

How the brain creates your taste in art

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It has been said that there is no accounting for taste. But what if taste can actually be accounted for, and what if the things doing the accounting are the neural networks inside your brain?

In a new paper published in *Nature Communications*, a team of Caltech

researchers show how they have revealed the [neural basis](#) for aesthetic preferences in humans using a combination of machine learning and [brain](#)-scanning equipment.

The work took place in the lab of John O'Doherty, Caltech's Fletcher Jones Professor of Decision Neuroscience, and builds on research published by that lab in 2021. In that previous research, scientists trained a computer to predict volunteers' taste in art by feeding it data about which paintings the volunteers liked and which they disliked. With enough training, the computer became adept at correctly guessing if a person would like a Monet or a Rothko, for example.

That act of liking or disliking a piece of art seems so innate and occurs so instantly and seamlessly in our brains that few of us have probably taken the time to wonder why or how it happens, but aesthetic preferences have been the subject of philosophical discussions for hundreds of years.

"When you see a picture, you decide immediately if you like it or not, but if you think about it, this is really complicated because the input is very complex," says lead author Kiyohito Iigaya, formerly of Caltech and now with Columbia University. "This is actually a very open question, and we haven't really known how the brain manages to do it. So, we were wondering if we could understand it using a computational modeling method."

That method involved having volunteers rate paintings (as many as a thousand) over the course of four days while their brains were scanned with a [functional magnetic resonance](#) imaging (fMRI) machine. Those brain scans and the volunteers' ratings of the paintings were fed into a machine-learning algorithm, along with the output of a neural net trained to examine the paintings for qualities like contrast, hue, dynamics, and concreteness (whether the painting is abstract or realistic).

The data the team collected showed that areas within the [visual cortex](#), the part of the brain that processes visual input, are responsible for analyzing those qualities. An area in the front of the brain known as the [medial prefrontal cortex](#) (mPFC) is responsible for assigning a subjective value to them.

Basically, the brain breaks a piece of art down into its essential qualities, and then decides whether those qualities are pleasing or not. This is more or less the same way the brain decides if it likes food or not, according to another study conducted by the O'Doherty lab. That study found that the brain analyzes a food according to its protein, fat, carbohydrates, and vitamin content, and then determines if those qualities are pleasing.

"What they found is that the brain integrates those different nutritional features to produce the overall liking of food," Iigaya says. "That's actually an inspiration for our work."

In their paper, the researchers say their findings suggest that this "value construction" system may be widespread throughout the brain and may explain many kinds of preferences.

"I think it's amazing that this very simple computational model can explain large variations in preferences for us," Iigaya says.

The paper describing their research, titled, "Neural mechanisms underlying the hierarchical construction of perceived [aesthetic value](#)," appeared in the January 24 issue of *Nature Communications*.

More information: Kiyohito Iigaya et al, Neural mechanisms underlying the hierarchical construction of perceived aesthetic value, *Nature Communications* (2023). [DOI: 10.1038/s41467-022-35654-y](https://doi.org/10.1038/s41467-022-35654-y)

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