The Whole is the Sum of its Parts

I can still recall my reaction upon first seeing a Chuck Close painting. It must have been during one of the semi-regular weekend "culture" trips to New York City that my family would take to see a museum or Broadway show. On this particular visit we had ended up at the Whitney Museum and there it was, on the third floor, a huge portrait (*Phil*, 1969), measuring 9 feet by 7 feet, and so realistic that I was sure it had to be a photograph. I can remember being transfixed by the image, and tentatively approaching it, almost afraid that this gigantic head might reach out of the canvas and take me up into its mouth. I had to see for myself some evidence that this was in fact a painting. I approached it cautiously and deferentially, feeling almost rude for imposing on the subject. Somehow, this two-dimensional representation of a person's head felt alive.

The creation of a great portrait is a complex work of data compression. On a simply physical level a person is three-dimensional, having a thickness, height, and width. But three dimensions only describes us spatially. What of our thoughts, feelings, histories, the way we smell, speak, and laugh - how many dimensions are really needed to describe any one of us? The artist is free to choose the medium, the brush stroke, the coloring, even the style. Physical attributes can be accentuated, distorted or even disregarded. Yet no matter what, the final portrait is a two-, or in the case of sculpture, three-dimensional summary, fixed in time, and it is the great challenge of the portrait artist to accomplish this reduction, this data compression, in such a way that it captures some irreducible living essence of its subject. As Close has said, “I want to make something,..., using the least amount of paint possible but providing the greatest amount of information possible” [1].

In fact, this is the problem treated by mathematical data compression as well. The torrents of bits and bytes that come spilling out of our modern techno-society are generated at such a tremendous rate that we are constantly searching for new ideas to transform this river of raw data into some much smaller quantity that still honestly reflects the original. This “compressed” data still represents most of the important information in the raw data, but requires less memory for storage, can be transmitted more quickly over networks, and hence, can be processed more efficiently, thereby facilitating its study, analysis and understanding.

For Close, the compression is obtained both in the style and the process. Beginning as a painter, in his early work even the brushwork was to remain hidden in the final portrait. He painted “...Showing no display of the artist’s hand in terms of virtuoso brushmanship, but employing unbelievable handwork...” [1]. While more recent work often does reveal the technique, the creative process which he still employs is essential and lean: First, a gridding of a large photograph. The photo is then transformed, square by square, to the canvas. A medium is chosen, perhaps oils, cardboard, or printmaking. Then a motif is selected. Circular swirls perhaps, or layers of cardboard ovals. Slowly the portrait takes shape, square by square, “no area is more important than any other area...every square inch made exactly the same way” [1].

The process is reduced to what takes place on a single small region.

Interestingly, mathematical *block transform* techniques for compressing images (digital pictures) are accomplished in a completely analogous fashion. To describe this, we need to remember that a digitized image (what you see on your computer screen) is really a collection of tiny dots of colored light intensity on the screen, called pixels, which are laid out in a checkerboard. A standard screen may be 1024 squares on a side giving $(1024)^2$ or over one million pixels to display an image. Each of the color intensities is actually a combination of shades of red, green and blue. At the very least, there are 256 possible intensities for each of these shades. This means that exactly one byte of memory is required to store each shade, so 3 bytes would be necessary for each pixel, and thus, almost 3 million bytes (megabytes) of memory would be needed for direct storage of a single color picture.

As the name suggests, block transforms proceed by processing the image in blocks - like Close's gridding of the photograph, a coarse grid is superimposed over the image. Instead of representing each pixel in the block as an independent point of light, the blocks are "transformed" and re-expressed using different *basis functions.* This allows the individual points to be combined in such a way that the features present within the block can be described more efficiently than by as list of pixel intensities. For example, psychophysicists have determined that the eye is primarily sensitive to only certain frequencies of light. By transforming the combinations of colors to this frequency representation and then storing only the appropriate amounts of the sensitive frequencies, the resulting compressed image uses less space, but appears almost identical to the original. This idea underlies one of the fundamental steps in the famous JPEG format used to compress images, and MPEG format used to compress movies which of course are just a sequence of images [2].

Close's different choice of media, style, and colors for the squares, take the place of the choice of basis functions for the block transforms described above. The accompanying *Self Portrait* (1992) has been made using the technique of spit-bite aquatint. In this process, acid is used to etch the aquatint ground (a granular surface) which is adhered to a copper plate. The etched surface is then inked, covered with a piece of paper and drawn through a press. The deeper an etched region, the more ink it may hold, resulting in a darker impression after the ink is transferred to paper. Subtle variations in the depth of etching are thus transformed into subtle tonal variations in the completed print. Thus, the original photograph is decomposed into a collection of small squares of detail, each of which is summarized by a single circular shade of gray.

Each of the different techniques reveals something new both about the subject and the phenomenon by which our eye and brain cooperate to organize these pieces into a whole, a wonderful visual and physical metaphor of the way in which our final perception of another is organized as the sum of many small observations. But of course, as a self-portrait, we are also presented with the artist's view of himself as an observer. It is at once an explanation of a life both as a reaction to the many impressions that the world makes upon us, as well as the accumulation of impressions that we make upon it. Events and our experience of them are engraved upon us, and we, in turn, use these etchings to shape and construct our future. It's a never ending stream of reaction and production, analysis and synthesis. In short, it's the creative process. Close takes the familiar and looks at it closely and carefully but in new and different ways so that what emerges is simultaneously recognizable and surprising.

Ultimately, in *Self-Portrait*, from the "basis functions" of small pools of light and dark there emerges a delicately shifting portrait of the artist, caught as if seen for just a moment at the bottom of a tiled outdoor bath on a breezy and sunny day, the waves creating small gradations in water depth and interference patterns, permitting more or less illumination of a mosaic self-portrait on the floor. It both calls back to an artistic ancestry of antiquities and printing presses, and forward to a world of digital technology. In this way it is a representation at one time and for all time; a life compressed in space and time, but like the output of some unreachably idealized JPEG transform, compressed, yet unreduced.

References

[1] Interview with Robert Storr, in catalog for the exhibition "Chuck Close", organized by Robert Storr, Curator in the Department of Painting and Sculpture at the Museum of Modern Art, New York, February 26–May 26, p. 89.

[2] See, eg. A. Tanenbaum, *Computer Networks*, Third Edition, Prentice Hall, NJ, 1996, pp. 734-744.