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Individual differences in face cognition: Using ERPs to determine relationships between neurocognitive and behavioral indicators

Individual differences in perceiving, learning, and recognizing faces swiftly and accurately were shown on the behavioral and neural level but were rarely related to one another. On the behavioral level, three component abilities of face cognition were established: face perception, face memory, and the speed of face cognition. On the neurocognitive level, event-related brain potentials (ERPs) were used to examine the neurocognitive underpinnings of individual differences in face cognition by determining relationships between neural processing of faces and face cognition abilities. P100, N170, the so called difference due to memory (Dm) as well as early and late repetition effects (ERE and LRE) were measured in 85 participants in addition to face cognition abilities. ERP components showed high psychometric quality, and were thus used in structural equation models to investigate their contribution to the component abilities of face cognition. In contrast to processes of early vision (P100), the neural effort of structural face encoding (N170 amplitude), and memory encoding of faces (Dm), individual differences in the time course of structural encoding of a face (N170 latency), the re-activation of both stored facial structures (ERE) and person-related knowledge (LRE) accounted for variance in face cognition performance. Thus, face-selective regions in the fusiform gyrus together with temporal brain areas seem to play an important role for normal variations in face cognition. The obtained relationships however were small to moderate indicating that the network of mental functions interacting to successfully perceive, learn, and recognize faces can not be reduced to a few neural sub-processes.