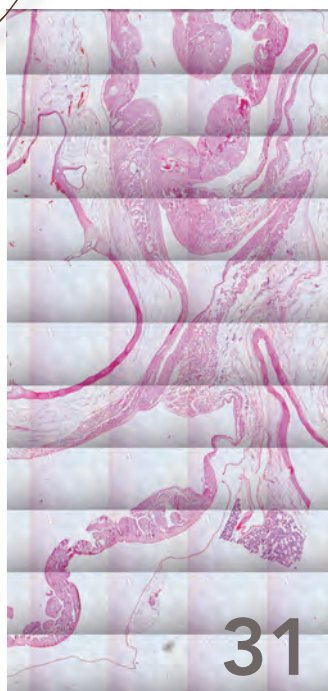
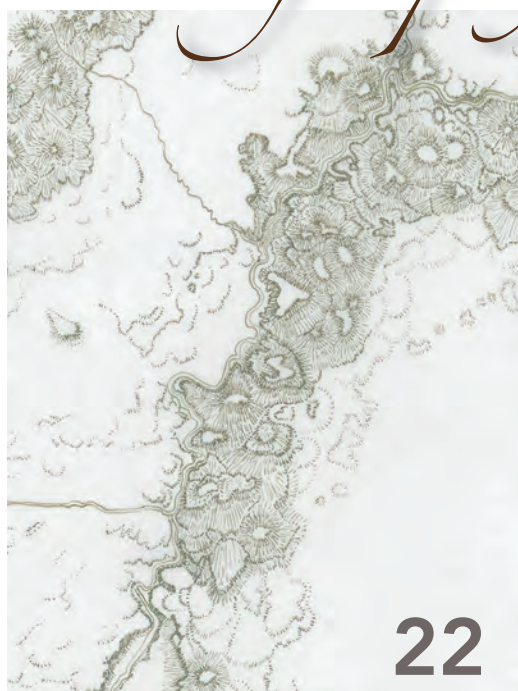


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issue 8

Cartography

autumn 2011



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(front and back covers)
Many Rivers, 2009
Inlaid maps, acrylic, on panel
48 x 78 inches
© 2011 Matthew Cusick
Image courtesy of the artist

Georgia Barnhill has been at the American Antiquarian Society since the fall of 1968 and was the curator of the graphic arts department from 1969 to 2009. During those many years, she lectured and published extensively on aspects of the Society's print and illustrated book collections for audiences in the US and abroad. Among her recent accomplishments is a definitive descriptive bibliography of books and articles on American prints of the 18th and 19th centuries. As director of the Center for Historic American Visual Culture, she places the demystification of images for historians and others at the center of a number of activities.

Elbie Bentley is a PhD student in Geography at the University of South Carolina. She received a master's degree in Geography from Ohio University and BAs in Geography and German Literature from San Francisco State University. Her primary research interest is in the development of innovative cartographic design techniques that work to restore cultural and historical voice to the map. She is currently a cartographer at the US Geological Survey, and also enjoys creating innovative map designs using combinations of

hand-drawn, watercolor and digital techniques in her free time.

Matthew Cusick is an artist captivated with the geography of American culture. Muscle cars, massive freeways, manicured golf courses and notorious killers have been recurrent themes in his work. Cusick was born in New York City where he earned his BFA from The Cooper Union in 1993. His work is held in numerous public and private collections including the San Diego Museum of Contemporary Art and the Progressive Art Collection and has garnered international praise through numerous blogs and traditional media such as *The New York Times*, *The San Francisco Chronicle*, *The New Yorker*, and National Public Radio. He currently lives in North Texas.

Katherine Fletcher is a project manager working for the University of Oxford. She is currently helping coordinate the EC-funded Virtual Physiological Human Network of Excellence and the JISC-funded DataFlow project (building open-source tools to help researchers keep and share their data). She also coordinated the EC-funded preDiCT project (2008-2011), which developed state-of-the-art cardiac electrophysiology models. She grew up in

Gretna, Nebraska, graduated from William Jewell College (Liberty, MO) with a BA in International Relations, and the University of Sussex (Brighton, UK) with an MA in Global Political Economy. She now lives in Oxford.

Lisa Gabbert holds a PhD from Indiana University-Bloomington in Folklore and American Studies. She is Associate Professor in the Department of English and Associate Director of the Folklore Program at Utah State University. Her research interests are in landscape and place, festivity and play, and medical folklore. Her book, *Winter Carnival in a Western Town: Identity, Change, and the Good of the Community* (2011), ethnographically examines various discourses about community good as they play out in the Mardi Gras parade, sports competitions and snow sculpture events found in McCall, Idaho's annual Winter Carnival.

Giuseppe Iaria is Professor in Cognitive Neuroscience in the Department of Psychology at the University of Calgary and a member of the Hotchkiss Brain Institute, Calgary, Alberta, Canada. Dr. Iaria has conducted behavioral and neuro-imaging studies in both healthy individuals and brain-damaged patients and in different academic/research locations such as the

University of British Columbia (Vancouver, Canada), the University of Rome "La Sapienza" (Rome, Italy), the Montreal Neurological Institute at McGill University (Montreal, Canada) and Le College de France (Paris, France). He is the director of NeuroLab (www.neurolab.ca), a cognitive and clinical neuroscience laboratory that is mainly focusing on investigating human spatial cognition.

Peter Kohl studied Medicine and Biophysics at the Moscow Pirogov Institute (1981-1987) and, after post-graduate training and research at the Berlin Charité (PhD 1990, Facharzt 1991), he joined the Cardiac Electrophysiology Chair group of Professor Denis Noble at Oxford (1992). In 1998, Peter set up at Oxford the Cardiac Mechano-Electric Feedback Lab, initially as a Royal Society Research Fellow, and subsequently as a Senior Fellow of the British Heart Foundation. While at Oxford, he held a Research Fellowship at Keble College (2002-2004) and was the Tutorial Fellow in Biomedical Sciences at Balliol (2004-2010). Since 2010, he is also an Affiliated Senior Fellow of the Oxford Department of Computer Science. In October 2010, Peter has taken up the Chair in Cardiac Biophysics and Systems Biology at the National Heart and Lung Institute, Imperial College London.

Mark Monmonier is editor of *Cartography in the Twentieth Century*, which will be published in 2015 as Volume Six of *The History of Cartography*.

Denis Noble, CBE, FRS, is Emeritus Professor of Cardiovascular Physiology at the University of Oxford. He was Chairman of the International Union of Physiological Sciences (IUPS) World Congress in 1993, Secretary-General of IUPS from 1993-2001 and is now President of IUPS. His previous publications include the seminal set of essays, *The Logic of Life* (Boyd and Noble, Oxford University Press, 1993), and he played a major role in launching the Physiome Project, one of the international components of the systems biology approach. *Science* magazine included him amongst its review authors for its issue devoted to the subject in 2002.

Yi-Fu Tuan is professor emeritus of geography at the University of Wisconsin-Madison, and the author of twenty books, the most recent being *Coming Home to China* (2005), *Human Goodness* (2008), and *Religion: From Place to Placelessness* (2010). He is currently working on *Humanists Geography: An Individual's Search for Meaning*.

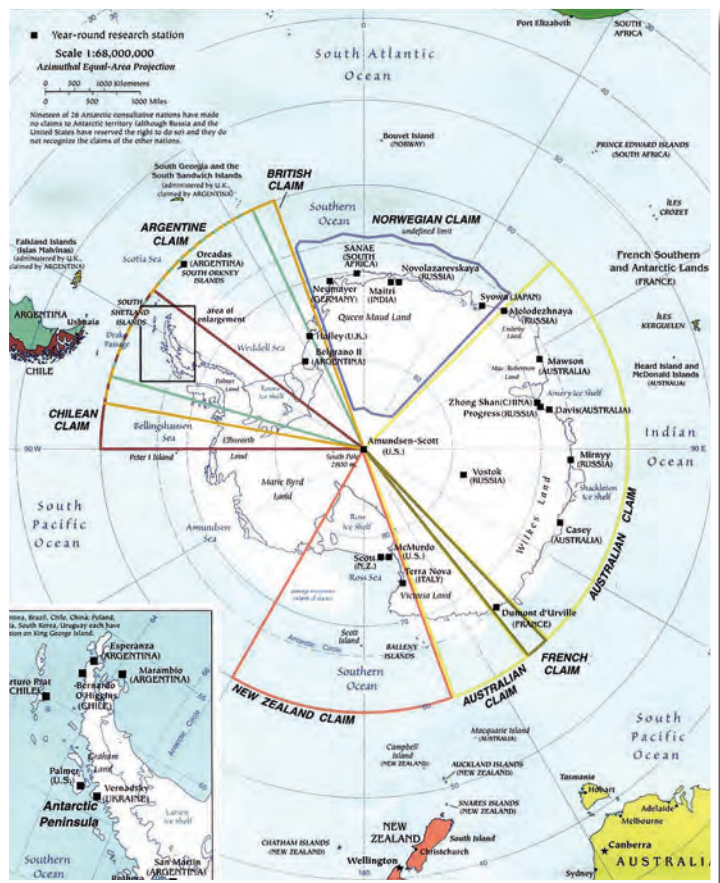
BORROWED BORDERS

Cartographic Leverage from Empires to Zip Codes

by Mark Monmonier

Much of the map's leverage—a far better physical science analogy than *power*—stems from boundary lines that restrict where people can go or what they can do. Whoever draws the lines exerts enormous leverage insofar as delineating a boundary is far easier than erecting a fence or wall. And because maps work so well as navigation tools, they've earned a reputation for truthfulness and authority that makes us respect their lines, or at least feel a mite anxious when we consciously ignore them in a burst of exuberance, entitlement or outright civil disobedience. Another form of cartographic leverage occurs when boundaries devised for one purpose are adopted for something else—the mapmaker avoids the tedious tasks of stating goals

and delineating lines that reflect the new goals, and the borrowed borders leverage the familiarity and prestige of the lines adopted.



(above) Territorial claims and year-round research stations of Antarctica. Oriented with Greenwich meridian at the top. Scale 1:68,000,000. Image courtesy of Central Intelligence Agency, 2005 (right) Image courtesy of CIA World Factbook (far right) Image courtesy of NASA Earth Observatory

Borrowed borders can be as simple as the graticule of whole-number meridians and parallels used to frame world and regional reference maps, or as geometrically intricate as the boundary network on a large-scale soils map. In the former case, the Earth's spherical grid, a geometric framework for fixing location and charting courses, provided Europe's colonial rulers with a convenient way to claim territory on other continents. The most egregious example is the whole-sale partition of Africa in the late 19th century, when meridians and parallels as well as rivers became colonial boundaries. Although these lines often cut through tribal territory or put squabbling factions under the same colonial governor, most of them survived the post-World War II independence movement because post-colonial governments were reluctant to cede territory to a neighbor or recognize the distinctiveness of small, comparatively weak ethnic groups. Elements of the graticule were also borrowed for the international border between Canada and the United States (the 49th parallel from Minnesota to the Salish Sea); the straight-line portion of the boundary between Alaska and Yukon Territory (the meridian at 144° W); and the pie-slice



Argentina's Antarctic sector is bounded on the west by a whole-number meridian (74°W) just west of the westernmost reach of its border with Chile and on the east by a whole-number meridian (25°W) just east of the South Sandwich Islands. The Falklands (known to Argentinians as the Islas



Malvinas) lie within this sector but north of 60°S, the northern boundary of its Antarctic claim. Argentina's national maps portray the Islas Malvinas, the South Sandwich Islands, the South Orkney Islands, and the South Georgia Islands as a natural northerly extension of its Antarctic claim.



John Smith, Virginia, 1612. John Smith's famous 1612 has north at the right. While in the New World, Smith began the first mapping of Maryland after two expeditions up the Chesapeake Bay in 1608. There is an inset of Powhatan in the upper left corner and the Indian is standing in Pennsylvania. 'Chesapeack Bay' lies at the center of the map and the 'Safquefabanough flu' (Susquehanna River) is shown emptying into it. A village of the same name is shown above 'Smyths fales' and the right side of the map has a large figure of an Indian given the name. This figure is based on the Indian chief who came down the river to meet with Smith. Underneath is written "The Safquefahanougs are a Giant like people thus atyred." The locations of several villages are shown with little huts in what would be Pennsylvania. This map would be imitated with increasing detail for the next 75 years. This image is from the Library of Congress copy which is state 6 from 1624. Image and caption courtesy of the Library of Congress, Huntingfield Collection, MSA SC 1399-1-101.



territorial claims to Antarctica asserted between 1908 and 1942. Although the Antarctic Treaty of 1959 put these claims on ice in the interest of international scientific cooperation, Argentina exploited its sector boundaries as an excuse for its ill-fated attempt to (re)take the Falkland Islands in 1982, and continues to use its sector claim as a symbol of national pride.

Easy appropriation of a line of latitude as the boundary between Maryland and Pennsylvania led to a border dispute between the two colonies in the early 1730s. Land grants to Lord Baltimore and William Penn had anchored their shared boundary to the 40th parallel, as represented by marginal tick-marks on a 1608 map by John Smith, the first European to systematically explore the Chesapeake Bay. Smith's inaccurate estimate of latitude might have privileged Baltimore and his successors had they moved quickly to mark the boundary. Hostilities began after Maryland officials belatedly measured latitude with a sextant, sought to collect taxes from Pennsylvania residents south of 40° N, and dared call Philadelphia "the finest city in Maryland." The dispute was resolved in 1750 when the Crown reattached the border

to a parallel 15 miles south of Philadelphia at 39° 43' N. Fourteen years later, English

astronomers Charles Mason and Jeremiah Dixon set to work demarcating the line with monuments a mile apart.

This new boundary became a second-generation borrowed border in the years before the Civil War when politicians and journalists adopted it as the unofficial dividing line between the North and South. Although Maryland remained a Union state, historians and the media continued to treat the Mason-Dixon line as a meaningful cultural divide through most of the following century and, to some degree, still today.

Airspace and Power in the 20th Century

Land boundaries added another dimension when the world's nations conveniently extended their sovereignty skyward in the early 20th century.

*the world's
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The issue of who controlled airspace was largely moot as late as 1910, when delegates from 18 countries met in Paris for the first International Conference on Aerial Navigation. France and Germany equated the skies with the high seas, to which all ships without hostile intentions enjoyed free access, while Britain claimed the right to restrict flying over its homeland and colonial territories. World War I solidified the British position by demonstrating the efficacy of aerial surveillance and bombing. The first aeronautical charts were annotated topographic maps cut into strips, and the first restricted areas were national borders borrowed to enhance national

security. From these rudimentary origins aeronautical charting evolved to produce, reproduce and regulate national airspace.

Several years ago, while working on a book on prohibitive cartography, I sought out early maps of flight restrictions. The Air Commerce Act of 1926 authorized the US Coast and Geodetic Survey to compile and distribute air navigation charts, but the earliest restrictive symbols merely warned pilots away from hazards like transmission lines and gunpowder factories. *The Air Commerce Bulletin* for April 15, 1935 included a historic map showing a no-fly zone around government buildings in downtown Washington. This followed a temporary restriction imposed two years earlier when the *Bulletin* for March 1, 1933 designated "the air space over the [entire] District of Columbia...as a prohibited area from 9 a.m. to 5 p.m. on March 4, 1933, for public safety purposes." On the occasion of Franklin Delano Roosevelt's first inauguration, this forerunner of the Federal Aviation Administration's Temporary Flight Restrictions relied on D.C.'s borrowed border.

During the Cold War, municipal boundaries throughout the nation helped the State Department retaliate against the Soviet Union for closing large parts of its territory to American travelers. Similar to Soviet restrictions based on administrative units, the US closures consisted of a list of individual counties and entire states, thereby forcing the Russians to make the map themselves, as we willingly did with their restrictions, to inform travelers as well as underscore Soviet secretiveness. Borrowed borders made it easy for either party to shrink, expand or otherwise tweak its list of closed areas—why bother to draft and print a new map when the constituent boundaries were so readily available?



Map delineating zip code boundaries in the United States. Image courtesy of U.S. Geological Survey, 1970.

From 90210 to 26581: ZIP Code as Identity

Size matters insofar as counties and towns are usually too large and internally diverse for retailers eager for a geographic sort that mirrors our buying habits. It's hardly surprising, then, that marketing strategies and rate structures are based on ZIP Code areas, which are neither so numerous as to be unwieldy nor so large as to be demographically, economically or culturally irrelevant. Established in 1963 to expedite the delivery of mail—ZIP stands for Zone Improvement Program—our postal precincts offer a convenience, stability and ready recognition lacking in census tracts, wards or vaguely defined city neighborhoods. Every residential mailing address has a compact, easily

PRIZM "lifestyle clusters" and the US Census

The PRIZM (Potential Rating Index by ZIP Market) categorization system is based on geodemographics, or the premise that people who live close to each other will be demographically similar to each other as well. The PRIZM has categorized US neighborhoods into 62 "lifestyle clusters" based on this idea. The clusters are created from public sources such as US Census data as well as private sources, such as consumer purchase records. Each US neighborhood is assigned to one of the PRIZM clusters according to the current year's demographic projections. Neighborhoods are defined by factors such as social rank, household composition, mobility, ethnicity, urbanization, and housing. The neighborhood clusters prove useful to marketers interested in targeting products to specific individuals.

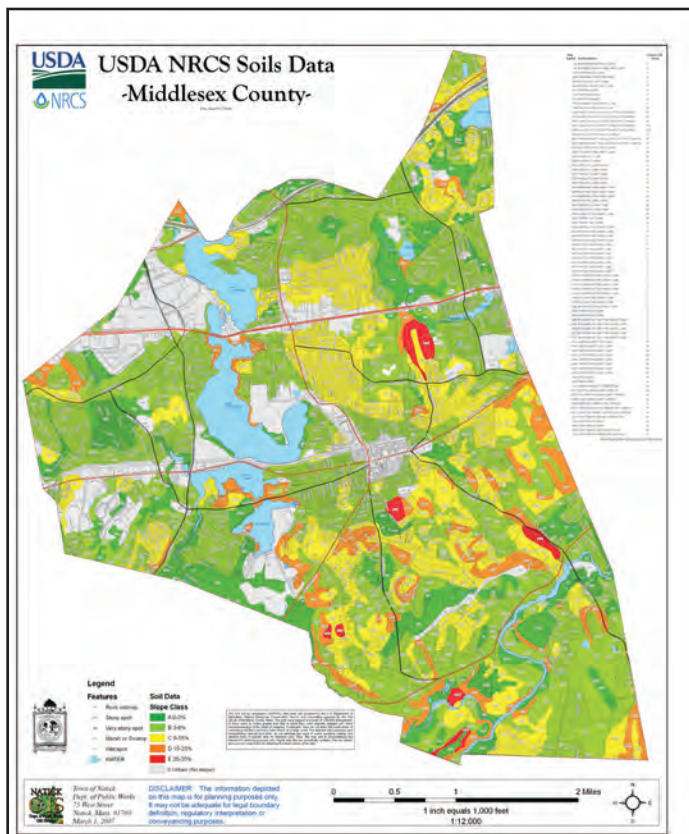


memorized five-digit ZIP Code; and should you forget, it's right there on your driver's license.

It's hardly surprising that the ZIP Code map has been re-purposed for the more efficient targeting of consumers by catalog retailers and telemarketers, assisted by demographic research firms like Claritas Corporation, which devised the PRIZM (Potential Rating Index by ZIP Markets) segmentation system in the early 1970s, which characterizes each ZIP Code according to five "lifestyle clusters" assumed

The first US Census was taken in 1790, more than a year after the inauguration of President George Washington. At the time, the census basically divided a population that was under 4 million into free white males who were of or younger than military age (16), free white females, all other free persons, and slaves. Today, the Census has evolved to map a much larger demographic that includes over 300 million diverse Americans. 2010 Census results have even recently revealed that well over half of America's cities are now majority non-white. Other significant trends noted from the 2010 US Census are that the US population is increasingly shifting toward the South and West. According to the US Census Bureau, the center of the US population has continued to move westward ever since the first census. In 1790, the center of the population was in Chestertown, MD. Today, the center of the population is in Plato, MO.

Soils map of Middlesex County, MA. Image courtesy of USDA/NRCS



to reflect key segments of its population. And it's no surprise that Beverly Hills 90210, which lent its name to a 1990s television series about teenagers in an affluent Los Angeles suburb, is home to segments labeled Blue Blood Estates, Money & Brains, Movers & Shakers, Upper Crust, and Young Digerati. By contrast, Littleton 26581, in West Virginia, described euphemistically by the clusters Back Country Folks, Blue Highways, Golden Ponds, Heartlanders, and Simple Pleasures, receives few if any catalogs from upscale retailers like Talbot's and The Shaper Image.

Ubiquitous and cartographically convenient, ZIP Code boundaries were occasionally borrowed for a form of geographic discrimination as invidious as the red-lining once used to deny mortgages

to gainfully employed African Americans trying to buy homes in deteriorated but promising neighborhoods. In the mid-1990s, for instance, an automobile rental firm in Syracuse, New York blacklisted the 13205 and 13207 ZIP Codes by refusing to rent to residents irrespective of their credit rating or driving record. Although the policy affected both African American and white residents, it was quickly perceived as racial discrimination, and city officials rightly retaliated by pulling city contracts and restricting the firm's access to the local airport.

The convenience of typing people by postal address led to a wide misuse of ZIP Code maps in setting auto insurance rates.

Although many states have outlawed the practice, insurers that compile claims data by ZIP Code argue that the cost of insuring against accidents, theft and vandalism depends on our neighbors' claims histories as well as our own.

The Perils of Cartographic Precision

Environmental regulations often borrow a radically different type of boundary: the lines separating mapping units on soils maps. Painstakingly delineated by scientists who often spend years walking a county's fields and forests, probing below the surface with an auger and collecting samples for lab analysis, the soils map partitions the land into mapping units as small as a few acres. Although the map categories were devised to reflect soil genesis, they provide a detailed picture of the land's suitability for various commercial crops as well as septic tanks and basements. Because the categories reflect agricultural potential for commercial crops, they can be combined to produce a map of agricultural productivity, which in turn provides a rational basis for preserving farmland by giving farmers a break on their property taxes.

New York state took farmland preservation a step further by prohibiting local governments from using eminent domain to acquire land for a landfill when the preponderance of the parcel in question is prime farmland. I learned of this policy a decade ago when our local "resource recovery agency," which is responsible for disposing of the county's trash, sought to open a landfill for ash from its new incinerator. Both the agricultural conservation law and the solid waste management act in New York deferred to soil

surveys created for a different purpose. Landfill opponents recognized this and mounted a valiant legal challenge, the premise of which was twofold. They argued that because the aerial map slightly distorted scale and distances in hilly areas, the county needed to commission a new map, mathematically exact and relevant to the proposed landfill. They also pointed to the presence of "inclusions" (small patches of another soil type within a larger patch) that undermined both the homogeneity of mapping units and the county's position that only about 43 percent of the contested parcel contained protected "Type I or Type II soils." In the end, an administrative law judge sided with the county by confirming that the existing soils map, however flawed, was legally binding. In so ruling, he underscored the economic and political efficiency—if not the scientific wisdom—if cartographic leveraging with borrowed borders.

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binding*

Borrowing borders exploits existing boundaries and public acceptance of maps as reliable and legitimate. Boundaries readily available at multiple levels can provide convenient, off-the-shelf borders for a range of goals. At the macro level, meridians and parallels stand ready to partition continents or declare no-fly zones, while at the micro level, soils maps and postal codes can be configured into plausibly efficient environmental and sociocultural regions. In between are provincial and municipal boundaries, expediently appropriated even when the well-known territories they bind are peripheral to the mapmaker's goals. Map users should be wary of borrowed borders as the cartographic embodiment of the notorious quick-and-dirty short cut. 