It's Thanks to Evolution That No Two Faces Are Alike, Study Finds

From bug eyes to aquiline noses, square jaws to chin dimples, no two faces are the same. That **diversity** may have **evolved** to make it easier to recognize other people, researchers reported on Tuesday. The **shape** and configuration of a human face are much more **variable**, **compared with** other body parts, the study found. What's more, genes that have been **linked to** face structure **vary** more than DNA in other **regions** of the body. This suggests that the **forces** of **evolution** have **selected** for facial diversity, perhaps to make individuals more recognizable to other people, the researchers say. "An individual may actually **benefit** from having a **unique** face," says lead **investigator** Michael Sheehan, a postdoctoral fellow at the University of California, Berkeley. "It's like evolving a name tag."

There are many situations in which it might be evolutionarily **costly** to be confused with another person, Sheehan notes, such as if an enraged neighbor mistakes you for their enemy. "Or maybe you've done something fantastic and someone wants to give you a **reward**, but they give it to someone else instead," Sheehan notes. "Being cryptic could be **harmful**."

That seems to be true for the paper wasp, Polistes fuscatus, a species that is "phenomenally diverse in their color **patterning**," Sheehan says. In 2011, his team reported that these highly social insects **rely on** their **distinctive** face and body patterns to recognize each other, which helps them keep track of who's who in the wasp **hierarchy**. In the new study, published today in Nature Communications, Sheehan and his colleagues **analyzed** a U.S. Army database that **includes** dozens of face and body **measurements** for thousands of its service members, from the distance between pupils to the length of the calf. Sheehan's team found that most body parts are internally consistent: If a person's hand is wide, it's usually long too. Face parts, in **contrast**, are not **predictable**. "You mix and match," Sheehan jokes, "like Mister Potato Head."

Diverse DNA

The researchers then looked at the genomic sequences of 836 people of European, African, or Asian descent from the 1000 Genomes Project, a freely available catalog of genetic information. The researchers **focused on** 59 stretches of DNA previously linked to facial features. These DNA codes were more variable than the rest of the genome was, and were more variable than regions **associated with** a person's height, the study found. To get a sense of when this diversity cropped up during human evolution, the researchers also compared the DNA of modern humans to that of a Neanderthal individual and of a Denisovan, another early human relative. In both the modern and **ancient** DNA, two genes—one related to the distance between the chin and bridge of the nose, and the other to nose shape—had similar levels of variability, suggesting that facial diversity evolved before modern humans did. That high level of genetic variability probably means that evolutionary forces are at play in shaping the diversity of faces, the authors say. Consider a hypothetical gene that codes for either a long nose or a short nose, depending on its DNA variations. If a long nose was harmful, long-nose variants would be weeded out over time. But if the **usefulness** of a long nose **depends on** the environmental context, then both short and long variants will stick around in the genome, leading to a more diverse set of genes. The increased genetic variability is **consistent** with the idea of evolution selecting for facial **uniqueness**, but that explanation is "hardly definitive," notes T. Ryan Gregory, a biologist at the University of Guelph in Ontario. Genetic diversity could alternatively have arisen because of recent interbreeding of previously **distinct** populations, or even just by chance, he says. If facial diversity is an evolved **trait**, it may have arisen for reasons other than recognition, other researchers have noted. Many other species, such as sheep, can use faces to recognize individuals even when those faces are not highly variable, says Susanne Shultz, an evolutionary biologist at the University of Manchester in the U.K.

"It is likely that numerous **processes** act in concert during the course of evolution," adds Barnaby Dixson of the University of New South Wales in Sydney, Australia. Earlier this year Dixson's team found that people rate beards as more attractive when they are **rare**. Mate preferences might have similarly played a role in facial diversity, he says. Rare characteristics "have the potential to **enhance** an individual's attractiveness relative to their **contemporaries**."

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