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Stone tools and trained brains: Comparing anatomical connectivity in expert toolmakers versus naïve subjects using Diffusion Tensor Imaging

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Abstract

Our study gathered Diffusion Tensor Imaging data to compare anatomical connectivity in expert stone toolmakers with naïve subjects with no prior toolmaking experience. The introduction of stone tool technology marked a shift in the evolution of human cognition, as early hominins gradually developed their capacity for complex hierarchical action planning and coordination. It is hypothesized that other abilities requiring these same capacities, like language, co-opted this neurocognitive scaffolding. Similarities in connectivity between experts and novices thus may be explained by the involvement of these networks in language or by a ubiquitous human competence in everyday tool use. Differences are likely explained by the increased complexity of the tool types experts make and use. These differences would support findings from a previous analysis within this study that found tool types of varying complexity (Oldowan, Acheulean, Levallois) differentially activated language networks for subjects with different levels of expertise.