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Emotional and action verbs influence motor response in Parkinson's disease

Giovanna Lagravinese[1,2], M.C. Silvestri[3], E. Leveraro[1], A. Botta[2], M. Putzolu[1], C. Cosentino[1], G. Bonassi[4], S. Mezzarobba[1], E. Pelosin[1,2], C.M. Vicario[3], L. Avanzino[2,5]

[1]Department of Neuroscience, Rehabilitation, Ophthalmology, Genetics, Maternal and Child Health, University of Genoa, Genoa, Italy
[2]Ospedale Policlinico San Martino, IRCCS, Genoa, Italy
[3]Dipartimento di Scienze Cognitive, Psicologiche, Pedagogiche e degli Studi Culturali (COSPECS), Università di Messina, Messina, Italy
[4]ASL4, Chiavarese, S.C. Physical Medicine and Rehabilitation, Rapallo/ Sestri Levante, Italy
[5]Department of Experimental Medicine, Section of Human Physiology, University of Genoa, Genoa, Italy

Background: Emotions influence motor system and the ability to react to different stimuli. Furthermore, it is known that motor resonance mechanisms are elicited by stimuli related to actions. Parkinson's disease (PD), besides manifesting with cardinal motor symptoms, presents cognitive and emotional impairment, including difficulties in recognizing and processing emotions. We hypothesise that motor response in PD may be influenced by the emotional or action content of the sentences.

Aim: To investigate whether sentences containing action or non-action verbs with or without emotional content could affect motor performance, in terms of accuracy and reaction time (RT), in PD patients.

Methods: 48 PD patients (HY 1-2) were recruited to perform a go no-go task. They were asked to recognize if the sentences appearing on a screen had an emotional content and press a button, according to the instructions given (press in response to an emotional sentence or press in response to a neutral sentence). Sentences were furtherly divided according to the type of verb (action or no-action).

Result: Statistical analysis showed that patients were more accurate in recognizing the emotional content for "action" than for "non action" sentences when the action had a positive emotional content ($p<0.001$) or neutral ($p<0.001$). Furthermore, patients responded faster when sentences had a positive valence, both when sentences had an "action" ($p=0.000$) or a "no-action" ($p=0.000$) verb.

Discussion: "Action" verbs in sentences promoted accuracy in patients' responses, likely due to embodiment mechanisms. Interestingly, negative emotional valence seems to disrupt this embodiment gain, present only in positive and neutral sentences. Furthermore, positive emotions seem to overwhelm motor resonance processes in terms of improving motor response velocity (RT) independently by "action" or "no-action" contents, differently to neutral stimuli.

Conclusion: Results indicate that basal ganglia impairments, with motor and non motor aspects in PD, are accompanied by selective modulation in processing action-related verbs with an emotional content.