



ORIGINAL RESEARCH ARTICLE

Electrodermal activity during Lower Paleolithic stone tool handling

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Abstract

Objectives: Hand coordination is a key feature in primate evolution at both behavioral and cognitive levels. Humans further improved their manual abilities, and their cognitive niche is deeply associated with hand-tool relationships and technological capacity. A main cognitive change is thought to be related to the transition from Oldowan to Acheulean stone tool technology around 1.7 million years ago. In this survey, we test whether distinct Lower Paleolithic tools induce different electrophysiological reactions during haptic exploration.

Methods: Electrodermal activity is a relatively quick way to measure emotional and attentional changes during specific tasks. We analyzed changes of the electrodermal response and electrodermal level during Oldowan and Acheulean stone tool handling in a sample of 46 right-handed adult subjects with no previous archeological knowledge.

Results: Electrodermal proxies for attention and emotion display a skewed distribution. Females present more variable reactions than males and more emotional engagement. Acheulean tools require longer manipulation time and exert less emotional response than Oldowan tools. Attention is influenced by tool length and weight, emotion is sensitive to tool thickness and weight, and manipulation time depends on tool length and width.

Conclusions: This study suggests subtle but detectable perceptual differences when handling Oldowan and Acheulean stone tools. Such variations associated with hand-tool interaction can provide information on haptic and prosthetic capacities associated with our specialized technological resources. Perceptual changes in the archeological record can reveal evolutionary changes in the corresponding body-tool cognitive mechanisms.

1 | INTRODUCTION

In archeology, cultural traces are generally used to make inferences about the behavior and cognition of past or extinct human populations. In cognitive archeology, this information is integrated with current theory in cognitive sciences (Coolidge, Wynn, Overmann, & Hicks, 2015; Wynn & Coolidge, 2016),

while in neuroarcheology, those behaviors are investigated with functional imaging or other neurofunctional correlates (Stout & Chaminade, 2007; Stout & Hecht, 2015). Stone tools have a key role in this sense, because the complexity behind their production is used as proxy of behavioral and cognitive complexity of the tool-makers (Muller, Clarkson, & Shipton, 2017; Stout, Semaw, Rogers, & Cauche, 2010).

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