

The neuropsychophysiology basis of empathy: The role of neuroendocrine; autonomic and central nervous system variables

Results:

The defined objectives for this project were: (i) to develop and validate a scale of empathy to assess empathy skills, (ii) assess the psychophysiological, neuroendocrine and neuroimaging correlates related to different empathic responses, and (iii) evaluate different category of stimuli and psychophysiological measures related to emotional modulation. Initially, a large dataset of empathy-eliciting vignettes were developed and validated in order to allow the assessment of the empathy responding ability. This database for research and clinical application is based on three level of empathic response, ranging from less to more empathic. At the peripheral level, we showed that the highest level of empathic response were accompanied by changes in the heart rate, suggesting that the cardiac response is a good candidate for a biomarker of complex human process, such as the empathic response. At the neuroimaging level, we found that more empathic responses were associated with sustained activation of the default mode network, which has been associated with emotional and cognitive domains of empathy. Additionally, our results also suggest that the medial prefrontal cortex seems to execute a reciprocal modulation of cognitive and emotional regulating functions during an empathic experience. In order to address others of our objectives, results showed that the cognitive component of the event-related potential could not function as a psychophysiological measure of emotional modulation, while the skin conductance and cardiac measures reflect similar processes of sustained attention, representing a good predictor of the attentional resources allocated to demanding tasks.

Published Work:

Oliveira-Silva, P., Maia, L., Coutinho, J., Frank, B., Soares, J. M., Sampaio, A., & Gonçalves, Ó. F. (submitted). Empathy by default: correlates in the brain at rest.

Oliveira-Silva, P., Maia, L., Coutinho, J., Frank, B., Soares, J. M., Sampaio, A., & Gonçalves, Ó. F. (submitted). Nodes of the default mode network implicated in the quality of empathic responses.

Leite, J., Carvalho, S., Galdo-Alvarez, S., Alves, J., Sampaio, A., & Gonçalves Ó. F. (2012). Affective picture modulation: valence, arousal, attention allocation and motivational significance. *International Journal of Psychophysiology*. doi:10.1016/j.ijpsycho.2011.12.005

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Carvalho, S., Leite, J., Galdo-Álvarez S., & Gonçalves, Ó. F. (2011). Psychophysiological Correlates of Sexually and Non-Sexually Motivated Attention to Film Clips in a Workload Task. *PLoS ONE* 6(12): e29530. doi:10.1371/journal.pone.0029530

Oliveira-Silva, C. P., & Gonçalves, Ó. F. (2011). Responding empathically: a question of heart, not a question of skin. *Applied Psychophysiology and Biofeedback*, 36, 201-207. doi: 10.1007/s10484-011-9161-2

Areas of interest:

Psychophysiology, empathy, affective modulation, emotional regulation.

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