

## The Robinson XI Projection

Arthur Robinson is world famous for his map projection, which has been adopted by the *National Geographic* as the basis for all its world maps. So it may come as a surprise to readers of this volume that there was an eleventh projection, which bears his name. In this case, however, it was named for him but not created by him.

When Robbie retired in April of 1980, the Department of Geography organized an event to which a number of people were invited [1]. Most of his Ph. D. students gathered beforehand at Joel Morrison's home for our special toast to his career. On that occasion we signed and I presented Robbie with the Robinson XI Projection—a recognition of, and by his eleven cartographic doctoral students, and a play on some of the ideas of the Dutch graphic artist Maurits Escher, particularly those found in his (Escher's) *Still Life and Street*, a woodcut from 1937. One of the themes of this and several other drawings, particularly *Savona*, 1936 and *Still Life with Mirror*, 1934, is the smooth connecting of different worlds [2]. Cartographers might express this effect as the seamless change in scale from one part of a map to another. This, of course, can be found in any small-scale map of the world made on our traditional projections such as the Mercator, Mollweide, Sinusoidal and even those by Robinson! It is only when we produce a world map on the icosahedron [3], as

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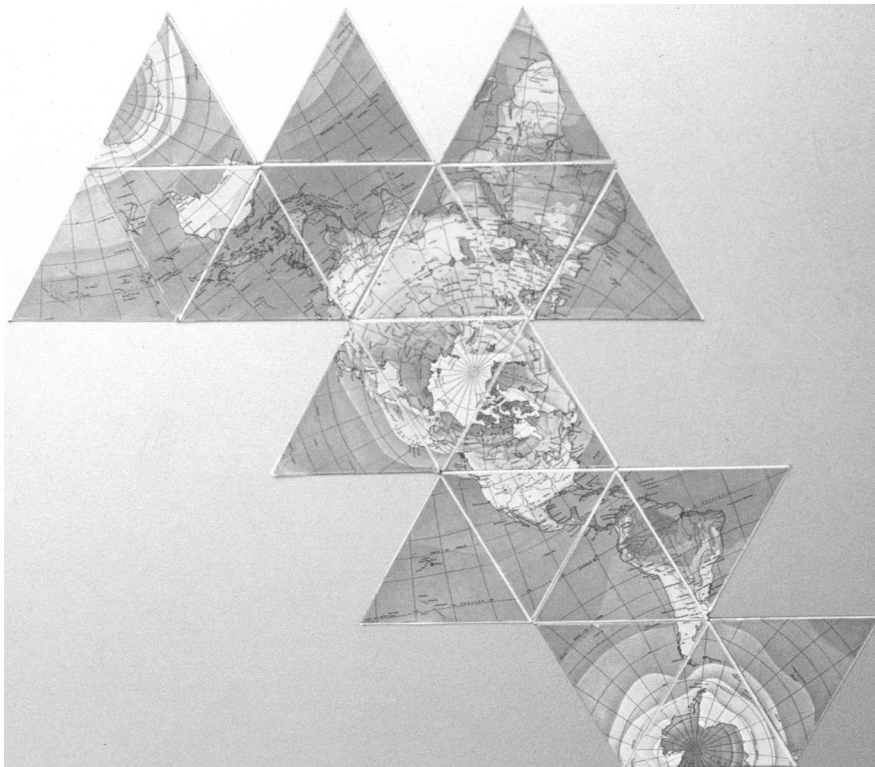


Figure 1. (see page 79 for color version)

in Figure 1, that we come face to face with this reality. The interruptions between and arrangements of the twenty equilateral triangles can never produce a uniform circular, elliptical or rectangular projection of the earth because of the mandatory breaks between the triangles, each of which has three possible positions. We must always compromise!! Or, as in the case of most world maps, we pretend these compromises aren't there and do not warn our lay viewers of the hazards hidden therein.

The manipulation of scale is also apparent in some of Escher's other works. For example, his *Balcony*, a lithograph from 1945, enlarges its central portion in order to call attention to a particular balcony in an otherwise complex scene with many balconies. Cartographers utilize many different devices to achieve emphasis, although not always with gradual enlargements of scale around some important feature or area. The best examples of this idea applied to flat surfaces are the many drawings of the famous op-artist, Victor Vasarely, from the 1960's. Sadly, there aren't many map examples around, although John Snyder [4] provides some interesting examples, e.g., the logarithmic azimuthal projection. As well, any perspective projection at some finite perspective elevation illustrates this idea.

Perhaps the nexus of cartographic and Escheresque ideas can be found in Escher's *Hand with Reflecting Sphere* from 1935—the image of a reflective sphere showing Escher, his office, his arm, and his hand which is holding the sphere. Bruno Ernst (1976, 75) notes that “In a convex mirror the eye sees the mirror image of the whole universe, with the exception of the part that is covered by the globe. The farther the eye is removed from the convex mirror, the larger the uncovered part becomes.” This seems like another way of distinguishing large and small scale in maps. While the person holding the sphere is Escher, one wonders if, symbolically, it is not a cartographer for it is we who professionally contemplate the globe and experiment with ways to control the variations in scale so as to best represent some idea or reality. I don't know when the first fish-eye lenses became available for cameras, or the first semi-spherical security mirrors were deployed, but they certainly provided my generation, if not Escher's, wonderful examples of scale variations in the world immediate to our surroundings. Whether Robbie saw scale change in such vivid ways we may never know, but clearly he was a master at manipulating scale changes for our benefit in world maps. Including some references to Escher might make our studies of map projections a far more interesting topic!

Now as to my drawing, Figure 2; it clearly extends Escher's ideas from *Still Life and Street*. The desk foreground preserves Robbie's view to the right outside of Bascom Hill from the windows in the corner of Science Hall nearest to the viewer. At the time of Robbie's retirement, he had just completed two terms as President of the International Cartographic Association and had presided over its most recent international congress in Moscow—hence the orientation of the globe. Thanks to some stealth photography by Joel, the snap shot cube, scribe, paper clips and calendar were a part of his desk accessories. The vertical books represented the dissertations of the eleven of us who did cartographic research under Robbie and who signed the diagram in the branches of the tree at the up-per right. The pile of horizontal books represented, symbolically, the four editions of *The Elements* that had appeared by that time, *The Look of Maps*, and *The Nature of Maps*—the six seminal publications that he gave to us. I can't remember if the paints and fly swatter were there or a product of artistic license! Of course in the history of cartography, a topic for which Robbie is also well known, water colors were a significant innovation.



Figure 2. (see page 79 for color version)

West Street, running in front of Science Hall extends past Memorial Hall on the right and, on the left, the psychology building where Robbie made some useful contacts that surely influenced his thinking. West Street then extends to a near horizon across Lake Mendota. The third scale change involves the sky, the Great Lakes-shaped clouds and the curved limb of the earth that combine to produce an outline of North America. The small circles represented the places where the eleven Ph. D. students were working at that time. The legend credits Escher's influence and notes the presentation date. And of course, like every good map, there was a scale bar! Coming over the horizon is a suggestion of how technology was going to change in so many ways how we approach the art and science of cartography.

In the case of the map projection adopted by the *National Geographic*, it was Robbie, as manipulator of scale *par excellence* that produced our most attractive compromise for a general world map.

[1] Another document that surfaced at that time, but was not used in our celebration, was the letter reproduced in this issue of *CP* (see *Arthur Robinson And The OSS*) from Colonel Lawrence Martin. It was passed to us by Mary Lib, the first Mrs. Robinson, who thought it would be interesting to know what Colonel Martin thought of Robbie since for some years Robbie was the Lawrence Martin Professor at Madison. She was fairly sure Robbie had never shown this letter to his colleagues. The reading of this letter reveals in detail the nature of the work and activities that Robbie performed during the war while at the Office of Strategic Services.

[2] Escher's images referred to in this paper can all be seen in *The Magic Mirror of M.C. Escher* by Bruno Ernst published in 1976 by Ballantine Books in New York. There are, of course, many other places where his works have been published.

## NOTES

[3] Figure 1 is one arrangement of the 20 equilateral triangles that made up the Fuller icosahedron; they are centered on the North Pole with most lying along a single meridian.

[4] Snyder, J. P., 1991. Enlarging the Heart of the Map, in *Matching the Map Projection to the Need*. Bethesda, MD: American Congress on Surveying and Mapping, pp. 12-13.