

STONE TOOLS AND THE EVOLUTION OF HUMAN THINKING: CULTURAL,
BIOLOGICAL, AND ARCHAEOLOGICAL ELEMENTS IN
AN ANTHROPOLOGY OF HUMAN ORIGINS

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Stone tools and the evolution of human thinking: Cultural, biological and archaeological elements in an anthropology of human origins

Durable stone artifacts provide some of the best remaining evidence of pre-modern human behavior and cognition. As the concrete remains of technological acts, these artifacts potentially bear on questions ranging from visuomotor coordination and spatial cognition to socially-mediated learning and the cultural negotiation of meaning. Accessing this information requires interpretive models that combine a firm empirical foundation with the broad scope needed to deal with complex technological phenomena. This dissertation contributes to the development of such models through a combination of experimental neuroscience and ethnography. Patterns of brain activation during the manufacture of simple (Mode I) stone tools were observed in modern human subjects using Positron Emission Tomography (PET). These experiments revealed that the making of even the simplest of stone tools is a relatively demanding visuospatial and motor task, activating regions in the frontal, parietal and occipital lobes of the brain. These areas also constitute regions of neuroevolutionary interest to be examined for adaptations relevant to stone tool making. Decreases in brain activation associated with experience further indicate that tool making skills are acquired and stabilized through deliberate practice. This practice necessarily takes place in a broader social and environmental setting. Ethnographic research with modern stone adze makers of the village of Langda in the mountains of western New Guinea (Irian Jaya) provides an example of the way in which social interaction and cultural meaning provide the motivation, opportunity and structure

needed for expert skill development. A better understanding of the skills displayed by ancient tool makers thus offers important insights into the evolution of human mental and cultural capacities. Techniques developed in this dissertation for the identification of skilled action from stone artifacts, and for the further delineation of the neural foundations of this skill, promise to aid in the development of such understanding.

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