



Neanderthals did not rely on brute force for their daily manual tasks

Neanderthal daily activities mainly involved fine-tuned hand movements

Tübingen, 09/26/2018. A research team led by Senckenberg and University of Tübingen scientist, Professor Katerina Harvati, in close collaboration with the Natural History Museum in Basel, rejects the previous assumption that Neanderthals mainly relied on brute force when using their hands. In their study, published today in the scientific journal “Science Advances,” the researchers show that Neanderthals almost exclusively used precision grips in their daily manual tasks.

Neanderthals (*Homo neanderthalensis*), who lived in Western Eurasia between 400,000 and 40,000 years before present, are often portrayed as physically strong but otherwise rather clumsy early humans that primarily relied on their strength for the production and use of stone tools. In contrast, modern humans were assumed to systematically use precision manual grips as part of their modern set of behaviors.

“The robust anatomy of Neanderthal hand bones previously led us to believe that they handled their daily tasks primarily by force, even though archeological discoveries increasingly indicate that they showed sophisticated cultural behavior,” explains Prof. Dr. Katerina Harvati of the Senckenberg Centre for Human Evolution and Palaeoenvironment at the University of Tübingen.

Using an innovative method, Harvati’s team has now been able to show that Neanderthals primarily managed their day-to-day tasks using precision rather than power manual grips, contrary to previous hypotheses. “In our study, we were able for the first time to successfully link the anatomical evidence preserved in the skeleton of fossil humans with the archaeological evidence they left behind, providing a more complete understanding of the behavior of extinct humans,” explains Dr. Alexandros-Fotios Karakostis, the study’s first author.

The research reveals that Neanderthals systematically employed “precision grips” in their manual activities. Contrary to the “power grip,” which uses the entire palm, including all fingers and the thumb, for gripping, the holding and guiding of objects with the

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Contact

Prof. Dr. Katerina Harvati
Senckenberg Center for Human
Evolution and Paleocology
Eberhard-Karls-Universität
Tübingen
Phone: +49-(0)7071-29-76516
katerina.harvati@senckenberg.de

Judith Jördens

Press Office
Senckenberg Gesellschaft für
Naturforschung
Phone: 069- 7542 1434
pressestelle@senckenberg.de

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Press Image



Muscle attachment markings for
power grips (pink) and precision
grips (blue).

Photo: Senckenberg

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SENCKENBERG GESELLSCHAFT FÜR NATURFORSCHUNG

Judith Jördens | Press & Social Media | Communication Staff

T +49 (0) 69 75 42 - 1434 F +49 (0) 69 75 42 - 1517 judith.joerdens@senckenberg.de www.senckenberg.de

M+49 (0) 1725842340

SENCKENBERG Gesellschaft für Naturforschung | Senckenberganlage 25 | 60325 Frankfurt am Main

Board of Directors: Prof. Dr. h.c. Volker Mosbrugger, Prof. Dr. Andreas Mulch, Stephanie Schwedhelm, Prof. Dr. Katrin Böhning-Gaese, Prof. Dr. Karsten Wesche



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“precision grip” primarily involves the tips of the thumb and index finger.

“Since muscles and tendons are not preserved in the fossil record, we examined the muscle attachment markings, or ‘entheses’ – the areas where muscles and tendons are attached to the bone,” explains Harvati. “These markings are the only direct evidence of muscle activity on the skeleton, but have been difficult to analyze reliably in the past.” The researchers from Tübingen and Basel developed an innovative method to analyze muscle markings using 3D scanning of hand bones. The new method also focused on muscle groups – rather than single muscles – that together produce precision vs power grips, and thus was able to uncover whether an individual commonly performed power or precision grasping during his or her lifetime.

The method was verified using samples from the “Basel Spital Cemetery” collection of the Natural History Museum in Basel. “This unique collection from the 19th century comprises fully documented skeletons, including information about the circumstances of their life and their profession,” explains Dr. Gerhard Hotz of the Natural History Museum in Basel. “If, for example, we examine a blacksmith’s hand, we can show by means of the muscle attachment points that he regularly used ‘power grips’ during his day-to-day activities.”

None of the examined Neanderthal hand skeletons showed evidence of a sustained use of power grips. “We therefore refute the commonly held view of the clumsy, forceful Neanderthal. Like modern humans, Neanderthals were competent tool makers and tool users, who were using delicate and precise hand and finger movements in their daily activities,” adds Harvati in summary. In contrast, the hand bones of early *Homo sapiens* show traces of the systematic use of both precision as well as power grips, supporting the hypothesis that division of labor intensified for the first time during the Upper Paleolithic.

*To study and understand nature with its unlimited diversity of living creatures and to preserve and manage it in a sustainable fashion as the basis of life for future generations – that has been the goal of the **Senckenberg Gesellschaft für Naturforschung (Senckenberg Nature Research Society)** for the past 200 years. This integrative “geobiodiversity research” and the dissemination of research and science are among Senckenberg’s primary tasks. Three nature museums in Frankfurt, Görlitz and Dresden display the diversity of life and the earth’s development over millions of years. The Senckenberg Gesellschaft für Naturforschung is a member of the Leibniz Association. The Senckenberg Nature Museum in Frankfurt is supported by the City of Frankfurt am Main as well as numerous other partners. Additional information can be found at www.senckenberg.de.*