

# Research suggests the brain uses color to help us choose what to eat

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Credit: Maliz Ong

According to a study at the International School for Advanced Studies (SISSA) in Trieste and recently published in the journal *Scientific Reports*, vision is the main sense humans use to guide food choices. The

researchers suggest that to evaluate calorie intake, humans rely on a "color code."

"According to some theories, our [visual system](#) evolved to easily identify particularly nutritious berries, fruits and vegetables from jungle foliage," says Raffaella Rumiati, SISSA neuroscientist and coordinator of the new study. The human vision system is trichromatic: in the retina, there are three classes of photoreceptors (cones) tuned preferentially to three different bands of the visible spectrum. This implies that we can see a large number of colors (more than monochromatic and dichromatic animals, less than those with four, even five types of photoreceptor). "We are particularly efficient at distinguishing red from green," says Rumiati. This sophistication testifies to the fact that we are "visual animals." Other animals, such as dogs, depend on their sense of smell.

"It is mainly the color of food that guides us, and our experiments show how," explains Rumiati. "To date, only a few studies have been focused on the topic."

What do humans look for in food? Nutrition, calorie-dense content, and high protein. "In natural foods, color is a good predictor of calories," explains Francesco Foroni, SISSA researcher and first author of the study. "The redder an unprocessed food is, the more likely it is to be nutritious, while green foods tend to be low in calories." Our visual system is clearly adapted to this regularity. "The participants in our experiments judged foods whose color tended toward red as higher in calories, while the opposite was true for greens," continues Giulio Pergola, a researcher at the University of Bari, and one of the authors of the study. "This is also true for processed, or cooked foods, where color loses its effectiveness as an indicator of calories."

Actually, the scientific literature shows clearly that cooked foods are favored over natural foods and the phenomenon has been observed even

in other species besides humans. "Cooked foods are always preferred because, compared to natural foods, there is more nutrition for the same quantity," explains Rumiati. "With cooked foods, however, the dominance of red over green no longer provides reliable information, which might lead us to believe that the brain would not apply the rule to processed foods. On the contrary, it does, which hints at the presence of ancient evolutionary mechanisms from before the introduction of cooking."

Another factor in favor of this hypothesis is the fact that the color code in the experiments is not active for items other than food: "The preference for red over green is not observed with non-edible objects," says Rumiati. "This means that the color code of the visual system activates correctly only with food stimuli."

## **Inner traffic light for eating healthier**

The findings, besides increasing knowledge of the visual system, offer interesting possibilities that could have an impact on public health: Marketing food, for example, and treating eating disorders. "Much is being done today to encourage healthier eating," notes Rumiati. "For example, trying to convince the people to eat foods lower in [calories](#)." Some countries propose bans on certain types of products, such as carbonated soft drinks and high-fat foods. In some cases, there is a disclaimer on the packaging, as with cigarettes. Perhaps [food](#) color could be used to produce significant results, even if artificial."

**More information:** *Scientific Reports*, [DOI: 10.1038/srep37034](https://doi.org/10.1038/srep37034)

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