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YOUR HAND IS MY HAND! BIMANUAL COUPLING EFFECT IN A SOMATOPARAPHRENIC PATIENT Francesca Garbarini[1], L. Pia[1], A. Piedimonte[1], M. Rabuffetti[2], P. Gindri[3], A. Berti[1]; [1]University of Turin, [2]Foundation Don Carlo Gnocchi IRCCS, Milan, [3]San Camillo Hospital, Turin – When people are required to draw circles with one hand while drawing lines with the other, both the trajectories tend to become ovals (Franz, 2003). Recently, we showed (Garbarini et al. under review) that these effects occur in both actual bimanual movements and when an active limb movement is combined with an illusory limb movement (i.e., anosognosia for hemiplegia). Those results would support the view that coupling effects arises from central signals (e.g., sensory predictions) rather than on actual feedbacks (Franz, 2003). Here we examine whether coupling effects are present also when an active movement is combined with a movement performed by another person's hand, misidentified as one's own hand. One right-brain-damaged-patients affected by left hemiplegia and misidentifications of the experimenter's hand as his own hand (somatoparaphrenia), five hemiplegic patients and ten healthy subjects were administered a bimanual circle-line drawing task. Participants were asked to draw lines with the right hand (baseline) and a) to draw circles with their own left hand b); to draw circles with their own left hand passively moved; c) to observe the examiner drew circle with his left hand positioned in a compatible orientation with respect to the subject's body. Results showed that, in the crucial c) condition, only in the patient who misidentified the experimenter's hand as his own, the lines produced with the right hand were significantly ovalized in respect to the baseline (p = 0.0001). These results give interesting new hints regarding the link between body ownership and sense of agency.

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FUNCTIONAL ROLE OF PRIMARY MOTOR CORTEX IN MOTOR IMAGERY MEASURED WITH FMRI AND MEG Hana Burianová[1], Paul Sowman[1], Lars Marstaller[1], Graciela Tesan[1], Anina Rich[1], Mark Williams[1], Greg Savage[1], Blake Johnson[1]; [1]Macquarie University, Sydney, Australia – Motor imagery (MI) is an internal rehearsal of a movement without any overt physical action. Neuroimaging studies have demonstrated that the neural mechanisms of MI substantially overlap with the mechanisms of motor execution (ME). Surprisingly, however, the role of primary motor cortex (PMC) remains controversial, as many studies have failed to show consistent activations of PMC during MI, a variability that may be largely due to differences in MI tasks. The objectives of this study were to (1) design a novel task that reliably invokes MI; and (2) compare PMC activations measured with functional magnetic resonance imaging (fMRI) and magnetoencephalography (MEG). Participants heard a sequence of auditory cues corresponding to the digits of the right or left hand and responded by raising or lowering the relevant digits, or imagining such movements. At the end of each cue sequence, the participants decided whether their own digit configuration was the same or different from a picture of a hand displayed on the screen. In all participants, fMRI analysis showed PMC activation during MI and ME, and MEG analysis showed significant beta-band desynchronization in the same PMC region at a latency of about 500ms from movement or imagery onset. These results demonstrate that our MI task robustly and reliably activated PMC. This paradigm may thus prove useful in clarifying the precise role of PMC in MI, as well as in examining the functional status of PMC in patients with motor disorders.

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FAVOURITISM IN THE SENSORIMOTOR SYSTEM: HISTORY OF INTERACTION MODULATES SIMULATION OF AN ANTICIPATED ACTION Dimitrios Kourtis[1], Natalie Sebanz[1], Günther Knoblich[2]; [1]Donders Institute for Brain, Cognition, and Behaviour, Radboud University Netherlands, [2]Central European University, Budapest, Hungary – The ability to anticipate others' actions is crucial for social interaction. We have recently showed that one simulates in advance an action performed by an interaction partner and practically ignores the same action performed by a person that (s)he never interacts with (Kourtis et. al., Biology Letters, 2010). In the present study we explored the effects of interaction history on action simulation. The setup comprised of an EEG participant, an interaction partner and an "outsider" (i.e. a person only performing individual actions). The task of the EEG participant was to plan and perform an individual action (lifting an object) or a joint action (giving or receiving an object) or to anticipate to observe the same individual action performed by either the partner or the "outsider". The EEG participant had the role of the giver or the receiver in the 1st half of the experiment and the opposite role in the 2nd half; moreover, the partner in one half became the "outsider" in the other half (and vice versa). We recorded stronger mu rhythm (8-12 Hz) decrease over sensorimotor cortex before and during the early stages of the partner's (individual) action in the 1st half of the experiment, but no difference between the partner's and "outsider's" actions in the 2nd half. These findings strengthen the notion that one's sensorimotor system favours the actions of an interaction partner over the same actions performed by an "outsider"; however, this favouritism disappears when the outsider has interacted with the observer in the past.

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INTERLIMB COUPLING DUE TO ILLUSORY MOVEMENTS: EVIDENCE FROM ANOSOGNOSIA FOR HEMIPLEGIA Lorenzo Pia[1], Francesca Garbarini[1], Lucia Spinazzola[2], Maurizio Ferrarin[3], Marco Rabuffetti[3], Alessandro Piedimonte[1], Jon Driver[4], Anna Berti[1]; [1]Psychology Department & Neuroscience Institute of Turin (NIT), Turin, [2]Hospital Company 'S. Antonio Abate', Gallarate (Milan), [3]Bioengeneering Center, Foundation 'Don Carlo Gnocchi' IRCCS, Milan, [4]Institute of Cognitive Neuroscience, University College of London, London – In anosognosia for hemiplegia, patients affected by a complete paresis of the side of the body opposite to the brain lesion may claim having performed willed actions with the paralyzed limb despite unambiguous evidence to the contrary. Does this false belief of being able to move reflects the functioning of the mechanisms that govern normal motor performance? By examining in anosognosic patients the temporal coupling effects known to exist during bimanual movements in normal subjects, we demonstrated that the illusory movements of the plegic arm impose to the healthy arm the same constraints that emerge during actual movements. Our findings strongly suggest that the same neurocognitive processes subserving movement execution underpin the 'nonveridical' experience of willed movements in anosognosic patients. Additionally, these data support the view that coupling effects depend on information already within the brain (i.e., a motor representation), rather than on on-line information from the periphery.

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NEURAL REFLECTIONS OF STATISTICAL STRUCTURE IN OBSERVED ACTIONS Christiane Ahlheim[1,2], Waltraud Stadler[3,4], Ricarda I. Schubotz[1,2]; [1]Max-Planck-Institute for Neurological Research, [2]Westfälische Wilhelms-Universität Münster, [3]Max-Planck-Institute for Human Cognitive and Brain Sciences, [4]Technische Universität München – The statistical structure of our environment can be used to generate predictions of its future states. The present functional magnetic resonance imaging (fMRI) study aimed at exploring the neural reflections of humans' sensitivity to statistical structure in actions. We developed an arbitrary but naturalistic action syntax. It consisted of particular transition probabilities (0.25, 0.5, 0.75 and 1.0) between six different elements of a construction toy. This setup allowed comparison of the neural effects of observing transitions that did to a larger (probabilities 0.75 and 1.0), or smaller extend (probability of 0.25) accord to the canonical model. On two successive training days, 15 subjects implicitly learnt the syntax by watching clips of action sequences. During the fMRI on the third day they were exposed to the same sequences. Activity increased at points of transitions (grasping new elements versus manipulation of elements) in the posterior middle temporal gyrus, anterior intraparietal sulcus and ventral premotor cortex, suggesting an intensified search for memorized action steps or an intensified matching between memorized and perceived manipulations at the beginning of a new action step. The parametric effect of transition