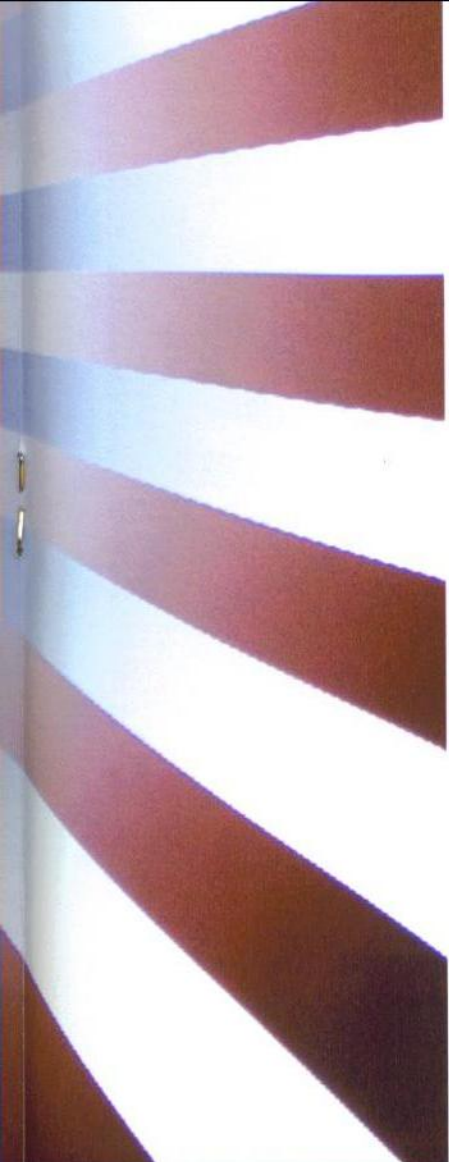




Digital images focus on visual illu





“All of these illusory effects show the importance of the distinction between the physical dimension and the psychological between luminance and brightness. Without it, we can make errors in judgment and think that there is a physical aspect for what we see when, in fact, we are being influenced by psychological aspects.”

D. Alan Stubbs

It began simply enough nearly two decades ago. When the professor of psychology wanted to enhance students' learning experiences in his 300-level class on perception, he introduced some visual aids — digital images of seemingly innocuous geometric patterns.

Suddenly, students discovered there's more than meets the eye.

But is there?

In the visual illusion research of psychologist and artist D. Alan Stubbs, perception and reality can be worlds apart. As a catalyst of illusion, digital art helps to illustrate principles of perception. It also raises awareness of the important distinction between physical and psychological dimensions of stimuli that affect human behavior, including errors in judgment.

As pilots flying at night without instrumentation and outdoor enthusiasts caught in white-outs know all too well, there are times when our senses deceive us. Or, to put it another way, a dual reality seems to exist. And that, says Stubbs, gets to the truth of illusions.

“Illusion is something that's not quite the same as you think it is,” says Stubbs, a University of Maine professor of psychology and an adjunct faculty member in the Department of Art. “For instance, all photos are illusions. The picture on the paper is not your Uncle Henry, but light or marks similar to what you see when you look at him. Put a CD in and the music sounds like whomever. That's an illusion.”

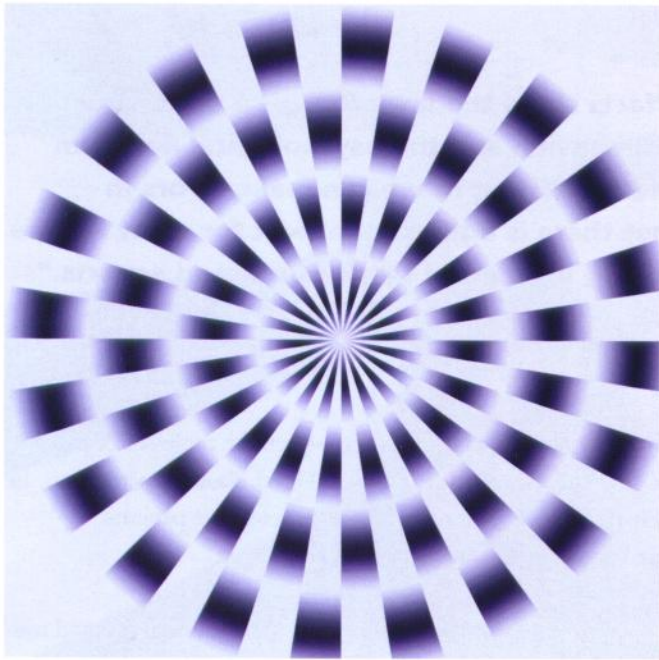
Some illusory images, like those Stubbs creates, might seem to be examples of misperception. Instead, Stubbs views them as mechanisms for understanding how the perceptual process works. That's particularly important, because perception is a strong influencer of human behavior.

“Perception is fundamental,” he says. “If you can't perceive, where is cognition going to

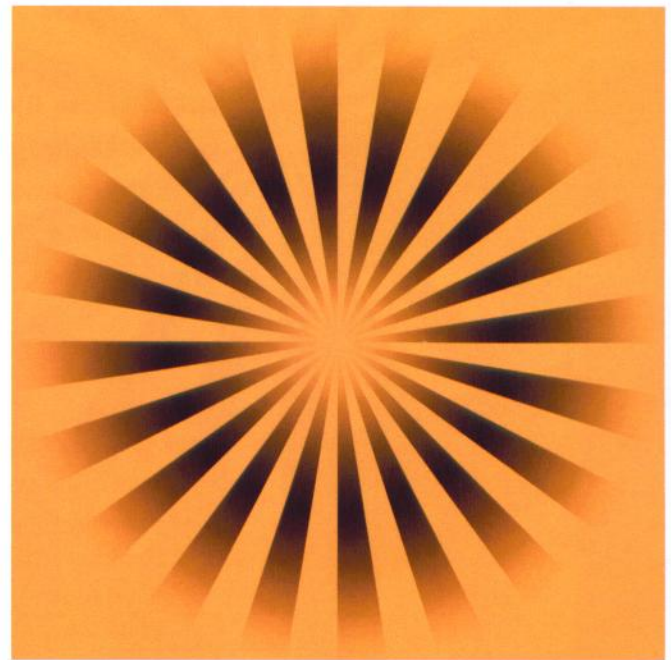
Illusion research

By Margaret Nagle

The Art of Perception



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come from? You perceive, act and know. They can't be separated. As I study it, perception is directly gathering information about the world."

Stubbs' research has evolved from the study of time perception in animals to graph and image perception in humans. It dovetails into his decades-long passion for photography that began concurrently with his graduate research. For Stubbs, the science of perception informs his art and vice versa.

In the 1970s, Stubbs was using pigeons to study perception learning and behavior, as well as visual cognition. In particular, he explored how pigeons tell time.

Then, almost a decade ago, Stubbs turned his focus to another form of perceptual learning.

"I started doing a lot of graph experiments in front of a computer screen," he says. "That's where I became the pigeon."

With UMaine psychology colleague Laurence Smith, Stubbs studies graphical perception, or how people extract information from data graphs to draw conclusions. The psychologists examine the accuracy of people's graph-based judgments, as well as biases

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resulting from the graph formats or the viewers' expectations. They also consider what pertinent details are needed in graph design to effectively communicate to produce sound, informed judgments.

The research is similar to Stubbs' work in image perception, which had its start in the classroom where he sought to bring the perceptual process to life for his students. Using PhotoShop software,

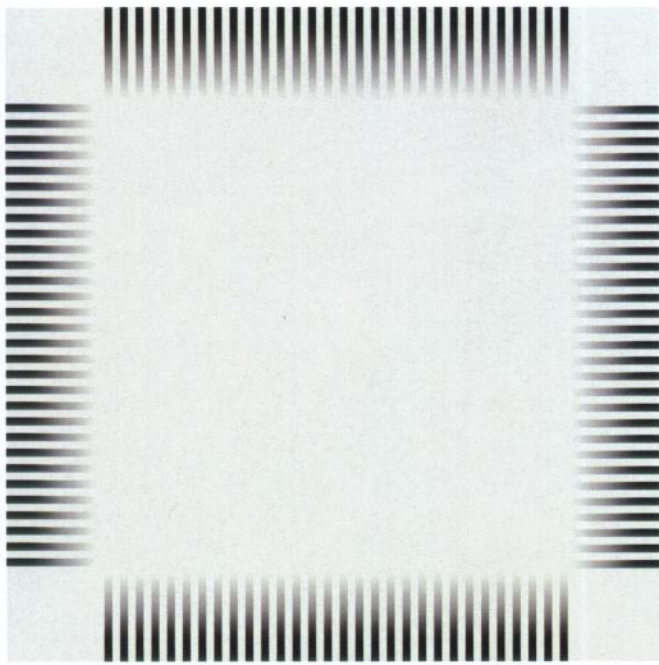
Stubbs took one-dimensional blackboard drawings and created his own 3D digital images that not only convey psychological principles of perception, but give the illusion of

increased and decreased brightness — and even movement.

"Students find the images fascinating because of the 'wow' factor, but I use them to make points. Even as they seem to deceive us, illusions give us a good truth about how the visual system works."

After a decade of creating the research-based visual aids, Stubbs has amassed a collection of original digital art that he now exhibits for the public. He admits that in the creation process, only one in 10 of his illusion images "turns out." But most important, those that do lead him to other questions about perception.

"I found I actually learn more about the phenomenon by creating the images," he says.



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One of Stubbs' digital art pieces, *Dynamic Luminance-Gradient Effect*, was deemed one of the Top 10 Best Visual Illusions of the Year in 2006 by the international Vision Sciences Society.

This year, Stubbs teamed with recent Ph.D. student Simone Gori of the University of Padua to create an image that was used as the logo for the 2007 Vision Sciences Society conference in May.

Dynamic Luminance-Gradient Effect — lines that meet in the center where a gradation of color or light is apparent — “works” by having the viewer physically move closer to and away from the image. Move toward the center and the image appears to brighten, giving a “here comes the sun” effect.

In other images, shaded areas among the bars and lines in his artwork appear to move, grow or shrink, depending on the distance between a viewer's eye and the image.

“It is an illusion in that nothing is changing. Nothing is getting brighter. There is only apparent motion. The illusion has to do with what's happening across the eye,” Stubbs says. “It's not a tricking; it just looks like the image is brightening when it's not.”

Part of the reason such illusions work, says Stubbs, is the

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retina receives increasing and decreasing light. Moving closer to a figure with a brighter center causes a person to see less in the periphery, while every point on the retina receives more light.

Gradation of the boundaries — graded change of luminance — appears to be a key to the illusory effect. “One explanation of this effect could be that these patterns, with gradients of luminance change, suggest to our visual system the presence of an optic flow, like a tunnel with a light at the end,” wrote Stubbs and Gori in the journal *Perception*.

In a sense, our visual system misinterprets the image, behaving as if it were a 3D physical situation instead of a two-dimensional pattern.

“All of these illusory effects show the importance of the distinction between the physical dimension and the psychological between luminance and brightness,” explained Stubbs, writing in *High Resolution*, a specialty newsletter for the displays industry. “Without it, we can make errors in judgment and think that there is a physical aspect for what we see when, in fact, we are being influenced by psychological aspects.” ■

>> See more of D. Alan Stubbs' digital images on the Web (perceptualstuff.org).