JIM HUNT

Anamorphic Art in the Time of Shakespeare

> For sorrow's eye, glazed with blinding tears,
> Divides one thing entire to many objects;
> Like perspectives, which rightly gaz'd upon,
> Show nothing but confusion, ey'd awry,
> Distinguish form.
> *Richard II,* Act II, scene 2

Jim Hunt discusses the invention of anamorphism in the time of Shakespeare and its many applications in art, science, and mathematics from the sixteenth century to present day. For the Learning Comons in the Shakespeare—Made in Canada exhibition, Hunt created an installation of anamorphic displays that deconstruct the complexities of the practice.

WHEN FILIPPO BRUNELLESCHI (1377–1446) invented and mathematically described the artistic technique of geometrical perspective, he revolutionized painting, allowing for the naturalistic representation of single unified scenes to develop. Anamorphism—the study of distorted projections or drawings that become visible when viewed from a particular perspective or with a special mirror—was a natural outgrowth of this intense interest in visual perspective. The scientist-artists of the period—for example, Leonardo da Vinci (1452–1519) and Albrecht Dürer (1471–1528)—attempted to apply mathematical and physical principles to the art of perspective, considering cases of extreme perspective (optic anamorphosis) and distortions produced by reflection in mirrors of various forms (dioptric anamorphosis).

A bike lane indicator

RIGHT Hans Holbein, *The Ambassadors*, 1533 (oil on oak) with a digital reconstruction of the skull image below

Anamorphic art was a popular form of both serious art and visual entertainment beginning in the sixteenth century. While its methods and geometrical elucidation belong to the seventeenth century, it was most practiced as a serious art form in the eighteenth century, one that often used anamorphism to manipulate an image so that the true message, often political in nature, was readable only by the initiated. By the nineteenth century, it was almost completely relegated to the nursery as an amusement for children. Nevertheless, it retains some popularity today, and a small coterie of artists still practice it.

The earliest known anamorphoses were those of da Vinci and took the form of a laterally stretched child's face and a sketch of an eye. Today anamorphoses are actually commonplace in busy cities. The traffic directions and symbols that are painted on roadways are distorted anamorphically. Consider a common bicycle lane indicator: the upper figure is what is actually painted on the pavement, while the lower is what a driver sees from about three metres away. The typical form of anamorphic display seen today requires reflection in a mirror for reconstruction of the image. Of the possible types of display, the cylindrical mirror is the most common.

Treatises on the mathematics of perspective and anamorphism were produced, particularly in the seventeenth century. In that prime period of development, much of the analysis of anamorphic perspective was done using the language of geometry. Today researchers continue that form of analysis. It is only natural to do so as geometrical methods are certain to provide instant and insightful information about phenomena related to anamorphism. The introduction of the high-speed computer, however, has stimulated interest in exact analytical solutions to the various types of anamorphic transformation. In some cases, the analytical solutions are simple to the point of triviality and have been known for a long time. An example of a "trivial" solution is the mathematics for the plane anamorphosis (as in the bicycle lane indicator) viewed from infinity; an example of a "simple" solution is the analysis of the same bicycle lane indicator as viewed from a finite distance. Some solutions, like those for an anamorphosis formed in a convex cylindrical mirror, are neither obvious nor simple. Many of these have only recently been derived, most particularly through work done at the University of Guelph Physics department.

An anamorphic rendering of the Sanders portrait created by Jim Hunt. A cylindrical mirror placed at the centre will yield an inverted reconstruction of the image in its reflection.

The immediate fruit of this type of analysis is the ability to apply the transformations to any digitized image. Using analytic expressions for the "transforms" and the power of the modern computer, it is now possible to undertake analyses of works of anamorphic art such as the famous "skull" in Hans Holbein's *The Ambassadors* (1533). Such analyses can yield important information. For example, a photograph of *The Ambassadors* taken before its restoration in 1996 can be compared to a photograph of the painting as it is today, after the restoration. By using the same electronic calculation, the two can be compared to see if the restorers have been faithful to Holbein's original.

This and other graphics of historical interest can be examined using exact mathematical analysis and the digital computer. The Shakespeare—Made in Canada Learning Commons demonstrates some of these possibilities in a non-mathematical way.

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