

Hungry for Meaning

The brain recognizes food-based illusions on multiple levels
BY SUSANA MARTINEZ-CONDE AND STEPHEN L. MACKNIK



ARE YOU IMPRESSED with meals that look like one food but are actually made of something else? Tofu burgers and artificial crabmeat, for example, are not what they appear to be, yet the masquerade half-convinces our taste buds all the same.

Such ruses have a venerable history. In medieval times fish was cooked to imitate venison during Lent, when it was customary to abstain from meat and other indulgences. At all times of the year, celebratory banquets included extravagant (and sometimes disturbing) delicacies such as meatballs made to resemble oranges and shellfish made into mock viscera. Recipe books from the Middle Ages and the Renaissance also

describe roasted chickens that appeared to sing, peacocks redressed in their own feathers and made to breathe fire, and a dish aptly named Trojan hog, in which a whole roasted pig was stuffed with an assortment of smaller creatures such as birds and shellfish, to the amusement and delight of cherished dinner guests.

Food illusions don't appeal only to the palate. Some exploit quirks of our neurological wiring to confuse and entertain both the eyes and mind.

Take this still life by Italian painter Giuseppe Arcimboldo (1527–1593), which depicts the ingredients for his favorite minestrone soup (*top left*). Turned upside down (*top right*), Arcimboldo's bowl of vegetables becomes a whimsical



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Why do we see a face in the arrangement, when we know it is a bunch of vegetables? And why only when the image is flipped?

portrait of a man's head, complete with a serving-bowl hat.

This image raises a couple of questions. First, why do we see a face in the arrangement, when we know that it is just a bunch of vegetables? Our brains are hardwired to detect, recognize and discern facial features and expressions using only minimal data. This ability is critical to our interactions with other people and is the reason that we perceive personality and emotion in everything from crude masks to the front ends of cars.

Second, why do we see the face only when the image is flipped? The same brain mechanisms that make face processing fast and effortless are optimized to recognize faces the way we generally see them—right-side-up—so upside-down ones are harder to recognize.

A Lot to Digest

Arcimboldo's work demonstrates that, neuroscientifically speaking, the whole is more than the sum of its parts. Clever arrangements of individual fruits, flowers and legumes become exquisite portraiture when viewed in their entirety, such as in the likeness of the Hapsburg emperor Rudolf II, here depicted as



Vertumnus, the Etruscan god of transformations (*opposite page, bottom*).

The brain builds representations of objects from line segments and tiny patches of color, then identifies them for what they are by comparing them to a mental library of similar visual images. The viewer first makes out a bulbous protrusion in the middle of Rudolf's face because thousands of retinal photoreceptors in the eye react to the various shades of color and

luminance in that area of the painting. There are no retinal cells specialized in recognizing noses, however. That next step occurs when high-level neuronal circuits in cognitive areas match the information to the brain's stored template for noses, created from a lifetime's experience of viewing them.

In this case, the output from those same photoreceptors also activates the high-level object-tuned neurons that recognize fruits, which is

what makes images such as these so much fun to look at. A nose is a nose is a nose, to riff on Gertrude Stein—except when it's a pear.

Such visual puns, artfully constructed, appeal to the mind as much as any wordplay. For example, in this image of a hummingbird (*above*) the brain simultaneously detects animal features (eyes, wings, tail) along with plant parts (eggplant, artichoke leaves). This dual spark of recognition, with all its contradictions, tickles the fancy.

Delicious Deceptions

The dots that compose this image of a cherry-topped cupcake (*left*) are multi-colored jelly beans, a technique that recalls the works of painters such as Georges Seurat and Paul Signac. The pointillists juxtaposed multiple individual points to create hues that were very different—when viewed at a distance—from the actual colors of the painted dots.

But in a very real sense, all art is pointillism. In fact, all visual perception is pointillism. Our retinas are sheets of photoreceptors, each sampling a finite circular area of visual space. Every photoreceptor then connects to downstream neu-





ral circuits that build our perception of objects, faces, loved ones and everything else. Thus, vision itself is largely a pointillist illusion, colored by a tremendous amount of “guesstimation” and filling in on the part of the brain. It doesn’t matter whether a painter uses brushstrokes or candy or whether the “artist” is the sun illuminating the world; the effect is the same—colors, lines, shadows, reflections are processed by the brain to become everyday objects.

Among artists who play with food are those who challenge the brain by changing the scale. Instead of constructing something small (a cupcake) from even smaller items (jelly beans), they build sweeping views. The image above looks, at first sight, like a landscape painting. But examine it more closely. These are actual foods laid out to re-create details of scenery and terrain. London photographer Carl Warner arranges meats, cheeses and vegetables to create environments that could be

the setting of a Brothers Grimm fairy tale, then photographs the scene in layers from foreground to background to create a composite image.

Warner’s work takes food-based visual illusions to the next level in that here real foods not only represent other things but are juxtaposed in such a way that their various sizes create the illusion of perspective. Some vegetables, for example, appear to recede into the distance: green chili and Romano peppers become cypress trees (the larger Romano peppers placed in the foreground to create the effect), pine nuts

are stones for walls, and mozzarella cheese, clouds. The brain recognizes a delicious assortment of Italian edibles, as well as a Tuscan hillside, in the same visual data. Food for thought, indeed. **M**

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(Further Reading)

- ◆ **Edible Art: Tricks and Tools for Master Centerpieces.** Narahenapitage Sumith Premalal De Costa. Schiffer Publishing, 2006.
- ◆ **The Decorative Art of Japanese Food Carving: Elegant Garnishes for All Occasions.** Hiroshi Nagashima. Photographs by Kenji Miura. Kodansha International, 2009.
- ◆ **Arcimboldo: Visual Jokes, Natural History, and Still-Life Painting.** Thomas DaCosta Kaufmann. University of Chicago Press, 2010.
- ◆ For medieval and Renaissance recipes, including illusion foods: www.godecooking.com
- ◆ For more about the Trojan hog: www.eatmedaily.com/2009/03/the-trojan-hog-on-hestons-roman-feast-video