Background

- Romantic relationships are the most central relationship for most adults with an important temporal duration in human life (Robles & Kiecolt-Glaser 2003). The consequences of marital conflict for society are relevant considering the impact of negative affect for the physical and mental health of each partner (SriWoo & Marks 2016), as well as for those directly involved in marital conflict such as children (El-Shalik et al. 2009).
- We aimed to investigate the neural basis of empathy as it occurs in real interpersonal contexts, specifically in couples’ relationships in an attempt to fill a gap in the literature where most studies rely on self-report measures or tasks where subjects are asked to empathize with fictional targets.
- At the pheripheral level conflict interpersonal interactions lead to an higher increase over baseline in psychophysiological responses such as heart rate, blood pressure and cortisol (Robles & Kiecolt-Glaser 2003). More than the level of autonomic arousal per se, the physiological synchrony between dyad members may be more relevant for interpersonal processes (e.g. Levenson & Gottman, 1983).
- At the central nervous system experiencing another person’s feelings recruits emotional brain circuits comprised by the anterior insula, amygdala and anterior cingulate cortex (Decety et al. 2012), whereas our ability to cognitively understand other’s feelings and thoughts recruits the medial prefrontal cortex, temporal parietal junction and posterior cingulate cortex (Krep et al. 2013). These regions belong to the Default Mode Network, a resting state networks, recruited when we think about mental states both our own and others.

Main Results and Conclusions

ANS Markers
- Significantly higher Heart Rate in the negative interaction (M = 82.72, SD = 10.27), than in the positive interaction (M = 80.89, SD = 9.16) (p = .001).
- Higher cortisol levels immediately after the negative interaction (M = 0.39, SD = 0.35), than after the positive interaction (M = 0.31, SD = 0.24), p = .001.
- Significantly higher eletodermal activity in the positive interaction (M = 4.10, SD = 3.02), than in the negative interaction (M = 3.15, SD = 2.58), p = .001.

SNC Markers
- Higher empathy scores were associated with higher functional connectivity of the DMN and an increased contribution of the medial prefrontal cortex (mPFC) to the DMN spatial mode.
- DCM revealed this association was mediated indirectly by the posterior cingulate cortex via the right inferior parietal lobule: for participants with higher scores in dyadic empathy, the PCC had a greater effect on bilateral IPL and IPL had a greater influence on mPFC in the right hemisphere.
- Areas of affective processing in left insula left superior temporal gyrus, right insula whereas more active during the self condition, whereas those involved in the cognitive representation of others like the fusiform gyrus and left supra marginal gyrus were more active during the other condition.

Methods and research design

Participants

N=72 (36 couples) in a monogamous relationship with duration > 1 year

Autonomic Nervous System and Neuroendocrin Measures

Central Nervous System – fMRI acquisition

Functional images acquired in a clinical approved 3T MRI scanner (Siemens Magnetom Tim Trio, Erlangen, German)
1) Structural MPRAGE acquisition;
2) 9’m Resting state acquisition;
3) Social fMRI Task

Self Condition

Other Condition

![Image of neuroimaging results showing brain activity](image-url)