Attachment model affects brain responses in areas related to empathy and maternal behaviour

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Theoretical background. During the young adulthood, elaborations the attachment experiences, mainly represented by early relationships with the principal caregivers, i.e. parents, organize the basis of *caregiving system*, the set of representations about nurturing behaviours, deriving from the integration of infantile experiences, their connected emotions and the individual attachment model. Within the Attachment theory **,** four attachment models have been identified in adults through the Adult Attachment Interview (AAI - Main, Goldwyn, 1997): secure, anxious-preoccupied, dismissive-avoidant, and fearful-avoidant. In particular, Securely attached people tend to have positive views of themselves, their partners and their relationships. They feel comfortable with intimacy and independence, balancing the two in their relationships. Dismissive-avoidant adults (second in frequency after Securely attached people) on the other hand desire a high level of independence and avoid attachment altogether. They tend to suppress and hide their feelings, dealing with rejection by distancing themselves from partners.

Attachment and maternal behaviour is known to be activated during the observation of babies (Konrad Lorenz, 1971). We therefore explored neural activity using fMRI in two groups with different Attachment models using as stimuli faces of babies with different facial expressions.

Method. Research involved 23 young-adult nulliparous females, divided in two groups according to their state of mind with respect to attachment Secure Free/Autonomous (n=11) and Dismissing (n=12). Subjects underwent fMRI, during which they were asked either to "imitate" or to "observe and empathize" with affective expressions (joy, distress and neutral) of unknown children. Neurobiological data was correlated with the scores of TAS-20 (Toronto Alexithymia Scale, Taylor et al., 1992, it measures the difficulti in identifying and in describing feelings) and of RF Scale (Reflective Function Scale, Fonagy et al., 1998, i.e. a competence which allows to ascribe others his own feelings and to interpret his internal states). Neuroimaging data were obtained on a 3 Tesla scanner (Magnetom Allegra, Siemens, Erlangen, Germany). For fMRI tasks, echo planar T2*-weighted imaging was used (TR = 2080 ms, TE = 30 ms, 32 axial slices, slice thickness = 2.5 mm, gap = 0, voxel size = 3 x 3 mm, flip angle = 70 deg, matrix size 64 x 64, FOV = 192 mm). For each run, 160 whole brain volumes were collected. Data were analyzed with SPM5 (Statistical Parametrical Mapping, http://www.fil.ion.ucl.ac.uk).
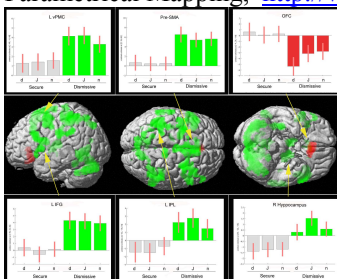

Fig.1

Results. In respect to Dismissing, Secure group reported higher levels of RF, and lower scores on TAS-20 (total, F1 and F2 scores). During "observation", fMRI evidenced an increased activation was observed in Dismissing Vs Secure subjects in several regions among which areas belonging to the Mirror Neuron System and the Limbic System; further, especially when empathizing with negative expressions, Dismissing subjects presented a decreased activation in perigenual Anterior Cingulate Cortex (pACC), a cerebral region involved in attachment and nurturing behaviours (see Fig. 1). Correlation analysis showed that, during the "observation" of emotional expressions, activity in the pACC was inversely correlated with activity in the Pre-SMA and directly with TAS-20 F2 scores (difficulty in identifying feelings) in Dismissing subjects.

Conclusions. These data show the presence of an overall increased brain reaction in Dismissive subjects to stimuli which activates attachment and maternal behaviour, which maybe the neural base of affective deregulation in dismissing subjects, due to the difficulty to regulate affective states (especially negative ones) and linked to infantile experiences of refusal towards attachment needs. It can be argued that defensive mechanisms of splitting and denial are used to escape from self-involving affective interactions, and to eliminate any negative affect.

Main M & Goldwyn R (1997) Adult Attachment Interview Scoring and Classification Systems (U.C. Berkeley).

Taylor GJ, Bagby RM, & Parker JD (1992) The Revised Toronto Alexithymia Scale: some reliability, validity, and normative data. Psychother Psychosom 57(1-2):34-41.

Fonagy P, Steele M, Steele H, Target M (1998) Reflective-Functioning Manual. Version 4.1 For Application to Adult Attachment Interviews.