Insights from neuropsychology, biology and evolution in Brain

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Abstract

Art is a uniquely human activity associated fundamentally with symbolic and abstract cognition. Its practice in human societies throughout the world, coupled with seeming non-functionality, has led to three major brain theories of art. (1) The localized brain regions and pathways theory links art to multiple neural regions. (2) The display of art and its aesthetics theory is tied to the biological motivation of courtship signals and mate selection strategies in animals. (3) The evolutionary theory links the symbolic nature of art to critical pivotal brain changes in Homo sapiens supporting increased development of language and hierarchical social grouping. Collectively, these theories point to art as a multi-process cognition dependent on diverse brain regions and on redundancy in art-related functional representation. The enormous variety of art created in human societies throughout the world expresses a multitude of ideas, experiences, cultural concepts, creativity and social values. The arts – paintings, sculpture, theater, poetry, film, music and dance to name but a few – form a communication system between artist and viewer, represented in a manner not afforded by language alone. Whereas nearly everyone can use language, only a few can create art compositions with qualities that elicit reactions of pleasure and appreciation for subsequent centuries and millennia. Because the compositions seem to incorporate unique understanding, their neuroanatomical basis is a challenge. Clues and insights can be obtained from several sources including the study of established artists with brain damage, the times of early humans when art practice began, evolution of Homo sapiens and immediate ancestors, as well as discussion about biological motivation, such as mate selection strategies in animals, and diverse fields such as archaeology, anthropology and the fossil record Several factors have simultaneously shaped the search for the elusive underpinnings of art in the brain, namely its ubiquitous presence in human societies, in contradistinction to its absence in animals, art's symbolic and representational essence, its seeming lack of functionality and its relatedness to pleasure. Three theories, which can be roughly grouped together into the localized brain regions or pathways, biological motivation of courtship displays and evolutionary explanations, have been proposed. The background and sources of evidence for these art and brain theories, particularly the visual arts, are described in this work in neuropsychology and neurology, the relationship between brain structures and their functions is traditionally inferred from behavioural effects of damage in regional brain areas. Alterations, if any, in artistic production in established artists following the damage is of great interest because they provide a strong basis for linking art to neural regions. As the complexity of art itself defies breakdown into easily definable elements, the focus is mostly on general artistic categories. Thus, the quest addresses region- or pathway-specific disruptions of general categories such as skill, technique, style, talent and creativity, and, whenever possible, the disruption of specific artistic components. Unlike the fixed meaningful units of language , units of art such as brush strokes have no meaning outside the context in which they are used. Absence of art-related alterations following brain damage in artists would imply both a redundancy in functional representation and multi-regional processing.

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