Poster Abstracts

Perceptual deficits of action are associated with impaired tool-use: evidence from patients with apraxia.

Carys Evans[1], Larry Taylor[1], Martin Edwards[2], & Magdalena Ietswaart[1]

[1]Department of Psychology, Faculty of Health and Life Sciences, Northumbria University, Newcastle upon Tyne;
[2]Institute of Research in the Psychological Sciences, Université catholique de Louvain, Belgium.

Patients suffering from apraxia present impairments in tool-use that have been attributed to deficits in motor imagery. Specifically, apraxic patients can accurately recognise, name an object, and identify its function, such as scissors to "cut", but are impaired when demonstrating the use of the object. These impairments have been attributed to an inability to generate and maintain an internal motor representation necessary to act upon the object appropriately for use. Apraxic patients may therefore provide a window into the behavioural consequences of impaired motor imagery. The current study aimed to make a link between the integrity of motor imagery and the impaired behaviours in these patients by examining left hemisphere stroke patients' action understanding in greater depth. Using a series of perceptual matching tasks, semantic, functional and manipulation knowledge of objects was assessed. A critical distinction was made between 'action representations' manifest in the understanding of how an object interacts with another object, and 'motor representations' or tool manipulation knowledge of how the hand handles an object. Based on two case studies (A.A and M.S) results suggest that ideomotor apraxics, presenting impaired pantomime of object use and intact actual use, maintain semantic and function knowledge, but display diminished manipulation knowledge of objects attributable to impaired internal motor representations. Ideational apraxics, presenting with impairments in actual use of objects, however maintain semantic knowledge but present both functional and manipulation deficits in tool-use perception. Results indicate that intact internal representations of action are necessary to appropriately sequence movements to achieve appropriate object use.

Evidence for the involvement of action simulation in the perception of 3D space.

Grade Stéphane[1], Pesenti Mauro[1] & Martin Gareth Edwards[1]

[1]Institut de Recherche en Sciences Psychologiques (IPSY), Centre de Neurosciences Système et Cognition (NeuroCS), Université Catholique de Louvain (UCL), Louvain-la-Neuve (Belgium).

Recently, Coello and Delevoye-Turrell (2007) proposed that three-dimensional space perception is derived from cognitive representations of the body and action simulation. Support comes from experiments showing moderated perception from manipulations of body state or tool use (Proffitt, 2006; Witt, Proffitt & Epstein, 2005; Witt & Proffitt, 2008) and primary motor cortex stimulation (Coello et al. 2008). In the study presented here, first

we determined whether there were differences in the type of space perception measured (e.g., object reachability, distance magnitude estimation between the self and an object, and distance magnitude estimation between two objects). Secondly, we determined whether dual tasks of action moderated the perception measures relative to a baseline. We predicted that if action simulation is necessary for the perception of space, then performing an action at the same time might moderate the participant's perceptual responses. The results showed that the action dual-tasks caused increased reaction-time responses for the perception of object reachability and the distance magnitude estimation between the self and an object, but had no effect on the distance magnitude estimation between two objects. These findings confirm the existing literature by showing that cognitive action simulation processes appear to be necessary for space perception.

Physiological changes in response to apnea impact the timing of motor imagery

Franck Di Rienzo[1]; Nady Hoyek[1]; Christian Collet[1] & Aymeric Guillot[1,2]

[1]CRIS (EA 647), Mental and Motor Performance, University Claude Bernard Lyon 1, Villeurbanne Cedex, F-69100, France.
[2]Institut Universitaire de France, Paris, F-75000 France.

Reduced physiological arousal in response to breath-holding affects internal clock processes, leading to underestimation of the time spent under apnea (Jamin et al., 2004). We investigated whether reduced physiological arousal during static apnea was likely to affect motor imagery timing. Fourteen national breath-holding athletes mentally and physically performed two 15m swimming tasks of identical durations. The two sequences were performed in a counterbalanced order, the first while breathing normally using a scuba, and the second under apnea. We assessed MI timing immediately after completion of the corresponding actual task. Athletes performed MI with and without holding breath, out of water. Without holding breath, MI durations (26.1s. ±8.22) were significantly shorter than actual times (29.7s. ±7.6). Apnea increased MI times by 2.6s. ±3.73. In response to breath-holding during MI, heart rate decrease correlated with MI times increase. Participants achieved temporal congruence between MI and PP only when performing, under apnea, MI of the apnea swimming task. Lickert data further indicated greater MI ease in this condition. We suggest that changes in physiological arousal affect the timing of motor representation through both its effects on internal clock processes and congruency between past motor experiences and the current state of the motor system.

The effect of imagery speed on performance of six tests of physical fitness

Chris Lynch[1] & Caroline Wakefield[1]

[1]Department of Psychology, Liverpool Hope University, United Kingdom

Imagery is arguably the most widely used psychological skill. However, despite increasing in popularity (e.g., Calmels, Lopez, Holmes & Naman, 2006) research is relatively scant in the area of imagery timing; a component of the PETTLEP model (Holmes & Collins, 2001). Additionally, imagery research to date has been largely focused on skill development, as opposed to the components of fitness involving cognitive based tasks. Therefore, further

research is needed, both on the timing of imagery and the range of skills with which it is employed. Therefore, this study aimed to test the timing element of the PETTLEP model (Holmes & Collins, 2001) on performance of fitness indicators. Twenty-eight participants were randomly assigned to 1 of 4 conditions: real-time (imagery) video playback, slow motion (imagery) video playback, increased speed (imagery) video playback and control group. Pre and post-tests consisted of performance scores of six different tests widely used as indicators of fitness throughout sport testing and rehabilitation (Sit & reach test, 20yard shuttle test, 30second continuous lateral hop, vertical jump, hand grip test and medicine ball extension). Participants completed the imagery interventions once per week for four weeks, with the speed of the intervention controlled by the use of video. The control group conducted a reading task for the same duration. A repeated measures ANOVA revealed that in 4 of the 6 tests (20yard shuttle, lateral hop, vertical jump and hand grip test) all of the groups employing imagery interventions increased from pre-test to post-test when compared to control performance. Furthermore, in 3 of the 6 tests slow motion and real time groups performed better than that of the increased speed group. On the vertical jump test the increased speed group performed better than the other imagery intervention groups and for the lateral hop test no interaction effect was found. Results of the study reiterate the effectiveness of imagery as an intervention, supporting the guidance provided by the PETTLEP model. Furthermore, imagery was shown to be effective in enhancing fitness test performance scores. The potential benefit of slow motion imagery and increased speed imagery is emphasised, but this appears to be task-specific. The results of the current study provide inconclusive findings related to the timing element of the PETTLEP approach to motor imagery, however, it is suggested that slow motion and real-time imagery use of video playback are workable imagery characteristics.

Selective attention modulates coding of biological and non-biological motion during imitation learning

Hayes, S.J. [1], Dutoy, C.A.[1], Elliott, D. [1, 2], Gowen. E. [3], Bennett, S.J.[1]

[1]Liverpool John Moores University, UK; [2]McMaster, Canada; [3]The University of Manchester, UK

The acquisition of new motor behaviours often requires a person to copy a movement that is not represented in their own behavioural repertoire. This process is known as imitation learning and depending on environmental context and nature of the observed stimulus, lower-level (sensorimotor) and top-down (attention) processes are engaged. Here, we examined whether selective attention and end-state goals modulate lower-level processes that code biological (*unnatural* or *natural* velocity) and non-biological (*constant* velocity) motion. Thirty-six participants were assigned to a *general-attention* or *specific-attention* group. During 84 trials each group imitated a non-human agent (white dot) in a goal-directed (moved to a *target*) or goal-less (moved to *no-target*) context. The motion trajectory profile of the agent was manipulated across trials to display *natural, unnatural* or *constant* velocity. The *general-attention* group was instructed to merely copy the agent, whereas the *specific-attention* group was instructed to imitate the exact motion trajectory profile of the agent. The performance data showed the *general-attention* group, irrespective of motion trajectory and target presence, was more accurate ($p<0.05$) at replicating movement time than the *specific-attention* group. The kinematic data showed that both

groups replicated the different motion trajectory profiles. Importantly, a Group x Motion interaction ($p<0.05$) for the kinematic data indicated the *specific-attention* group was more accurate at replicating the *natural* and *constant* velocity motion trajectory profiles than the *general-attention* group. The findings show that biological (*unnatural* velocity) and non-biological (*constant* velocity) motion are coded during complex imitation. Moreover, the ability to imitate movement time and movement kinematics was modulated differentially as a function of attention. Top-down factors (attention) have previously been shown to modulate lower-level visuo-motor processes in automatic imitation, but the current data set are the first to show this interaction during complex imitation.

Motor imagery ability in young people

Rachel Cope[1], Paul Holmes[1]

[1]Institute for Performance Research, MMU, United Kingdom;

Imagery ability has received relatively little coverage within imagery literature. Given that the mechanisms underlying imagery ability are refined during adolescence; young people were of particular interest. There have been relatively few large-scale studies; including among UK populations. It was hypothesized that there would be no significant difference in imagery vividness between males and females adolescents and that young people would find an internal visual imagery perspective most vivid. A total of 776 pupils aged 13 to 18 years from schools across the North West and Midlands completed a modified, paper-based or online version of the Vividness of Movement Imagery Questionnaire-2. The study did not support the first hypothesis that there would be no significant difference in imagery ability between the sexes. There was a weak but significant difference with males scoring higher than females for all three imagery conditions. This may be attributed to pubescent changes affecting areas of the brain activated during imagery. The study supported the second hypothesis that imagery would be more vivid from an internal visual perspective. It revealed interesting findings for practitioners who work with young people to refine motor or other skills benefiting from imagery.

Hemineglect: creation of a mirror neuron rehabilitation based on "The light House Strategy" and improvement of a collision and deviation diagnosis method

Catherine Noiset[1]

[1]Institut de Recherche en Sciences Psychologiques (IPSY), Centre de Neurosciences Système et Cognition (NeuroCS), Université Catholique de Louvain (UCL), Louvain-la-Neuve (Belgium)

Influence of mirror neuron rehabilitation on hemiparetic patients

Charlotte Verfaille[1]

[1]Institut de Recherche en Sciences Psychologiques (IPSY), Centre de Neurosciences Système et Cognition (NeuroCS), Université Catholique de Louvain (UCL), Louvain-la-Neuve (Belgium)