OXAV
Forthcoming at *New Geographies 07*

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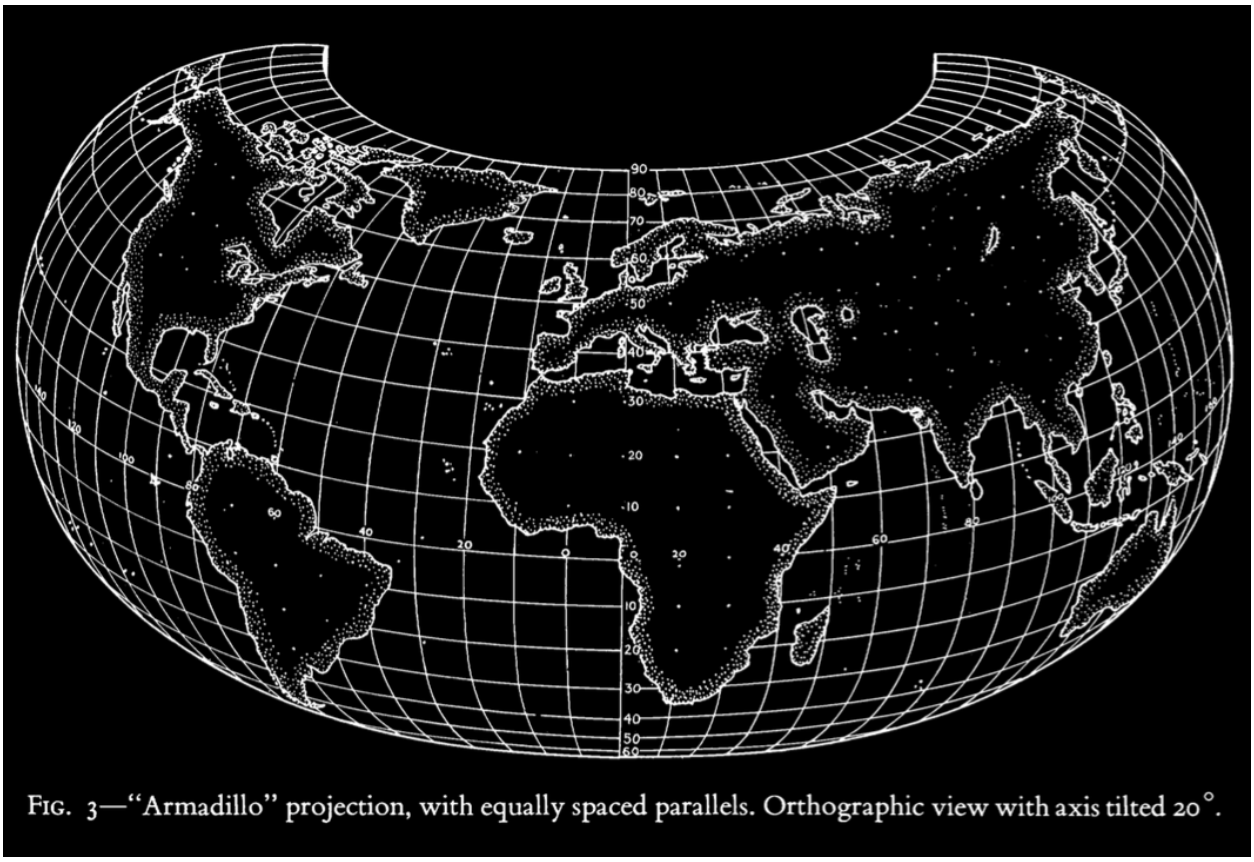
> Although the distortions on the peripheries of the orthographic view may be extreme, we perceive the correct proportions because we visualize a three-dimensional body instead of a flat map. The use of these projections is limited to illustrative and educational maps, and in many cases the results will be amusing rather than of practical value, yet they open up a new avenue of experimentation, the end of which has not yet been seen. (Raisz 1943, 134)

> It will usually be necessary for the map designer to make a conscious choice between generalization and particularization. Each has its value, but if the main goal is good overall comprehension, we will usually need to generalize to a substantial degree. … No method has ever been invented which is capable of optimally serving both goals simultaneously. (Fisher 1982, 31)

The pages of *New Geographies* are undoubtedly filled with contemporary examples of experimentation in geographic representation. Stroke widths, object alignments, and typographic stylization dominate the last-minute, fine adjustments made in illustration software. And while these visual works likely share little in common with their predecessors from a century prior, that moment of experimental tinkering with a drawing binds these practices. What follows is a brief rumination on one of the first computer maps, articulated as an extension of the experimental methods of the early 20th century and provoking open questions as to the status of such experimentation in geographic representation today, now.

The ability to *see* the the world as it unfolds around us was part of the mapmakers' craft. The juxtaposition of the two quotes in the epigraph and the two adjacent images deliberately connect the experimental process of crafting that vision of the world: Erwin Raisz (1893-1968) and Howard Fisher (1903-1979), both Harvard cartographers employing different techniques to shape what was possible in mapmaking. Here, I employ OXAV as a marker for a 'make-do' attitude in the 1960s advent of the digital map -- to take what was perfectly adequate in one domain and apply it, make more of it, in another domain. Fisher and his team of programmers determined to use the overprinting of characters to produce visual densities. And central to this kind of digital experimentation was an interest in the projection of a three-dimensional image across a flat medium -- an interest long-found in the history of cartographic expression. As Erwin Raisz notes above, the work of geographic representation was largely perceptual, then as now. Indeed, while Raisz, as the primary cartographer at Harvard, would witness the beginning of a new mapmaking method on campus, his work highlights how experimentation in geographic representation can be found in both traditional, manual methods as well as in the ascendent digital map at the end of his life.

This experimental spirit at Harvard would be born through a series of events that connect the Harvard campus of the mid-1960s to the broader revolutionary stirrings in the spatial sciences across North America. On a Saturday in 1963 on the campus of Northwestern University, Howard Fisher, who was then a lecturer at Northwestern, attended a workshop led by Ed Horwood, a faculty in civil engineering at the University of Washington. Horwood, who had studied under Mumford at Penn, had developed a program called CARD MAPPING, which would produce a digital map of numbers -- where areas would be assigned numbers at their centroid, representing the frequency of a specific phenomenon. Horwood's research assistants in the late-1950s and early-1960s importantly included a number of geography graduate students at Washington who were studying under Bill



Armadillo map projection. Raisz (1942, 133) experimented with graphic techniques that would allow a lay public to see the curved Earth, to make visible the cartographer's craft.

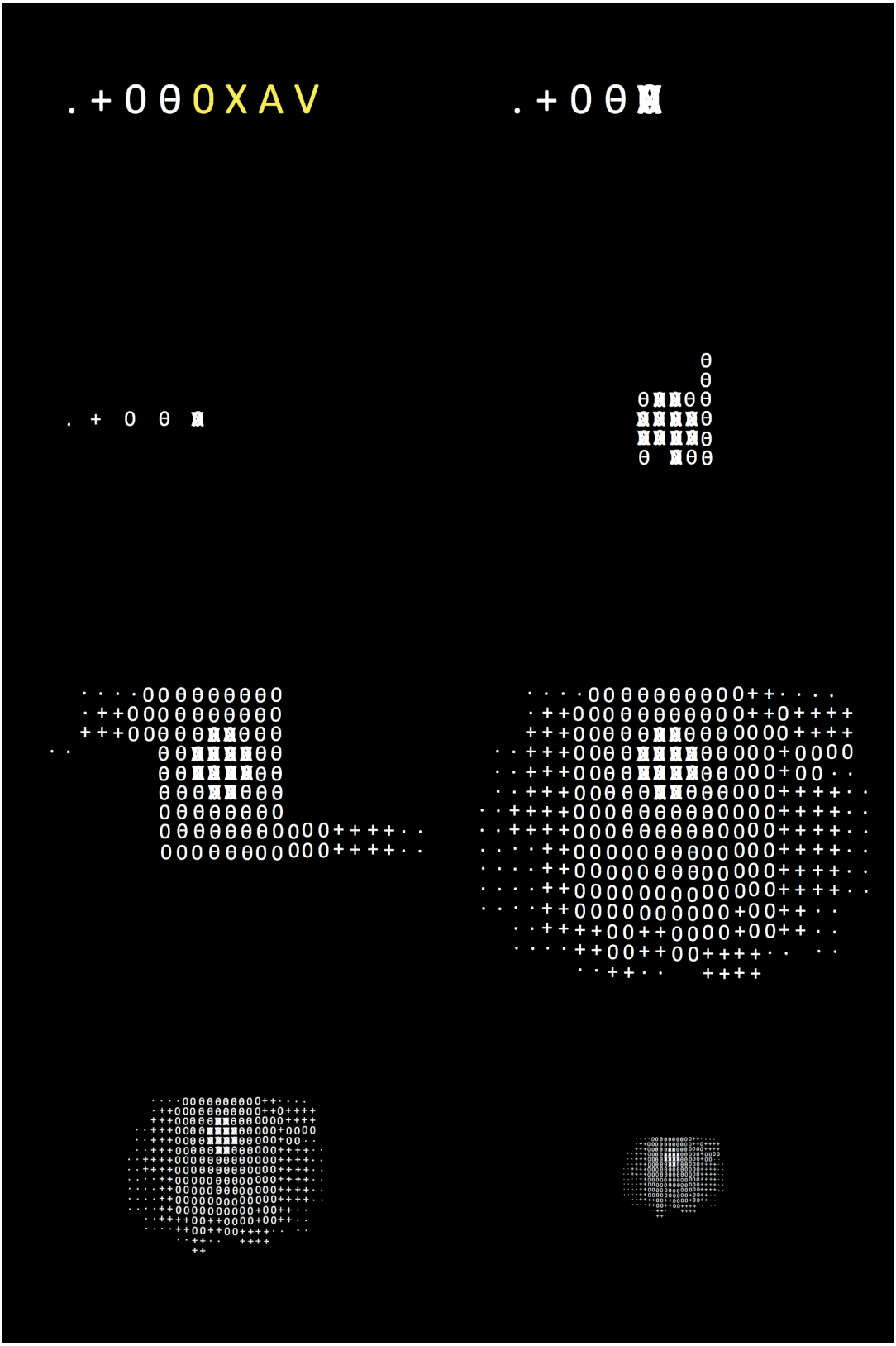
Garrison and many of these students would become proponents of a theoretical and quantitative variant of geographic scholarship.

Bill Bunge, one of these students, would discuss this emerging approach to analyze complex social and spatial phenomena and the representation of such analyses. He writes in his dissertation,

> The exact distinction between the map as a logical system and the map as a framework for theory is murky, but it is of the utmost importance since theory can only be as powerful as the underlying logic. For this reason cartography is placed in company with mathematics. (1960, 26-27)

For these mid-century geographers, the map is burdened by both the particularity of observable facts and the theorization of geographic phenomena (here, understood as map abstraction or generalization). An epistemological turn was afoot, driven by the use of the computer in spatial analysis. And a new language to express geographic relationships required a revolutionary method for expressing these relationships.

Horwood and Garrison's students like Waldo Tobler and Brian Berry, would be key resources as Howard Fisher innovated on the CARD MAPPING program -- producing a procedure called the Synagraphic Mapping program, or SYMAP. With a programmer named Betty Benson, Howard built SYMAP as a revision of the Horwood process of printing out a field of numbers, by creating representations of surfaces through overprinting characters using printing technology which was generally available at major computing centers. The overprinting of OXAV created a visual solid that, when placed near other symbols, would create gradation. With photographic scaling, these individual characters could be perceived as a map surface.



OXAV. Fisher experimented with the use of overlapping symbols and photographic scaling to produce representations of surfaces.

Shortly after developing a first version of SYMAP, Howard was hired at the Harvard Graduate School of Design, where in 1965 he founded the Laboratory of Computer Graphics (LCG). His earliest work on SYMAP and the OXAV method focused on comprehensibility -- such that the representational technique would allow a user to most directly and efficiently connect the representation to what might be witnessed in reality. Howard assembled a team of developers to expand the routines available within SYMAP. One student from his freshmen seminar, Donald Shepard, revised the interpolation method that would allow a more efficient computation of map surfaces.

These experimentations intended, as did the tinkering with map projections by Raisz in prior decades, to expand the possibility for witnessing a changing planet. Far from requiring a scientific expertise in the viewing of geographic representation, these drawings sought to make the world viewable, and therefore accessible, for a public eager to understand these spatial dynamics. The computer, for Fisher, did change the game in thematic cartography -- but most importantly, perhaps, the new capability of the digital map further elevated the concern for general comprehensibility.

In the fifty years since the founding of the LCG, the practices of geographic representation have changed in both speed and volume, while the model of map communication and interaction has largely remained settled. Maps are visioned as documents that, when designed with great efficiency, should effectively communicate information about a variety of spatial phenomena. As a mode to collect, analyze, and represent geographies of information, mapmaking is burdened by the weight of these models of correspondence and comprehensibility -- establishing a particular register within which information about the world is to be viewed. Contemporary techniques in geographic representation, sometimes termed geovisualizations, consider the map as perhaps just another informational graphic. Here, it's perhaps appropriate to reconsider those interests in mapmaking a century ago. Susan Schulten (2014) reminds us of the visual affect of early 20th century mapmaking in her interview with Richard Edes Harrison (1901-1994), a contemporary of Raisz:

> When I interviewed Harrison in New York at the end of his life in 1993, he still insisted that I call him an artist rather than a cartographer, for he disdained the constricted techniques of mapmakers who were hidebound by convention. (Schulten 2014, n.p.)

The gloss or patina of contemporary geovisualizations break with one key aspect of early-to-mid 20th century geographic representations. The work of Raisz and Harrison highlight a commitment to wide participation from a map-reading audience -- a kind of fantasy, a creation, where the vehicle of representation was vernacular, yet artisanal, grounded, yet imaginative.

OXAV reminds us of a culturally-conditioned comprehensibility, where correspondence between reality and map would figure the map reader more deeply into the representation, to make interpretations, and draw strong conclusions. These experimentations, to 'make do' with available technologies, should inspire contemporary cartographic work. How might design practice resist the gloss of spectacle and elevate slow-mapmaking where the representation intervenes in the known? How might the fine adjustments made in design software further disguise the mechanics of representation from a public? How might cartographic experimentation forego the rush toward a faddish polishing of infographics, and instead amplify the disruptive potential of geographic representation?

References

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