

Aging as Adaptive Reorganization: A Network Analysis of Psychological, Cognitive, and Personality Traits Across the Lifespan

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Aging refers to a series of changes occurring throughout the lifespan in physical and mental health, cognitive abilities, and personality traits. While aging has often been associated with a progressive and inevitable decline, recent findings suggest that this is not the case for many variables. Given the adaptive nature of this process, it is crucial to investigate the relationships among psychological, cognitive, and personality factors at different life stages, hypothesizing that not only do these aspects change over time, but so does the architecture of their interrelationships.

To investigate this, we analyzed the relationships among 31 measures from the Human Connectome Project (HCP) in three age groups: Young (22-35), Middle-aged (36-59), and Older (60-100) adults. Data were examined from a network perspective, investigating their tendency to cluster into communities (Exploratory Graph Analysis, EGA) and assessing group-related differences in both global and local network properties (Network Comparison Test, NCT).

Our findings reveal substantial differences between age groups, supporting the view of aging as an adaptive reorganization process. Six distinct communities emerged in the Young group, while in the Middle-aged and Older groups, variables clustered into four, indicating a reduction in segregation. Additionally, older adults' networks showed lower global strength, indicating a shift towards more integrated but less differentiated associations.

These patterns align with the dedifferentiation theory, suggesting that aging involves a reduction in domain specificity as the boundaries between cognitive, psychological, and personality variables become less distinct, potentially increasing the support each function provides to the others.

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Ageing as a Process of Adaptation and Evolution

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No

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