

COGNITIVE COPING STYLE MODULATES NEURAL RESPONSES TO EMOTIONAL FACES – A 3T FMRI STUDY

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Introduction: Repression designates coping strategies that aim to shield the organism from distressing stimuli by disregarding their aversive characteristics. In contrast, sensitization comprises coping strategies employed to reduce situational uncertainty, e.g. analyzing the environment. fMRI was used to study neural correlates of coping styles during the perception of threatening and non-threatening socially relevant information.

Methods: Pictures of human faces bearing fearful (ambiguously threatening), angry (unambiguously threatening), happy (non-threatening) and neutral expressions were presented masked and unmasked.

Two groups of subjects were examined who were defined as consistent repressors vs. consistent sensitizers with the Mainz Coping Inventory (MCI) (1).

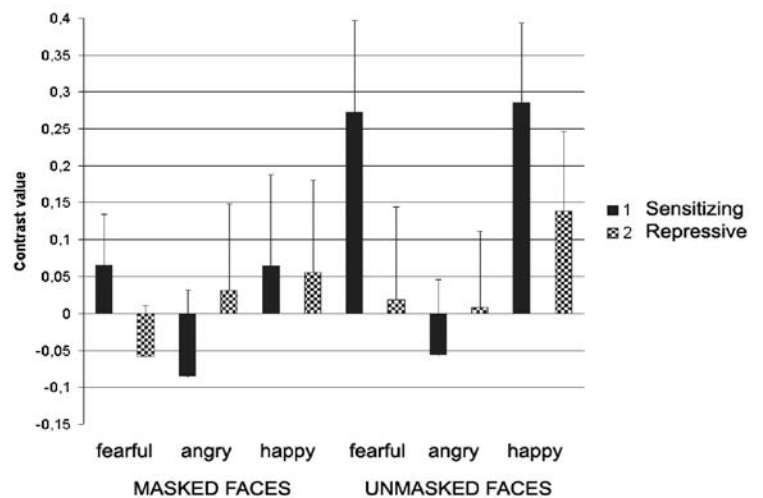
20 healthy, right-handed volunteers (10 m, 10 f) were selected from a sample of 150 students as consistent repressors and consistent sensitizer, resp., based on their scores on the MCI, and examined with fMRI at 3 T (Gyrosan Intera 3.0T, Philips, NL).

Facial stimuli consisted of gray-scale normalized fearful, angry, happy, and neutral expressions of ten individuals (2). They were projected with an MR compatible beamer system on a screen at the rear of the scanner (ERTS software (3); beamer system, Covilex, Magdeburg, GER). Faces were presented in alternating epochs as masked (33 ms emotional faces followed by 467 ms neutral expression, below the threshold of conscious awareness) or unmasked faces, followed by a no-face control stimulus. Order of epochs were counterbalanced across subjects

In addition to T1w anatomical data, functional data were acquired with a multi slice single shot EPI sequence covering 25 axial slices with voxels of 1.8 x 1.8 x 3.5 mm edge length, TR = 3 s, TE = 30 ms. For normalization, the whole brain was measured with 43 slices with identical contrast parameters. Functional imaging data were motion corrected, spatially normalized to standard MNI space, and smoothed, using SPM2. The general linear model was used to contrast emotional faces (angry, sad, and happy) with the neutral face condition. Voxel values of regions of interest were extracted, summarized by mean and tested among the different conditions using the MarsBaR toolbox (4).

Results: Sensitizers tended to exhibit stronger neural responses in the amygdala to unmasked fearful faces compared to repressors. Overall, repressors were cortically more responsive to fearful (ambiguously threatening) and happy (non-threatening) facial expressions than sensitizers, whereas sensitizers presented an enhanced responsivity to angry faces in several prefrontal areas, i.e. to unambiguously threatening expressions

Discussion: Results from time series analyses suggest that sensitizers could exhibit less top-down cortical regulation of the amygdala than repressors in the processing of fearful faces. An increased responsivity of the amygdala to ambiguously threatening stimuli may represent a biological determinant of sensitizers' feelings of uncertainty.



Between-group differences in amygdala response to facial emotions

References: (1) Krohne HW et al., Cogn Ther Res 24: 297-311 (2000); (2) Ekman P, Friesen WV, Pictures of facial affect, Palo Alto (1976); (3) Beringer J, Experimental Run Time System. V3.28 Users's Manual, Frankfurt, BeriSoft (1999); (4) Brett et al., NeuroImage 16: Abstr. 497 (2002)