

The Cingulate Cortex as Organizing Principle in Neuropsychiatric Disease

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Humans have a behavioral repertoire that far exceeds that of even our closest animal relatives. Humans are unsurpassed in their ability to monitor, adapt to, and modify their environment which includes not only the natural world but also the complex social structures that characterize the human species. Thus, while every animal can adapt to changes in the environment (and many animals operate in social systems), humans are unique in the degree to which they can problem-solve and engage in multiple complex goal-oriented behaviors in an ever-changing natural (and man-made) environment.

These unique behavioral and adaptive qualities have been traditionally associated with the much larger frontal lobe of the human brain, which includes greatly expanded prefrontal and anterior cingulate cortices. These regions have extensive connections throughout the brain that implicate them in nearly all neurological systems (motor, sensory, cognitive, emotional, autonomic, and homeostatic/drive processes). While its role in each of these systems is not completely understood, the prefrontal cortex appears to be important for the integration of multiple streams of information about the internal and external environment. Selection among internally represented “goals” in the process of determining a course of action appears to result from decisions made in cingulate cortex based on information flow between these connected structures. The operations of the prefrontal region are referred to as executive functions that allow humans to have their unique behavioral and adaptive capabilities. However, these same processes, when dysfunctional, can also