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## Did early *Homo* have language? Neurocognition behind stone tool-making

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Recently, considerable interest for language evolution has arisen. Many researchers believe that language evolved via exaptation of domain-general cognitive systems such as long-term memory, visuospatial processing and executive functioning. Therefore, many studies on language evolution have focused on determining when specific cognitive functions, which might have supported language, developed. One approach in this area has been to establish the neurocognitive and neural correlates of specific behaviours during the Palaeolithic period (from ~3.3 mya to ~10 kya). The focus has been on stone-toolmaking-related behaviours because of the higher preservation of stone in the archaeological record compared to other materials. The earliest stone industry is the pre-*Homo* Lomekwian. It has been hypothesized based on experimental replication of the knapping process that the Lomekwian findings are suggestive of lesser functional lateralization of the motoric and prefrontal cortex compared to modern humans. The next stone industry, the Oldowan, typically associated with *Homo habilis*, has been linked to more complex subsistence strategies and social behaviours. Neuroimaging studies have shown that Oldowan toolmaking predominantly involves frontoparietal sensorimotor areas and the cerebellum, which is why this industry has been described as cognitively relatively „ape-like“. The following industry, the Acheulean, taxonomically linked to *Homo erectus* and chronologically coinciding with significant brain enlargements in our genus, is believed to be more demanding in hierarchical and sequential action processing compared to earlier technologies. Additionally, neuroimaging studies have shown higher activation of the right Broca's area and temporal cortices during Acheulean compared to Oldowan toolmaking. Recently, a study by our lab comparing sidescraper manufacture, associated with *Homo heidelbergensis* and Neanderthals, and Oldowan toolmaking has found higher involvement of visuospatial and executive functions in the former task. While it is hard to generalize based on this data, we will suggest some implications for the existence of language in early *Homo*.

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