



Ruprecht-Karls-Universität Heidelberg
Medizinische Fakultät Mannheim
Dissertations-Kurzfassung

Hippocampal involvement in configural processing and contingency awareness during contextual fear conditioning

Autor: Christian Bäuchl
Institut / Klinik: Zentralinstitut für Seelische Gesundheit Mannheim (ZI)
Doktormutter: Prof. Dr. H. Flor

The present dissertation focused on the examination of two processes during differential contextual fear conditioning which are believed to be hippocampus-dependent: configural context processing and contingency awareness.

The aim of first study was to develop and test an experimental paradigm that necessitates configural context processing during contextual fear conditioning. To this end two context-picture stimuli were created that contain the same visual elements (depiction of a living room) but with different spatial arrangements of a subset of these elements in both contexts. In a sample of 15 young healthy controls we showed that differential skin conductance responses (SCR) were higher for the fear associated relative to the safe context after one third of the experiment and that subjects engaged insula, inferior frontal gyrus (IFG), middle frontal gyrus (MFG), superior medial gyrus (SMG), inferior parietal lobule (IPL), hippocampus and amygdala during contextual fear learning. A psychophysiological interaction (PPI) analysis revealed functional connections of the posterior hippocampus to posterior cingulate cortex and superior parietal lobule and functional connections of the anterior hippocampus with amygdala and postcentral gyrus.

The second study used the same paradigm to investigate the role of contingency awareness on a hemodynamic, autonomic and behavioral level in a sample of 96 healthy young adults. Based on post-conditioning ratings subjects were assigned to a contingency aware ($n = 41$) and a contingency unaware ($n = 55$) group and both groups were compared statistically. Contingency aware subjects had stronger brain activity in insula, IFG, IPL, SMG, MFG and thalamus than contingency unaware subjects. Activity in the hippocampus was only significantly pronounced in the aware group but did not differ significantly between groups. Awareness was also associated with functional connections between hippocampus and dorsal anterior cingulate cortex, differential SCRs for the fear associated context and better performance in tests of visual and working memory.

These two studies underline the importance of the hippocampus for configural processing and contingency awareness during contextual fear conditioning