

Conscious will and voluntary actions: is there a last ventriloquist in the brain?

Results:

A fundamental topic in neuroscience is the nature of “free will” and how it is derived from neurophysiological processes. In this study, we investigate decision-making by examining the differences in brain activity underlying free and forced behaviours using magnetoencephalographic (MEG) recordings from subjects performing button pressing tasks that require them to exercise their choice by pushing one of two buttons in response to various cuing methods. The greatest ability to discriminate (>80% classification accuracy) free and forced trials came from MEG sensors located over the primary sensory cortices specific for the modality used to cue each trial: either visual (occipital) or auditory (left temporal), and minor non-localized differences for trials that were pre-specified. These findings suggest that primary sensory areas play a crucial part of the information processing steps organizing the production of free and forced behaviours, and, contrary to the current conceptualisation, that fronto-parietal processes may not be the principal determinants of these actions.

Published Works:

Dominguez, L. G., Kostecki, W., Wennberg, R., & Perez-Velazquez, J. (2011). Distinct dynamical patterns that distinguish willed and forced actions. *Cognitive Neurodynamics*, 5(1), 67-76. doi: 10.1007/s11571-010-9140-y

Kostecki, W., Dominguez, L. G., & Perez-Velazquez, J. (2011). Single trial classification of magnetoencephalographic recordings using Granger causality. *Journal of Neuroscience Methods*, 199(2), 183-191. doi: 10.1016/j.jneumeth.2011.04.032

Kostecki, W., Mei, Y., Dominguez L. G., & Pérez Velázquez, J. L. (2012). Patterns of brain activity distinguishing free and forced actions: contribution from sensory cortices. *Frontiers in Integrative Neuroscience*, 6: 84, 1-7. doi: 10.3389/fnint.2012.00084

Pérez Velázquez, J. L. (2012). The biophysical bases of will-less behaviors. *Frontiers in Integrative Neuroscience*, 6: 98. doi: 10.3389/fnint.2012.00098

Areas of interest:

Voluntary actions; brain coordinated activity; Granger causality

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Researchers Contacts:

Neuroscience and Mental Health Program
Hospital for Sick Children
555 University Avenue
Toronto, ON M5G1X8, Canada

Tel: 416-8137715

Email: jpgv@sickkids.ca; jpgvjjpgv@gmail.com