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4/8/05

Final Paper

Bryan Smith

Drawing It Out: Communicating in Brush, Pen and Ink

As a graphic artist, I have made a habit of keeping a sketchbook around to keep a visual record of my surroundings. In successful pieces, issues of composition, line quality, and brush strokes are closely considered because they can carry so much meaning in their execution. Beyond just blatant representation of what is physically available to our eyes, drawn images can communicate and retain abstract ideas such as feelings, emotions and even state of mind.

The goal of communication in the world of mathematics is to be so concrete and precise, to produce information that is understandable to everyone in the exact same way. When I think about how to word proofs and other pieces of mathematical writing, I often imagine all the illustrated how-to-assemble guides that come with IKEA furniture. Though these directions contain only pictures, the illustrations are bland and to the point, and it is difficult to be led astray in their meaning. I assume that this method is used, instead of exact words and easily

understood sentences, to break down on the language barrier that may exist in Europe, as well as the US, where these products may be bought. Extraneous or redundant information is better left out, just as words within a proof are painstakingly chosen for their ability to communicate the mathematician's thought processes and methods in such a way that it can be universally understood by all who read it. A mathematician may also include simple illustrations that give less left-brained folk an easier time of understanding complex ideas laid out in writing.

In this paper, I will introduce a few early artists and investigate what ideas their work is able to preserve and imply through choices the artists make with their media, as well as how these methods of communication are like or unlike those of mathematics, or how some chose to employ mathematics as a means of organizing their picture plane.

The idea of harnessing certain properties of mathematics to produce a more convincing illusion of depth arose early in the 13th Century, but often to only a partially successful end.

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Giotto. (1267-1337) is a key pioneer of painting depth in the 13th Century. As seen in the structure that frames Joseph, Mary and Jesus, Giotto was considering appropriate methods to produce a convincing sense of space within the picture plane. Giotto uses perfectly parallel lines to construct the stable that houses the Holy Family. Though the structure still looks a bit out of perspective (Giotto

did not consider all parallel lines to eventually meet at the vanishing point, which shall be discussed later when Brunelleschi is introduced) it is clear that Giotto is representing an object that takes up space.

Ratios were another way Giotto created a sense of space that receded into the background. Repeated forms of people or camels in the example above seem to shrink in size, with the tallest individuals in the front. Giotto was introducing the idea of scale and how it can be used to create the idea of depth by means of varied repetition.

Brunelleschi (1377-1446) is known for designing the dome that is still featured on the top of the Florence Cathedral. He, too, employed the use of parallel lines to give his drawings a greater sense of depth.

While working for the famous Medici family of Italy as an architectural designer, Brunelleschi developed the concept of the vanishing point. As demonstrated in the photograph below, the lines of edges that are known to be parallel in the three-dimensional world we inhabit appear to converge in a specific location, or the vanishing point.

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For example, the edges that the ceiling creates with the top of either wall seem to converge with each other at the dot that is near the doorway, as does the line of every other parallel line in this environment. This also makes for convincing scale, as the windows on the right and pilasters on the left recede in size at a convincing and regular rate. Brunelleschi's method of utilizing a vanishing point greatly improved his architectural drawings, as any of the buildings of his time were fairly rectilinear, with walls, windows, and other necessary

features constructed at strict right angles. His ideas were influential, too. Leonardo da Vinci, famous for many scientific innovations and obscure inventions, was a great admirer of Brunelleschi's drawings and studied their attention to perspective at length.

The concept of parallel lines in art has evolved a lot from 13th century Italy, but they are a strong bond that ties picture-making to mathematics. Though in Euclidean Geometry, parallel lines only converge when there exists a line at infinity, the idea of an alternative representation of parallel lines, via the vanishing point, that enhances the authenticity of the view the artist would like to show us is very mathematical. Especially when thought of in terms of ratios. In my own work, it is easy to overlook how much computation I am actually performing when organizing the layout of my drawings, especially if I am drawing a man-made structure, which are often full of parallel lines. These concepts are very important in the field of studio art, especially in terms of representing three-dimensional design on a two-dimensional picture plane.