maps; it is just that their need is rare. Social wayfarers might also use maps, but only as a last resort and likely with aversion.

Before you get too uncomfortable about all this, I am aware that maps are used well beyond wayfinding. Of course I am aware; when I was nine or ten years old and poor as a church mouse, I would haunt the second-hand stores looking for used *National Geographic*s that still carried their maps. And, by the way, the fact that about half of those *National Geographic*s did still have their maps—in unopened condition, no less—tells me just how many people aren't interested in maps *despite* subscribing to a geographic magazine! Anyway, you could buy one for 5¢, getting a map whose equivalent at the bookstore or office supply store might cost you a wrenching 69¢ or even a dollar. Did I use these maps for wayfinding? Of course not. I used them to inform myself about the world. I claim there is a huge intersection of people who don't need maps for wayfinding, and people who don't concern themselves with distant geography at all. There is nothing you can do to interest them in a mode of thinking that they either cannot engage in or do not consider useful. They have other ways of understanding the world that are more comfortable or efficient for them. They do not believe that a spatial understanding of the wider world could benefit them more than the other things they already concern their time with. Or even in some rare cases, people acquire a sophisticated spatial understanding by means other than maps.

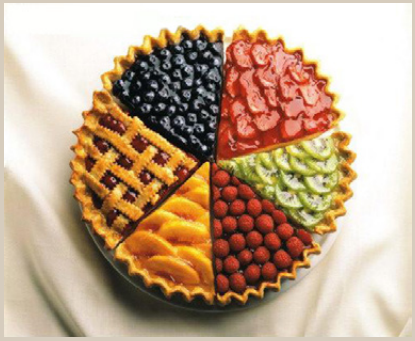

Figure 2: The pie of potential map power.

Secondly, in this recognition of impotence, we need to understand that, within your lifetime, maps have lost one of the two primary components of their power. You may not even have been aware of this shift, but it is in progress and is nearly complete (Figure 2).

What are the components of a map's power?

The first is its *rhetorical power*. This comes about through the editorial choices you make in constructing your map:

- Selection, rejection, and extent of coverages
- Generalization of features
- Color scheme
- Symbology
- Projection
- Time evolution, if it is an animated map
- Typefaces

And so on. By these choices you set the agenda for the map you make and, for better or worse, its effectiveness as a means for communication and extraction of information. I have no quibble with this aspect of power; this is the craft of cartography and it will persist indefinitely. The other half of a map's power, on the other hand—well. Irreversible decline. Nearly gone. Did you even notice?

What is that half? Historically, to some degree or another, maps were central to the acquisition of information. They were often a *primary authority*. Here's what I mean by that: in order to construct a useful map in times past, potentially a huge amount of work went into collecting information, perhaps in the form of an expedition or a large-scale survey. This information was distilled down into a map. Meanwhile the survey data, with no other practical means of storage, often was lost or discarded, leaving the map itself as the primary record of that survey and hence the primary source for other maps as well as for analysis.

I don't want to emphasize importance of maps as primary authorities because I think it is already overemphasized by map historians. The truth is, often other sources were primary, particularly when it came to things like boundaries, which normally are described legally in written form rather than as maps. Still, sometimes maps were all that remained even in boundary disputes, and certainly when it came to features outside of legal concerns, the map was the sole record and primary authority—at least unless someone went look for themselves. Hence in times past a map might simultaneously be the authoritative source *and* the medium of presentation.

Well, gentle reader, those days are over. The map is not a primary authority anymore. It is only a visual artifact representing information that is encoded elsewhere as digital structures. Maps have moved from the center to the periphery, and they will remain there. The information they purvey is available elsewhere now in more accurate form and free from some of the possibilities for rhetorical taint. That does not mean the need or use for maps will fade away. Humans, after all, will always be visual creatures. But it does mean that maps have lost half of what little power they once had (Figure 3).

Half. Gone. In your lifetime. Just as people like Denis Wood began preaching the power of maps, they've lost half their potency, relinquishing their position of authority. How's that for power?

So, the pie here loses almost half due to this shift of authority. Half of the rest is lost due to inapplicability or audience apathy (Figure 4).

Of the remaining quarter, we must then consider what fraction of a typical person's life is consumed by using maps. Typical, okay? Not even Joe the Plumber; he used maps to make house calls. Certainly not you, with your lives wrapped up in maps. I think the average American who uses maps at all probably spends under a minute a day examining them. That's one part in a thousand of a person's waking life, and that's the ratio of time a map has to compete with the whole rest of what's going on in a person's life to exert power over it.

There's your sliver (Figure 5).

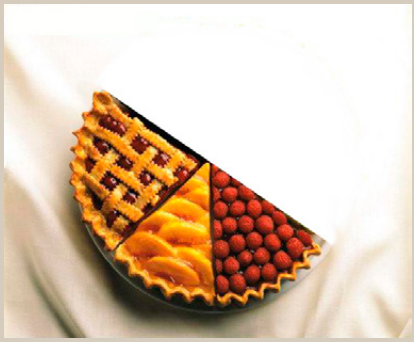

Figure 3: Half that pie has been eaten recently.

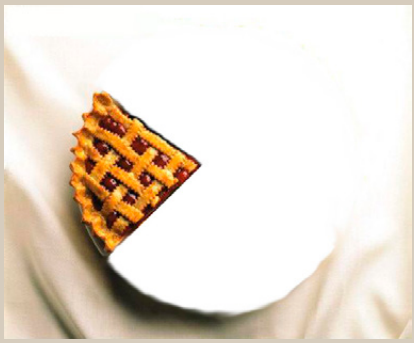

Figure 4: Another half of the remaining.

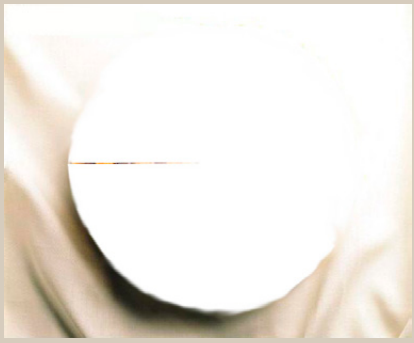

Figure 5: The real sliver of maps' power.

Figure 6: By this iconic map you might think Baron's Court, Hammersmith, Goldhawk Road or Holland Park were closer to (the now defunct) Addison Road than your destination Shepherds Bush. But Shepherds Bush is only half the distance of some of those, is the closest, and really, you might as well walk the ten minutes rather than take the red route. People don't use subways in a vacuum of surface context.

Not very impressive, is it? Before you fetch the pitchforks and torches, let me just say I don't write this to crush your soul or stir up trouble or play contrarian. Obviously I like maps; that's why I spend so much time on them. I also happen to think they're quite important—even critical—for specific purposes, and they need to be done right. That's where you come in. All this toiling over map design, all this honing of professional skills: this is good and necessary. Even the educational lobbying and pushing for more map literacy is good because without the amount of pushing we do, we'd lose what little we have. I just advocate taking up a more objective view of the situation. A more objective view means you can reach your goals more efficiently. In particular, maybe you should recognize that a lot of people are not, *and never will be*, your constituents. You have nothing to say to them. If you have nothing to say to them, then *stop talking to them!*

By which I mean, mapmakers spend a lot of time simplifying, reducing, discarding. As matters of design, those are good ideas anyway. But if you give up on the idea that *everyone* needs to understand a map, maybe, just maybe, you can keep more of what's important to the people who are likely to listen to you in the first place. I've seen examples of self-conscious modern maps that, in their obsessive drive for minimalism in order to expand their audience, leave off elements that I thought would improve their narrative (Figure 6).

I don't have any specific recommendations here; I prefer that someone who actually knows how to make a map take up this idea and put some serious thought and research into it. I do want to advocate a little more humility. We're excellent—in our field. Not everyone needs our field, and those who do, generally not nearly as much as we tend to think. Rejection of maps doesn't imply ignorance or stupidity; nor does it even necessarily run counter to the interests of the person rejecting them. Don't worry about that. Make better maps for the people who do need them.

(From an "Aesthetics of Mapping" presentation at NACIS 2012, 18 October, Portland, Oregon.)

From a Dry Statement of Facts to a Thing of Beauty: Understanding Aesthetics in the Mapping and Counter-Mapping of Place

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ABSTRACT

Aesthetics plays a key role in cartographic design and is especially significant to the representation of place, whether by the state, the community, the crowd, or the artist. While state topographic mapping today demonstrates a rich diversity of national styles, its evolution (particularly since the Enlightenment) has led to the establishment of a particular aesthetic tradition, which has recently been challenged by counter-mapping initiatives and through map art. This paper explores the function of aesthetics in the cartographic representation of place. It offers an analysis of the aesthetic value of topographic maps and suggests how an appropriate wielding of the aesthetic language of cartography can communicate a sense of place more effectively.

KEYWORDS: Topographic Maps, Aesthetics, Cartographic Design

PROLOGUE

> *"The quality of a map is also in part an [a]esthetic matter. Maps should have harmony within themselves. An ugly map, with crude colours, careless line work, and disagreeable, poorly arranged lettering may be intrinsically as accurate as a beautiful map, but it is less likely to inspire confidence." (John K. Wright 1942, 23)*

> *"The assumption that effective cartographic technique and its evaluation is based in part on some subjective artistic or aesthetic sense on the part of the cartographer and map reader is somewhat disconcerting." (Arthur H. Robinson 1952, 16)*

> *"It is in accordance with practical experience, however, which the author has personally observed over many decades, that in cartographical affairs, as in all graphic work, the greatest clarity, the greatest power of expression, balance and simplicity are concurrent with beauty." (Eduard Imhof 1982, 359)*

Few topics in the theory of cartography can claim to divide opinion as much or suffer from being under-researched, yet carry so much relevance to the practicing cartographer, as that of aesthetics: "the branch of philosophy which deals with questions of beauty and artistic taste" (Pearsall 2001, 21). Aesthetics was established as a distinct area of philosophy in the 18th century, particularly with the publication of Immanuel Kant's seminal work *Kritik der Urteilskraft* (The Critique of Judgment) in 1790, generally regarded as the foundational treatise in modern philosophical aesthetics (Crawford 2005). For Kant (2007), aesthetic experience results from the harmonious free play between imagination and understanding and does not depend upon concepts or desires. Kant's argument for the subjective paradigm, i.e., that beauty is in the eye (mind) of the beholder, still enjoys widespread acceptance. More significantly, aesthetics is explicitly studied today in a range of fields associated with the theory and practice of design, such as degree courses in architecture (e.g., University of Edinburgh 2013), engineering (e.g., University of Warwick 2013), product design (e.g., University of Brighton 2013) and vehicle design (e.g., Royal College of Art 2013). The singular form "aesthetic" refers to questions of visual appearance and effect (Williams 1983, 82), and, put simply, in modern society, aesthetic sensibilities are relevant to all products, regardless of their function (Bloch 1995).

INTRODUCTION

There was little room for the more subjective elements of cartography in Robinson's post-war manifesto for a serious scientific discipline that was intended to rise above the rubble of Haushofer and the Geopolitik school (for examples of Geopolitik cartography, see Herb 1996). The aim of turning cartography away from expression and towards communication served to further polarize the artistic and scientific elements of mapmaking, which at one time had enjoyed a greater unity of purpose: "until science claimed cartography, mapmaking and landscape painting were kindred activities, often performed by the same hand" (Rees 1980, 60). While Wright (1942, 542) had stated that a symbol's suitability is dependent upon the cartographer's sense of taste and harmony, successive interpretations tended to treat aesthetics as no more than an elusive by-product of map design that requires no particular skill to achieve (e.g., Karssen 1980; Collinson 1997). The degree of subjectivity implied by its synonymy with taste suggests to some that aesthetic preference for one map over another is no more than personal opinion (de la

Mare 2011), while others have doubted the practical application of investigations in this direction (e.g., Dobson 1985), despite pleas for research (Board 1981) and earlier progress in related fields (e.g., Moles 1968). Debate surrounding the role of aesthetics in cartography continues today, with some calling for greater focus (e.g., Huffman 2013) and others asserting the opposite (e.g., Woodruff 2012). Nevertheless, aesthetics has tended to be seen as a fruitless topic for research in cartography, allowing its significance in both the creation and use of maps to be overlooked (Kent 2005).

We are witnessing an exciting stage in cartography where the traditional aesthetic language used to represent place is being challenged by multiple cartographies that use different aesthetic approaches.

By contrast, sixty years after Robinson's words of warning, the focus of mapmaking has shifted away from the user and is today characterized by a praxis that celebrates both the individual and the subjective. Online map mashups are more ubiquitous than state topographic maps and artists embrace maps as vehicles for expressing ideas about place (Cosgrove 2005; Wood 2006; Cartwright et al. 2009), while the mapmaking canon has broadened to incorporate emotional and sensory experience (Nold 2009; McLean 2012). Moreover, the relevance of these developments has been recognized in the creation of Commissions on Art and Cartography and on Neocartography within the International Cartographic Association (ICA 2013) and, at last, the aesthetic response to maps is emerging as a topic for research (e.g., Fabrikant et al. 2012). The different circumstances of cartographic production that reflect a shift in power from national mapping organization to non-expert mapmaker—made possible through technological capabilities afforded by the Internet and global positioning systems—have also helped to cultivate an attitude which is increasingly open to exploring cartographic aesthetics. We are therefore witnessing an exciting stage in cartography (notwithstanding the realm of map art) where the traditional aesthetic language used to represent place is being challenged by multiple cartographies that use different aesthetic approaches. These include applying famous painters' palettes to state topographic mapping (Christophe 2009) and experimenting with different styles for online web map services (e.g., Stamen Design 2012).

The scope of this paper is not wide enough to undertake a defense of the relevance of aesthetics in cartography, nor to attempt a deconstruction of cartographers' aesthetic judgments. To deny that aesthetics has played, and continues to play, a key role in map design would be to devalue the cartographic process of communicating geographical experience and the developments in (re)production technology that have brought greater control to the cartographer. The aim of this paper is simply to examine the role of aesthetics in topographic mapping, with a view to showing how this genre offers some insights into the wider relationship between cartographic aesthetics and society. It will explain how official topographic maps maintain an aesthetic tradition which serves the interests of the state, how counter-mapping has responded to this, and how cartographic aesthetics can be wielded to affect attitudes to place.

CONSTRUCTING THE AESTHETIC TRADITION

While practicing cartographers generally align to the idea that cartography is essentially about communication (Lilley 2007, 208), they also tend to support the

view that maps have aesthetic properties, which are necessary for a map to succeed (Wood and Gilhooly 1996). Indeed, Karssen (1980, 125) believed that "objective beauty" could be constructed in maps through the appropriate treatment of five subjective elements of map design: generalization (simplified shapes), symbolization (graphic representation), color (accent and balance), layout (composition), and typography (appearance). It is not difficult to appreciate how, at its simplest level, trained cartographic practice is ordered towards the construction of a particular aesthetic (i.e., visual effect), that is based upon conformity, harmony, balance, and uniformity (Figures 1 and 2).

Elements of this aesthetic tradition in cartography are easy to trace. Even a cursory glance at the historical development of map reproduction techniques reveals a desire to refine and apply aesthetic judgments as cartographers created maps to meet society's thirst for geographical knowledge and keep up with its changing taste. For example, copperplate printing enabled a finer quality of type and linework than could be achieved using woodblock, while centuries later, what-you-see-is-what-you-get graphical user interfaces allowed changes to the map to be seen immediately on the screen. The desire has been to present more data in graphically more sophisticated ways, while advances in technology have allowed higher levels of consistency and have given cartographers greater control over the end result.

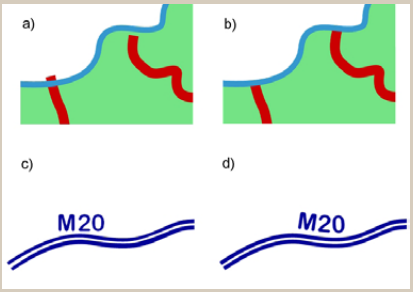

Figure 1: The elimination of undershoot and overshoot (a, b) and irregularity of linework (c, d) not only removes error but the resulting unity of form exhibits an aesthetic that implies correctness or goodness and the concept of being "fit for purpose."

Maps can maintain aesthetic value and relevance long after the quality of scientific information they comprise has been surpassed. Although decoration and ornamentation are generally regarded as obsolete in modern cartography, they have also formed part of the design process and may be mandatory within a particular time or culture (Figure 3). At the zenith of the decorated estate map, for example, decoration and ornamentation were nuances of the society that produced them and were not out of place, even if, as Hodgkiss (1981) asserts, topographical information was rendered subservient to the decorative elements. In his historical survey of art and cartography, Rees (1980, 63) claims:

> *"The most fanciful maps belong to the Middle Ages, the least scientific period of European cartography; the most aesthetically pleasing were the gift of the Renaissance. For cartography the Renaissance fusion of art and technology was particularly felicitous. Painting and mapmaking were so closely related that the first professional cartographers were pictorial artists who had engaged in the work of copying, decorating, and even compiling maps."*

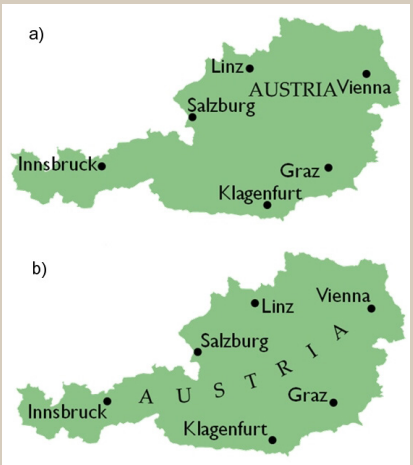

Figure 2: Maps may offer no more functionality with simple improvements to lettering, but the application of cartographic principles to text placement maintains an aesthetic tradition that serves to improve visual efficiency and make type more comfortable to read.

An aesthetic appeal may also lend a sense of validity to a map. Modern maps may fall short in gaining the trust of the user if a sense of authority is not supported by at least the appearance of scientific validity and "unauthoredness"—yet this appearance is itself socially constructed and ordered towards a particular aesthetic. In commenting on a topographic map of the Kashmir Valley presented at the Royal Geographical Society in 1859, Colonel George Everest stated: "The beautiful map behind the chair, which could not be characterized in terms that were too high, was a good proof of the knowledge and skill employed in the survey" (Purdon 1859, 32). The aesthetic here not only serves to validate the authenticity of the map

Figure 3: "America or New India, in an abridged version based on the universal description by [his] grandfather Gerard Mercator" by Michael Mercator, Duisberg, c.1630 (reproduced courtesy of www.RareMaps.com—Barry Lawrence Ruderman Antique Maps).

but also attributes some special value to its accomplishment. In this case, "beauty" results in part from a commitment to achieving correctness in cartography (through the skill and care of execution) that implies a dedication to completing a survey which is both accurate and "correct." Indeed, Jervis (1938, 118) later described Everest's triangulation of India as "beautiful," no doubt in terms of its mathematical proof. Advancing methods of survey may provide more accurate results, but if the ensuing maps do not conform to certain aesthetic ideals, they may not retain their value and authority.

This authority is, of course, in part derived from the apparent scientific accuracy with which symbols on the map correspond to features in the real world, but is also a reflection of state authorship and production; modern topographic maps are not produced by an individual map-maker:

> ***"Most of our maps are made by organizations, principally governments and large companies, but mostly governments. Cartographers and cartographic technicians might be involved in various stages of planning and producing these maps, but the important decisions are institutional—federal, political or corporate, rather than individual." (Monmonier 1982, 99)***

Since the design of a national topographic map series involves the collective experience and judgment of many, it incorporates a wider understanding of landscape that characterizes the institutional cartography of national mapping organizations. Moreover, this lends a particular aesthetic of "unauthoredness" to the state topographic map, reinforcing its portrayal of nature as raw and unconditioned—despite both landscape and aesthetic being social constructions.

In meeting their function as serving the interests of the user, maps (particularly topographic maps) can also simultaneously employ both artistic and scientific means of creation; perhaps to work towards a goal summarized by Eckert (1908, 347): "The ideal is the intimate union of the scientific spirit with artistic execution, and when this is realized it produces those maps which for years remain models of their kind." Whether cartographers may or may not consciously seek to endow their maps with an "objective" aesthetic appeal, as suggested by Karssen (1980), this appeal is constructed by society. Achieving a universal aesthetic appeal may be the conscious goal, but this appeal is nevertheless historically and culturally

situated. It is a case of finding resonance between the ideas and experience of both cartographer and user, despite, as Kant (2007) suggests, claims from either that what each regards as beautiful is universally so.

Maps typically synthesize various geographical data by utilizing a range of graphical (or visual) variables to communicate spatial and non-spatial information. The value of modern graphics software lies in the power of manipulation, flexible viewing scales, and instantaneous display, facilitating experimentation with different effects. For practicing cartographers who enjoy more freedom from rigid specifications, the creation of symbols and the construction of the map in general is an exploratory one—different graphic variables are manipulated and chosen for the best expression of the subject matter—where the process is often one of trial and error in refining symbols to reach the best outcome. Naturally, the context and clientele of the map will set some boundaries for that expression, but the cartographer tries different combinations, shapes, arrangements and colors, until the result "looks right" (Kent 2013). While the cartographic production process involves working in detail, the goal is to ensure that map symbols work together in their specification to provide an overall coordinated effect of clarity, harmony, and balance. Woodward (1982), for example, explains how the style of type plays a significant role in forming the image of the map. But however small the adjustments and refinements may be, each resulting from a cycle of reaction, judgment, and action, together they construct the aesthetic of the map.

This holistic view is worth considering because the user's aesthetic response is a reaction to the entire design of the map (Petchenik 1974). Indeed, according to Keates (1984), it is only the map's complete form which commands aesthetic attention. A recent online questionnaire (Kent 2013) found that being drawn to explore the map further was considered by most respondents to characterize their aesthetic experience of maps. Indeed, as Eaton (2008) states, what has aesthetic value sustains attention, and we can often return to gain more pleasure and understanding.

It is tempting to suggest that such aesthetic goals are restricted to individual cartographers who are able to exercise the most control over map design in their desire to create something of lasting value and worth, as an expression of their own aesthetic ideals. The significance of aesthetics in the pursuit of cartographic excellence is nevertheless also prevalent in the corporate environments of state mapping organizations such as Ordnance Survey. For example, in a discussion held at The Royal Geographical Society in 1933 concerning the introduction of a grid to Ordnance Survey maps:

> ***"…though it may spoil the aesthetic form of that beautiful map, for instance, that has been produced of Plymouth, it is a distinct advantage to the present map reader that he should have a number and a letter to mark the different sections." (Goodenough et al. 1933, 53)***

The importance placed on preserving aesthetic quality over the introduction of something so fundamental on the maps of today is perhaps surprising, given the

neglect aesthetics has suffered in cartographic theory. So whether by an individual or a corporation, a major objective of the cartographic enterprise is to create a map that is at least as beautiful as it is accurate and useful.

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If aesthetics plays such a significant role in cartography through the symbolization of features and their design, it is as relevant to the systematic production of maps through their recognizable and standardized forms as it is to the creation of individual maps with a unique symbology. In this case, the resulting aesthetic or "look" gives rise to a certain "style" that can be applied to other maps. Indeed, Keates (1996, 251) points out that style and aesthetics are "intimately connected" and the relationship described in Captain Withycombe's (1925, 533) appraisal of "recent products" of the Ordnance Survey in 1925 implies that the style of a map actually determines its aesthetic appeal:

> ***"Just as good literary style is of the utmost practical value in the presentation of scientific facts in a book or pamphlet, so good cartographic style enhances the practical value of a map besides converting it from a dry statement of facts to a thing of beauty."***

This would suggest that following a "good cartographic style" is important, both for the optimum presentation of geographical information and also, it would seem, to attain lasting aesthetic value. Aesthetics therefore plays a vital role in the creation of a good cartographic style, which in turn determines map symbol specifications—and standards of portrayal. Faithfully following these specifications to reproduce the appropriate style becomes a practical way of enhancing the aesthetic appeal of a map. If a style has been established and is versatile enough to portray a range of subjects, it can be applied rather like a filter for portraying information with a particular aesthetic. The aesthetic judgment of the cartographer is crucial because this determines how a map symbolizes its subject and therefore how the map might appeal to its users. In order to explore this further, it is necessary to examine how aesthetics has played a role in the symbolization of landscape and the user's response to this.

LANDSCAPE CARTOGRAPHY: MAPPING THE AESTHETIC

> ***"Almost every Englishman, if asked what he meant by 'beauty', would begin to describe a landscape—perhaps a land and mountain, perhaps a cottage garden, perhaps a wood with bluebells and silver birches, perhaps a little harbour with red sails and whitewashed cottages; but, at all events, a landscape." (Kenneth Clark 1949, 132)***

> ***"Clarity and a helpful presentation of our still beautiful country must take first place. Too heavy a marginal decoration detracts the eye and overshadows even so fine a feature as Dartmoor." (Brigadier H. S. L. Winterbotham 1932, 18)***

> *"To capture the essence of landscape requires that the components be blended graphically so as to have an iconic quality, a unique sense of place and character. This aspect of topographic mapping is rather like portrait painting in that the objective is to produce an image blending feature and expression that conveys the essence of personality." (Arthur H. Robinson 1989, 93)*

Mapping the landscape, which requires the selective generalization of features from the land, is one of the earliest applications of cartography. The introduction of institutionalized survey from the Enlightenment onwards brought greater levels of standardization, while the adoption of color lithographic printing by the early 20th century saw further steps towards a general style of topographic mapping which Keates (1996, 256) identified as the "Classical" style. The development of broader symbologies to portray the diversity of national landscapes and meet the changing needs of users within the realms of each national aesthetic tradition has contributed to the stylistic individualism present today (Kent and Vujakovic 2009).

In topographic mapping, scales can be large enough to allow the representation of features in enough detail to present an image that approaches a mimetic (albeit pictorial) view. Indeed, in the seventeenth century, a fondness for topographical views and details made maps closer to our idea of pictures (Alpers 1987, 60), while the Enlightenment's systemization of knowledge brought greater standardization. Due to the restrictions suggested by scale, symbolization involves abstraction and this affects the aesthetics of mapping the landscape. As the degree of abstraction tends to increase as scale decreases, it seems possible that smaller scale maps such as thematic or special-purpose maps that concern the presentation of phenomena far beyond the normal human perspective (e.g., a map of Europe) in particular, will embody an altogether different aesthetic. As Robinson (1965) implies, at larger scales we tend to see reality while at smaller scales we tend to see symbols, which carry associations. Furthermore, the less an artifact interests our eye as imitation, the more it must delight our eye as pattern (Clark 1976). Abstract forms also allow more freedom of expression because they are not tied to mimesis. Harry Beck's design for the London Underground map was successful not solely because of its rational approach to navigating the Tube, but also because its pattern of regular angles and vibrant colors were in step with the Art Deco aesthetic that was burgeoning in the 1920s and 1930s.

The aesthetic response to larger scale maps that are more representative of the surface features of the subject (i.e., the landscape in topographic maps) is influenced by the user's imagination, experience and memory of the phenomena. Some landforms, however, are perhaps more likely to take precedence over others because their aesthetic appeal attracts more observation and study. While many share a particular fascination for Swiss topographic maps because of their detailed expression of this natural landscape (e.g., Knowles and Stowe 1982, 108), others dismiss the Swiss map on the grounds that it is the subject matter, the Alps, which is impressive (Keates 1984, 39). Indeed, the landscape shown by topographic maps tends to affect the user's ability to read the map to a greater degree than its cartographic design (Raposo and Brewer 2011). However, this does not imply that the

cartographic style employed by different national mapping organizations should not also be aesthetically pleasing, regardless of the fact that the terrain may be very different. According to Brady (1998, 142), "It may take less effort to see the beauty of a particularly grand landscape than a mudflat or a wasteland. However, mudflats and wastelands may also have aesthetic value, and perceiving that is dependent upon the effort of the percipient." Indeed, as Hodgkiss (1981, 174) suggests, "The landscape of the Netherlands hardly seems likely to inspire the making of such beautiful maps but the country has an unrivalled cartographic tradition and is one of the world's leading mapmaking nations."

Tempered by professional and public scrutiny, state topographic maps express a particular—aesthetically conditioned—view of the landscape; the map is a symbol of the mapped. If the aesthetics of landscape influences the cartographer's judgments and the user's response to these, then a successful cartographic style would express these aesthetics through a whole national series of topographic maps. The representation of landscape outside this tradition therefore demonstrates a lack of authenticity because it falls short of the particular aesthetic ideals developed and maintained by the state mapmaker, as illustrated in Figure 4.

State topographic maps utilize a national style that is generally rooted in a particular aesthetic tradition, which is itself derived from a broader aesthetic associated with topographic mapping. They may also be considered to have particular aesthetic value for several reasons. The simultaneous presentation of multiple sets of geographical data often results in a complex interplay of features that requires the application of several principles of cartography to create an effective result on a holistic level (as intended in the creation of the map symbology). These may include: a logical visual organization (hierarchy) that typically prioritizes point and line symbols; a harmonic range of colors (particularly those used in the background) which also demonstrates a visual hierarchy so that the use of stronger colors are minimized in surface area; a level of standardization throughout (where repeated symbols are identical); a layout that demonstrates balance and alignment (applicable to marginalia); and lettering that is evenly spaced and whose size and typeface matches the character of geographical features. These may be supported by certain factors regarding how the user approaches a topographic map, e.g., as a "natural" representation (nature itself) free of bias; as a reliable document derived from "objective" survey and mathematical proof in its underlying geodetic framework; as a souvenir providing a connection

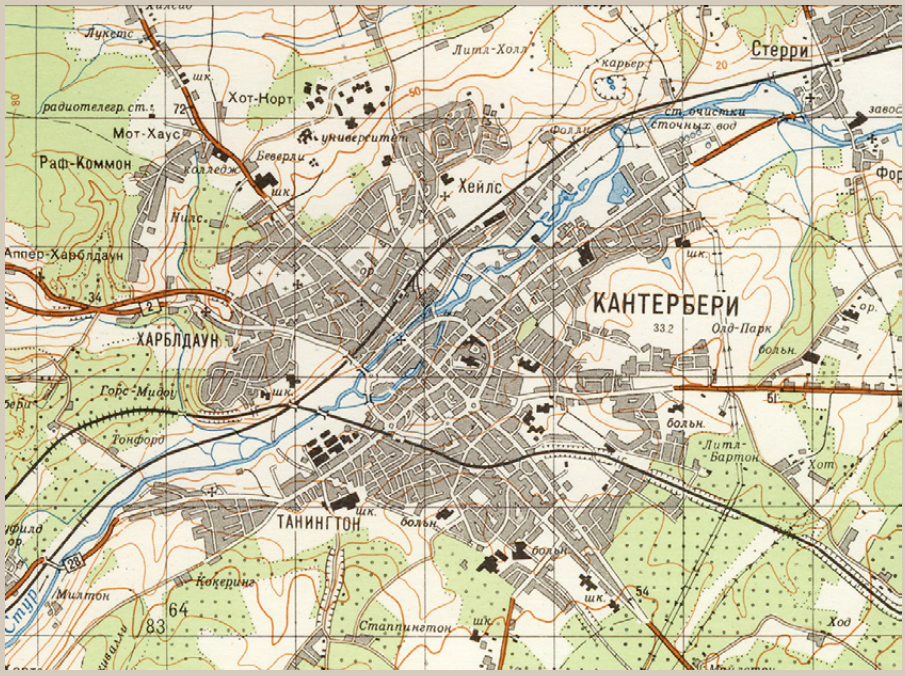

Figure 4: Extract from 1:50,000 topographic map sheet M-31-XXVII-A "Canterbury" produced by the General Staff of the Soviet Armed Forces, 1981.

between memory and place; and whether they approach the map in a state of disinterestedness (i.e., without the need for the map to exist), which, for Kant, was an essential condition for aesthetic experience. The presence of these elements—particularly when coupled with the factors affecting user response—lends the topographic map a sense of unity, conformity, harmony, and (perhaps more significantly) intricacy, that has made this wider aesthetic tradition successful and supranational. The map shown in Figure 5 for example, utilizes some of these characteristics to an extent that its appearance suggests the sublime—perhaps by challenging our imagination and by presenting nature as both irrational and infinitely complex.

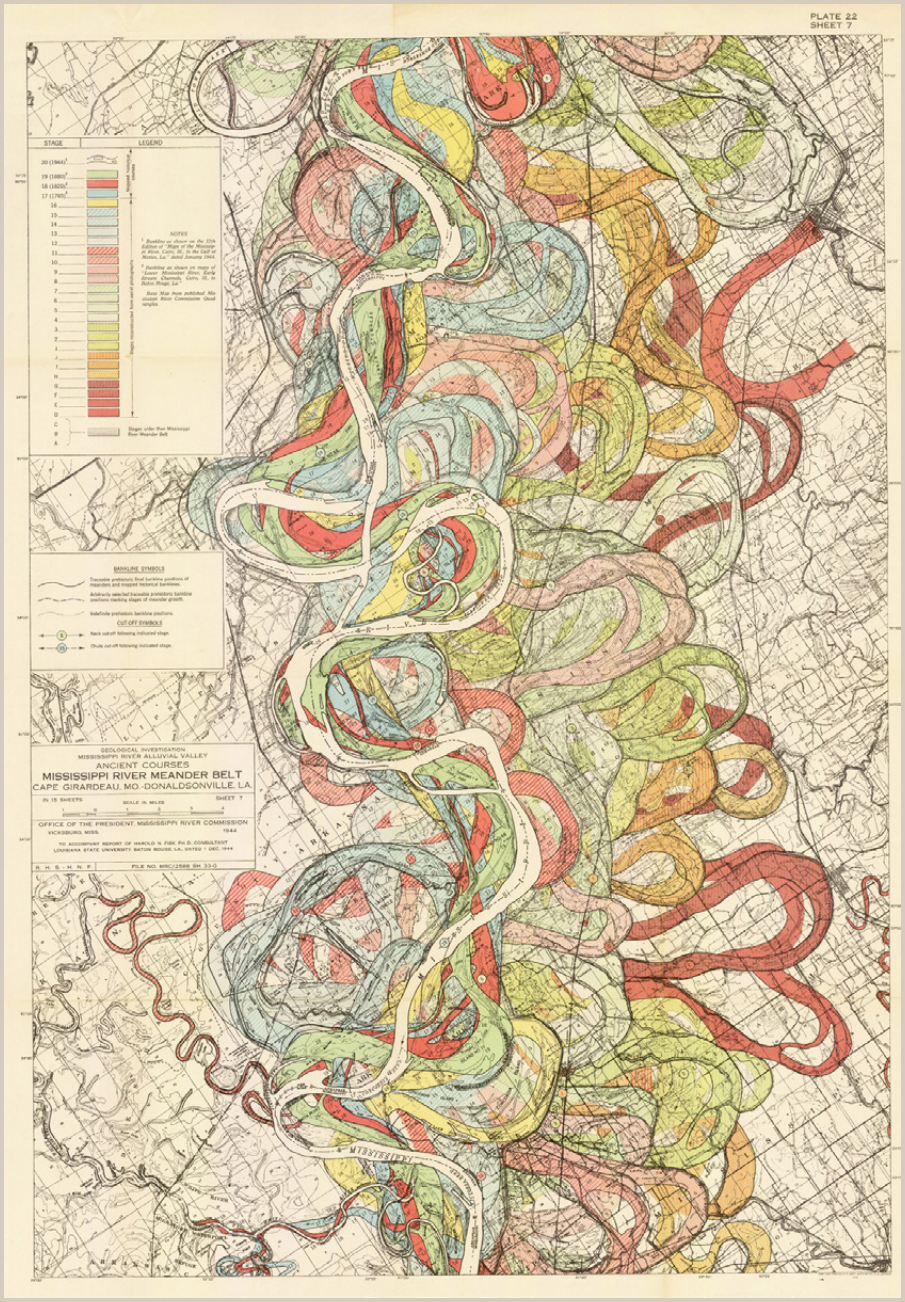

Figure 5: Plate 22 Sheet 7 from a geological survey of the Mississippi Basin (Fisk 1944).

It is important, however, to remember that the aesthetic impulse does not direct the inception of a topographic map in the same way as, for example, a landscape photograph. So, while Ansel Adams (1983, 79–80) could declare "Unless I had reacted to the mood of this place with some intensity of feeling, I would have found it a difficult and shallow undertaking to attempt a photograph," topographic maps are typically initiated from a utilitarian desire to understand, manage, control, and defend territory. While the emotional association with a specific place would perhaps be affected by the amount of detail apparent in its portrayal—and hence the scale of the map—the absence of detail inherent to cartographic symbolization allows a free play of the imagination necessary for the development of emotions associated with that sense of place. It consequently provides the map with advantages over the photograph.

Yet it is possible to communicate a more general, as opposed to a more specific sense of landscape through a particular combination of language, style and abstraction. An example, albeit using a very different language, can be found in the music of Symphony No. 6 ("Pastoral") by Ludwig van Beethoven (1770–1827). The title of the first movement, "*Erwachen heiterer Empfindungen bei der Ankunft auf dem*

Lande" (Awakening of Happy Feelings on Arrival in the Countryside), would imply that a successful interpretation of the music depends on the experience of countryside. But the music does not necessarily evoke feelings associated with the countryside surrounding the village of Heiligenstadt outside Vienna, where the music was composed (Jones 1995, 38), but rather the "countryside" in general. The emphasis is not on communicating the sense of a particular place—a *genius loci*, as often in the "tone poems" of the later 19th century—but a particular *type* of place. Although some elements in the symphony are deliberately mimetic (such as the call of the nightingale, quail, and cuckoo), these do not communicate the sense of countryside so much as the particularity of melody, harmony, orchestration, and timbre within the early nineteenth century style of musical composition in general. As Jones (1995, 34) suggests, the music is sufficiently allusive so that the listener can discover, rather than be told, what the "picture" is. The music expresses an experience of countryside, but this is broad enough to appeal to the particular experiences and imagination of the individual.

Through a familiarity with cartographic style and experience of landscape, the user's imagination and memory may be combined to enable a greater exploration and understanding of place. The establishment of national styles—particularly by a state mapping organization—therefore not only facilitates map reading to those familiar with this particular cartographic language of symbols but also serves as a "centripetal force" that suppresses regional differences through the homogenous representation of state territory. Moreover, the aesthetic tradition of topographic mapping reinforces the values of a faithful portrayal of the landscape, based on precise survey and objective science, and also exudes order and control.

THE AESTHETICS OF COUNTER-MAPPING

> ***"Nowadays, to the map-maker's eye, all water is blue. Even the Avon at Bristol, the Mersey at Liverpool, the Thames at Waterloo Bridge, and the very mud which, during most of the day, fringes the rivers, all are as blue as a Mediterranean seascape." (Walker W. Jervis 1938, 40)***

People invest deep emotional associations with places and so their representation or portrayal can trigger strong responses, which can be positive or negative. The homogenous cartographic style that characterizes state topographic mapping is intended to offer a versatile yet standardized portrayal of the national landscape. Where this homogenization has driven some to undertake mapping initiatives of their own, often these have sought to promote the uniqueness of place and the voice of community over state. In the UK in 1987, the environment and arts group *Common Ground* launched its first major public initiative—the *Parish Maps Project* (Crouch and Matless 1996). The aims of the project may be summarized as follows:

> ***"The idea is to encourage groups of volunteers to celebrate what Common Ground calls "Local Distinctiveness" so that people can***

> *identify what is particular and special about their home surroundings. The maps are all about people and their sense of place." (West Sussex County Council 2007)*

Collectively, the Parish Maps present a series of unique landscapes, each of which appears to uphold the values and interests of the community associated with each place. In a way perhaps not too dissimilar from Dutch topographical views of the seventeenth century, most maps incorporate pictorial representations. Drawing the community together through the theme of a common, localized space—if making the maps somewhat exclusive to outsiders—the depiction of local inhabitants and wildlife is in clear contrast to the "dehumanised landscapes" of state topographic maps and it would appear that they provide an authentic alternative. However, as with any cartographic language, Parish Maps are also influenced by the aesthetics and politics of selectivity. For example, particular features were dropped on grounds of their aesthetic value, ensuring that social inequality crept onto the map as in the case of Charlbury, Oxfordshire:

> *"The Charlbury map appears as an exercise in comprehensive realism but its imagery is carefully selected. A particular iconography of the place is set up: older buildings, a flora and fauna denoting a settlement in harmony with its parish land, a landscape written over by layers of history. The making of a map "like an old painting" is bound to a particular social aesthetic: "we wanted the map to be interesting to look at and council houses are not pretty."* […] *Unwilling to register a very visible architectural and social presence, placing part of their village out of cartographic sight, the mapmakers undercut their desired holistic vision of place and community." (Crouch and Matless 1996, 250)*

The fundamental premise of counter-mapping initiatives such as this lies in a rejection of the view that the landscape presented by state cartography is the only valid representation. The creation of OpenStreetMap (OSM) in the UK by Steve Coast in 2004, which launched the idea of crowd-sourced mapping of the nation as a potential alternative to state topographic data, has encountered a similar aesthetics and politics of selectivity. The drive to develop rendering toolkits such as Mapnik to "make beautiful maps" (Pavlenko 2007, 13) and the subsequent integration of these within OSM demonstrates the underlying belief that these maps should also be aesthetically refined creations, and more significantly, suggests that the mapping of place necessarily involves the integration of aesthetic values. Nevertheless, as Hacklay (2012) observes, spatial biases in contributions to OSM are noted—the concentration on highly populated places, the gap between rich and poor places, and the difference between rural and urban areas. So in their resistance to the state's "landscape of power," the exercising of aesthetic judgment over the selection and portrayal of features in order to present a particular landscape is nevertheless evident in counter-mapping. It would seem that the desire to present an aesthetically conditioned view—with its inherent process of selectivity—there-

…the desire to present an aesthetically conditioned view—with its inherent process of selectivity—remains an intrinsic element of the "authentic expression" of topographic cartography.

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Ironically, perhaps, Harley's (1991, 13) warning is no less relevant to the makers of these maps: "we may create a design masterpiece but it will merely be a projection of an unethical landscape in whose making we have no part and for whose social consequences we have abrogated responsibility." So, just as there is no one map for one area (Peil 2006), it would appear that topographic maps produced by the state are no less "authentic" as cartographic expressions of landscape than those produced by a local community or the crowd as volunteered geographical information: all are socially constructed mapping initiatives which exercise their selectivity from political and aesthetic values. The major differences in their cartographic representations arise from how they construct meaning for, and embody relevance to, the users that they are intended to serve.

According to Crouch and Matless (1996, 251), in the empowerment offered by the Parish Maps Project, "Conservative aesthetic technique may constrain the social content and complexity of a map, fixing the locality rather than letting place flow." If national mapping organizations aim to design and produce maps with the greatest possible relevance to society, it might appear that the *genius loci* is an elusive, but nevertheless important, element to consider:

> ***"Our sense of a place is in many ways more important than objective fact. The impressions we carry of the house we grew up in and the places where we played as children are more important to us than any mathematical measurements of them." (Turchi 2004, 29)***

The abstraction of features in state topographic maps allows them to operate as "open texts," inviting imaginative interpretation. According to Brady (1998, 143), "imagination provides a more intimate aesthetic experience, and thus allows us to explore aesthetic qualities more deeply than through perception alone." As they define the landscape in a highly subjective way, Parish Maps are perhaps almost "closed texts," not least because they provide pictorial representations of specific locations and features, but also because they are deliberately embedded with meanings that essentially have relevance to a smaller, and therefore more exclusive community. State topographic maps, especially perhaps at the scale of 1:50,000, present landscapes with enough mimesis to denote a basic, recognizable character of place, but, crucially, enough abstraction to connote personal experience, allowing an intimate, imaginative interpretation. A user's familiarity with the language of 1:50,000 state cartography and the particular style—or dialect—of symbology enables this to be performed more effectively (Kent and Vujakovic 2011).

A problem faced by the creators of web map services and topographic map series alike is the creation of a symbology and style that is versatile enough to portray a diversity of landscapes that meets the expectations of users. However, few topographic map series extend far beyond state borders and reach across the globe. Topographic mapping projects which have sought to achieve this, such as the International Map of the World at 1:1,000,000, proposed by Albrecht Penck in

1892, have often been unsuccessful. Those which have prevailed have tended to adhere to a special purpose or serve a limited user group, and are usually at the small scale (e.g., world aeronautical charts, or military mapping programs such as that of the former Soviet Union and NATO standardization agreements). Hence, a detailed portrayal of landscape is avoided, as can also be seen in the current initiative for supranational mapping in Europe:

> *"EuroRegionalMap (ERM) is a pan-European multifunctional topographic reference dataset at scale 1:250,000 based on national contributions from EuroGeographics member organizations. In one of its regional production groups data providers of eight Central European countries faced the challenges of harmonizing their national medium-scale databases in matters of content, geometry and quality standards." (Pammer et al. 2010, 20)*

Most web map services, such as Google Maps, base their portrayal of landscape on a minimalist aesthetic that includes enough topographic detail to allow users to identify locations and perform route-finding queries (and to use as a base for their own data), even if they do not adequately communicate a sense of place (Spence, quoted in BBC 2008). OpenStreetMap offers more detailed representations and the potential to (at least) provide regional symbologies that more strongly evoke this sense of place. However, experimentation with different styles of cartographic representation, such as those provided by Stamen Design for OSM, allows users to experience cartographic representations that draw on an altogether different aesthetic, such as watercolor painting (Figure 6). Hence, counter-mapping has led to a re-engagement with the expressive power of cartography.

Exploring the expressive power of state cartographic styles has also become an emerging theme in map art. The work of British artist Layla Curtis, for example, challenges these naturalized views of the national landscape through collages of topographic maps from around the world in arrangements that retain a recognizable geospatial framework (Figure 7). These have a destabilizing effect on the familiarity of representation that users have come to expect of a state topographic map through its particular appearance, construction of meaning, and homogenization of landscape. Curtis' collages also serve to illustrate that without their capacity to communicate using a familiar style, state topographic maps lose their power to convey the nationalized sense of place. The application of colors from famous paintings to state topographic maps (Christophe 2009) challenges their established aesthetic tradition more directly. Here, the underlying geospatial framework is retained, allowing a fuller experimentation with style and hence aesthetic effect.

These recent experimentations with the representation of place have tended to focus on challenging the established aesthetic of topographic mapping and mark an important step in the development of cartographic treatment of landscape. Moreover, we are perhaps also witnessing a return of the cartographer's role to incorporate that of the "pictorial artist." It is important to remember, however, that such visualizations offer no more functionality than their source (indeed, some offer less, such as the omission of lettering in the watercolor OSM map). Ulti-

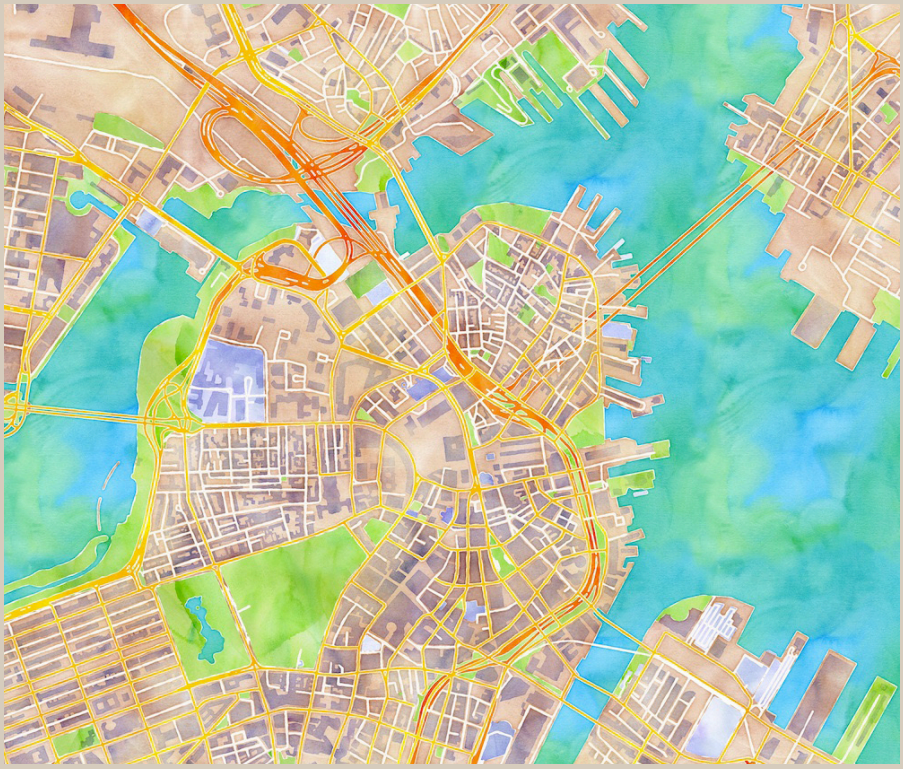

Figure 6: The "Watercolor" map (style) by Stamen Design that can be applied to OpenStreetMap data for any worldwide location (in this case, Boston, Massachusetts), that was inspired by watercolor paintings based on Google Maps as part of the Bicycle Portraits project (Stamen Design 2012; Engelbrecht & Grobler, 2013).

Figure 7: Extract from NewcastleGateshead (2005) by Layla Curtis. Collaged road and topographical maps in two parts, each 50 cm x 70 cm. Image reproduced courtesy of the artist.

mately, maps are tools, and although these developments have stressed the form over function in their design, the progression and application of this tenet to topographic mapping (and cartography in general) can have consequences. Cartography is not alone as a discipline that involves art, science, and technology and seeks to meet functional and aesthetic demands and expectations from its users. Architecture is often quoted as a field whose constraints to some extent are analogous with those of cartography (Hurni and Sell 2009). A building may be designed to meet some aesthetic ends but fail to function properly (or worse, it may collapse), or it may be designed to function well but its form may inhibit its use. The consequent neglect of the needs of the user (especially when coupled with an ignorance of the effects of climate or weathering) has meant that few examples of Brutalist architecture have earned the respect of preservationists. As Graham (1997, 143) points out, "In short people are not cars, and aesthetic form can no more determine function exhaustively than function can determine form." At its finest, architecture unifies form and function, providing the example of the Gothic cathedrals of Europe:

> ***"It has been pointed out many times that everything about a Gothic cathedral, but especially the spire, draws our attention upward, just as the minds and souls of those who worship in it should also be drawn upward. The gigantic nave of the cathedral at Rheims must fill those who stand in it with a sense of how small and fragile they themselves are. The important point is that this is an attitude***

singularly appropriate for those entering the presence of God." *(Graham 1997, 145)*

It is for this sort of intimate relation between form and function that those involved in cartographic design should strive; each symbol on the map must meet its user's need effectively and express the object or idea it is intended to symbolize. Mapmakers who treat aesthetics as no more than a way of injecting appeal or charm will create maps that are simply just "pretty," lacking the depth that befits maps of greater aesthetic value that can be achieved through innovation or multi-layered effective functionality.

Perhaps the most effective maps, therefore, are those which succeed in utilizing the aesthetic language of cartography to express their subject in such a way as to create in the mind of the user an attitude appropriate for engaging with its subject. The aesthetics of cartography need not construct a positive emotion or pleasing effect. Visitors to the Sachsenhausen Memorial and Museum, the former concentration camp near Berlin where an estimated 30,000 prisoners died during World War II (plus several thousand later under Soviet administration), are offered a map of the site. The minimal and suggestive use of color (grays, white, blood red), lack of natural detail (despite the large scale), and clinical typeface, together construct an aesthetic that communicates a bleak, soulless landscape (Figure 8). The map successfully utilizes the aesthetic language of cartography both to communicate the sense of place while also suggesting an attitude appropriate for contemplation during the visit.

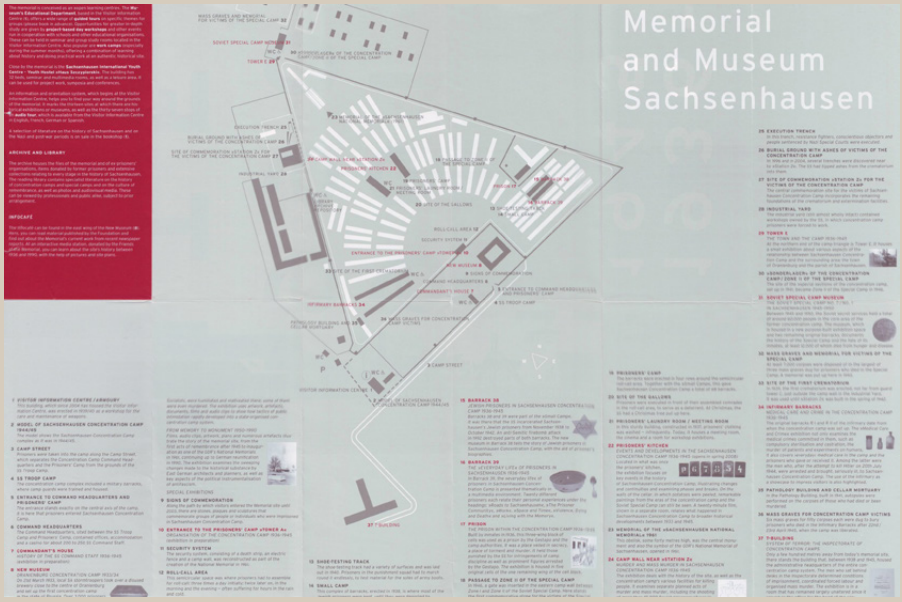

Figure 8: Sachsenhausen Visitor Map (2008) designed by L2M3 Kommunikationsdesign GmbH, Stuttgart. Reproduced with permission from Sachsenhausen Memorial and Museum/Brandenburg Memorials Foundation.

CONCLUSIONS AND AVENUES FOR FUTURE RESEARCH

"We must be sensitive enough to our surroundings to preserve their beauty, and mould it, if at all, into something as fine as its natural fineness. […] *with maps we can devise plans—indeed, our maps are our plans—for remoulding the land after our desire." (Walker W. Jervis 1938, 149–150)*

The effective mapping of place depends upon the measurement and representation of phenomena using a combination of scientific and artistic methods. The scientific tradition, since at least the Enlightenment, has led to the cartographic portrayal of landscape through the development of a particular aesthetic which became more standardized during the early 20th century. The democratization of mapping and broadening of the cartographic canon during the last decade, especially through neocartography and map art, has inspired a growing community of user-cartographers to wield the expressive power of maps, while cultivating a greater appetite for appreciating their artistic (as opposed to scientific) value. Technical and societal change has seen the aesthetic tradition of state topographic mapping challenged and has led to experimentation with the representation of place, yet the aesthetic language of cartography still tends to be used to ennoble the landscape or lend a sense of beauty to the character of its subject.

Cartography utilizes a graphical language that allows a wide range of aesthetic possibilities and the application of this language to fully express the characteristics of place is long overdue. If one of the main goals of a (topographic) map is to communicate geographical reality, this should not be restricted to evoking positive emotional experience. While the sensory maps of Christian Nold (2009) and Kate McLean (2012) embrace this gamut through recording emotions and smells respectively, the visualization of place is inherently biased towards the beautiful. If another goal is to effect change through transforming attitudes or feelings towards a subject (for example to combat urban decay or to assist a vulnerable population), there is much scope to wield a breadth of aesthetics through cartographic language.

It is perhaps, at last, time for cartography to move beyond the emotional security of the Enlightenment. Technological advances can no longer assume a definitive role in determining the character and direction of the discipline. Indeed, "Understanding how technology works is important, but the partnership between art and science, and their contributions to the discipline, are more important" (Cartwright 2000, 11). Not surprisingly, more research into how cartographic aesthetics influences users is needed. Instead of focussing on the individual elements of cartography, there is huge scope to investigate what characterizes the aesthetic response to maps and how different aesthetics affect map interpretation. Furthermore, user studies should embrace the wider functions of map design to explore emotional associations and with this the communication of a sense of place and its effective recall. It is hoped, then, that a more informed understanding of cartographic aesthetics will help us to map, portray, and visualize our landscapes with more authenticity.

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Expressive Map Design Based on Pop Art: Revisit of *Semiology of Graphics*?

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ABSTRACT

Is aesthetics an objective in the map design process? This question echoes our long-term research: does aesthetic quality improve map efficiency? In this paper, we discuss the notions of aesthetic response, objective and experience proposed by Kent (2005), and their relevance for making more expressive personalized maps. We first present the state of present research related to these notions and our interpretations. Then we present a systematic approach for rendering geographic data in a cartographic style based on the visual properties of Pop Art; the resulting maps are more vibrant and expressive. We consider this result a first step towards enhancing map quality. The proposition of a Pop Art cartographic style leads us to revisit some theoretical and practical principles of Semiology of Graphics *(Bertin 1967), considering our experience with color contrasts and new approach for using texture. We conclude that expressive cartographic renderings would be useful for every mapmaker, and in the context of personalized map design, providing more elaborate tools could improve the design process and the resultant maps. Improving map quality is a question of managing visual variables in a traditional way—according to Bertin's* Semiology of Graphics*—but also in a more artistic way, in order to find better cartographic representation according to the preferences, needs, and purposes of the mapmaker.*

KEYWORDS: Map Design, Graphic Semiology, Visual Variables, Colors, Texture, Style, Pop Art.

INTRODUCTION

Contrary to his provocative title, "Aesthetics: A Lost Cause in Cartographic Theory?", Kent (2005) assumes that aesthetics has played and still retains a central role in cartographic theory, and has perhaps been a topic missing from the map design process. He mentions that current maps are tools that "must all function to work and aesthetics are part of, and enhance, their function." Moreover, he discusses the aesthetic response that can be experienced "when something is beautiful," and the relation between a user's confidence in a map and the degree to which they feel it is aesthetically pleasing. Finally he asks us, as researchers in cartography: is aesthetics an objective in the map design process?

All these open issues coming from Kent echo our own long-term research question: does aesthetic quality improve map efficiency? On the one hand, we consider the map efficient if the cartographic message intended by the mapmaker matches what the map user effectively understands when reading the map. Efficiency in map design is currently most related to readability and understandability. On the other hand, aesthetics in map design refers to perception and feelings when looking at a map. This definition implicitly suggests that it has nothing to do with efficiency. To conclude, there seems to be some conflict in map design research between aesthetics and efficiency. Our main long-term purpose is to try to prove that those notions are closer than is currently accepted.

For the moment, we are focusing on a related research topic: proposing sophisticated methods to make more aesthetic and expressive maps in the context of personalized map design. Therefore, we have been searching for sources of inspiration in artistic domains, in order to find ways of enhancing the expressive and aesthetic properties of personalized maps. In earlier work, we used a famous painting to consider color uses in map design (Christophe 2009 and 2011). We now consider Pop Art: a colorful, brilliant, very expressive, and popular artistic movement useful for revisiting the visual and aesthetic properties of personalized maps, and thus revisiting *Semiology of Graphics*.

In this paper, we discuss the notions of aesthetic response, objective, and experience, proposed by Kent (2005), relevant in our context of making expressive maps. We first present a state of the art related to these notions and our interpretations. Then we present a systematic approach to making a Pop Art cartographic style that may be used by any mapmaker to render their geographic data and enhance the map quality. The proposition of a Pop Art cartographic style makes us revisit principles in *Semiology of Graphics* (Bertin 1967) regarding our experience in colors and a new approach to consider the texture. We hope that these considerations may then be formalized to help users of online cartographic tools make better personalized maps according to their purpose. Therefore, we use the notion of "user," implying "user of cartographic tools," (i.e., a mapmaker) whatever his/her level of expertise.

CURRENT UNDERSTANDINGS OF AESTHETIC CONSIDERATIONS IN MAP DESIGN

Here, we discuss the aesthetic considerations of the map design process as they are presently understood, though we will not be exhaustive; others have magnificently done so (Keates 1993 and 1996, Krygier 1995, Kent 2005, amongst others). We assume that aesthetics enhances the function of a map by making it more easily readable, efficient (as regards an intended purpose or task), and understandable. Therefore, we would like to highlight this role, and our analysis is twofold: on the one hand, aesthetics may be considered an essential characteristic of map quality which must be integrated in the map design process (i.e., "aesthetic objective"); on the other hand, aesthetics is a question of perception for map readers (i.e., "aesthetic response").

AESTHETIC OBJECTIVE: MANAGEMENT OF VISUAL VARIABLES

The underlying question of the aesthetic objective of the map design process is: on which variables does the map design process rely in order to make an aesthetic map? Existing methods to manage aesthetics in automated map design or on-demand maps are mainly related to symbol specification—how visual variables are specifically arranged and balanced to make an aesthetic rendering. As cartographers, we benefit from Bertin (1967), whose conceptual framework describes the properties of visual variables and the way they should be used to represent relationships between objects. But, if we consider the aesthetic objective we pursue, we don't know any properties or principles to specifically create aesthetics from visual variables. Instead, many research works on aesthetics focus on color specification. Color choices are mostly driven by theoretical and practical cartographic considerations, based on conventional and contrast principles (Bertin 1967, Brewer 1994, Robinson et al. 1995). In this context, three ways may be explored to manipulate colors to enhance aesthetics.

First of all, the issue of harmony, prevalent but not formalized in cartography, is mostly considered a problem of arranging colors. Brewer (1994) proposes harmonious color schemes based on recommendations similar to Munsell (1947). Christophe et al. (2011) provide a quantitative measure to evaluate color harmony in a given map, based on indicators of balance and liaison between colors, and balance between spatial color contrasts.

Secondly, some theoretical and practical cartographic principles may be ignored, even while making good maps; unconventional uses of colors won't necessarily make bad maps. In that sense, conventions may be bypassed, opening all-new possibilities of color choices and uses. For instance, the color of the sea does not necessarily have to be blue according to the mapmaker's intention, as long as the selected color does not disturb the map reader's perception or create misunderstandings (Christophe 2011). Moreover, the use of contrast to highlight salient objects may be switched (as compared to traditional practices); in order to reduce the energy use of mobile devices displaying maps, Hoarau (2011) suggests that maps should be darker than usual and thus proposes a kind of "by night" map instead of a traditional style, which is too brilliant for this use.

Lastly, it may be interesting to find new color practices coming from other visual domains. Using color from artistic paintings and painters' practices to enhance the aesthetic objective of the map, while improving its quality, has been tested by Feranec and Pravda (2009), Friedmannova (2009), and Christophe (2011)—see Figure 1.

Figure 1: Cartographic and artistic color use from a painting of Derain (IGN Data: BDTOPO®). Note: these maps are made with GeOxygene (oxygene-project.sourceforge.net).

The watercolorization of the OpenStreetMap background (**maps.stamen.com/watercolor**) is also an attempt to reach new practices in cartography, inspired by artistic practices. In addition to colors, some works explore other visual characteristics. Inspired by hand drawings, Wood et al. (2012) provide sketchy rendering tools to convey the uncertainty of the visualized information and to involve users in a participative annotation task. Jenny et al. (2013) suggest designing digital panoramic maps by applying example-based texture synthesis methods to hand-drawn hiking or skiing maps.

AESTHETIC RESPONSES IN CARTOGRAPHY: FEELINGS AND PREFERENCES

Our analysis of aesthetics considerations in map design was twofold; we previously detailed the aesthetic objective, now we present the aesthetic response as a question of perception for map readers. Several issues about the aesthetic response, regarding the question of what is beautiful, are still at stake: which form does this response take (emotion, perception, feeling, preferences)? how could it be analyzed and measured? how is it perceived by map readers and also mapmakers? The classical approach aims at considering users' feelings, mainly through the knowledge of their preferences. The question, "which map do you prefer?" or "which map is the most beautiful?" is often used in visual tests to gauge feelings and/or preferences (Ortag 2009, Christophe 2009 and 2011, Christophe et al. 2011, Jolivet et al. 2009, Fabrikant et al. 2012, amongst others). The difficulty lies in the possible interpretations of the question and also of the answers. In some studies, descriptors are provided to help users specify their feelings (Dominguès and Bucher 2006, Jolivet 2009, Dhee 2013). Christophe (2009 and 2011) highlights the difficulty in directly asking users their color preferences. Her proposition consists instead of providing sources of inspiration for color choices and color uses (existing topographic maps and famous paintings) that users may like or dislike:. Thinking by analogy, they may transfer the visual impact and the general feeling of the color composition of an inspiration source into their maps. What is relevant here is that an aesthetic

response may be stimulated by both classical topographic maps (perceived as beautiful; see Kent 2005, 2010) and by famous colorful paintings.

In order to better understand the aesthetic response, Fabrikant et al. (2012) attempted to physically measure it with the help of a body sensor capturing skin measurements, combined with an eye tracker. They provide a protocol to measure emotional response while looking at different traditional and original topographic maps coming from their previous research work. Results of their measurements were validated by a final ordering of previously presented maps, according to the preference of the user.

CARTOGRAPHIC STYLES: A WAY TO STEER THE MAKING AND PERCEPTION OF AESTHETICS?

The two previously discussed aspects of aesthetics, the aesthetic response and objective, are difficult to independently explore, analyze, and formalize because they feed each other. Therefore, we think that they are strongly gathered in the notion of cartographic style. This term is still being defined, though it is described and approached in some recent works (Kent and Vujakovic 2010, Beconyte 2011, Christophe 2012); cartographic style may convey an aesthetic experience that we would like to formalize. Plus, an interesting aspect of topographic styles may be that "finding the maps aesthetically pleasing is thus derived from (our own) representation of the landscape" (Kent 2005). As does Kent, we believe that the perception and the (re)cognition of a territory play a great role in the notion of cartographic style. Ory et al. (2013) try to formalize these aspects based on a study of French and Swiss cartographic practices and related geographic spaces.

These considerations of aesthetic response, objective, and experience introduce an aesthetic experimentation with the help of sources of artistic inspiration applied to topographic maps.

A SYSTEMATIC APPROACH TO MAKING A POP ART CARTOGRAPHIC STYLE

We aim to make an artistic cartographic style involving an aesthetic response and enhancing the aesthetic objective of resultant maps. Our first task is to find representative images of an artistic movement from which we can extract some of its salient visual characteristics. We then draw a parallel between these visual characteristics and the visual variables we may handle in a map. Here, we focus specifically on the Pop Art movement, manipulating its characteristic, brilliant, easily recognizable colors. Some aspects of making Pop Art maps have previously been presented in Christophe et al. (2012); we describe here our systematic approach to making a Pop Art cartographic style with the purpose of making more expressive and aesthetic topographic maps.[1]

1. In our research work, we mainly handle topographic data and maps related to the national mapping agency in which we are situated. It is a very relevant place in which to consider traditional and original cartographic practices in the context of personalized map design and geovisualization.

IDENTIFICATION OF REPRESENTATIVE AND INSPIRING IMAGES

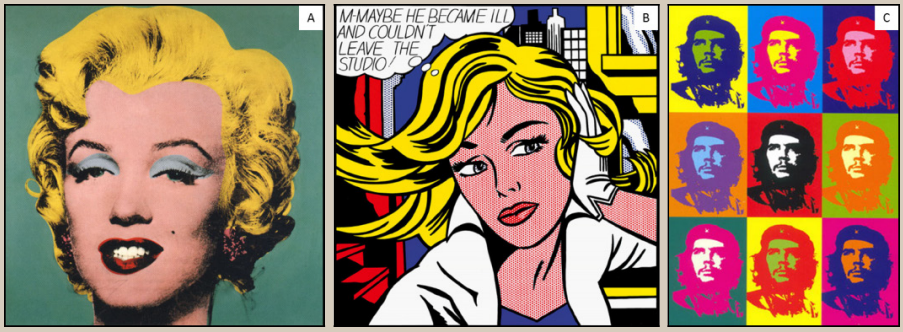

Figure 2: A set of representative images of the Pop Art movement.

First, we tried to specify what is representative of the Pop Art movement for us and, if possible, for people at large: mostly brilliant complementary color contrasts, visual effects of relief or serigraphy, cartoonish writing, Benday dots[2] and finally, the idea of an image reproduced with many color schemes. Our idea was to select a set of very famous images or images which make people think of Pop Art. We thus selected a Marilyn Monroe portrait by Andy Warhol (1962; Figure 2A), a piece by Roy Lichtenstein (1965; Figure 2B), and a famous imitation of Warhol, representing Che Guevara, by Gerard Malanga (1968; Figure 2C).

We assumed that people may recognize a Pop Art style while looking at these images; we make the hypothesis that they may recognize this Pop Art style when it is applied to geographic data. This selection of representative images may be subjective, but subjectivity is inherent to aesthetic and artistic perception.

Our objective was to determine the visual characteristics of the Pop Art style that may be applied to geographic data. Christophe et al. (2012) make recommendations regarding how to manage colors, color contrasts, typography, and stroke thicknesses, according to various data selections. With the help of these guidelines, many Pop Art maps are possible.

THE MAKING OF POP ART MAPS

What is relevant when using the three inspiring images is that it is not necessary to use all specified visual characteristics to think about Pop Art; it is possible to select some visual characteristics from one or several images and to combine them to reach a Pop Art cartographic style. Therefore, using only one Guevara from the first image makes a first map, "Che Guevara" style, with typical complementary and brilliant contrasts and highly saturated colors (Figure 3A). Using textures made of Benday dots, cartoon typography, bright colors, black outlines, and the specific color contrast of the Marilyn Monroe image makes a second map, a more "Lichtenstein" style (Figure 3B). In mixing inspiration sources, a third map may be obtained, with the typical blue-green (background)/pink (skin) contrast from Marilyn, bright colors from Malanga, and Benday dots, black outlines, and typography from Lichtenstein (Figure 3C).

Even if aesthetically evaluating artistic renderings is obviously quite subjective, we conclude that Pop Art maps have a great potential to enhance aesthetics and readability. This statement has to be considered always according to the user's need,

2. Benday dots are a printing process, coming from the illustrator and printer Benjamin Henry Day; they consist of a field of colored dots closely or widely spaced, providing a visual effect.

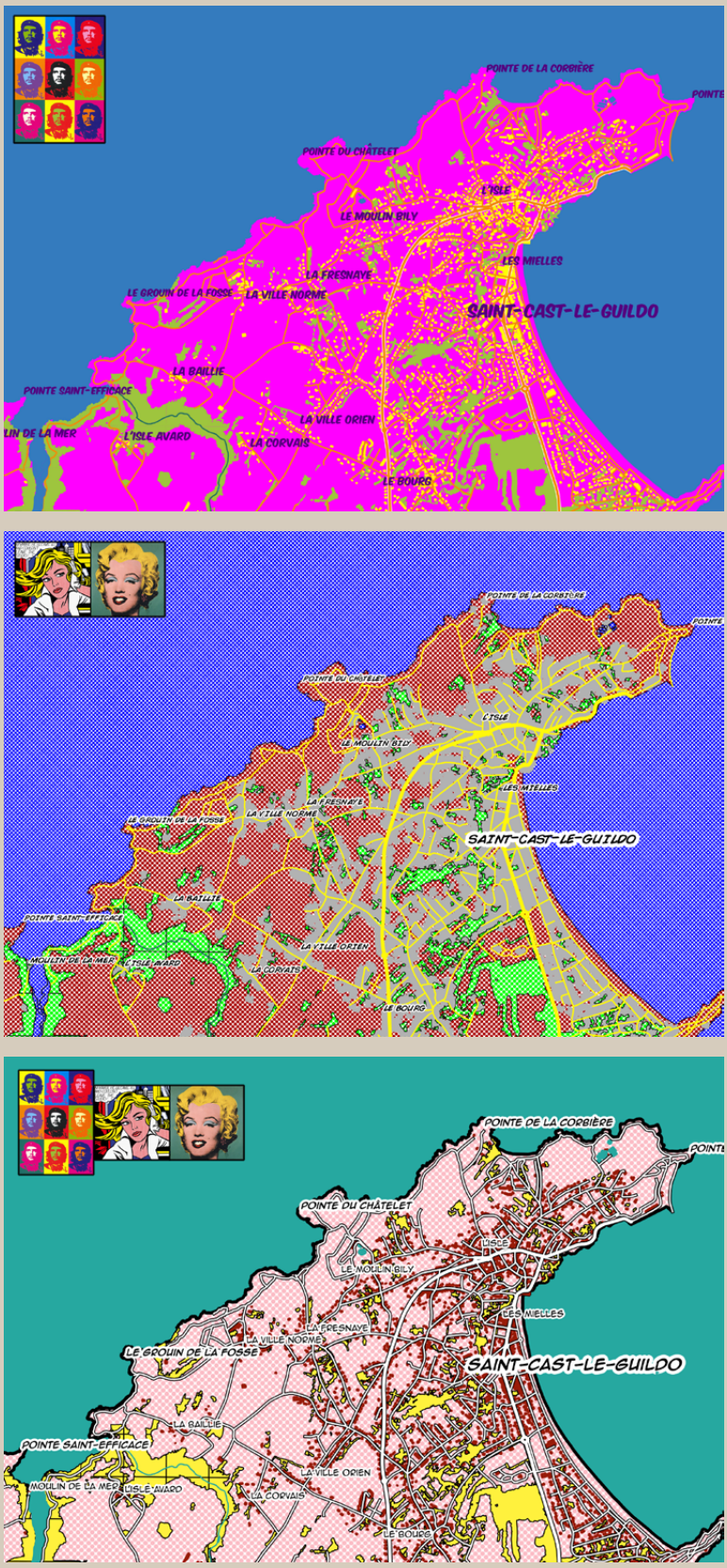

Figure 3: Three examples of Pop Art maps, from Christophe et al. (2012) (IGN Data: BDTOPO®). Note: all maps are made with QuantumGIS (qgis.osgeo.org)

taste, and purpose in our context of personalized map design. We present here only three possible resultant maps, but there are many possibilities for using Pop Art properties to make maps more expressive, more artistic, and thus more aesthetic, according to the mapmaker's wishes. We personally find that the third map (Figure 3C) conveys something particularly aesthetic in highlighting the sea-earth frontier; the black line and the opposition between a large blue area and a large field of pink Benday dots makes the map more vibrant. Moreover, Pop Art maps may also be more readable and efficient, depending on the mapmaker's purpose. The mapmaker may play with levels of color contrasts in order to manage a global impression or feeling, or to increase visual contrast between map features (for instance, with the complementary contrast). With the help of Pop Art properties, mapmakers may also highlight some geographic features over to others, according to what they need to make salient. It is our goal to be able to parameterize and control Pop Art properties in order to provide methods to mapmakers that manage various levels of reading and various kinds of visual saliency, while respecting their purposes.

Many maps can be created using the guidelines detailing how to manipulate visual characteristics found in Christophe et al. (2012), with many possibilities for selecting and combining those characteristics. Guidelines are not meant to constrain users during map design but rather help them enhance visual effects, the expressivity of data and map, and creativity—and thus the aesthetic experience.

HOW DOES THE POP ART STYLE REVISIT *SEMIOLOGY OF GRAPHICS*?

The resultant Pop Art maps made us revisit *Semiology of Graphics* (Bertin 1967) and related design principles both theoretical and practical.

COMPLEMENTARY COLOR CONTRASTS

The two visual variables, color hue and color value, very powerfully achieved our aesthetic objective

during the map design process. Bertin's definition of color in the *Semiology of Graphics* now has to be extended; Bertin was not very explicit about colors, as he was more driven by black-and-white issues and necessarily thrifty regarding the printing of colors. Moreover, the representative images of the Pop Art style testify that bright colors and complementary color contrasts are two relevant visual characteristics of Pop Art. Both considerations of color uses invited us to manipulate the colors of a topographic map based upon the complementary contrasts of the Guevara painting (Figure 4). We aimed to convey a visual impact similar to each Guevara in each mini-map. Consequently, we tried to preserve complementary contrasts, color proportions, and arrangement in the masterpiece when producing each mini-map:

Figure 4: Che Guevara-inspired mini-maps (IGN Data: BDTOPO®).

Figure 5: The same artistic style applied to different map extents (IGN Data: BDTOPO®).

- The color of the Guevara background is used for the sea (for example, bright yellow for the left top mini-map).
- The color of the Guevara silhouette is used for the map background layer (for example, navy blue for the left top mini-map).
- The color of the Guevara face is used for the vegetation layer (for example, apple green for the left top mini-map).

The use of complementary contrasts allowed us to achieve a maximum effect of color and light. The human eye, when looking at a color, tends to perceive its complementary color (i.e., simultaneous contrast): when two colors close to each other on the chromatic wheel are juxtaposed, this simultaneous contrast is enhanced, making the composition very vibrant. The bottom right Guevara image presents a blue-orange complementary contrast that has been described by Chevreul (1839): "Once you put together a blue area and an orange area, it is obvious that the colors of both objects purify themselves and become brighter." In the related mini-map, the vegetation is subsequently enhanced. Complementary contrasts may thus be useful for highlighting data on a topographic map; we could have used the orange color for the building layer in order to contrast it with the background layer. It would deviate from the Guevara image, but it could be a way to design a more

efficient map, depending on the cartographic purpose. Moreover, this example is also an opportunity to show a landscape with various impressive colors inspired by the Guevara image. The Pop Art concept of easily reproducible images is quickly applicable to vector data, allowing the design of a set of maps with various color specifications. This could be useful in providing different views of a given landscape depending on a given user's need.

The application of artistic characteristics to a fixed geographic dataset is a specific stage of the map design process. The features represented in a map have a given shape and geographic location, though they are sometimes modified a little in order to generalize the information and improve the readability of the map. But this process is limited because of another relevant objective of the map: accuracy. Consequently, the distribution of colors in a map is driven by the location, shape and size of the represented features. Christophe (2009) provides guidelines on applying some artistic color composition to geographic data; for example, if a color is used for little spots or small spread-out little objects in the inspiration source, it could be used to render the building objects, as "spots" at this scale, related to their shapes and sizes. We followed these principles in designing the mini-maps inspired by the Guevara painting (Figure 4), in order to preserve color proportions and distribution.

Another issue is to choose an adapted footprint for the map. For example, different options may be proposed to reproduce the Che Guevara style, as illustrated by Figure 5.

Figure 5A shows mini-maps of the same extent with different color specifications. As we previously stated, it provides different views of the landscape, and could be useful for highlighting different information in each. But the mini-maps are not very readable due to a level of generalization that is unsuitable to the scale. Figures 5B and 5C are graphic experiments in which the whole landscape has been divided into nine parts in order to convey the nine color compositions of the Guevara painting. Here the maps have an acceptable scale and may still convey the Guevara visual impression. Mini-maps are clearly examples of what could be done; now they must be associated with specific users' needs. They are a first attempt to reconcile our aesthetic objective and response, making a cartographically correct map without losing the expected Pop Art visual impression. This method is adaptable to making more efficient personalized maps, for instance, suitable to the space being represented.

BENDAY DOTS AND THE TEXTURE OF BERTIN

Using the typical Benday dots of Pop Art made us revisit the texture visual variable and the dot grid maps proposed by Bertin originally in a black-and-white context. These design processes were once hard to carry out manually, but Bertin anticipated the automation of graphic representations which is now possible in GIS applications and computer graphics tools (Emery 1975). Therefore, we explored the recovered potential of these old-fashioned map design processes in the context of color, in order to assess the value of using them not only to convey a Pop Art style, but also to improve the quality of the map.

Dot textures were used as background layers in order to assess their visual impact (Figure 6). Figure 6A shows a map with a plain tint background layer. This map presents a relevant Pop Art complementary contrast between the turquoise blue of the sea and the light pink of the background layer. This contrast is recommended by our guidelines inspired by the Marilyn painting, and very well conveyed by the map. But the induced contrast between the light pink and the burgundy red of the building layer is very strong, and may be too saturated in red, pink, and warm tints. This conflict could reduce the efficiency of the map. Dots provide a great opportunity to soften the pink background color and its contrast with the building layer by using a white background. Moreover, the dots allow conveying a visual effect similar to the Pop Art Benday dots. Graphic experiments seen in Figures 6B and 6C aimed at testing different sizes of dots, which must be chosen carefully. Indeed, dots which are too large or too salient could affect the desired Benday effect and the readability of the map (Figure 6B). Figure 6 allows a study of the impact of the size of the dots, but it could also be interesting to further experiment with other variations of the texture such as the disposition of the dots (in quartering, in staggered rows, etc.), the spacing between them, or their shape.

Finally, dots were used to convey quantitative information. Figure 7 provides examples of a texture map (on the left) and dot grid map (on the right) designed with QuantumGIS (**www.qgis.org**) and the Kartograph framework developed by Gregor Aisch (**kartograph.org**), respectively. Both maps represent the population of the departments of France. Both cartographic techniques were very hard to manually create in Bertin's time. Here, they are an interesting way to provide thematic information, and the use of pink dots with a white background, inspired by Figure 6, allows a softening of the contrast between the background color and the sea, and in so doing, creating a subtler potential background layer.

Both examples show the visual importance of the sea and background layers and their potential for conveying Pop Art complementary contrasts. They are elements relevant to our aesthetic objective. Both map design processes allow us to keep this contrast, but softened, as we see in the graphic experiments of Figure 6. Thanks to these examples, we can assume that designing Pop Art thematic maps is also possible. The texture variable and the grid dot map method are interesting alternatives for representing quantitative information without using the size, value, or color visual variables. Using other visual variables, such as size, value, or color, to represent quantitative information could have been difficult with respect to our Pop Art guidelines and would have weakened the resultant aesthetic response.

Figure 6: Using dot texture as a background layer (IGN Data: BDTOPO®).

CONCLUSION

In this paper, we discussed aesthetic objective, response, and experience and our interpretations of these notions in topographic map design. Though these concepts are mainly studied independently, we believe they should be analyzed together in a notion of cartographic style. We have searched artistic domains for sources of inspiration, seeking to enhance the expressive and aesthetic properties of personalized maps. In earlier work, we used famous paintings to consider color uses in map design (Christophe 2009 and 2011). Here, we have used ideas from Pop Art—a colorful, brilliant, very expressive, and popular artistic movement—to revisit the

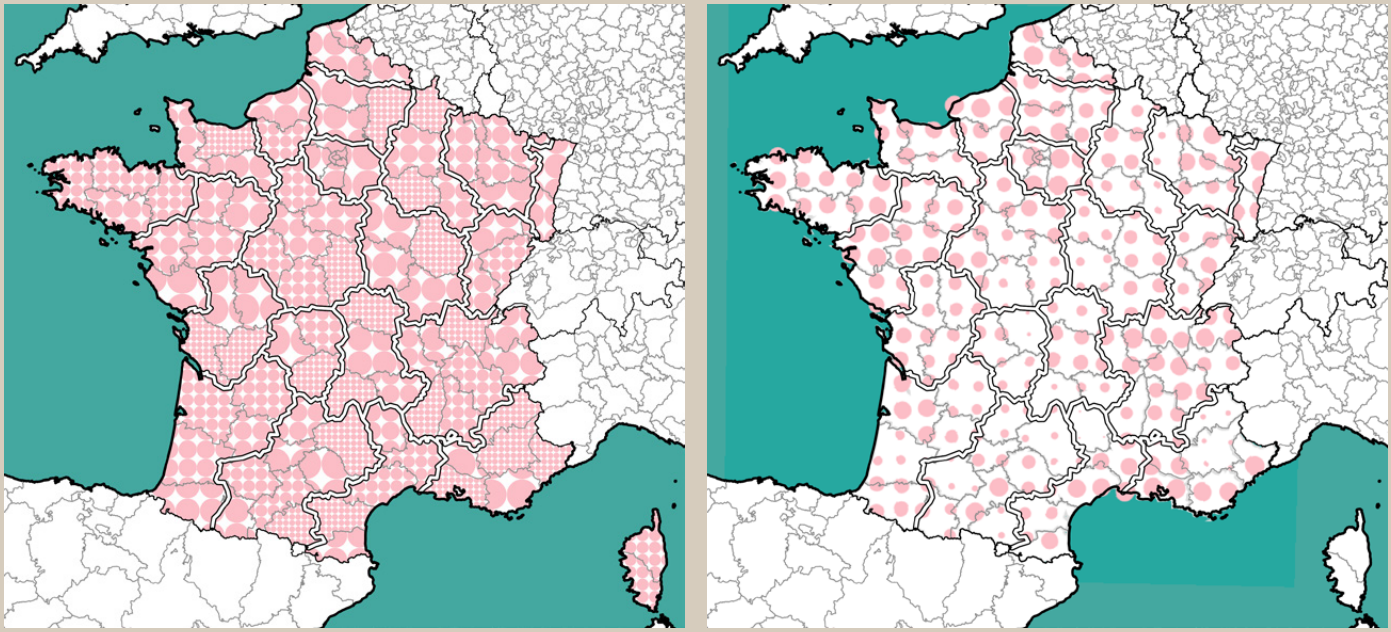

Figure 7: Using dots to represent quantitative information in a Pop Art style (IGN Data: BDTOPO®, GEOFLA®; ©EuroGeographics).

visual and aesthetic properties of personalized maps. We propose that a Pop Art cartographic style will improve their expressivity and aesthetic quality. This aesthetic experience has also made us revisit *Semiology of Graphics* on the subjects of color contrasts and texture.

Our long-term purpose is to validate that idea aesthetic quality improves map efficiency. We test methods to enhance aesthetics step-by-step in the map design process. But we often face difficulties with automatic design techniques that should be parameterized by the mapmakers themselves in order to make more satisfactory maps. We assume that the expressivity of maps—coming from expressivity of visual variables—if well-managed, would be very useful for every mapmaker. Actually, in the context of personalized map design, providing more elaborate tools could improve the map design process and the resultant maps. Improving map quality is a question of managing visual variables in a traditional way—according to Bertin's *Semiology of Graphics*—but also in a more artistic way, in order to find better cartographic representation according to the preferences, needs, and purposes of the mapmaker.

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A Disquisition on Cartographic Style and Taste: With Attendant Remarks upon Aesthetics, Clarity, Design, and Mapicity

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ABSTRACT

The discussions and findings of the 2012 NACIS Conference Aesthetics of Mapping *sessions both turned and stumbled upon the definition of terms like aesthetics, clarity, and style. This paper attempts to situate these key concepts, along with others such as design, taste, and mapicity, in a broad and flexible theoretical framework that will facilitate a useful and applicable understanding. A structure is proposed wherein a map, a rhetorical object which exists under the aegis of mapicity (which is that quality of map-ness that makes a map a map), is brought into being through an aesthetic act of design. Design, which has both theoretical and craft aspects, governs the form of the artifact through adherence to conventional practices identifiable as styles. The balance between the choices available is a matter of taste, wherein the schema of mapicity is manifested judgmentally. Clarity, currently seen as a desirable attribute, is one of a range of aesthetic attributes contingently defined by the cultural interpretive community that provides the schema of mapicity.*

AESTHETICS

The large participation in the *Aesthetics of Mapping* sessions at the 2012 NACIS Conference in Portland, Oregon, was gratifying and encouraging, but, at the same time, the general trend of the discussion was, in some ways, a bit of a curate's egg. As a theme for the conference, the focus on aesthetics followed naturally upon

the 2011 conference theme of the importance of design, and it is very good to see these important issues take a front seat in the attentions of the cartographic community. Aesthetics is a broad term for concepts pervasive in our lives and behavior; aesthetics even intrude, as Leonard Koren has pointed out, "into what we believe are the domains of reason. We often rely on aesthetic cues to determine whether the information we receive from others is true, false, or in-between" (Koren 2010). It became clear quite early on in the *Aesthetics of Mapping* presentations and general discussion, however, that there was a good deal of confusion about how the concept of cartographic aesthetics was to be engaged, and its place in education and practice.

Aesthetics is a broad term for concepts pervasive in our lives

Significantly, the discussion in Portland (in both of the general sessions and in the smaller working group session the next day) tended to appose the concept of *aesthetics* to one of *clarity*. In fact, there was a widely held consensus that ascribed the quality of *beauty* to be a product of *clarity*, and to suspect an indulgence in *aesthetics* of tending to erode both beauty and clarity. Clearly, the long established popular antipathy between the self-image of the "serious" cartographer and pervasive cultural attitudes toward aesthetic concerns is alive and well. These attitudes are rooted (consciously or not) in both Schopenhauer's view of aesthetics as a non-practical state of contemplation (Schopenhauer 1966) and in the Expression theory of art wherein aesthetic concerns are manifestations of emotion (Dickie 1997). Either view is predictably unattractive to any map maker with a positivist, "serious," self image. Obviously, the supposed dichotomy between aesthetic and so-called "serious" concerns needs to be critically examined and debunked before a useful understanding of cartographic aesthetics can be reached.

CLARITY

Clarity was discussed by many in Portland as if it was an absolute commodity that was essential to a map's value as a map. The consensus seemed to be that one should start with a *clear* map, to which one could carefully add "aesthetics" with fine discretion, taking care that the sacred clarity not be impinged. Although there was a broad agreement that clarity comes, in some undefined manner, through simplification and/or abstraction, in general clarity seemed to be thought of as some sort of state of grace. There was a great deal of resistance to the suggestion that clarity is itself an aesthetic dimension, and a cultural convention that may or may not be defined consistently across cultures or across time. This is to say that what might constitute cartographic clarity for one group of map readers (in time or cultural space) may very well not constitute clarity for another. Clarity, in this regard, is like realism: each is defined by culturally determined conventions that are variable. There is little reason to think that the famously realistic grapes of Zeuxis or curtain of Parrhasius (Pliny 77) would fool anyone today, and it is reasonable to expect that future generations will find images that we consider faithful reproductions of reality to be as artificial as we see ancient Egyptian figure painting (Gombrich 1960). This is not, however, because of any superior sophistication in ourselves over our ancestors, or any inferiority of our perception to that of our descendants, but simply that our and their criteria for defining realism and/or clarity are just rather different.

For an example of this, we could consider the case of blackletter type (often misnamed *Olde English* in the US). "The first types cut in Europe, including all of Gutenberg's, were blackletters," and use of the form was widespread. "Scripts and printing types of this kind were once used throughout Europe—in England, France, Hungary, Poland, Portugal, the Netherlands, and Spain, as well as in Germany—and some species even thrived in Italy" (Bringhurst 2002, 250). This letterform could only have flourished so pervasively, and over such a considerable period of time (from the 10th century to well into the 17th, and in some cases into the 20th), because it was considered clear and readable by its audience: it afforded *clarity*. That blackletter is no longer considered clear, and is instead often denigrated as an obfuscated affectation, has no bearing on its earlier status as clear. Similarly, that some antique maps may sometimes seem crabbed, obscure, obfuscated, or even just quaint, to a reader today has no bearing on their clarity to their targeted audience, and any inclination to broadly dismiss such maps as, for example, being over-decorated to mask an underlying unsophistication, is profoundly naïve.

A good many participants at the *Aesthetics of Mapping* sessions professed the opinion that clarity was achieved through simplification and/or abstraction. If so, then, logically, this would mean that the most clear map graphic would be a single mark on an otherwise blank sheet of paper. It would seem unlikely, however, that such a "map" would have been accepted by any of the session participants as a paradigm of clarity. There must, therefore, be some sort of *qualification*, some sort of *limit*, to simplification and abstraction that allows achievement of clarity. Perhaps it is only certain *types* of simplification and abstraction, or only certain *ways* of carrying it out, that result in clarity. This is certainly the case; the conventions of cartographic generalization provide qualifications and limits to practice, and the limits are as conventional as the generalization conventions themselves.

Clarity, it is clear, is as much a product of a conventional code as any other aspect of the map, and must be understood as an aesthetic element.

Clarity, it is clear, is as much a product of a conventional code as any other aspect of the map, and must be understood as an aesthetic element. As such, clarity is defined contingently, as a part of the overall definition of what makes an artifact a *map*, and of what makes a map a *good* map.

MAPICITY AND DESIGN

Maps are artifacts, first and foremost, before they ever become maps. A map is an artifact with particular formal attributes, and that artifact mediates a process of social communication. Map form is critically important, because it is the formal aspects of the map that allow it, first, to be recognized as a map, and then to go on to sustain a reading as a map. Without recognition, something can never be a map, whatever the intention of the map maker, and without an ability to sustain a (post-recognition) map reading engagement, a map will be dismissed: not used, not read, not considered. If that happens, the artifact will have failed as a map.

The designed form of the map mediates between the map maker and map user, and is the sole means the maker has of signaling to the potential user that the artifact is a map. It is the map user who must recognize an artifact's potential to be a map, and it is the design of the artifact that allows the map to be recognizable.

No one can recognize a map, or set out to make one, without knowing how to tell a thing-that-is-a-map from a thing-that-is-not. We recognize maps, and distinguish them from all other things, because they conform to a schema of map-ness that we receive from our cultural communities. This schema, which includes a paradigmatic vocabulary of appropriate form, a grammatical syntax of application, and a canon of exemplars, is how we recognize suitable candidates for map-ness. Conformation to that schema constitutes *mapicity*, which is the quality a map reader recognizes in the artifact as constituting the condition of being a map (Denil 2011). Recognition of mapicity relies on formal attributes, and design is the means the map maker has of manifesting it in a manner accessible to a potential reader.

Maps can only exist inside strictly defined, albeit mutable, formal boundaries, and outside the boundaries of the schema of mapicity lies the not-map. We read and understand only that which we recognize as readable and understandable, based on criteria we receive from and share with our fellows. Ludwig Wittgenstein noted that: "If a lion could talk, we could not understand him." (Wittgenstein 1958, 223e), and similarly, if a lion drew maps, we would not know them to be maps. This is because we have no community of culture with the lion, and should lions have a schema of mapicity, we would have no access to it.

If a lion drew maps, we would not know them to be maps.

There is a certain hegemony in the operation of all schemas of understanding, similar to that Max Beerbohm noted exists in regard to dandy-ism: a dandy must be innovative, but can be so only within strict limits.

> ***"It is only by the trifling addition or elimination, modification or extension, made by this or that dandy and copied by the rest, that the mode proceeds. The young dandy will find certain laws to which he must conform. If he outrages them he will be hooted by the urchins of the street, not unjustly, for he will have outraged the slowly constructed laws of artists who have preceded him." (Beerbohm 1962, 1896)***

Similarly, a map that departs from the accepted schema of mapicity will have a hard time even being recognized as a map, and will at best incur extreme prejudice against its validity, veracity, and value. "Common sense" (which is simply an application of the dictates of the schema) will speak against the map's acceptance.

The mapicity schema provides us with criteria for judging not only the existence of the map object, but also for judging its quality, and it does so, as has been mentioned, through both a conceptual framework and a canon of exemplars of quality. The canon provides a library of models for what constitutes good practice (examples "their shipmates would do well to emulate," as enlisted sailors are exhorted in the US Navy), against which all maps are judged. Truly, Heinrich Wölfflin's remark that all paintings owe more to other paintings than they owe to direct observation (Wölfflin 1932; Gombrich 1969) can also be applied to maps. In short: we can recognize a good map because we have seen good maps before.

Thus, the schema both facilitates and constrains the form of the artifact, and the stricture of that schema both defines the boundaries of mapicity and gives meaning (and a means of reading that meaning) to the artifacts which lie within the pale. Boundaries fence both in and out, and, as Mozart is reported to have remarked, "we would not be creative if we did not have all these boundaries."

MAPICITY THEORY

The existence and operation of schemas of mapicity, defining the very existence of a category of things-that-are-maps, is an extension of the broadly recognized way that such schemas of understanding govern many aspects of culture, notably in regard to our ability to recognize and read graphic images (Gombrich 1960), and it is consistent with a great deal of recent thinking in a variety of theoretical fields. Particularly, the theory of mapicity can be compared to what is known as the Institutional Theory of Art, wherein "works of art are art as the result of the position or place they occupy within an established practice, namely, the artworld" (Dickie 1997, 88; Danto 1997). Mapicity theory is also strongly grounded in linguistic theory, in particular the Reader Response theories of Stanley Fish (1980), and in the work of many others, such as Roland Barthes (1972). By contrast, although some aspects of the functioning of the mapicity canon might be modeled using the example of prototype theory, which is a mode of graded categorization sometimes used in cognitive science, prototype theory is likely not a good overall explanation for mapicity. While it may help explain how one map might be seen as a "better" model than another, prototyping also tends to imply that some maps are more map-ish than others, and so tends to run straight into the dead end of mistaking taxonomy for definition.

The theory of mapicity has been criticized for a certain circularity of causation; *to wit*: a map is a map because we recognize it as conforming to the schema of mapicity, and mapicity is the schema of things-that-are-maps. While a chain of definition should ideally lead only to more and more basic terms, and circularity is commonly seen as an argumentative fallacy, it should be recognized that where the phenomenon itself,—in this case the existence, creation, recognition, and use of things-that-are-maps—is intricate, interdependent, and co-relational, then the terms of the definition must be inflected and presuppose each other. Thus, the perceived circularity is not vicious. We must keep in mind that cartography is not an essential activity: there is no essential category of things that are maps, that always were maps, and will always be maps. Cartography is instead a body of conventions to which communities of humans subscribe, and the map is an artifact that meets the criteria set forth in that body of conventions. Regardless of any hypothesized or fantasized human predilection or predisposition to map making, cartography is only a conventional practice producing conventionalized artifacts to the parameters defined in a cultural convention. Nowhere does the cycle rest on any essential bedrock. Instead, like Baron Munchausen (Raspe *et al*. 1960), cartography pulls itself up by its own bootstraps, and it has kept itself in the air for thousands of years by that means alone: by means of that common agreement we are calling mapicity.

Cartography pulls itself up by its own bootstraps, and it has kept itself in the air for thousands of years by that means alone.

THE ACT OF DESIGN

The map artifact is composed in conformity with a schema of mapicity, and the artifact itself is formed through a process or act of *design*.

Alex White points out that "having material on the page read and absorbed is a visual communicator's chief responsibility" (White 2002, 1), and that design is a process, not a result. He goes on to remind us that to design means to plan, and that "the process of design is used to bring order out of chaos and randomness" (White 2002, 1). Furthermore, as Randy Nakamura noted, "design is about analysis and problem-solving, [but] its fundamental impact on the world (for better or for worse) is in the artifacts and form it produces" (Nakamura 2004, 49).

Design, the means used to bring the map artifact into existence, involves an intersection of theoretical and craft knowledge. Theory tells us what a map is and should be (mapicity); what a meaning bearing graphic text is and can be; and what a persuasive argument is and must be. Craft, on the other hand, gives us a mastery of means and a culture of materials, and among the means are the so-called cartographic fundamentals in which aspiring map makers have long been drilled. It is within a framework of theory that tacit craft knowledge is applied.

Theory and craft are not a dichotomy; neither can exist independently, and one side of the pair cannot be privileged over the other. Theory requires craft for embodiment, and even a state of pure virtuoso craftsmanship requires a belief (a theory) that virtuosity is by itself sufficient.

STYLE

The particular schematic elements, graphic practices, and rhetorical tropes and figures that a particular interpretive community has come to identify as correct and appropriate (come, that is, to recognize as constituting good, effective, acceptable, clear, fine, or even barely credible, map making), are not entirely autonomous and independent. One does not generally pick and choose "one from column A and two from column B," as if in a Chinese restaurant. The individual elements are instead bundled together in sets that are deemed to constitute frameworks of appropriate application; sets of elements, practices, and features that are conjectured to work well together. These frameworks of "correct" practice are called *styles*.

If asked, most people would likely say that style is something added to a work or object; something tacked-on or applied like paint or wallpaper. Walt Whitman, writing in his introduction to *Leaves of Grass*, saw style as a curtain: something that covers what lies beneath, and that hides what is "really there."

> ***"The greatest poet has less a marked style and is more the channel of thoughts and things without increase or diminution, and is the free channel of himself. He swears to his art, I will not be meddlesome, will not have in my writing any elegance or effect or originality to hang in the way between me and the rest like curtains. I***

will have nothing hang in the way, not the richest curtains. What I tell I tell for precisely what it is." (Whitman 1855, vii)

Many would agree with Whitman's view, but his definition rather confuses substance with decoration. The curtain metaphor implies that the curtain could be parted, or made transparent, and that something deeper would in that way be revealed (Sontag 1969). Denis Wood (2007) makes a similar mistake in writing that the mask of the map could somehow be removed, or, as in his so-called "art map," never donned in the first place—but such an unmasking is clearly impossible.

It is impossible because, as Susan Sontag wrote, "Even if one were to define style as the manner of our appearing, this by no means entails an opposition between a style that one assumes and one's "true" being. In fact, such a disjunction is extremely rare. In almost every case, our manner of appearing is our manner of being. The mask is the face." (Sontag 1969, 26).

Whitman's curtain metaphor lends itself to ideas of style as having thickness and opacity, and implies that there can be quantities of style; more style or less style, or perhaps even no style at all. This conception is rooted in the idea that style somehow covers or hides what is really there, and that style can only obscure something deeper. Sontag refuted that, noting that "the notion of a style-less, transparent art is one of the most tenacious fantasies of modern culture" (Sontag 1969, 25), and went on to observe that "the antipathy to 'style' is always an antipathy to a given style. There are no style-less works of art, only works of art belonging to different, more or less complex stylistic traditions and conventions" (Sontag 1969, 27). There is not, and cannot be, a neutral, absolutely transparent style. Even a so called "non-style" is a style, and is simply another set of conventions.

The writers Albert Camus (Camus 1955), Ernest Hemingway (Hemingway 1949), Roland Barthes (Barthes 1968), and George Orwell (Orwell 1958) had all, in their day, been hailed for dispensing altogether with style and instead presenting bald, unadorned prose devoid of all artifice. Nonetheless, as Sontag observed, neither the "white style" of a Camus novel, nor the "zero degree of writing" of Roland Barthes, is any less selective and artificial than any other style of writing (Sontag 1969).

Style, then, is not a curtain or mask, but is instead a collection of elements and characteristics enshrined in the schema as effective and appropriate for employment, and that are recognizable as "consistent" and "right" by someone versed in the schema. Leonard Koren wrote that "a style […] is a conglomeration of perceptible elements recognizable as a distinct variety of order. In other words, a style is a perceptually cohesive organization of qualities […] that is distinct from other perceptually cohesive organizations of qualities" (Koren 2010, 21). These organizations of qualities are simply patterns of practice, and form the paradigmatic frameworks that are extracted from the mapicity schema's vocabulary, grammar, and canon as prototypes for both designing and judging maps.

Anyone who attempts to actually make a map without any style may succeed in making something, but that thing will not be a map.

No map anyone can make is ever anything except a selective application of conventional codes, and the codes are definable and classifiable stylistically. Anyone who attempts to actually make a map without any style may succeed in making

something, but that thing will not be a map. Maps only exist by conformation to a schema of mapicity, and style is just a set of characteristics enshrined in the schema as effective and appropriate for employment.

To centralize style in this manner—that is, to maintain that there can be no map devoid of style—is not to allow the definition of the map to be infiltrated by stylistic characteristics (which would be to mistake taxonomy for definition). This is to say that the *kinds* of map (topographic, thematic, sketch, plan, diagram) play no part in *defining* the map, but only in *describing* a particular map. The map, as a thing, must ultimately be understood as "the projection and materialization of a mental schema on a medium. The materialization of an abstract intellectual order extracted from the empirical universe" (Jacob 2006), and as a rhetorical object that must be "useful, usable, and persuasive" to its audience (Denil 2002). As a rhetorical object, the map clearly has no special subject matter (it can be about almost anything), and it has no special or specific means of presentation and persuasion (it can use any means at its disposal). Obviously, as a rhetorical vehicle, it will employ means that are amenable to its target audience: it will make use of tropes and figures that will persuade that community. The architecture of that body of means is encapsulated in the schema of mapicity for that community, and can be described by reference to stylistic definition: the map itself is an artificial architecture of signs ruled by graphic choices (Jacob 2006), and the sets of appropriate choices are gathered into styles.

Style, we see, has a clear role in describing the map, but not in defining it. Of course, for many people, defining and describing is the same thing.

A PARABLE ABOUT DEFINITION VERSUS DESCRIPTION

Since 2007, the Cartography Special Interest Group (CartoSIG) for Esri software users has appointed a panel of map judges to select winners of CartoSIG Map Awards at the annual Esri International User Conference. In 2012 a very interesting map was nominated: it was a street furniture map of the City of Carson, California, that was composed by an unnamed map maker using the tool that the maker had at hand and knew how to use, which happened in this case to be Microsoft Excel. The map was a remarkable production: clear, easy to read and understand, full of useful and usable information, and persuasive of its value and reliability. The CartoSIG nominator argued that this, perhaps unorthodox, map deserved the attention of the judges and, quite possibly, an award. However, the majority of the judges on the panel thought otherwise, and some were, in fact, openly affronted by the suggestion. "*That is not a map*!", and "*That is only a diagram*!" were typical comments in the debate. Regardless of the merits or otherwise of the map in question, the vehemence of the resistance to even considering the artifact as a *map*, let alone as a *good* map, demonstrates both the operation of the schema and a naive interpenetration of that schema that mistakes taxonomy for definition. For the majority of the judges, the artifact was squarely beyond the not-a-map pale, and they made it clear that their placing it there was grounded not in a evaluation of its value as a map (*to wit*: is it useful, usable, and persuasive as a

map?), but on the fact that it didn't look like (that it did not stylistically match), what it is they are expecting maps to look like. The consequence of employing this narrow viewpoint is that the artifact in question (and, by extension, a large class of other such artifacts)—which in fact meets all practical and logical criteria for being a map; that answers a need for a map, that can be used as a map, that is persuasive of its veracity as a map, and that is in fact (apparently) employed by some people as a map—is, somehow, and somewhat irrationally, *not a map*! It is as if it had been born on the wrong side of the tracks, and so must be cut by polite society.

This story leads us to consider how judgments about maps (such as map/not-map? or good/bad/indifferent map?) are made. The schema supplies us guidelines, rules, and a canon of samples, but how are these overlapping and sometimes contradictory instructions to be applied? The decisions are made by employing *taste*.

TASTE

While style manifests the schema as sets of appropriate choices, taste is the schema's judgmental manifestation that allows choices to be made.

We can recall that the outward signs of mapicity are manifested through design, a process which determines the form of the artifact, and we can recall as well that design itself incorporates both theoretical and craft aspects that co-exist in a symbiotic relationship. We have also seen how sets of graphic and structural choices appropriate to audiences holding particular schemas of mapicity are recognizable as styles. *Taste* provides the balance between theory and craft, and between competing factors within each of them, and also provides the facility for navigating between, and negotiating amongst, the dictates of style. While *style* manifests the schema as sets of appropriate choices, *taste* is the schema's judgmental manifestation that allows choices to be made.

The operation of taste came to prominence in eighteenth century philosophy, in the work of such writers as the 3rd Earl of Shaftesbury (Shaftesbury, 1737), Francis Hutcheson (1725), Edmund Burke (1770), Archibald Alison (1790) and Immanuel Kant (1790). In subsequent years, however, focus for most thinkers moved on to center on theories of aesthetics and of art (Dickie 1997). Thus, taste gradually became a side issue in wider discussions, less attended and less clearly understood.

Despite the fact that "the idea of taste is problematic and widely contested today" (Keedy 2004, 97), it still provides us with "the ability to perceive and distinguish—to recognize and identify—artistic and stylistic features of things, and then to use this ability to make judgments of value based on cultural or professional criteria" (Koren 2010, 22).

Taste, we see, is an ability to balance and prioritize amongst the dictates of style, the facilitations and constraints of craft based technique and the culture of materials, and between the arbitrary demands of clients, the perceived needs of the targeted audience, and the hegemony of the schema of mapicity itself. Ultimately, experience is needed in order to establish criteria for balancing and prioritizing amongst seemingly contradictory demands and needs and conventions and rules. It is difficult, but, as the designer Jeff (Mr.) Keedy said: "that's why you ask an ex-

pert—you know, someone who actually knows what they are talking about" (Keedy 2004, 97).

The skilled cartographer, the expert, the one who actually knows what they are talking about, sees the cartographic challenge from inside the context of the schema of mapicity, and tastefully navigates amongst applicable stylistic convention to compose the useful, usable and persuasive map. In a similar manner:

> ***"a client coming to a lawyer tells a story that in his mind has obvious critical features and decisive moments; but when the lawyer hears that story, she hears it quite differently and with different emphasis. What may appear most significant to the client may drop out altogether in her consideration of the matter. What she has been doing is translating (or transubstantiating) what was told her into appropriate legal categories; that is, into the categories from which a legal case might be assembled." (Fish 1995, 71)***

There are some who maintain that this process is a distortion of reality by the special vocabulary of a mere discipline (whether of law or cartography), and see this as a cautionary tale as to why one should not put oneself into the hands of lawyers, or of cartographers. Such people believe that if one could only get rid of the machinery of cartographic culture, with its terms, conventions, standard map furniture, neat lines, and whatnot, then everyone would be closer to seeing what is *really* going on. We could then grab the map by the scruff and rip away its mask, allowing us to march naked truth up the street for all to ogle and to paw.

If we really ripped away the mask, we would no longer recognize what we held.

But such stripping is simply not possible. If we really ripped away the mask, we would no longer recognize what we held. This is because the map exists as the mask, not as something lurking under it. This is not to say that the mask is immutable; the mask is the schema of mapicity and that schema evolves and mutates over time. It is also important to note that the mask worn by the map is not necessarily the mask intended by the map's maker: it is the reader who supplies and imposes the mask. If the reader so chooses, a subversive mask can be imposed, as Denis Wood (1992) has shown, although Wood himself might not express it that way. It would even be possible to dramatically remake the schema itself, and Mark Denil (2011) has outlined what would be required to do that in a radical fashion. Such re-makings, however, must then perforce be reabsorbed into the schema because once we have seen and recognized a radical map, it is then, by definition, a map, and thus a part of the schema.

The schema functions this way because cartography is a conventional activity, not an essential one. In other words, the cartographic activity is not an activity with an essential existence in and of itself, but is instead defined by sets of conventions. No one *discovered* cartography (it was not sitting there waiting to be noticed); but someone had to *invent the conventions* of cartography, and every map maker and reader has had to *learn* them.

ACQUIRING TASTE

If taste is so important, how does one go about acquiring it? How can one learn to tell if he is a tuna with good taste or just a tuna that tastes good? The answer is that taste, like the schema itself, is passed to us.

Turning back to our law office example, the lawyer is applying what we could call her "legal taste" in navigating the structures and strictures of the legal schema. The client has come to consult her because he believes she can do this. She may, in turn, have a mentor to whom she can turn for advice. No doubt the mentor would not build her case for her, but may be willing to critique her brief: to point out what may or may not fly in the courtroom she is entering, and to steer her in directions the mentor's experience might suggest. Taste is not developed in a vacuum; it is passed through critique.

Critique is too large a topic to tackle in this paper, but it is clearly pivotal to developing taste, just as taste is critical to employing style. The topic of critique was bandied about in the *Aesthetics* sessions, and Nat Case specifically spoke about it at length in a separate NACIS session later that same day, but it seems clear that critique is little understood and cultivated in the cartographic community.

At one point in the general discussion, a well known professor from a large, north-eastern university quoted a colleague of hers to the effect that "*we should not solicit the opinions of students; we should supply them with opinions*." While succinct and pithy, this glib statement is, however, only true in a very limited sense, and only insofar as it pertains to the most elementary levels of education. Yes, a basic education must supply a pupil with a clear understanding of the mapicity schema: the student must be drilled in the common understanding so that it solidly underpins their reading and composition. At that level, cartographic education is essentially craft instruction. At more advanced levels, however, such a professorial attitude is a positive disservice to both the student and to the cultural community. Of course a student's opinion must be solicited: it must be solicited and dissected and examined and discussed; it must be paraded and made to dance and itself be constructively criticized. It must be solicited, that is, if the teacher ever hopes to impart or implant discerned judgment (which we call *taste*) in the student. One *raison d'être* of critique is the building of taste, and, clearly, one person cannot just hand taste to another, or drill it into them with instruction; taste can only be fostered and cultivated so as to grow itself and bear its own fruit.

SUMMARY

Together, style and taste are key elements in the composition of useful, usable, and persuasive maps. All maps, from the simplest and most naive or primitive to the most elaborate and complex, exhibit style, and a style is a set of appropriate choices afforded by the schema of mapicity. However, while style can assist in the implementation of good cartographic decisions, it cannot by itself direct the map maker to make good decisions. This is the role of taste, which is the ability to perceive and distinguish stylistic features and aesthetic dimensions, and then to use this ability to make value judgments based on cultural or professional criteria, which is to say,

on the schema of mapicity. Taste develops with cultivated experience, and must be cultivated to be valuable. A naïve, serendipitous, "good taste" is possible, but such a taste is, at best, limited. Experience throughout history has taught us that the best vehicle for cultivating and refining taste is through engaged critique with experienced mentors. A basic educational groundwork upon which to build this superstructure of taste is required, but that basic education is unfinished if it is not used as a plinth for underpinning taste.

CONCLUSION

The theoretical, practical, and canonical elements of cartographic mapicity are made available by the cultural interpretive community to which the individual map maker or map reader belongs. Mapicity is manifested in artifacts composed through aesthetic acts of design, and the formal aspects of the map artifact are parametrized in styles. These styles are navigated by means of discerned judgment guided by taste, which is fostered in an individual maker or reader through basic instruction (including craft instruction) and advanced, critique-based experience afforded by mentors who are themselves facile with the tasteful application of paradigms and exemplars afforded by the vocabulary, grammar and canon of mapicity. The convergence of style and taste leverages a particular map into the canon, where it serves as an aesthetic benchmark and expands and refines the horizon of mapicity for the wider interpretive community.

SOME CLOSING REMARKS ON THE 2012 NACIS AESTHETICS SESSIONS.

The difficulty the cartographic community exhibits in engaging with aesthetic issues, including design, style, taste, and critique, seems to lie in a certain poverty of vocabulary and grammar for addressing aesthetic concerns. This poverty may well spring from the uneasy relationship many in the community have with accepting the pertinent and essential nature of aesthetics in cartography; but, regardless of the cause, it is a lack that can only be overcome by vigorous and persistent critical exercise with knowledgeable and open minded colleagues. Let us hope the 2012 NACIS *Aesthetics of Mapping* sessions are only a beginning that foretells a deeper engagement and understanding that is to come.

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Undergraduate Geography Students Define Aesthetic Maps

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ABSTRACT

Several aesthetic map definition approaches aim to describe the components, concepts and aspects of aesthetic maps. While the discussion is mostly conducted by mapping professionals and researchers, one may wonder how naïve map users would define an aesthetic map. Thirty-four undergraduate geography students answered a short questionnaire in which they defined an aesthetic map, and identified the most aesthetic map along with the reasons why they liked that particular map. Preliminary findings indicate that two important concepts for aesthetic maps are clarity and being visually pleasing/attractive. Favorite aesthetic maps ranged widely from reference to thematic to imaginary maps. Questionnaire results also indicate the emerging importance of and possible aesthetic paradigm shift towards mobile and other interactive, web-based spatial representations. Naïve aesthetic map definitions could provide an important insight into current and future aesthetic map trends.

KEYWORDS: Aesthetic Maps, Cartographic Education, Undergraduate Students, Questionnaire, Naïve Map Users

As a faculty member in the GIScience program at a middle-sized university in the southwestern United States, I teach a range of basic and advanced cartography courses at the undergraduate and graduate level. One of my core cartography courses is "Maps and Mapmaking," in which I teach the principles of map use and

design. I was teaching this particular course during the 2013 spring semester, with 58 participants, and just had finished the section about historic and contemporary maps when this call for papers was published by the ICA Working Group on Map Design. Having introduced my students to important cartographic artifacts by lecturing about the history of cartography, showing several culturally unique spatial representations, and displaying more recent contemporary spatial representations, I invited them to answer a short questionnaire about "Aesthetics in Mapping." By discussing and looking at different spatial representations over a two week period, my undergraduate students had received an overview about different mapping products and learned that there are cultural and historic differences in map design. However, the students had not yet learned about fundamental map design theory; rather, cartographic "time travel" was used in my lecture to visualize and understand that map design changed over time and is closely connected to technical, cultural and social properties and influences.

Thirty-four undergraduate students chose to provide their opinions on and definitions of aesthetic maps. The session lasted for about 10 minutes, and no demographic information was collected. The goal of this qualitative opinion paper is to provide undergraduate geography students, our future map designers, with a platform to contribute to the map aesthetics discussion. My hope is that their remarks and viewpoints will provide additional contributions on this topic, and that we as practicing cartographers, cartographic researchers, and educators can learn from our students.

The first question prompted students to describe or define an aesthetic map. No additional information on the term "aesthetics" was provided, and no textbooks or any other media were used in generating responses. This opinion paper will present nine student definitions for aesthetic maps that provide a good starting point for a naïve aesthetic map discussion. These definitions are not listed in any particular order.

> *"An aesthetic map would be a map that captures the reader's attention and engages the reader in such a way to convey a certain point of view."*

> *"A map should be simple, functional and relevant. Common sense items/objects don't need to be labeled to clutter a legend. Map objects should be sized relative to their importance as well as colored in a scheme that makes sense (i.e. water is blue, vegetation is green)."*

> *"A map that has clean lines and a logical use of colors that does draw attention to certain features more so than others. Clarity and resolution of the printed map is very important. Labeling on the map is clear and simple."*

> *"An aesthetic map is a map that is visually pleasing. One that has attractive features in the eyes of the analyst/viewer."*

> *"I think all maps are aesthetic maps. Some try harder than others to look nice, but most maps contain the same components."*

> *"An aesthetic map is appealing to the eye (from a design standpoint), is easy to read and may or may not be useful for daily activities."*

> *"It is pleasing to the eyes. It is easy to read and understand. It looks professional."*

> *"It is decorative, instead of just showing the basic information, it also has color or designs. It is a map that catches the eye."*

> *"A map that pleases someone rather than [being] used as an informative tool."*

While I will not specifically remark on individual definitions, two important concepts are mentioned several times: "*clarity*" and "*visually pleasing/attractive.*" Limited time does not permit me to conduct an in-depth qualitative analysis of all definitions, and follow-up thematic analysis should be done to formally assess patterns. However, it is intriguing that seven of these naïve definitions mention the concept of "pleasing the eye," while four of them contain "clarity" as design theme. This observation matches important aspects of the recent map aesthetics panel discussion at the 2012 NACIS conference, where panelists debated whether beautiful, thus aesthetic, maps would be achieved through clarity in map design, i.e., symbolizations, colors, typefaces, etc. (Marston et al. 2012; Buckley 2012). While aesthetics seem closely connected to cultural, generational, and other societal properties, one might wonder how the *Zeitgeist* (spirit of the time) affects our view on and definition of aesthetic maps.

…one might wonder how the Zeitgeist (spirit of the time) affects our view on and definition of aesthetic maps

The answers to the second set of questions were as diverse and individual as the recent NACIS aesthetic map panel discussion (Marston et al. 2012; Buckley 2012). Two questions asked students to identify the most aesthetic map that they had seen so far and describe why they liked it. Of the responses that were given, twenty-two students listed a reference map, eight opted for a thematic map, and one participant described an imaginary map as the most aesthetic. Three students did not provide an answer in this category. Five of the students who favored reference maps mentioned that their most aesthetic map is Google Maps, with two of these students specifically highlighting iPhone-based maps. This is certainly a trend which needs additional research, and clearly indicates that map aesthetics might be a changing concept.

One of the students focused on clarity, and wrote that the most aesthetic map he or she had seen was a SERE (Survive, Evade, Resist, Escape) map, which assists military personnel in returning to their home station. The student liked it because the map "is used to stay alive, provide vast amounts of relative data [about] the local area and gives routes in order to return quickly and efficiently." USGS topographic 7.5 minute maps were also considered as being aesthetic. One student

states that he or she used one to navigate and explore landscapes in New Mexico. Another student highlights a three-dimensional planning model in one of Chicago's museums: "the model was all white, except for the green space and upcoming planning projects. […] It was full of information, very clean and easy to read." One student liked a map of the London Underground: "Though it is not spatially accurate, it makes it easy to navigate the Tube. The colors for the lines are distinctive, stations which have more than one line servicing are connected, and stations are clearly marked. It is [a] clean and clear [map] with no extraneous information." Some students also like historical maps for several reasons: "I like them because they show history, but they are distorted and incomplete so I can't use them as reference tool, but they are pretty and I will probably inherit them." Student answers indicate that while everyone might have his or her favorite aesthetic map, it seems that the underlying thematic keywords are "clarity" of information presented and "beautifulness" in map design. While the concept of clarity could be empirically measured through testing, beautifulness might be much more difficult to capture and describe. Thematic analysis of map user responses seems to hold the most promise for a more in-depth analysis.

What is the "take-home-message" from the undergraduate student remarks? There are indications that map aesthetics might be an individual/group, social, cultural, Zeitgeist, and generation-based concept. As cartographers we should continue to investigate how map aesthetics is related to the ever-changing concepts of beauty, taste, culture, Zeitgeist, art, and technology. A starting point for such an investigation could be a formal study of historic and contemporary maps to assess their relationship to the above listed concepts. Another approach to defining map aesthetics could be initiated through soliciting and analyzing additional naïve aesthetic map definitions. Overall, naïve aesthetic map definitions could enhance the aesthetic map discussion and provide important insights in current and future aesthetic mapping trends.

One of the students writes: "It may not be [an] aesthetic [map] but my favorite maps are road maps. Don't know why, I could just look at them for hours." As long as maps facilitate the human passion to explore and question, then cartographers are on the right track for good and aesthetic map design—but this is a topic for another opinion paper.

There are indications that map aesthetics might be an individual/group, social, cultural, Zeitgeist, and generation-based concept.

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The Aesthetic of Maps: Considerations on their Mutable Functions

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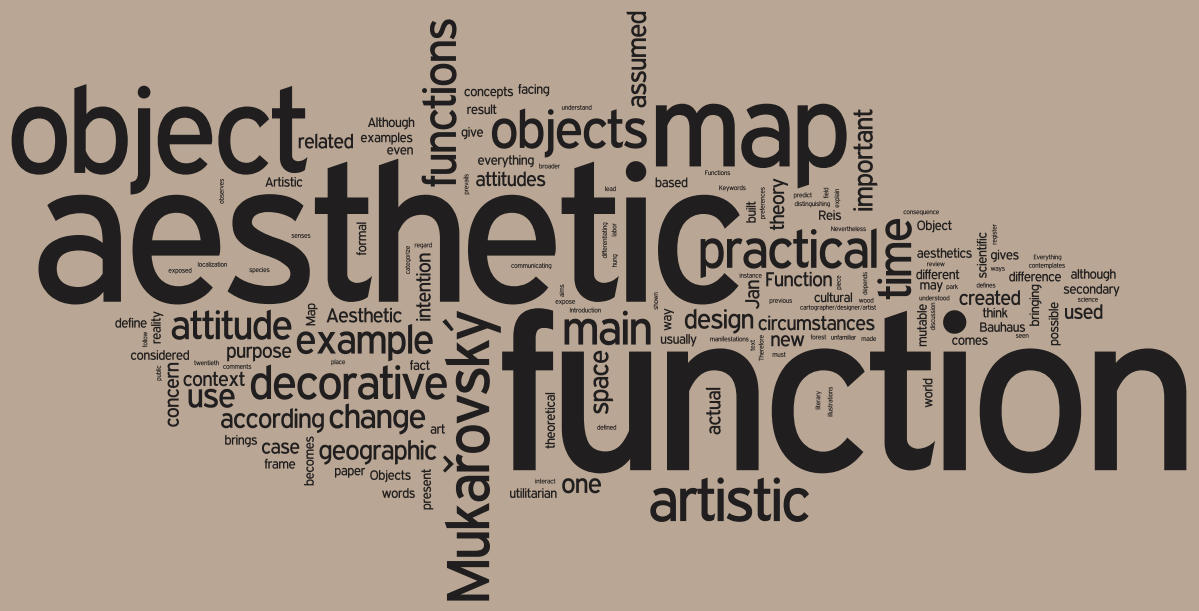

ABSTRACT

The purpose of this paper is to give a short review of the concepts of artistic and aesthetic function given by Jan Mukařovský, the Czech literary and aesthetic theorist. Mukařovský gives a clear concept of aesthetic function and its use in distinguishing the difference between artistic objects and aesthetic objects. The functions of an object—a map, for instance—can change in time and space, as are shown in two examples.

KEYWORDS: Aesthetic Function, Map Design, Jan Mukařovský, Aesthetic Object, Artistic Object

INTRODUCTION

This paper aims to briefly present the definition of *aesthetic function* proposed by Jan Mukařovský, as well as expose the different functions assumed by maps according to the circumstances in which they are used. In some circumstances, a map can be seen as a decorative object, even though it was created with a practical function.

The considerations exposed here are inspired by a previous discussion (Reis 2008) that considered the concepts of *aesthetic object* and *artistic object* from Mukařovský's theory as differentiating *design* objects and *art* objects.

Harley (1989) argues that the rhetorical value of the map, in addition to its formal function, can be understood as a narrative of the cultural and social context in which it was built. In this sense, one can begin to think in a broader range of functions related to the map. Over time, a map can acquire new functions, as a historical and artistic object, for example.

AESTHETICS FUNCTION AND ATTITUDE

For Mukařovský (1981, 119), "the aesthetics is the science that studies the aesthetic function, its manifestations and its carriers." To define the aesthetic function, the author brings up the different attitudes assumed by the human being facing the world, the ways chosen to observe and interact with reality. He divides the attitudes into practical, theoretical, religious, and aesthetic. The practical attitude is related to labor and can change according to the individual perspectives. For example, for a carpenter, a forest has the practical function of providing wood, although for a park ranger it is a cultural environment, which has to be protected. The theoretical attitude has to do with the scientific thinking. It is the attitude that, when facing unknown objects, one tries to categorize them, understand them, and explain their existence. The aesthetic attitude is related to everything that is perceptible to the senses; in the aesthetic attitude, the person observes and contemplates the reality without modifying it, with no specific intention.

The functions of an object with regard to all attitudes are mutable and can change as time and space change. In the case of a map, it is possible to think about the function assumed by the viewer or, in other words, the use that is made out of it.

AESTHETIC OBJECTS AND ARTISTIC OBJECTS

It becomes important to define the difference between objects in which the aesthetic function is the main concern and those in which the aesthetic function remains important but is not the main reason why the object was created. Considering Mukařovský's theory, Ramalho (2001) says, "Everything that, among other functions, presents the aesthetic function as a secondary function, is aesthetic. And everything that has the aesthetic as a main function is considered artistic."

Bringing the subject into the design field, Reis (2008) also comments on Mukařovský's approach, saying that when the aesthetic function is present but is not the main intention, we say that as a result we have an **aesthetic object** (e.g., industrial design objects); when the aesthetic function is the main concern, the result is an **artistic object** (e.g., art and decorative objects).

In the case of a map, one can suppose that when a map is built with the main purpose of communicating geographic information, although bringing formal characteristics of beauty, it will be an aesthetic object. When its aesthetic function overcomes its geographic presentation purpose, it will be a decorative, artistic object.

THE FORM AND THE FUNCTION

At the beginning of the twentieth century, the German Bauhaus School was known by the statement that "form follows function." For Bauhaus adherents, the utilitarian function prevails, and the aesthetic function must follow as a consequence. Therefore, it is important to point out that the design of a map is based on a necessity, a function usually defined by a practical task, and the aesthetic function is usually a secondary concern during the development of a map.

The utilitarian function of a tourist map, for example, is to give geographic directions and, in this way, is a practical function. In this case, the aesthetic function comes on a second level. Nevertheless, a pleasurable aesthetic experience can influence the user's preferences and lead to an increase in engagement and interaction with the map.

THE MUTABLE FUNCTIONS OF A MAP

The function of an object may change during time and space—for example, scientific illustrations that were created to register new species at a time when there was no photography may nowadays be used as decorative images.

The fact that function depends on use and context, and that functions are mutable according to space and time, brings us examples where the practical function of a map gives way to the aesthetic function even in a manner not intended by the cartographer/designer. In other words, an aesthetic object becomes an artistic object.

Figure 1: Portion of 1599 Map of Arctic Exploration by Willem Barentsz
Source: http://en.wikipedia.org/wiki/File:Barentsz_Full_Map.jpg. Accessed June 25, 2013.

As an example, see Figure 1. Although one can argue that the mythological figures spread over the sea were merely decorative, they had a communication function in the context of their time, for both the public to which the "new world" was so unfamiliar and for those that aimed to describe it.

Another example is a contemporary piece (Figure 2): an urban map that comes in a frame and is sold as a decorative object. Although the distribution of the streets and places corresponds to the actual place, the main objective isn't geographic localization; instead, the aesthetic function is assumed as more important when the map is hung in a frame, according to a typical attitude toward an artistic object.

CONCLUSION

This text was based on a philosophical argument from Mukařovský's theory of aesthetics and aesthetic function, with the intention of bringing consideration to the fact that it is not possible for the cartographer/designer/artist to predict the actual use of the map. Whether a map is used as a decorative or a practical object is a matter of the circumstances in which it is placed. The actual use of the object is what defines its function.

Figure 2—Austin Neighborhoods Map., These Are Things Design and Illustration Studio. Source: http://shop.thesearethings.com/products/austin-neighborhoods-map. Accessed June 25, 2013.

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The Hand-Drawn Beijing-Shanghai High-Speed Railway Map with Sights

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Translation of Chinese text on the map by Xu Wang-Angsüsser

This Chinese strip-format travel map is devoted to the high-speed railway connecting the capital Beijing with the metropolis Shanghai. The line was opened to the public in June 2011 and is more than 1300 km long. The entire map was hand-drawn by the artist DONG Zheng, save for the lettering and the north arrow. Due to its roughly eastern orientation, Beijing is found on the left hand side and Shanghai on the right.

The main purpose of the map is to promote this railway line. As a consequence, it was designed not to help users to find each train station as quickly as possible, but rather to trigger a positive attitude towards rail transport and the high-speed railway in particular. To achieve this emotional response, the artist applied several aesthetic codes on different levels. Some of these codes are clearly culturally bound.

In China, the traditional writing direction is from top to bottom in columns arranged from right to left. Often, bamboo slips bound together were used as material for the columns, resulting in an overall shape of a sometimes very long, horizontal rectangle. This probably influenced the decision for an eastward oriented map in a horizontal rectangular shape (Figure 1). The short text on the right-hand side of the map, describing the main features of this region, is also written according to the traditional writing direction.

The map is drawn from a bird's eye point of view. While the railway line and its touristically interesting surroundings are shown in detail, the background is partly blurred and partly hidden by clouds and fog. Although the Yellow Sea is very

Figure 1: Overall view of the map, shown at about 41% of the original size.

Published in the "hand-drawn travel series" of the China Railways Publishing House

Address: Beijing City, Xi Cheng District, Youanmenxi Road, No 8

near, it is difficult to find it on the map (Figures 2 and 3). Horizontally, the map is structured into several regions. Right of the central folding line runs the Huai River, generally seen as the border between North and South China. This line is additionally emphasized by two cranes flying above it in the sky - a traditional Chinese symbol for longevity (Williams 2006).

The two most important rivers of China are depicted in an outstanding brownish hue and a wave-like line structure: the Yellow River in the northern part of the map and the Yangtze River in the southern part. Where the railway line crosses these waterways, the big cities Jinan and Nanjing, both provincial capitals, are identified. South-east of Jinan lies a mountainous region; the sacred mountain Tai (Tai Shan) is prominently featured. The presentation style of both the mountains and the two big rivers follows that of traditional landscape paintings and maps (Figure 3).

The highly distortive application of different object scales (e.g., compare track gauge, train stations, buildings, and mountains) is a fascinating aesthetic feature of this map. A flexible

Figure 2: The northern end of the railway line with the cities Beijing (except for the train station, only historic buildings are shown) and Tianjin (depicted as the modern counterpart to Shanghai at the southern end). Shown at about 68% of the original size.

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Released: November 2012
Size: 953 mm x 190 mm
Artist: DONG Zheng
Cover: DONG Zheng
Chief Editor: WANG Jing

use of scale results in an underestimation of distances along the railway line and an overestimation of easily reachable areas surrounding it. In some respects, this railway depiction adopts the aesthetics of model railways (e.g., only one track, tunnel shapes; Figure 3). Further, there are local variations in perspective (e.g., compare the first three train stations on the northern end; Figure 2).

Corresponding to its topical theme, many touristic spots are shown on the map: on the one hand historic sites (historic centers, temples, pagodas, tombs, bridges) and on the other hand modern sites (besides the railway line with its stations, cities with high-rises, and bridges) are shown. Completely missing, however, are roads (although most of the bridges are road bridges), other railway lines, and many other features not supporting the idea of perfect harmony between nature and culture, and between the glorious Chinese past and modernity.

The heavy usage of traditional codes and symbology to promote a high-tech achievement makes this map a very good example of the cultural dependence of aesthetics (Kent 2005), as well as the related aesthetics of identity (Lotman 1970 cited by Nöth 1990). An aesthetics of identity is established through the use of identical or nearly identical codes by producers and recipients. The artist invokes deeply rooted cultural conventions well-known to the intended audience. Aesthetic codes, such as emphasizing a central axis (Huai River), obscuring parts of the area with clouds and fog, and the presentation style of mountains, are examples found in this map.

Users with a different cultural background are often not familiar with some of these conventions and might therefore miss their symbolic dimension. As a possible consequence, users might overlook their aesthetic value. For these users, clouds and fog may not have aesthetic value at all, or clouds and fog might even be seen as disturbing and aesthetically harmful. Besides these uninitiated users unaware of

the related aesthetic code, there are other users who can decode it, but in a different way than the map producer. For them, clouds and fog could have an aesthetic value merely because of the exotic oddity of clouds and fog rather than an awareness of the cultural code of clouds and fog as referenced by the artist. In such cases, Lotman introduced the term aesthetics of opposition (ibid.).

As this discussion shows, aesthetics in mapping partly depends on the actors involved and their individual and cultural peculiarities. Some aesthetic codes are at the same time cultural codes.

Figure 3: The sacred mountain Tai (Tai Shan), the Yellow River fading into the fog, and the city Jinan in between. Shown at original size.

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The Beauty of Clear Communication

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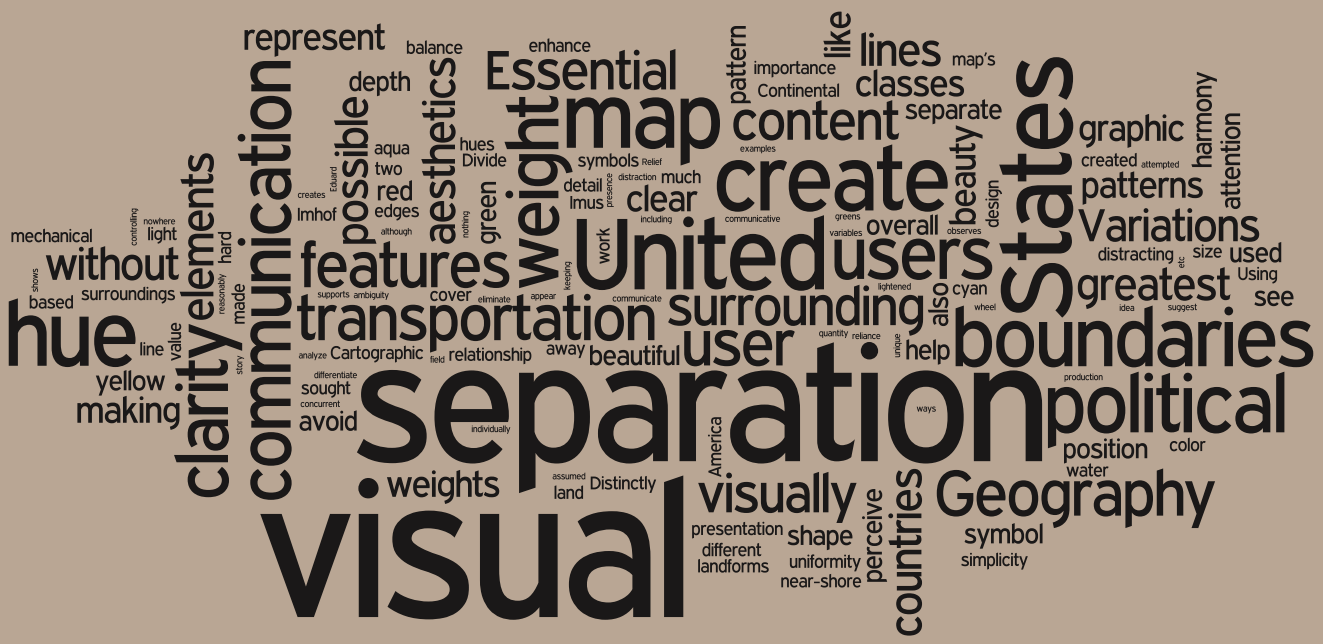
Paula Loftin, Eugene School District 4J: loftin@4j.lane.edu



ABSTRACT

Users see aesthetics in the Essential Geography of the United States of America, *a map that was made to communicate clearly, supporting the idea that, in cartography, there is a relationship between clarity and beauty.*

KEYWORDS: Aesthetics, Visual Separation, Map Elements, Weight, Hue

Our goal for the *Essential Geography of the United States of America* (Imus 2010) was to achieve the graphic depth and clarity that a map must have if it is to reveal the interrelated patterns of basic United States geography. However, users also appreciate the map's aesthetics.

Guided by the principle that, to the greatest extent possible, nothing should confuse or distract the user, we made each design and production decision to enhance the depth and clarity of the communication.

To minimize user confusion, we tried to eliminate ambiguity by creating as much visual separation as possible between all classes of map elements, without sacrificing overall balance. We did this by controlling each element's weight (size and density), hue, pattern, content, position, font, shape, and/or orientation. Likewise, we controlled the same graphic variables to create visual unity among similar elements.

To avoid distracting user attention away from the communication, we moderated the visual separation between elements in deference to a balanced presentation in which each map element draws an amount of attention to itself appropriate to its importance to the overall geographic story. To avoid cognitive overload, we sought a level of graphic and content generalization in keeping with the size and quantity of detail users can reasonably be expected to perceive.

Finally, because a map is a communication between the cartographer and the user, we attempted to visually analyze the communicative success of each map detail. If the communication was clear to us, we assumed it would be clear to other users, too.

Below, descriptions of two *Essential Geography* design considerations provide examples of ways in which we created visual separation between classes of map elements.

USING VARIATIONS IN WEIGHT, HUE AND CONTENT TO CREATE VISUAL SEPARATION BETWEEN THE UNITED STATES AND ITS SURROUNDINGS

We used weight to visually separate the United States from its surroundings by making US landforms, land cover and political boundaries as dark as possible without making overprinting lines and type hard for the average user to see under normal light, and the landforms and political boundaries of surrounding countries as light as possible without eliminating all of their expressiveness (Figure 1). We also lightened near-shore water as much as possible without making it appear to be white (Figure 2).

We created visual separation based on hue by printing subtle yellow over the United States, rendering an ivory color, but did not print yellow over surrounding countries (Figure 3), and we selected cyan for surrounding oceans, gulfs, etc., instead of a hue like aqua, which, because aqua incorporates yellow, would have had less visual separation than cyan from the abundant yellows and greens of the United States (Figure 2).

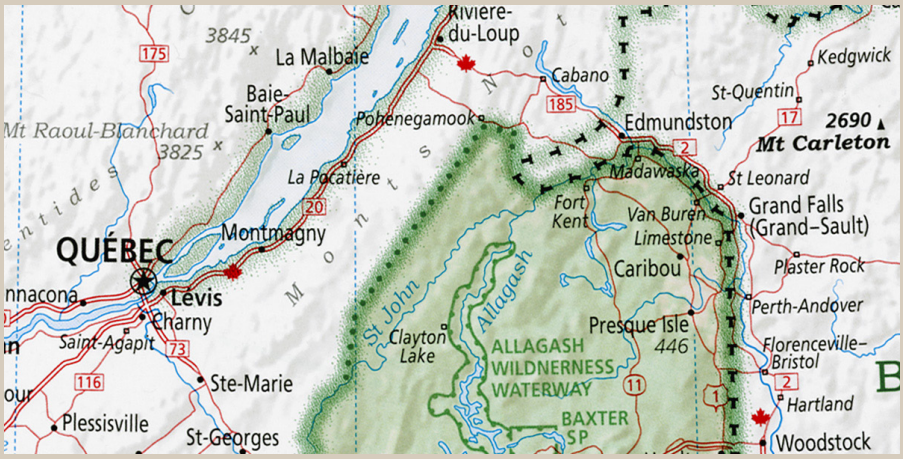


Figure 1: Variations in weight and content help to create visual separation between the United States and surrounding countries.

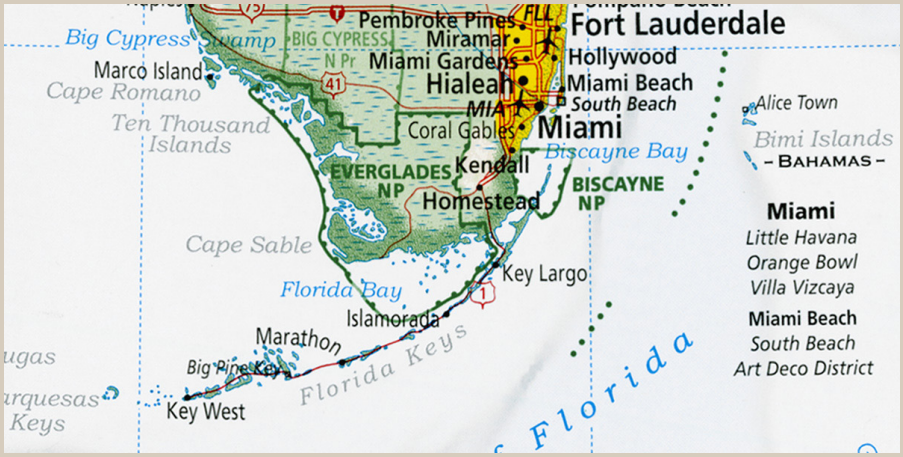


Figure 2: Highly contrasting hues and weights enhance the visual separation between the United States and near-shore water.

Figure 3: Variations in hue and content add to the visual separation between the United States and surrounding countries.

Figure 4: Variations in weight, hue and pattern each help to create visual separation between political boundaries and transportation features.

Figure 5: Distinctly different weights and patterns create visual separation without reliance on hue.

We varied content to create visual separation between the US and surrounding countries by including land cover—forest and urban areas—only inside the United States. (Figures 1 and 3).

USING VARIATIONS IN WEIGHT, PATTERN AND HUE TO CREATE VISUAL SEPARATION BETWEEN POLITICAL BOUNDARIES AND TRANSPORTATION FEATURES

Political boundaries and transportation features are the visually dominant classes of line symbols on the *Essential Geography*, making the visual separation between them of great importance to the map's clarity and overall appearance of simplicity. To create visually separate weights, we used heavy lines to represent political boundaries and thin lines to represent transportation features (Figure 4).

Graphically distinct patterns also help to visually separate these two line symbol classes. Speckled lines with soft edges and embedded dots represent political boundaries, and solid lines with hard edges represent transportation features (Figures 4 and 5).

We used hue to create visual separation by selecting green for political boundaries and red for transportation features (Figure 4). Most users perceive the greatest visual separation between hues like green and red, which lie directly opposite each other on the color wheel. Users who cannot appreciably differentiate between green and red can perceive a visual separation between political boundaries and transportation features based on their distinctly different weights and patterns (Figure 5).

Figure 6 shows that each Continental Divide symbol has a unique weight and shape, and that they are individually positioned. This was not done because variation is pleasing to the eye, although it often is. We did this because we felt that the presence of strong mechanical uniformity on an otherwise diverse and undulating field would create a visual distraction that could draw user attention away from the communication, and because individual spacing allowed each symbol to be placed in the position of greatest expressive value.

Figure 6: To avoid visually distracting the user with mechanical uniformity, Continental Divide symbols vary in value, shape and position.

In *Cartographic Relief Presentation*, Eduard Imhof observes a relationship between clear communication and aesthetics: "…in cartographic affairs, as in all graphic work, the greatest clarity, the greatest power of expression, balance and simplicity are concurrent with beauty" (Imhof 1982, 359). Our experience with the *Essential Geography*, a map that nowhere trades clarity for aesthetics, supports Imhof's observation. On the Imus Geographics website, comments on the *Essential Geography* like, "it's gorgeous" and "beautiful work," suggest that users see beauty where only depth and clarity of communication were sought.

Clarity creates visual harmony. Harmony in maps, like harmony in music, is beautiful. When users say that a map is beautiful, we believe they are unconsciously responding to the beauty of clear communication.

ABOUT THE AUTHORS

David Imus made the *Essential Geography of the United States of America*.

Paula Loftin was artistic editor.

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ICA Commission on Map Design

Kenneth Field, Chair, ICA Commission on Map Design: kfield@esri.com

A new International Cartographic Association (ICA) Commission on Map Design was approved in July 2011 at the International Cartographic Conference in Paris. It is designed to foster discussion, the exchange of ideas, and the development and spread of the principles and practice of high quality, effective cartographic and infographic design.

Good design and better mapping is core to effective spatial communication, and the Commission is focused on engaging international experts from a wide range of fields to provide a body of knowledge that guides cartography as it tackles the challenges brought about by GIS, the Internet, cloud-based computing, pervasive web-based map services, and the mashup culture. Such changes bring with them new mapmakers who, though not formally trained in cartography, still require knowledge of the basic tenets of good cartographic design. They also bring new principles that are required by emerging cartographic landscapes (e.g., temporal, animated, interactive, and 3D). Additionally, emerging production and display environments require new approaches for effectively implementing well-understood design techniques while tackling the challenges and harnessing the opportunities brought about by new technologies. In particular we will be exploring the value of aesthetics in map design and begin to tackle the issue of affective design: the assessment of the extent to which the look and feel of a map contributes to its success as a communication device. Design is perhaps one way in which cartography can reassert itself as a discipline based on strong scientific principles applied through clear artistic means. In this sense, we might find a way to both maintain uniqueness amongst the world of mapmakers who have little or no formal car-

tographic training and also offer a knowledge base and set of practical skills and advice to those seeking to better their mapping. Design could be the focus for what sets cartographers apart from mapmakers and this is an area we will explore during our initial four-year term.

We have already been active across a wide range of work that showcases the efforts of the Commission or, more accurately, acts as a lens on design in cartography. A number of papers at the North American Cartographic Information Society (NACIS) Annual Meeting in Madison, Wisconsin (October 2011) touched on pressing design issues and served as a reminder of the relevance and timeliness of the Commission. The conference theme was "how does design make a difference?", so the new Commission is entirely in line with the thoughts of numerous learned societies. Commission members presented at the NACIS meeting and followed that up with seven paper sessions at the Association of American Geographers (AAG) in New York (February 2012), co-organized with the Commission on Cognitive Visualization. A wide array of papers explored overarching issues of the value of design in mapping as well as specific topics, including the way color is applied in particular circumstances and re-workings of the Minard map. The best papers from the sessions were published as part of a special issue of *The Cartographic Journal* in 2012 and evidenced the importance of design in mapping. More generally, there was quite a focus on mapping at the conference and a particularly well-attended session by the team from the *New York Times* graphics department gave an insight into their work. The maps and infographics in the *New York Times* are widely recognized as being some of the clearest, cleanest contemporary examples of good design and the session showcased much of their work and processes. It is work by this sort of individuals and organizations that is both pushing and challenging cartography to evolve.

Commission meetings have also been held at the last two Esri International User Conferences in San Diego. Commission members have also given presentations at the British Cartographic Society Annual Symposia and also at the GeoCart 2012 conference in Auckland, New Zealand. Design was also a focus of a pre-conference workshop in which participants explored the range of possibilities for creating meaningful thematic maps and how design plays an important part in shaping the message of the map. Over the two days, the story of which nations had been most successful in the London 2012 Olympic Games changed dramatically, simply due to the different mapping techniques applied to the same dataset. This provided a unique opportunity for mapmakers to really come to grips with a simple dataset and the myriad ways in which design can be applied and influence the outcome.

Of course, this issue of *Cartographic Perspectives* has emerged from the Aesthetics of Mapping forum held at the NACIS conference in Portland, Oregon in 2012. More details can be found in the editorial letter at the beginning of the issue. More recently, the Commission has continued its presence at the AAG by organizing a day of themed sessions on map design and neocartography, co-hosted with the Commission on Neocartography. The sessions brought together a terrific mix of cutting-edge work on a wide variety of topics that cross-cut themes of map design in the digital age. The Commission was also active at the International

Cartographic Conference in August 2013 in Dresden, where a number of sessions dedicated to map design took place. The Commission additionally held a meeting, and organized a pre-conference workshop, which featured presentations on digital map design and demonstrations of best practice in web map design.

Given the Apple Maps debacle in early 2013 and the recent redesign of Google Maps, aesthetics is clearly something that the big players are grappling with. Apple's well publicized difficulties illustrate clearly what happens when you ignore the issue of how your map looks. Google, on the other hand, seem to be increasingly embracing the look and feel of their map as a showcase for a more personalized map interface. But have they gone too far in using the map as a canvas for advertising and displaying promoted content? This touches on the importance of ethics in cartography as well as aesthetics, as the unwitting consumption of maps born out of selection and omission based on your Internet profiles takes over. This is a really fascinating space and one which the Commission will continue to engage in.

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SPECIAL ISSUE ON AESTHETICS

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