About the Cover

Explaining the Brave New World of Information

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with Susana Maria Halpine

Other than looking aesthetically diverse, insulin molecules and butterfly wings might initially seem like incongruous topics for a piece of art. After reviewing some of Susana Maria Halpine's work, however, it's apparent that they're sensible contrasts. As a biochemist and an artist, Halpine connects the molecules and wings with a laboratory black light effect, thereby visually stimulating and clueing the reader into her scientific background.

Symbols and visual contrasts are integral to understanding Halpine's work. Her goal is to make the unfamiliar (for example, insulin molecules) as familiar as butterflies to the human eye, something that we can know and understand through visual experience. In today's world, where humans attach themselves to buzz words to mediate their world and our eyes glean across books, Web pages, and television screens, often ideas such as genetically modified food aren't completely understood. Here is where the work of a visualization artist such as Halpine can shed light on our information-laden world.

Learning through symbols

As a child, Halpine lived in Paraguay, Colombia, El Salvador, and Spain. She then moved to the United States while in high school. Her childhood in South America introduced her to magical realism, where the natural and unnatural (or supernatural) easily interplay (see Figure 1). As Halpine noted, "Growing up in Latin America, miracles seemed commonplace; they seemed to happen around every other corner." The magical realist influence can be seen in *Transcription and Translation of the Insulin Protein* (the cover image) where, as Halpine noted, "The butterflies refer both to the pinned insect—the 19th century analogy for scientific analysis—and to the end result of the DNA transcription–translation process: life itself."

Looking further into the image, you can see how carefully Halpine has tied the subject matter together, because the image interweaves all the processes for transcription and translation. Starting with the coded information in the nuclear DNA (in the upper left corner), the information is transcribed as a mirror image onto the red RNA. Next the (tan) ribosome translates the linear code in the RNA to construct a protein chain. This translation is based on the genetic code (background text). Transfer RNAs (the cross-like shapes) ferry amino acids to the ribosome for insertion in the growing protein chain. Finally, the insulin protein strand is released and folds itself into its active form (upper right corner). To see Halpine's animation of the translation process, see http://www.whfreeman.com/purves6e/con_index. htm.

The magical realist influence can also be seen in *Buckyballs: Cosmic Time Capsules* (Figure 2), where Halpine contrasts the image of Earth with approaching buckyballs (see the "Buckyballs" sidebar for further explanation).

After high school Halpine pursued her interests in art and science, completing dual degrees in biology and art at Worcester State College, Worcester, Massachusetts, and continuing her education with a master's degree in nutrition from Columbia University in New York. Halpine received a fellowship at the National Gallery of Art to transfer biotechnology to art conservation. She was subsequently hired as a biochemist and developed microanalytical methods to identify proteinaceous paint binders and natural colorants.

While at the gallery, Halpine noticed the work of Lorenzo Lotto,

1 Halpine's image, *Vegan Leather Shoe,* is a visual pun. The shoe is printed with molecular models of the protein collagen, the main component of leather.

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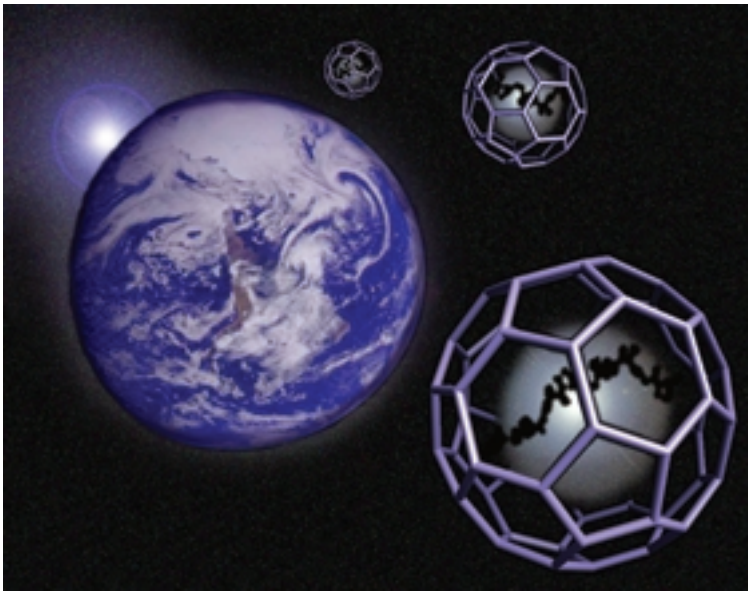
an early Italian Renaissance painter who used allegories and symbols in his work. Halpine found a strong connection between Lotto's work and the symbols and analogies in her own work.

Arriving in the land of computer graphics

When Halpine's job at the National Gallery of Art ended, she explored educational animation as a means to further her dual interests in the arts and sciences. It wasn't an easy transition to computer graphics, however.

Halpine initially worked on three different platforms simultaneously. In the lab she used Rocky Mountain Pascal to operate analytical instruments and DOS for data processing, but at home she used a Commodore Amiga for digital graphics. The Amiga ran impressive graphics software, such as Deluxe Paint, but crashed frequently. She now works primarily on the Macintosh platform.



2 Halpine flirts with the notion of how life began on Earth in *Buckyballs: Cosmic Time Capsules*. Buckyballs containing extraterrestrial gases have been discovered at meteor impact sites and may be implicated in the origins of life on Earth.

Macromedia Flash is her software of choice because of its breadth and flexibility. Although Flash has upgraded to version 5, Halpine currently uses version 4 for her stills and animations. "The free-line pen tool is great for creating original drawings or tracing images from another layer, and Flash 4 lets you customize the line in unique ways, such as fuzzy or prickly instead of just solid. This feature seems to be missing from version 5." She also prefers Flash 4's tool interface—the tool modifiers are readily available within a compact tool bar, which she prefers over Flash 5's sprawling user interface. She hopes the evolution of digital graphics tools will continue towards customizable tool interfaces, similar to those available in 3D software programs such as Maya and 3D Studio Max.

Halpine suggests exploring the graphic capabilities of Flash for print and digital images (not just Web animation). In fact, Halpine created the images accompanying this article in Flash, which combines artist-friendly drawing tools, scalable vector-graphic output, layers, and keyframes. She tests different image iterations, such as variations in line, fonts, color, and design placement by duplicating and altering keyframes along the time line. The users can compare the original version side by side with different iterations. Flash lets the user print out a single image or several in storyboard or comic book format, and export digital images in most standard formats.

Around the corner

Even with the flux of today's economy, Halpine feels there's a strong future in information visualization. A biochemical concept that can take pages of text to explain to a student might be conveyed just as easily with a three-minute animation. Halpine primarily focuses on educational animation projects. For example, she is developing K-12 pilot programs to teach science using hands-on art workshops. She also teaches digital animation to inner city kids while publishing work on science education and visualization.

Halpine animates diverse topics, from a thirty-second TV spot for UNICEF titled, "The Right of Every Child to Adequate Nutrition and Healthcare" (available at http://home.earthlink.net/~shalpine/anim/unicef/unicef2.htm) to her current project animating septoplasty (reconstructive nasal surgery) for medical doctors.

With information visualization emerging as an effective approach for learning, Halpine has developed different strategies for scientific visualization, including still images, interactive charts, animation, and game formats. Although her primary goal is to reach new audiences, such as school kids and nonscientists, Halpine said she'll "keep explaining art to scientists and science to artists." ■

Buckyballs

Buckyballs are 60-carbon structures that resemble soccer balls. Officially named Buckminsterfullerenes after architect Buckminster Fuller's geodesic domes, buckyballs are the third fundamental form of carbon after graphite and diamonds. Potential applications include drug delivery and blocking HIV protease. For more information on buckyballs, see http://www.rideforlife.com/n_buckyball101000.htm or http://www.spacescience.com/headlines/y2000/ast21mar_1.htm.