Women leave their handprints on the cave wall

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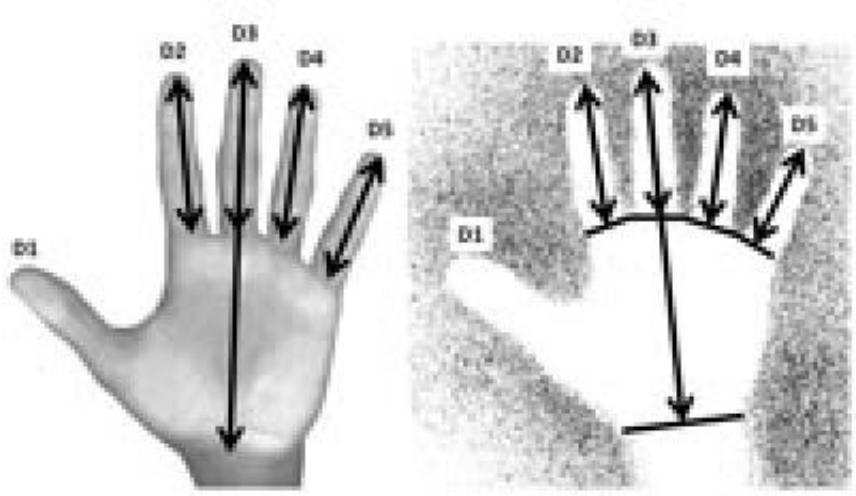


Images of male and female hand with measurements that determine gender. Credit: Dean Snow

Plaster handprints from kindergarten, handprint turkeys, handprints outside Grauman's Chinese Theater in Hollywood—are all part of modern life, but ancient people also left their handprints on rocks and cave walls. Now, a Penn State anthropologist can determine the sex of some of the people who left their prints, and the majority of them were women.

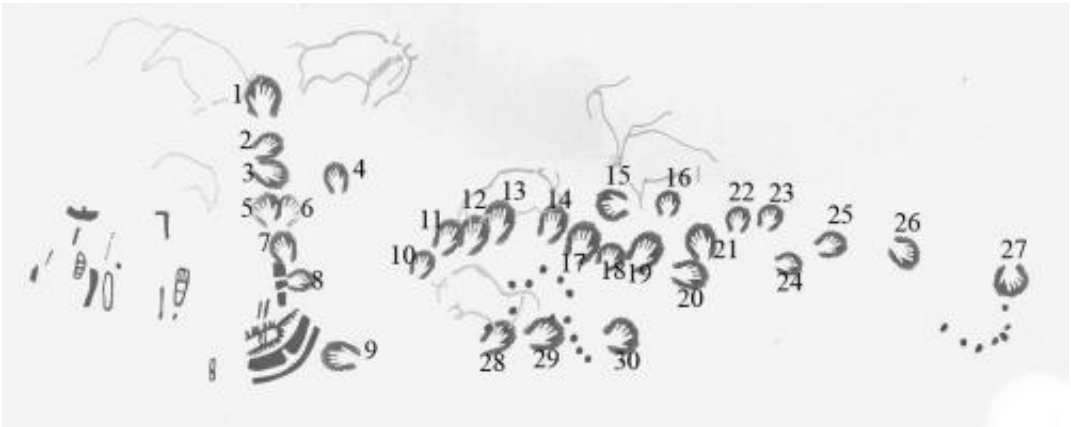
The assumption has been that hand prints, whether stencils—paint blown around the hand—or actual paint-dipped prints, were produced by men

because other images on cave walls were often hunting scenes. The smaller handprints were assumed to be adolescent boys.

Dean Snow, emeritus professor of anthropology, came across the work of John Manning, a British biologist who about 10 years ago tried to use the relationships of various hand measurements to determine not only sex, but such things as sexual preference or susceptibility to heart disease. Snow wondered if he could apply this method to the handprints left in cave sites in France and Spain.

"Manning probably went way beyond what the data could infer, but the basic observation that men and women have differing finger ratios was interesting," said Snow. "I thought here was a neat little one off science problem that can be solved by applications of archaeological science."

When Snow saw a handprint in a book on Upper Paleolithic art, he realized that the image was female. A quick look at five other images found that two thirds were female.



Friso de las Manos, El Castillo. Credit: Dean Snow, Penn State

Unfortunately, most cave art photographs lack size indication, making it difficult to determine relative size and the sex of the artist. Snow visited a number of caves and the few existing images with size indications. He also collected hand images from people with European and Mediterranean ancestry. He published his results in the current issue of *American Antiquity*.

Snow found he needed a two-step process for the modern hands to successfully differentiate men from women. He first measured the overall size of the hand using five different measurements. This separated the adult male hands from the rest. Snow found that step one was 79 percent successful in determining sex, but adolescent males were classified as female.

Step two compares the ratios of the index finger to the ring finger and the index finger to the pinky to distinguish between adolescent males and females. For the known hands, the success rate, though statistically significant, was only 60 percent. There is too much overlap between males and females in modern populations.

"I thought the fact that we had so much overlap in the modern world would make it impossible to determine the sex of the ancient handprints," said Snow. "But, old hands all fall at or beyond the extremes of the modern populations. Sexual dimorphism was greater then than it is now."

Sexual dimorphism implies that males and females differ. Not only were male hands larger, Snow found that development of the fingers, how long they are relative each other, also differs significantly.

The first step in the process showed that only 10 percent of the handprints on cave walls in Spain and France were left by adult males. The second step indicates that 15 percent were placed by adolescent

males, leaving 75 percent of the handprints female.

"By just eyeballing, I'm more accurate with the modern hands than the formulas I developed," said Snow. "There are some variables there that I'm not aware of yet. The algorithms are pretty good, but they could be better."

Snow also looked at modern American Indian hands and found that the rules and algorithms developed for Europeans did not work. He notes that different populations require separate analysis.

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