**Operational and strategic mental models reveal different brain activation**

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**Introduction:** According to Bressan [1], information from a workplace is received, processed and used differently by people with distinct mental models, which also influences decision making. In this sense, mental models can be divided into: 'operational' - those who receive information and make decisions based in a concrete plan, and 'strategic' - who organize information, identifying new possibilities to support decisions. Yet, there are no references of evidence concerning this classification and the brain response. Within the field of Neuroscience applied to Management, functional Magnetic Resonance Imaging (fMRI) laid the foundation to differentiate entrepreneur’s behavior [2], as well as to understand brain activation in task-based studies [3]. In this research, we applied a psychometric test called Raven, frequently used to estimate IQ, to compare the two groups (operational and strategic) during an fMRI acquisition.

**Methods:** fMRI images (TR=2s, voxel=3x3x3 mm3, FOV=240x240x117mm3) of 25 healthy volunteers classified as operational (na=15) and strategic (nb=10) were acquired on a 3T MR (Philips Achieva) coupled to InVivo Eloquence stimulation equipment. The MRI protocol was complemented by an anatomical sequence MPRAGE (3D high resolution image, weighted by T1), with a total duration of 6 minutes for functional corregistration. During the exam, volunteers were given 20s to mentally solve one of Raven’s matrix. Raven's progressive matrix test consists of presenting an array of figures where there is a logical pattern between the figures. One of the casts of the matrix is left blank and the examinee is encouraged to fill the box with the correct figure according to his reasoning.

**Results:** According to the *t* test, areas of activation that present significant differences (p<0.05) between the groups were: left posterior cingulate gyrus (13.9%), thalamus (9.3%) and left hippocampus (3.7%). Raven responses did not present significant difference between groups (p<0.05).

**Discussion:** Imaging studies indicate a prominent role for the posterior cingulate cortex in pain and episodic memory retrieval [[4]](https://en.wikipedia.org/wiki/Posterior_cingulate#cite_note-2), and thalamus as a hub of information, establishing the connection between different subcortical areas and the [cerebral cortex](https://en.wikipedia.org/wiki/Cerebral_cortex). For the visual system, for example, inputs from the [retina](https://en.wikipedia.org/wiki/Retina) are sent to the [lateral geniculate nucleus](https://en.wikipedia.org/wiki/Lateral_geniculate_nucleus) of the thalamus, which in turn projects to the [visual cortex](https://en.wikipedia.org/wiki/Visual_cortex) in the [occipital lobe](https://en.wikipedia.org/wiki/Occipital_lobe). The thalamus is functionally connected to the [hippocampus](https://en.wikipedia.org/wiki/Hippocampus) as part of the extended hippocampal system at the thalamic anterior nuclei [5] with respect to spatial memory and spatial sensory datum they are crucial for human episodic memory and rodent event memory. These findings indicate a difference in activation patterns related to memory retrieval between operational and strategic mental models. **Conclusion:** This work provides evidence of preliminary differences in brain activation between ‘operational’ and ‘strategic’ while making decisions during a test.

**References:** [1] Bressan et al., Revista Psicologia: Organizações e Trabalho, 13(3): 309-324, 2013. [2] Laureiro-Martinez D et al., Strategic Management Journal, 2014. [3] Desalvo MN et al., Brain and Behaviour 4(6): 877–885, 2014. [5] Doll et al., Frontiers in Human Neuroscience 7(October): 1–13, 2013. [4]   Nielsen FA et al NeuroImage. 27 (3): 520–532, 2005. [5] Aggleton JP et al, Behavioral and Brain Sciences. 22 (3): 425–44, 1999.