

Final Report

The Development of Body Representations over the Lifespan

29-30 March 2010

Principle Applicant: Dr. Ellen Poliakoff (Manchester)

Organising Committee Members: Dr. Andy Bremner (Goldsmiths), Dr. Nick Davis (Bangor) and Dr. Nicholas P. Holmes (Reading)

Summary

The Body Representation Workshop was held at Goldsmith's University London, on Monday 29th and Tuesday 30th March, 2010, and was a great success. The theme of the meeting was "The development of body representations over the lifespan", and we were very pleased to have attracted a number of internationally-recognised experts, both to give invited talks, and to attend. There were 71 attendees, producing a lively and dynamic workshop.

Programme and speakers

The programme of speakers filled the two days of the meeting. We have attached a copy of the timetable to this report. The keynote speaker, Professor Philippe Rochat (Emory University, Atlanta), opened the meeting with an hour long presentation entitled 'From an embodied to a public sense of self in early development' providing a broad theoretical and empirical introduction to the development of the self and an awareness of one's body.

We arranged for the other invited speakers to speak for 40 minutes each, including their responses to questions. Professor Brigitte Roeder (University of Hamburg) spoke about visual-tactile interactions, and in particular the development of tactile reference frames, from children until old age. Dr. Marko Nardini (University College, London) presented evidence, obtained from some exciting and sophisticated new techniques, that children may keep sensory estimates (e.g., texture, disparity) separate in order to allow efficient sensory recalibration as their body size changes. Dr. Sabine Schaefer (Max Planck Institute, Berlin) linked cognitive and motor functioning, talking about the performance of motor and cognitive tasks simultaneously. In particular, she focussed on how dual-task costs can be greater in old age. She also discussed exercise interventions for cognition in old age and how cognition in children might also benefit from such interventions. Finally, Professor Virginia Slaughter (University of Queensland, Australia) presented a series of studies investigating when infants develop the ability to recognise the human body, when presented at all levels of abstraction, from stick figures to full 3D moving bodies. The ability to recognise the body appears to emerge later than the recognition of faces.

We made an open call for research talks: 3 speakers chose to give a longer (40 minute) talk, and 15 researchers gave shorter (20 minute) talks. These research talks covered a broad range of topics, including development (touch, perceiving bodies, linguistic aspects of bodily processing), clinical questions (anorexia, medically unexplained symptoms, Parkinson's disease, anosognosia), and more general aspects of body representation (ownership, action, the effects of tool-use). We hoped that the shorter, more informal, talks would encourage more junior scientists to present unpublished work, or work-in-progress. A number of speakers did indeed present unfinished work, and many commented that the feedback that they had received was positive and constructive.

19 people registered to present a poster. These covered the full range of topics in body representation, and were in the main presented by junior scientists. A small prize was offered for the best poster presented at the meeting. Two judges selected “The role of visual attention in learning to use a myoelectric prosthesis”, presented by Mohammad Sobuh of the University of Salford, as the best poster. This was an impressive achievement for Mohammed, who is a first year student - this was his first conference presentation.



We also included practical demonstrations at the meeting to expose researchers to different techniques and methodologies. Stephen Oliver Associates demonstrated two different Applied Science Laboratories eye tracking systems. The organising committee and some attendees of the workshop also presented: The rubber hand illusion; prismatic distortion of vision, Braille reading; the tactile grating orientation task; and reaching movements made with mirror reflections of the hands.

The conference meal was held at the Turkish restaurant Meze Mangal for the evening of Monday 29th March. This was a great success, with 34 of the participants attending. The informal atmosphere led to more networking and scientific discussion.

Attendees

71 people registered for the workshop. These represented 31 institutions, including 22 based in the UK and from 6 countries outside the UK: USA, Australia, Germany, Netherlands, Italy, and France. We were pleased that the attendees included people at all stages of an academic career, including 2 undergraduate students. 14 postgraduate students and post-doctoral researchers were supported by travel bursaries.

Outcomes

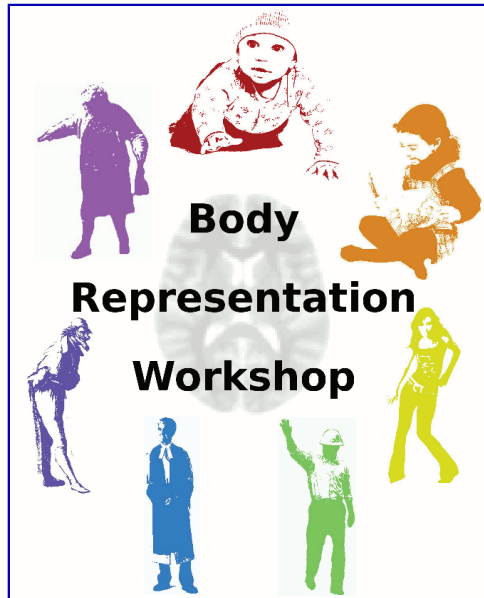
The workshop has already led to a number of outcomes that are beneficial to the field and the careers of the attendees. The primary benefit was the intended one: Bringing together researchers with common interests, but with different backgrounds. This has led to:

- A greater appreciation for, and knowledge of, neighbouring fields of research for individual researchers (e.g., development, ageing research, rehabilitation, more basic body-related research). For example one participant commented that *'...the workshop and paradigms of developmental psychology inspired me with a lot of potential future work.'*
- An awareness of different methodologies, particularly the new capabilities of mobile eye trackers and near-infrared spectroscopy. The methodological demonstrations were particularly useful in the context of a meeting which was bringing together researchers who have, through their separate traditions, used distinct methodological paradigms. We fully expect that this cross-fertilization will lead to research which better integrates the disciplines of developmental psychology and cognitive neuroscience.
- Feedback on ongoing work. For example, one participant commented *'...it was an opportunity to discuss my work with experienced psychologists. This made me more confident about the direction I have undertaken in my research.'*
- Identification and discussion of theoretical questions which are critical in both adult and developmental psychology, for example how judgements of tactile distances change with changing body size and/or tool-use.

The contact between different groups has led to other more tangible outcomes:

- Sharing of data and of experimental stimuli
- Invitations to speak at seminars in other institutions
- Planning further meetings
- Collaborations in experimental work
- Collaborative bids for grants
- Invitations for Masters students to apply for PhD studentships

Experimental Psychology Society Research Workshop



"The Development of Body Representations over the Lifespan"

29th-30th March, 2010

Goldsmiths University of London

Meeting website: <http://bodyrep.bangor.ac.uk>

Programme

29th March, 2010

Time	Contributor(s)	Title
09:00		---Registration & Introduction---
09:45	Philippe Rochat	From an embodied to a public sense of self in early development
11:00		---Break---
11:30	Brigitte Röder	Developmental plasticity of reference frames for touch
12:10	Marko Nardini	Rescaling sensory estimates with changing body size in childhood
12:50		---Lunch---
14:00	Sabine Schaefer	The interplay of cognition and motor functioning across the lifespan: How do children, young, and older adults perform a cognitive and a motor task simultaneously?
14:40	Virginia Slaughter	Becoming a body expert
15:20	Manos Tsakiris	The self as another?
16:00		---Break---
16:30	Aikaterini Fotopoulou	The others-in-me: Body ownership and representation in neuropsychology
17:10	Tamara Christie & Virginia Slaughter	Exploring links between sensori-motor and visuo-spatial body representations in infancy
17:30	Annalisa Setti, K E Burke, M T Liuzza, R A Kenny, Anna M Borghi, & Fiona N Newell	Visuo-motor resonance in older adults
18:00		---Posters---
19:30		---Workshop Dinner---

30th March, 2010

Time	Contributor(s)	Title
09:00	Derek G Moore	Perceiving form, motion and meaning in point light displays: Evidence from babies and children with developmental difficulties
09:40	Sarah Lloyd-Fox	Cortical mapping of biological motion perception in young infants: A fNIRS study
10:00	Laura Mirams, Ellen Poliakoff, Richard J Brown, & Donna M Lloyd	'Seeing is believing': The effect of vision on erroneous reports of touch
10:20	Kirsten J McKenzie, Donna M Lloyd, Richard J Brown, & Ellen Poliakoff	Touch and Go: Investigating the mechanisms of visually evoked touch
10:40		---Break & Demos---
12:00	Anouk Keizer, Monique A Smeets, H Chris Dijkerman, Marcel van den Hout, Irene Klugkist, Annemarie van Elburg, & Albert Postma	Inappropriate body representations in Anorexia Nervosa on various modalities
12:20	Eleanor Miles	Using the modality shift effect paradigm to investigate attention to touch in people with unexplained symptoms
12:40	Rebecca Cleary, Ellen Poliakoff, & Judith Holler	Does Parkinson's disease affect the production of co-speech gestures?
13:00	Jorge Esteves & Charles Spence	Am I imagining things? Eyes closure during a clinical examination improves diagnostic reliability in experienced osteopaths
13:20		---Lunch---
14:20	Ora Oudgenoeg-Paz, M Chiel Volman, Paul P Leseman, & Marian J Jongmans	The relation between early motor development and cognitive-linguistic development
14:40	Andrew J Bremner & Hazel Jooste	Categorical tactile perception of the body surface in young school children
15:00	Emma L Axelsson, Derek G Moore, Julia E Goodwin, B R Clifford, & E Murphy	Infants' developing use of body information when forming categories of human and non-human animals
15:20	Patrick Haggard	What does action do to time?
15:40	Catherine Preston	Will any body do? The adaptive nature of human body representations
16:00	Elisa Canzoneri	Extension of peripersonal space and body schema after tool-use
16:20		---Close---

Posters (18:00, 29th March, 2010)

No.	Contributor(s)	Title
1	Danilo Jagenow, Sabine Schaefer, Julius Verrel, Michael Schellenbach, & Ulman Lindenberger	Children stabilize their gait when working on an easy cognitive task: Principal component analyses of gait parameters
2	Mohammad M Sobuh, L Kenney, Adam Galpin, S Thies, P Kyberd, & M Twiste	The role of visual attention in learning to use a myoelectric prosthesis
3	Djamila Maleika, Sabine Schaefer, Michael Schellenbach, & Ulman Lindenberger	Effects of dual-tasking on cognitive control and walking regularity in children
4	Frederick William Cody	The accuracy of tactile localization is reduced by skin stretch at the human wrist
5	Amy Pearson	Spatial perspective taking and mental transformations of human and non-human objects
6	Silvia Ubaldi, Emanuel Mian, & Andrea Serino	How do I perceive my body? A new method to assess body size
7	Kirsten J McKenzie	Illusory sensations of touch: More than just guesswork?
8	Laurent Auclair, J Barra, & B Lothun	Where are my hands? Influence of limb posture on tactile extinction
9	Ana Tajadura-Jiménez, Galini Pantelidou, Pawel Rebacz, & Manos Tsakiris	Merging with the crowd: Personal space decreases when listening to positive music through headphones
10	Beatriz Calvo-Merino, Helge Gillmeister, Patrick Haggard, & Bettina Forster	The aesthetics of the human body: A sensorimotor mechanism?
11	Fatma Al, M C Jackson, & Beatriz Calvo-Merino	Working memory capacity for body postures increase with motor expert
12	Mark Gardner & Rosalind Potts	Hand dominance influences laterality judgements for observed bodies
13	Alice Alberici	The development in young children of direction-dependent multisensory weightings in reaching
14	Marjolein P Kammers	Touching on temperature and pain
15	Alyanne de Haan	Fingers crossed! An investigation of somatotopic representations using temporal order judgements
16	Christa Nijzens	The influence of object identity on obstacle avoidance reaching behaviour
17	Annalisa Xaiz, Juliette Richetin, Angelo Maravita, & Marco Perugini	Is this mine? Self body recognition depends on implicit self-esteem
18	Guido Orgs & Patrick Haggard	Temporal binding during illusory movement of the human body
19	Duncan Brown	The attentional brain network and motor preparation in adults with developmental coordination disorder: An EEG study

1	From an embodied to a public sense of self in early development	Rochat	Talk	09:45	29 March
---	---	--------	------	-------	----------

Philippe Rochat

Cognition & Development Group, Department of Psychology, Emory University, Atlanta

"From an embodied to a public sense of self in early development"

Citation:

Rochat P (2010) From an embodied to a public sense of self in early development. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

Infants from birth express a sense of their own body as a differentiated entity among other entities in the world, an entity that is situated, physically bounded, organized, and agent in the environment. Quickly, however, this implicit sense of self develops to become explicit, conceptual, and, more importantly, public and social. This development would correlate with the maturation of specific prefrontal cortex regions. By 2 years of age, children begin to perceive and represent the embodied self through the evaluative, possibly coveting eyes of others. They become self-conscious. This developmental transition is further exemplified with the parallel emergence of an explicit sense of possession. By the second birthday, the "me" is extended to include the "mine", giving children new embodied power to share, exchange, and give.

1	From an embodied to a public sense of self in early development	Rochat	Talk	09:45	29 March
---	---	--------	------	-------	----------

Brigitte Röder

Department of Biological Psychology & Neuropsychology, University of Hamburg

"Developmental plasticity of reference frames for touch"

Citation:

Röder B (2010) Developmental plasticity of reference frames for touch. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

Tactile stimuli are represented in multiple frames of reference. This talk will summarize the developmental trajectory and experience dependence of the coordinate systems for touch, as well as consequences for the interaction of the sense of touch with other senses.

Marko Nardini

Department of Visual Neuroscience, Institute of Ophthalmology, University College, London

"Rescaling sensory estimates with changing body size in childhood"

Citation:

Nardini M (2010) Rescaling sensory estimates with changing body size in childhood. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

To avoid making errors, an observer whose body changes in size must recalibrate metrics such as the distance of an object at arm's length, or of one with a certain interocular disparity (given increasing interocular distance with age). Following recent studies in which children did not integrate spatial information across modalities until after 8 years, it has been proposed that keeping estimates separate in childhood may be necessary for recalibrating relationships between sensory estimates as these change with body size. I will present recent developmental studies of integration of spatial information across and within modalities, and ask whether this theory provides a good account of the data.

Sabine Schaefer

Max Planck Institute for Human Development, Berlin

"The interplay of cognition and motor functioning across the lifespan: How do children, young, and older adults perform a cognitive and a motor task simultaneously?"

Citation:

[Schaefer S](#) (2010) The interplay of cognition and motor functioning across the lifespan: How do children, young, and older adults perform a cognitive and a motor task simultaneously?. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

Are there age differences concerning the ability to perform a cognitive and a motor task simultaneously? Correlational studies indicate a larger interrelatedness of cognition and sensory or sensorimotor functioning in old as compared to young and middle adulthood, suggesting that older adults might show more pronounced performance decrements in a demanding cognitive-motor dual-task situation. Children can also be expected to show higher dual-task costs, because they have fewer resources available, and because their motor functioning is not as automatized as in young adults. My talk will present the results of several dual-task studies comparing children, young, and older adults, for example, when walking on a narrow track while memorizing word lists, or when balancing on a force plate while performing a working memory task. Although there seems to be a general tendency for children and older adults to show larger dual-task costs as compared to young adults, and to protect their motor functioning in situations in which their body's equilibrium is at stake (posture-first hypotheses), performance improvements under dual-task conditions can occasionally also be observed. For example, all age groups reduced their body sway or walking variability while working on an easy cognitive task. Furthermore, children and young adults showed superior working memory performances while walking on a treadmill as opposed to sitting on a chair, possibly due to an optimization of arousal levels due to exercise. In addition, aerobic fitness interventions have been shown to improve cognitive functioning in older adults, and it is currently not clear whether children's cognition would profit from a fitness intervention as well. Taken together, the results suggest that motor and cognitive functioning are strongly interrelated across the lifespan, and experience seems to modify this relationship in several ways.

Virginia Slaughter

Early Cognitive Development Unit, School of Psychology, University of Queensland, Australia

"Becoming a body expert"

Citation:

[Slaughter V](#) (2010) Becoming a body expert. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

Adults see the human body shape in all manner of stimuli, such as highly abstract stick figures that barely specify the human body configuration, and point light displays that depict only the characteristic motion patterns of the human form. This capacity to quickly and effortlessly perceive the human form reflects our expertise at visually processing human bodies. In this talk, I will present the results of a series of studies investigating when infants readily recognise the typical human body shape, and discriminate it from non-human body shapes. The data show that visual recognition and discrimination of human bodies is slow to develop in infancy, and it is initially stimulus-dependent, becoming more and more generalisable over time in a typical learning trajectory. Based on this developmental pattern, I will argue that expertise in perceiving bodies ultimately comes about by virtue of their ubiquity and social significance, and not because of any kind of innate representation or privileged learning mechanism.

Manos Tsakiris

Department of Psychology, Royal Holloway University of London

"The self as another?"

Citation:

[Tsakiris M](#) (2010) The self as another?. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

The question of individual identity lies at the heart of human psychology, and of social science as a whole. My face belongs to me and is part of my identity, and at the same time is a seat of multisensory experience. However, psychological research on faces and identity is mostly visual, and based on other people's faces. Unlike the case of body- and action-recognition (e.g., the rubber hand illusion), the link between multisensory cues and the sense of self has never been extended to faces. We recently bridged this gap by formally investigating, for the first time, the relationship between face recognition and selfhood following multisensory stimulation (Tsakiris, 2008). Tactile stimulation on the participant's face, while she was looking at another person's face being touched in synchrony, produced a behaviourally (Tsakiris, 2008), psychometrically, and physiologically (Tajadura-Jiménez, Grehl, & Tsakiris, in preparation) measurable changes in the representation of her facial identity. After synchronous, but not asynchronous, visuo-tactile stimulation, participants identified themselves with faces that looked more like the other person's face. In addition, the effect was asymmetric in the sense that the other face became more part of the self-face rather than the self-face part of the representation of the other's face. Multisensory integration can, therefore, update cognitive representations of one's body, such as the sense of body-ownership, as previous research has shown, as well as the representation of one's identity in relation to other people.

Reference

[Tsakiris M](#) (2008) Looking for myself: Current multisensory input alters self-face recognition. *Public Library of Science One*, 3(12):e4040.

Aikaterini Fotopoulou

Institute of Cognitive Neuroscience, University College, London

"The others-in-me: Body ownership and representation in neuropsychology"

Citation:

[Fotopoulou A](#) (2010) The others-in-me: Body ownership and representation in neuropsychology. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

BACKGROUND: When right hemisphere stroke causes paralysis, striking neurocognitive symptoms concerning the paralysed limbs may also occur. The study of 'anosognosia for hemiplegia' (AHP, the apparent unawareness of paralysis) and somatoparaphrenia (the belief that one's limbs belong to someone else) can provide unique insight into the mechanisms and experience of action awareness and body ownership, respectively.

METHODS: Unfortunately, experimental investigations of such phenomena are scarce. Here, I present experimental studies on rare right-hemisphere syndromes mainly assessing the hypotheses that 1st and 3rd person perspectives on the body dissociate.

Methods include lesion analysis, providing visual feedback via realistic rubber-hands, video recordings, and mirror-viewing.

RESULTS & CONCLUSIONS: The results suggest that body ownership is differentially influenced by egocentric and allocentric perspectives of the body. I put forward the hypothesis that this dissociation supports the notion that the objectification of the self (the perception of the body from a 3rd person perspective, i.e., as another) is an independent developmental stage of bodily self-representation, and that it can be dissociated from 1st person experience of the body following right perisylvian lesions.

Tamara Christie & Virginia Slaughter

School of Psychology, University of Queensland, Australia

"Exploring links between sensori-motor and visuo-spatial body representations in infancy"

Citation:

[Christie T, Slaughter V](#) (2010) Exploring links between sensori-motor and visuo-spatial body representations in infancy. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

The aim of this study was to explore whether sensori-motor and visuo-spatial body representations interact during the first 15 months of infancy, as they do in adults. Sixty-two infants between 6 and 15 months of age were tested for visuo-spatial body representations via a human body visual discrimination task. The task tested the infants' sensitivity to violations of the human body shape in photographs presented on a projector screen. The infants' spontaneous motor activity during the discrimination task, as well as motor development and imitation skill, were assessed as indices of sensori-motor body representations. Based on research with adults, we predicted correlations between performance on the visuo-spatial body task and infants' sensori-motor development. However, no significant correlations were found between the sensori-motor and visuo-spatial tasks, thus the results of this experiment found no evidence for a link between sensori-motor and visuo-spatial body representations during infancy. Hence, it was concluded that sensori-motor and visuo-spatial body representation systems may develop as distinct systems that come together later in development.

Annalisa Setti, K E Burke, M T Liuzza, R A Kenny, Anna M Borghi, & Fiona N Newell

Trinity College, Dublin

"Visuo-motor resonance in older adults"

Citation:

[Setti A, Burke KE, Liuzza MT, Kenny RA, Borghi AM, Newell FN](#) (2010) Visuo-motor resonance in older adults. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

Recent evidence has shown that visual and auditory inputs related to meaningful actions (e.g., grasping a peanut or ripping paper) can activate the motor system and, specifically, mirror neurons in the cortex (Fogassi & Gallese, 2004; Rizzolatti & Craighero, 2004). This mechanism of 'motor resonance' is thought to be the neural underpinning of a congruency effect found at the behavioural level with a visuomotor priming paradigm (e.g., Bruzzo, Borghi, & Ghirlanda, 2008). To our knowledge, no study has investigated visuo-motor resonance in older adults (i.e., in a population subjected to the deterioration of perceptual and motor skills). In the present study, older and younger adults were asked to judge the weight ('heavy' or 'light') of images of objects. The pictures were preceded by primes depicting a generic grasping action or no action (arm with hand in fist position). We hypothesised that if motor resonance occurs in weight judgement (i.e., in a cognitive judgement not directly implying action upon the object), participants' performance should be modulated by the type of prime. We also manipulated the interplay between the characteristics of the agent in the prime and the participant (i.e., male vs. female; older vs. younger). Hence, we further hypothesised a modulation of the priming effect when the participant and the agent shared the same sex and/or age (Calvo-Merino, Glaser, Grézes, Passingham, & Haggard, 2005). Our results show that the prime modulates participants' performance when the characteristics of the agent hand in the prime, and those of the participant, are shared.

References

[Fogassi L, Gallese V](#) (2004) Action as a binding key to multisensory integration. In [Calvert GA, Spence C, Stein BE](#) (Eds). *The Handbook of Multisensory Processes*. MIT Press, London, pp425-442.

[Bruzzo A, Borghi AM, Ghirlanda S](#) (2008) Hand-object interaction in perspective. *Neuroscience Letters*, **441**(1):61-65.

[Rizzolatti G, Craighero L](#) (2004) The mirror-neuron system. *Annual Review of Neuroscience*, **27**:169-192.

[Calvo-Merino B, Glaser DE, Grézes J, Passingham RE, Haggard P](#) (2005) Action observation and acquired motor skills: An fMRI study with expert dancers. *Cerebral Cortex*, **15**(8):1243-1249.

Derek G Moore

School of Psychology, University of East London

"Perceiving form, motion and meaning in point light displays: Evidence from babies and children with developmental difficulties"

Citation:

[Moore DG](#) (2010) Perceiving form, motion and meaning in point light displays: Evidence from babies and children with developmental difficulties. *Body Representation Workshop*, Goldsmiths University of London, 30th March.

Abstract:

While there is considerable work that is exploring the parameters that determine the perception of the coherence of the motion of bodily point-light-displays (PLDs), and debates regarding the neurological underpinnings of the process, less work has been done exploring the levels of meanings that can be conveyed by PLDs, and how infants and children perceive these meanings and what properties they attribute to the underlying form. In this talk, I will review some of the findings from behavioural studies in infancy that have explored the representation of the human form depicted by PLDs, and what these studies might allow us to conclude about early developing representations. Secondly, I will consider recent findings regarding the perception of PLDs by children with autism and with developmental difficulties, and what these suggest about the critical role of motion perception and body representations in the perception of social meanings, and in particular actions and emotional states. This talk will be concerned not so much with the basic perception of the coherence of PLDs and what the evidence to date says about perceptual systems, but rather with what appears to be perceived beyond the surface information, in terms of representations of the human form and actions, how this might develop, and what evidence, if any, there is that some children may have specific difficulties with some, but not other, components of this process.

Sarah Lloyd-Fox

Centre for Brain and Cognitive Development, School of Psychology, Birkbeck, University of London

"Cortical mapping of biological motion perception in young infants: A fNIRS study"

Citation:

[Lloyd-Fox S](#) (2010) Cortical mapping of biological motion perception in young infants: A fNIRS study. *Body Representation Workshop*, Goldsmiths University of London, 30th March.

Abstract:

A decade has passed since near infrared spectroscopy (NIRS) was first applied to functional brain imaging in infants. Functional NIRS (fNIRS) offers a non-invasive, safe, and portable method of studying higher level neural processing of infants at a range of ages. Our research uses fNIRS to investigate functional activation in the social brain network of five-month-old infants. While this network of regions has been the subject of extensive research in adults, the neuroimaging techniques available for monitoring infants have, in the past, limited research in this area. We used fNIRS to measure the haemodynamic responses to biological motion stimuli in the frontal and temporal cortices. Our findings indicate defined regions of activation in response to eye, mouth, and hand movements, confirming the role of social perception from an early age. Further, the results suggest that individual infants display differing cortical activation, with some infants responding to the hand condition only, and some responding mostly to the eye and mouth condition. Potential explanations for the apparent 'face' or 'hand' specific behaviour of these infants are discussed. To conclude, these results highlight the potential this technology offers for advancing our understanding of the developing brain.

Laura Mirams, Ellen Poliakoff, Richard J Brown, & Donna M Lloyd

School of Psychological Sciences, University of Manchester

"'Seeing is believing': The effect of vision on erroneous reports of touch"

Citation:

Mirams L, Poliakoff E, Brown RJ, Lloyd DM (2010) 'Seeing is believing': The effect of vision on erroneous reports of touch. *Body Representation Workshop*, Goldsmiths University of London, 30th March.

Abstract:

Research has shown that non-informative vision of a body-part enhances tactile sensitivity at that body-part. The current study investigated the effect of non-informative vision on the frequency of erroneous reports of touch made during the somatic signal detection task (SSDT). During the SSDT, participants report whether or not they detected a near-threshold tactile pulse (presented in 50% of trials) under two conditions: Concomitant light flash (produced by an LED next to the stimulated finger), or no light. The presence of the light typically improves detection of the tactile stimulus but also increases false alarms (reports of perceiving a pulse that did not occur). Thirty-seven participants completed the SSDT under two conditions: Stimulated hand visible, and stimulated hand covered (with the LED still visible). It was predicted that enhanced sensitivity due to non-informative vision would reduce false alarms by improving the ability to distinguish between touch and no touch trials. Contrary to predictions, non-informative vision of the hand affected false alarm rates, but not sensitivity, with higher false alarm rates in the non-informative vision condition. This may be because non-informative vision enhances the perception of internal bodily sensations, in addition to enhancing the perception of external tactile stimulation. Studies are currently being undertaken to investigate this possibility.

Reference

Mirams L, Poliakoff E, Brown RJ, Lloyd DM () Vision of the body increases interference on the somatic signal detection task. *Experimental Brain Research*, ..

Kirsten J McKenzie, Donna M Lloyd, Richard J Brown, & Ellen Poliakoff

School of Psychological Sciences, University of Manchester

"Touch and Go: Investigating the mechanisms of visually evoked touch"

Citation:

McKenzie KJ, Lloyd DM, Brown RJ, Poliakoff E (2010) Touch and Go: Investigating the mechanisms of visually evoked touch. *Body Representation Workshop*, Goldsmiths University of London, 30th March.

Abstract:

When attempting to detect an ambiguous signal in a particular modality, participants often report the presence of the signal when no such stimulus has been delivered, particularly when a stimulus in an orthogonal modality is presented simultaneously (Johnson, Burton, & Ro, 2006; Lloyd, Mason, Brown, & Poliakoff, 2008; Lovelace, Stein, & Wallace, 2003). Factors known to mediate visuo-tactile multi-sensory integration and top-down perceptual control are thought to underlie these illusory experiences. We have previously shown that participants show similar levels of illusory tactile sensations across successive test sessions, indicating that this tendency to report illusory sensations may be a robust phenomenon (McKenzie, Poliakoff, Brown, & Lloyd, Submitted). Here, we demonstrate that, despite never having received a paired light and pulse stimulus, participants still made more false alarms in the presence of the light. This suggests that these 'false alarms' may be a consequence of an existing association, rather than an association learned during the experiment. We then sought to manipulate the strength of any association between the two stimuli, by using a training protocol prior to the task. While both 'low' and 'high' association groups exhibited an increased number of illusory touch reports during light trials, individuals in the 'high' group made no more illusory touch responses than a control group, in contrast to those in the 'low' group, who showed significantly fewer false alarms. This suggests that the light-evoked false alarms rely on associations built up during everyday multi-modal experience, the effect of which can be reduced but not increased by a short training protocol

McKenzie KJ, Poliakoff E, Brown RJ, Lloyd DM (submitted) Now you feel it, now you don't: How robust is the phenomenon of illusory tactile experience?.

References

Lloyd DM, Mason L, Brown RJ, Poliakoff E (2008) Development of a paradigm for measuring somatic disturbance in clinical populations with medically unexplained symptoms. *Journal of Psychosomatic Research*, **64**(1):21-24.

Johnson RM, Burton PC, Ro T (2006) Visually induced feelings of touch. *Brain Research*, **1073**:398-406.

Lovelace CT, Stein BE, Wallace MT (2003) An irrelevant light enhances auditory detection in humans: A psychophysical analysis of multisensory integration in stimulus detection. *Cognitive Brain Research*, **17**(2):447-453.

Anouk Keizer, Monique A Smeets, H Chris Dijkerman, Marcel van den Hout, Irene Klugkist, Annemarie van Elburg, & Albert Postma

Helmholtz Research Institute, Department of Experimental Psychology, Utrecht University

"Inappropriate body representations in Anorexia Nervosa on various modalities"

Citation:

Keizer A, Smeets MAM, Dijkerman HC, van den Hout M, Klugkist I, van Elburg A, Postma A (2010) Inappropriate body representations in Anorexia Nervosa on various modalities. *Body Representation Workshop*. Goldsmiths University of London, 30th March.

Abstract:

Anorexia nervosa (AN) is not only characterized by an emaciated appearance: A disturbance in the experience of one's own body weight, shape, and size is central to the diagnostic criteria as well. Literature on body representation disturbances in AN has focused mainly on the visual aspect of body image (i.e., the mental image of one's own body), while studies on the tactile modality are notably absent. We therefore investigated whether AN patients displayed a deficit in somatosensory perception, implying a disturbance in tactile body image. A second aim of the study was to test whether this tactile body image disturbance was related to an inappropriate visual body image and high levels of body dissatisfaction. We found that AN patients adopted an inaccurate visual mental image of their body when asked to judge which of two word-pairs, consisting of body parts, reflected the largest distance. Interestingly, AN patients overestimated tactile distances when asked to estimate the width between two tactile stimuli, applied to the arm and belly, by separating their thumb and index finger. Furthermore, both visual mental and tactile body size estimation were independently related to body attitudes, but not to each other. Taken together, the results imply that body representation disturbances in AN are multimodal, and affect not only the attitudinal and visual modalities, but extend to the tactile modality as well, suggesting that body representation disturbances in AN are more pervasive than previously assumed.

Eleanor Miles

Department of Psychology, University of Sheffield

"Using the modality shift effect paradigm to investigate attention to touch in people with unexplained symptoms"

Citation:

Miles E (2010) Using the modality shift effect paradigm to investigate attention to touch in people with unexplained symptoms. *Body Representation Workshop*, Goldsmiths University of London, 30th March.

Abstract:

It has often been assumed that people with medically unexplained symptoms (MUS) have an attentional bias for the body, which leads them to amplify normal physical sensations and to experience these sensations as symptoms. However, this conclusion is based largely on self-report measures of attention to the body. Experimental investigations have the benefit of providing more direct evidence for an attentional bias, and can also provide more specific evidence about the nature of this bias. The current study applied an experimental paradigm from the attention literature (the modality shift effect, cf. Spence, Nicholls, & Driver, 2001) to an analogue MUS group and a control group, in order to investigate whether symptom experience was associated with a deficit in the ability to shift between touch and vision. Both groups showed a relative RT benefit when the same modality was repeated across two trials (and a relative cost when the modality switched), and this effect decreased over time after target presentation. However, the analogue MUS group showed a longer-lasting benefit when the tactile modality was repeated, which might suggest impaired disengagement from tactile stimuli as the key attentional process contributing to symptom experience. Future research should take into account the possibility that attentional deficits in MUS are more complex than simply attending towards the body.

Reference

Spence C, Nicholls MER, Driver J (2001) The cost of expecting events in the wrong sensory modality. *Perception & Psychophysics*, **63**(2):330-336.

Rebecca Cleary, Ellen Poliakoff, & Judith Holler

Institute of Neurology, University College, London

"Does Parkinson's disease affect the production of co-speech gestures?"

Citation:

Cleary R, Poliakoff E, Holler J (2010) Does Parkinson's disease affect the production of co-speech gestures?. *Body Representation Workshop*, Goldsmiths University of London, 30th March.

Abstract:

Parkinson's disease (PD) is a neurodegenerative movement disorder primarily due to basal ganglia dysfunction. While much research has been conducted on Parkinsonian deficits in musculoskeletal limb movement, in comparison, a paucity of research has focussed on investigating the effect that such impoverished movement has on PD patients' communicative acts. Previous research has, however, identified that patients exhibit a number of verbal and non-verbal communicative deficits including: Abnormal changes in articulation, reduced prosody, and significant difficulty generating and recognising facial expressions. However, communication involves more than speech and facial expressions. Importantly, it also encompasses co-speech gestures. Co-speech gestures are the spontaneous and idiosyncratic body movements, usually of the arms, hands, and fingers, which accompany speech. One dominant view of gesture production is that gestures fulfil a communicative function. Thus, if gestures are communicative and PD patients have progressively worsening communicative functioning, do patients also exhibit impaired gestural production compared to age-matched controls? Secondly, do patients show a selective deficit in the type of gesture they produce compared to controls? It has been argued that PD patients exhibit fewer gestures due to their motor control problems. However, these studies are characterised by a number of methodological shortcomings. I will present a more fine-grained and rigorous analysis of the spontaneous hand gestures produced by 23 PD patients and 22 healthy controls, describing a previously completed experimental study (Poliakoff et al., 2007), and providing some first answers to these questions.

Reference

Poliakoff E, Galpin A, Dick JPR, Moore P, Tipper SP (2007) The effect of viewing graspable objects and actions in Parkinson's disease. *NeuroReport*, **18**(5):483-487.

Jorge Esteves & Charles Spence

Oxford Brookes University

"Am I imagining things? Eyes closure during a clinical examination improves diagnostic reliability in experienced osteopaths"

Citation:

Esteves J, Spence C (2010) Am I imagining things? Eyes closure during a clinical examination improves diagnostic reliability in experienced osteopaths. *Body Representation Workshop*, Goldsmiths University of London, 30th March.

Abstract:

Osteopaths make perceptual judgements regarding the presence of soft tissue changes, based on sensory information conveyed by their nervous system. Previously, we have shown a link between the development of expertise in osteopathy, and the integration of visuo-haptic diagnostic information. Here, we investigate whether the simultaneous use of vision and haptics contributes to higher diagnostic reliability. We also explored the effects of having one's eyes closed or open during the haptic exploration of tissue dysfunction. Nine participants at different levels of expertise examined the lumbar spine of eighteen subjects on six separate occasions under conditions of unimodal [haptics-eyes-closed; haptics-eyes-open], and bimodal testing [visuo-haptic]. In the haptic conditions, vision was occluded by the use of opaque goggles (eyes-open), or with a dark sleep mask (eyes-closed). Experts demonstrated higher levels of intra-examiner reliability in the haptic-eyes-closed and visuo-haptic conditions. Novice practitioners were considerably better in the haptic-eyes-open condition. We offer possible explanations for our results. The experts' superior performance in the haptic-eyes-closed condition suggests a possible reliance on visual mental imagery. Eye closure in the dark is typically characterised by imagery and multisensory activity (e.g., Marx et al., 2003; Hufner et al., 2008). This may enable experts to access representations of tissue states from memory. In contrast, the students' superior performance in the haptic-eyes-open condition suggests that their focused attention on the haptic modality. We have previously demonstrated that, on occasion, students tend to divert their gaze away from palpated regions. Focusing their attention on the haptic modality did, however, affect the experts' performance. We speculate that ongoing deliberate practice enables osteopaths to learn how to combine information from vision and haptics more efficiently.

References

Höfner K, Stephan T, Glasauer S, Kalla R, Riedel E, Deutschländer A, Dera T, Wiesmann M, Strupp M, Brandt T (2008) Differences in saccade-evoked brain activation patterns with eyes open or eyes closed in complete darkness. *Experimental Brain Research*, **186**(3):419-430.

Marx E, Stephan T, Nolte A, Deutschländer A, Seelos KC, Dieterich M, Brandt T (2003) Eye closure in darkness animates sensory systems. *NeuroImage*, **19**(3):924-934.

Ora Oudgenoeg-Paz, M Chiel Volman, Paul P Leseman, & Marian J Jongmans

University of Utrecht, Netherlands

"The relation between early motor development and cognitive-linguistic development"

Citation:

Oudgenoeg-Paz O, Volman MCJM, Leseman PPM, Jongmans MJ (2010) The relation between early motor development and cognitive-linguistic development. *Body Representation Workshop*, Goldsmiths University of London, 30th March.

Abstract:

The current embodiment theory suggests that cognition and language emerge in real-time through body-environment interaction. Therefore, a positive relation over time between early sensori-motor experience, spatial cognition, and (spatial) language development can be expected. Empirical studies have revealed cross-sectional correlations between spatial cognition and spatial language, and between sensori-motor experience and spatial cognition. However, to date, these developmental hypotheses are understudied. In the current study, two groups of 30 children are being followed for a period ranging from 15 to 21 months, starting at ages 9 and 20 months, respectively. The childrens' motor development, spatial exploration behaviour, spatial cognition, and general and spatial language are being measured at six measurement times. The main goal of the study is to provide a detailed description of the development in these domains, and the dynamic relation between them, at both the group and the individual level. Initial results from the first measurement wave (including 60 children aged 9 and 20 months) show substantial correlations between the timing of achieving the developmental milestones of sitting, crawling, standing, and walking, and early sentence production as well as correlations with general vocabulary level. Correlations between the same milestones and some measures of spatial cognition are also evident. These results suggest that early experience with sitting, standing, crawling, and walking might be important for the development of spatial cognition and some aspects of language.

Andrew J Bremner & Hazel Jooste

Department of Psychology, Goldsmiths College, London

"Categorical tactile perception of the body surface in young school children"

Citation:

Bremner AJ, Jooste H (2010) Categorical tactile perception of the body surface in young school children. *Body Representation Workshop*, Goldsmiths University of London, 30th March.

Abstract:

Human adults represent their own body in terms of a hierarchical structure of body parts, and neuropsychological observations have documented a number of specific deficits in body part localisation and recognition (e.g., Buxbaum & Coslett, 2001). Recent findings by de Vignemont et al. (2008) have demonstrated that the perceived perceptual distance between two tactile stimuli presented to the body surface is increased when those tactile stimuli are presented across a joint between body parts (across the wrist), relative to if they are presented within them (within the arm or the hand). As the tactile sense can be viewed as essentially a somatosensory sheet which is unrelated to body part segmentations (de Vignemont et al., 2005), this ability implies some categorical organisation of tactile perception relative to body-part anchors, and seems likely to be due to neural reorganisation caused by specific sensory experiences (Simmel, 1966). It is possible that this restructuring may happen in either infancy and/or early childhood. For example, linguistic input (e.g., the acquisition of noun terms for limbs in early childhood) might drive such category differentiations. We report the findings of a study in which we asked young children aged between 5 and 7 years to estimate tactile distances presented by two punctate stimuli within (arm or hand) and between (wrist) body parts. The data indicate a category boundary effect across all age-groups, comparable to that found in adults (de Vignemont et al., 2008), in which tactile distance is perceived as larger across a body part boundary than within body parts. No developmental change in this effect was observed.

References

- de Vignemont F, Majid A, Jola C, Haggard P (2009) Segmenting the body into parts: Evidence from biases in tactile perception. *Quarterly Journal of Experimental Psychology*, **62**(3):500-512.
- de Vignemont F, Tsakiris M, Haggard P (2006) Body mereology. In Knoblich G, Thornton JM, Grosjean M, Shiffrar M (Eds). *Human Body Perception from the Inside Out*. Oxford University Press, New York.
- Simmel ML (1966) Developmental aspects of the body scheme. *Child Development*, **37**(1):83-96.
- Buxbaum LJ, Coslett HB (2001) Specialised structural descriptions for human body parts: Evidence from autotopagnosia. *Cognitive Neuropsychology*, **18**(4):289-306.

Emma L Axelsson, Derek G Moore, Julia E Goodwin, B R Clifford, & E Murphy

School of Psychology, University of East London

"Infants' developing use of body information when forming categories of human and non-human animals"

Citation:

[Axelsson EL](#), [Moore DG](#), [Goodwin JE](#), [Clifford BR](#), [Murphy E](#) (2010) Infants' developing use of body information when forming categories of human and non-human animals. *[Body Representation Workshop](#)*, Goldsmiths University of London, 30th March.

Abstract:

Based on previous research (Spencer, Quinn, Johnson, & Karmiloff-Smith, 1997), infants' developing representations of featural information of bodies of human and non-human animals were investigated. This was done by exploring infants' use of body information in forming categories of human and non-human animals. Five- and 7-month-olds were familiarised to typical images of human or non-human animals. Infants were subsequently presented with a novel image from the familiarisation category paired with a 'crossed' stimulus. This image was made up of a head (of the familiarisation category) on a novel category body. Thus, after familiarisation to a category, the novel category was presented in the body of the crossed stimulus. Only the 7-month-olds familiarised to non-human animals looked significantly longer at the crossed stimuli with a human body, suggesting that they may have attended to body information. After familiarisation to humans, 5- and 7-month-olds did not show any preferences, but a further sample of 9-month-olds did. Thus, there may be asymmetries in infants' use of bodies in forming categories of human and non-human animals until 9 months of age. A separate test assessing infants' a priori preferences suggested that infants did not find typical or crossed stimuli more attractive. Further analyses exploring the relationship between categorisation performance, and infants' motor development, mental development, and level of pre-exposure to non-human animals, showed no clear relationships. Preliminary findings from an eye-tracking study will also be presented.

Reference

[Spencer J](#), [Quinn PC](#), [Johnson MH](#), [Karmiloff-Smith A](#) (1997) Heads you win, tails you lose: Evidence for young infants categorizing mammals by head and facial attributes. *[Early Development and Parenting](#)*, **6**(2):1-14.

Patrick Haggard

Institute of Cognitive Neuroscience, University College, London

"What does action do to time?"

Citation:

[Haggard P](#) (2010) What does action do to time?. *[Body Representation Workshop](#)*, Goldsmiths University of London, 30th March.

Abstract:

Several studies suggest that voluntary actions lead to changes in perceived time. Some report temporal realignments, while others report temporal compression. Few studies distinguish between the efferent and afferent aspects of action. To investigate these issues, we combined active self-touch with temporal order judgements of touch. Sixteen participants held their palms together in a praying posture. They tapped one index finger against the other, in synchrony with the third of three pacing tones. Thus, the motor component was focussed on one index finger, and the sensory consequence to the other. Just before this movement, they received brief tactile stimuli on the backs of the two index fingers, and judged which finger was stimulated first. By interposing the experimenter's hands between the participants', we isolated the motor component of self-touch from the sensory component. Further, when the experimenter, rather than the participant, made the tapping action, we isolated the sensory component from the motor component. We also included a rest condition. Results showed that the intention to make a voluntary action shifted the temporal order judgement curve, with stimuli on the acting finger being perceptually delayed. The presence or absence of sensory consequences of action to the other hand had no effect. This effect is local to the moving body part, and does not depend on predictable somatosensory consequences of action. Accounts based on altered arousal, prior entry, shifts of attention from moving to touched finger, and sensori-motor prediction cannot straightforwardly explain this result. We conclude that motor system activity itself shifts perceived time.

Catherine Preston

Perception & Action Team, School of Psychology, University of Nottingham

"Will any body do? The adaptive nature of human body representations"

Citation:

[Preston C](#) (2010) Will any body do? The adaptive nature of human body representations. *Body Representation Workshop*. Goldsmiths University of London, 30th March.

Abstract:

The human body undergoes many changes over a lifetime as we grow up and grow old. Yet despite these, often rapid, changes, we generally have little difficulty in identifying, controlling, and owning our own bodies. However, neurological abnormality can alter the experience of the body in bizarre ways, such that patients can disown their actual body parts or claim ownership over additional non-existent body parts, or body parts that belong to someone else. This talk will present an experiment that exploits the adaptive nature of the body representation, in which we attempt to induce ownership over an unnatural visual representation of a body part, whilst disrupting feelings of ownership for the real body.

Elisa Canzoneri

Centre for Studies and Research in Cognitive Neuroscience, University of Bologna

"Extension of peripersonal space and body schema after tool-use"

Citation:

[Canzoneri E](#) (2010) Extension of peripersonal space and body schema after tool-use. *Body Representation Workshop*. Goldsmiths University of London, 30th March.

Abstract:

In order to interact physically with an external object, our brain needs to integrate information about the position of the external stimulus in space with information related to the position of body parts in space. The first kind of information is coded in a multisensory representation of the space around the body, called peripersonal space (PPS), whereas the second kind of information is coded in an online, constantly updated, representation of the body for action, called body schema (BS). Using a tool to act upon objects in the far space is able to extend the PPS. However, less is known about whether PPS extension accompanies an incorporation of the tool into the BS. To study this issue, we assessed PPS by means of an audio-tactile integration task, and BS by means of a tactile distance confrontation task, both before and after a training consisting of using a 1m long tool to reach far objects. After tool-use, PPS extended along the tool axis. A similar extension effect was also present in the task assessing the BS: After tool-use, subjects perceived their forearm narrower and longer as compared to the session performed before tool-use, such as if their arm took the shape of the tool. Taken together, these results suggest that even a brief training with a tool induces a plastic change both to the PPS and the BS, suggesting a possible overlap between these two representations.

Danilo Jagenow, Sabine Schaefer, Julius Verrel, Michael Schellenbach, & Ulman Lindenberger

Max Planck Institute for Human Development

"Children stabilize their gait when working on an easy cognitive task: Principal component analyses of gait parameters"

Citation:

Jagenow D, Schaefer S, Verrel J, Schellenbach M, Lindenberger U (2010) Children stabilize their gait when working on an easy cognitive task: Principal component analyses of gait parameters. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

As shown by Verrel and colleagues (2009) using principal component analyses (PCA), young and older adults stabilize their gait when concurrently working on an easy cognitive task. Older adults increased their body sway again when the difficulty of the cognitive task was increased. In addition, in a study by Schaefer and colleagues (2008), 9- and 11-year old children demonstrated less body sway under dual-task conditions when balancing on an ankle-disc board, while young adults increased their body sway. The current study investigates whether children stabilize their gait under cognitive load. Seven- and 9-year old children and young adults (N=18 in each group) performed a working memory n-back task under two difficulty levels, while sitting and while walking on a treadmill. Three different speeds were used for the walking task: Preferred speed, 30% faster, and 30% slower than preferred. Motion was captured using a VICON system, and analysed using PCA. Cognitive performances remained stable under single- and dual-task conditions. Walking variability, as indexed by residual variance in the PCA, decreased in a linear fashion with increases in walking speed in all age groups. Children, furthermore, decreased their walking variability when working on the easy version of the cognitive task, but increased variability again when the cognitive task was most difficult. The discussion compares the findings to previous studies in young and old adults, and discusses whether the findings can be explained as an interplay of attentional focus and the differential investment of resources.

References

Schaefer S, Krampe RT, Lindenberger U, Baltes PB (2008) Age differences between children and young adults in the dynamics of dual-task prioritization: Body (balance) versus mind (memory). *Developmental Psychology*, **44**(3):747-757.

Verrel J, Lövdén M, Schellenbach M, Schaefer S, Lindenberger U (2009) Interacting effects of cognitive load and adult age on the regularity of whole-body motion during treadmill walking. *Psychology and Aging*, **24**(1):75-81.

Mohammad M Sobuh, L Kenney, Adam Galpin, S Thies, P Kyberd, & M Twiste

University of Salford

"The role of visual attention in learning to use a myoelectric prosthesis"

Citation:

Sobuh MMD, Kenney L, Galpin A, Thies S, Kyberd P, Twiste M (2010) The role of visual attention in learning to use a myoelectric prosthesis. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

Myoelectric prostheses are controlled via the electromyographic (EMG) signal generated during a muscle contraction, and it is believed that users rely heavily on visual feedback for their control. This study is believed to be the first to report on the characteristics of visual attention while learning to use a myoelectric prosthesis. A healthy subject was recruited to the study. Within each test session, the subject was instructed to complete a manual task (pouring water from a carton) from a sitting position. During the performance of the task, an eye-tracking system was used to monitor gaze. The task was repeated 10 times in 5 separate sessions (S1-S2, phase 1; S3-S5, phase 2). In phase 1, the subject completed the task using her anatomical hand; in phase 2, she completed the task with a myoelectric prosthesis, fitted over her anatomical limb. The SHAP functionality test was also performed following sessions S3-S5. Both task completion time and SHAP scores deteriorated dramatically at the start of phase 2, and both showed significant improvements over the course of phase 2, indicating skill acquisition. For the analysis of gaze, the task was segmented into reaching and manipulation. Reaching was associated with lengthy fixation durations at the hand or grasping area, which appeared insensitive to training. Fixation at the grasping area was also observed during manipulation, but this was reduced by training. The results of the study are consistent with the hypothesis that myoelectric prosthesis users rely heavily on visual feedback for their control and merit further investigation.

Djamila Maleika, Sabine Schaefer, Michael Schellenbach, & Uman Lindenberger

Max Planck Institute for Human Development

"Effects of dual-tasking on cognitive control and walking regularity in children"

Citation:

Maleika D, Schaefer S, Schellenbach M, Lindenberger U (2010) Effects of dual-tasking on cognitive control and walking regularity in children. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

How do children manage to perform a cognitive and a motor task concurrently, and under which conditions do they profit from an easy motor activity like walking (Schaefer et al., 2009)? Seven- and 10-year-old children (N=16 per group) performed a working memory task (n-back, with difficulties n=1 to n=3) and a reaction time task while sitting, and while walking on a treadmill with preferred speed. Cognitive and sensori-motor performances were measured as single tasks and concurrently in all possible dyadic combinations. Ten-year-olds outperformed 7-year-olds in the cognitive and sensori-motor domains under single-task conditions. Contrary to the hypotheses, concurrent walking did not facilitate cognitive performance. However, gait was positively affected by concurrent cognitive tasks: Both age groups walked in a more regular fashion and were more stable when executing a task while walking. As expected, performance decrements were largest in the cognitive-cognitive task pairing (RT and n-back). Differences in the laboratory environment between Schaefer et al. (in press) and the current study (e.g., size of the treadmill, handrail, and virtual world) are assumed to underlie the opposing findings in cognitive performance. For the motor domain, the gait stabilization under dual-task conditions supports the posture-first principle of motor prioritization (Woollacott & Shumway-Cook, 2002), or the beneficial effects of an external focus of attention as postulated by the constrained action theory (Wulf, McNevin, & Shea 2001).

References

- Wulf G, McNevin N, Shea CH (200) The automaticity of complex motor skill learning as a function of attentional focus. *Quarterly Journal of Experimental Psychology A: Human Experimental Psychology*, **54**(4):1143-1154.
- Woollacott MH, Shumway-Cook A (2002) Attention and the control of posture and gait: a review of an emerging area of research. *Gait & Posture*, **16**(1):1-14.
- Schaefer S, Lövdén M, Wieckhorst B, Lindenberger U () Cognitive performance is improved while walking: Differences in cognitive-sensorimotor couplings between children and young adults. *European Journal of Developmental Psychology*, .
- Schaefer S, Krampe RT, Lindenberger U, Baltes PB (2008) Age differences between children and young adults in the dynamics of dual-task prioritization: Body (balance) versus mind (memory). *Developmental Psychology*, **44**(3):747-757.

Frederick William Cody

Department of Biological Sciences, Faculty of Life Sciences, Manchester University

"The accuracy of tactile localization is reduced by skin stretch at the human wrist"

Citation:

Cody FWJ (2010) The accuracy of tactile localization is reduced by skin stretch at the human wrist. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

We have tested the hypothesis that tactile localization accuracy (locognosia) is reduced when the skin is distended, as during limb movements, with concurrent expansion of the receptive fields (RFs) of cutaneous sensory units. Spatial locognosic acuity was measured over a linear stimulus array on the dorsal surface of the non-dominant wrist in twenty-five healthy subjects. Localization precision was quantified under baseline conditions (wrist at 0deg) and during application of background skin stretch by (1) controlled flexion (Wrist-Bend, small (35deg) and large (70 deg) amplitudes) of the relaxed joint, and (2) matched direct pulling on the skin (Skin-Pull, small and large amplitudes) using wires attached to adhesive pads. Statistical analysis of locognosic discriminatory threshold using a 2 (amplitude of skin stretch, small, large) x 2 (mode of skin stretch, Wrist-Bend, Skin-Pull) repeated-measures ANOVA showed a significant main effect of stretch amplitude ($F(1,24)=11.123, p=.003$) but no main effect of stretch mode ($F(1,24)=2.306, p=.142$). Paired t-tests indicated that localization was significantly less accurate than baseline values for the two large amplitude stretch conditions (Wrist-Bend, $t(24)=2.445, p=.022$; Skin-Pull, $t(24)=2.120, p=.045$), but did not differ significantly ($p>.25$) from baseline for either of the small stretch conditions. We interpret our observations as (1) supporting the long-held assumption that tactile localization depends primarily upon the RF dimensions of regional touch units, and (2) suggesting that tonic activation of non-cutaneous proprioceptors during joint positioning exerts rather little modulatory effect.

Amy Pearson

University of Nottingham

"Spatial perspective taking and mental transformations of human and non-human objects"

Citation:

Pearson A (2010) Spatial perspective taking and mental transformations of human and non-human objects. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

Spatial perspective taking (SPT) is the ability to imagine things from a different point of view. Previous research suggests that objects and bodies may be processed differently in SPT, and that distinct neural substrates are involved in each (Zacks et al., 2001). Depending on demands, bodies can be processed either in relation to one's own point of view (egocentrically), or as if the body itself were shifting (object-based transformation, Zacks et al., 2002). Recent work suggests that egocentric SPT is related to mentalising (Hamilton et al., 2009). However, previous work has contrasted bodies (which are large and not very graspable) with everyday objects (which are smaller and more graspable). Here, we use a mental rotation paradigm from Zacks et al. (2002) to examine the different ways of processing bodies, hands, large objects, and small graspable objects. Participants will be required to make same-different judgements on pairs of stimuli presented at different orientations (rotated about a vertical axis), or to make left-right judgements on a single stimulus, also varying in orientation. Based on Zacks et al.'s (2002) findings, we predict longer RTs for left-right as compared to same-different judgements, and longer RTs for larger angles of rotation. Furthermore, we predict longer RTs for bodies and hands than for non-human objects (Kessler and Thomson, 2010). However, if size rather than classification (e.g., body) determines the cognitive mechanisms used in this mental rotation task, RTs should be influenced by item size rather than by whether the item is human. The results will be discussed in relation to current theories of spatial object and body representation.

References

Hamilton AF, Brindley RM, Frith U (2009) Visual perspective taking impairment in children with autistic spectrum disorder. *Cognition*, **113**(1):37-44.

Kessler K, Thomson LA (2010) The embodied nature of spatial perspective taking: Embodied transformation versus sensorimotor interference. *Cognition*, **114**(1):72-88.

Zacks JM, Vettel JM, Michelon P (2003) Imagined viewer and object rotations dissociated with event-related fMRI. *Journal of Cognitive Neuroscience*, **15**(7):1002-1018.

Zacks JM, Ollinger JM, Sheridan MA, Tversky B (2002) A parametric study of mental spatial transformations of bodies. *NeuroImage*, **16**(4):857-872.

Silvia Ubaldi, Emanuel Mian, & Andrea Serino

Centre for Studies and Research in Cognitive Neuroscience, University of Bologna

"How do I perceive my body? A new method to assess body size"

Citation:

Ubaldi S, Mian E, Serino A (2010) How do I perceive my body? A new method to assess body size. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

A disorder in body perception is considered a key symptom for the diagnosis of eating disorders (ED). This symptom is normally assessed by means of clinical observation, or explicit assessment methods, such as figural rating scales. The aim of the present study is to develop a quantitative method to evaluate body perception, combining implicit and explicit measures. As an implicit measure, we administered a tactile distance perception task in a group of 19 female and 14 male participants (mean age, 19.6±1.85 years), with normal body mass index (BMI), and no sign of ED. Subjects were asked to compare the distance between a pair of stimuli delivered on a reference body part (the forehead), and on a target body part (the thigh, abdomen, or forearm). Female subjects overestimated the dimension of their thigh. In contrast, male subjects showed a similar bias for their abdomen. To assess explicit body perception, we used the "body image revealer". Subjects were requested to modify their computerized distorted body image according to how they perceived or desired their body to be. Although healthy observers were correct in perceiving the dimensions of their body, female participants showed a clear desire to appear thinner. Eye movements recorded during the task revealed that female subjects focused their attention on their thighs. These results suggest that even healthy subjects may suffer from implicit distortions of body part size, but they normally compensate for such biases when asked explicitly to evaluate their whole body image. Future research will standardize these methods to evaluate body perception disorders in ED patients.

Kirsten J McKenzie

School of Psychological Sciences, University of Manchester

"Illusory sensations of touch: More than just guesswork?"

Citation:

McKenzie KJ (2010) Illusory sensations of touch: More than just guesswork?. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

Illusory sensations in one modality can be induced via the simultaneous presentation of stimuli in another sensory modality, even when the target stimulus has not been delivered (Johnson, Burton, & Ro, 2006; Lloyd, Mason, Brown, & Poliakoff, 2008; Lovelace, Stein, & Wallace, 2003). However, it is unclear whether these are indeed illusory sensations or merely the product of guessing when participants are faced with an ambiguous signal. The current study used confidence ratings in a tactile signal detection task to investigate this phenomenon. It was found that participants reporting a high proportion of 'false alarm' tactile responses were also more confident in these incorrect perceptions than participants who made low numbers of such reports. That a number of participants indicated that they 'definitely' felt a target stimulus when none was present, despite the availability of a 'maybe' option, indicates that such individuals may indeed be experiencing an illusory touch sensation.

References

[Lloyd DM](#), [Mason L](#), [Brown RJ](#), [Poliakoff E](#) (2008) Development of a paradigm for measuring somatic disturbance in clinical populations with medically unexplained symptoms. *Journal of Psychosomatic Research*, **64**(1):21-24.

[Johnson RM](#), [Burton PC](#), [Ro T](#) (2006) Visually induced feelings of touch. *Brain Research*, **1073**:398-406.

[Lovelace CT](#), [Stein BE](#), [Wallace MT](#) (2003) An irrelevant light enhances auditory detection in humans: A psychophysical analysis of multisensory integration in stimulus detection. *Cognitive Brain Research*, **17**(2):447-453.

Laurent Auclair, J Barra, & B Lothun

Laboratoire de Psychologie et Neuropsychologie Cognitive, CNRS, FRE3292, Universite Paris Descartes

"Where are my hands? Influence of limb posture on tactile extinction"

Citation:

Auclair L, Barra J, Lothun B (2010) Where are my hands? Influence of limb posture on tactile extinction. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

Tactile localization on the skin involves both a somatotopic and a postural (body schema) representation. Here, we attempted to determine the extent to which body posture influences tactile identification in right brain-damaged patients. In Experiment 1, 20 controls and patients were asked to detect light touches delivered to their left or their right hand, or to both hands simultaneously. There was no tactile extinction when their left hand was placed in the left hemispace and the right hand in the right hemispace - this is commonly referred to as the 'anatomical' position. Several tactile identification tasks were further conducted with different hand postures. In the crossed hands condition, the hands were crossed one over the other, and the tactile stimulation was delivered either to the hand (after crossing) or to the forearm (before crossing). In the inverted hands condition, the left hand was placed in the right hemispace, and the right hand in the left hemispace, without crossing over: In this situation, the left arm was placed in front of the right arm. In Experiment 2, three patients were asked to detect light touches delivered to their left or their right forefinger, or to both fingers simultaneously. The fingers were placed in an anatomical position or crossed over the other in their middle, and stimulation was delivered either after or before finger crossing. Controls performed at ceiling in all conditions. For patients, performances were accurate in the inverted and anatomical conditions (Experiment 1), suggesting that crossing hands is not only linked to the bodily midline. Patients, however, showed a left tactile extinction only when the stimulations were delivered on the body part situated after the crossing (Experiments 1 & 2). This suggests that specific body-part representations are used to localize tactile input in space.

Ana Tajadura-Jiménez, Galini Pantelidou, Pawel Rebacz, & Manos Tsakiris

Royal Holloway, University of London

"Merging with the crowd: Personal space decreases when listening to positive music through headphones"

Citation:

Tajadura-Jiménez A, Pantelidou G, Rebacz P, Tsakiris M (2010) Merging with the crowd: Personal space decreases when listening to positive music through headphones. *Body Representation Workshop*. Goldsmiths University of London, 29th March.

Abstract:

Anecdotally, SONY developed the first Walkman with the experience of the over-crowded Tokyo metro system in mind. The ubiquitous use of personal music players in over-crowded public transport alludes to the hypothesis that, apart from making the journey more pleasant, listening to music may also affect representations of our personal space. "Personal space" is described in social psychological literature as the emotionally-tinged zone around the human body that people feel is "their space" (Sommer, 1959). This space is not fixed. It varies across cultures, but it is also constantly negotiated according to the context and to the ongoing emotions, which may push us towards or pull us away from others. We evaluated the effect of listening to music through headphones on participants' personal space. The personal space was evaluated as the comfort distance between the participant and the experimenter during both active and passive approach tasks. Our results show that listening to positive arousing music reduces the representation of personal space, allowing others to come closer to us. In contrast, listening to negative arousing music, or being in silence, increases the representation of personal space. The observed disparity between positive and negative music was larger when the experimenter approached the participant, than when the participant approached the experimenter. This effect implied that crowding can be better tolerated when listening to music of positive valence. This research might help to understand the benefit that people find in using personal music players in crowded situations, such as when using the public transport in urban settings

Keywords: personal space, individual distance, auditory-induced emotion, embodiment.

Reference

Sommer R (1959) Studies in personal space. *Sociometry*, 22:247-260.

Beatriz Calvo-Merino, Helge Gillmeister, Patrick Haggard, & Bettina Forster

City University, London

"The aesthetics of the human body: A sensorimotor mechanism?"

Citation:

Calvo-Merino B, Gillmeister H, Haggard P, Forster B (2010) The aesthetics of the human body: A sensorimotor mechanism?. *Body Representation Workshop*. Goldsmiths University of London, 29th March.

Abstract:

Body perception mechanisms rely on both motor and visual processing. Here, we investigate if sensori-motor mechanisms are recruited in a specific or general manner during the observation of body postures. We recorded electroencephalographic (EEG) activity from 18 participants who performed two different tasks, both involving the observation of body postures: A merely perceptual task, in which pairs of body postures were judged for changes in luminance, and an aesthetic task, in which the same pairs were judged for aesthetic preference. Aesthetic perception has often been linked to visual, emotional, or executive functions of the brain. However, a recent functional magnetic resonance imaging (fMRI) study suggested that aesthetic preference correlates with the level of sensori-motor activation during observation of body movements. The present study investigated whether such observation-related sensori-motor activation is specific to aesthetic judgement, or is evoked in a more task-general manner, by examining changes in Mu rhythm activity, which have been related with sensori-motor processing in frontoparietal networks.

Fatma AI, M C Jackson, & Beatriz Calvo-Merino

City University, London

"Working memory capacity for body postures increase with motor expert"

Citation:

AI F, Jackson MC, Calvo-Merino B (2010) Working memory capacity for body postures increase with motor expert. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

Dancers' motor ability influences what their body can do, but also their neural responses and visual sensitivity during dance perception. Here, we aim to explore how dancers' sensorimotor expertise contributes to enhance memory for movements and body postures. Previous studies in working memory (WM) have shown that the WM storage can improve if a visual representation of the item already exists in long term memory. Here, we use dancers' expertise to investigate if WM capacity also benefits from acquired sensori-motor representations. The experiment involved two groups (classical ballet dancers, and control non-dancers). We used a classical change detection task where we manipulated (1) the type of information to remember (classical ballet body postures, Indian body postures), and (2) the set size (arrays will vary from 1 to 6 elements or dance postures). Differences in dancers between ballet and Indian postures will indicate if the expertise effect is specific for learned movements, or general for motor information. A 2x2x6 ANOVA (group, body postures, set size) on the d' scores revealed a significant main effect of group. Further post-hoc tests showed that dancers' memory capacity for body postures was larger than controls', but this effect was not specific to familiar dance postures. We conclude that there is a sensori-motor storage in short term memory that facilitates the processing and retention of motor information. Dancers may use this to learn, and to retain in memory, already acquired movements, as well as while learning new ones.

Mark Gardner & Rosalind Potts

Department of Psychology, University of Westminster

"Hand dominance influences laterality judgements for observed bodies"

Citation:

Gardner M, Potts R (2010) Hand dominance influences laterality judgements for observed bodies. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

OBJECTIVES: In motor tasks, hand dominance has been shown to be associated with differential asymmetries in the spatial distribution of attention about one's own body. The present study examined whether similar attentional biases apply when making laterality judgements about an observed body, in order to investigate the modulatory role of motor competencies for body representation.

METHODS: Sixteen right handers (RHs), 22 consistent left handers (CLHs), and 11 relatively ambidextrous inconsistent left handers (ILHs) made speeded left-right judgements about an object held by a schematic human figure (front- or back-facing). Participants either imagined taking the spatial perspective of the figure in an "own body transformation" task, or responded from their own point of view in a control task.

RESULTS: CLHs' judgements were faster to the figure's left side, while ILHs, like RHs, showed facilitated performance to the figure's right side. These effects were selective to the own body transformation task, and were not found to be affected by the spatial orientation of the figure.

CONCLUSIONS: Attentional biases associated with hand dominance were found to extend to the processing of observed bodies. These results provide evidence for a novel embodiment effect, whereby the processing of a static schematic human figure is modulated by an individual's personal motor capabilities. This finding is consistent with the notion of experience-dependent plasticity in the representation of observed bodies.

Alice Alberici

Goldsmiths, University of London

"The development in young children of direction-dependent multisensory weightings in reaching"

Citation:

[Alberici A](#) (2010) The development in young children of direction-dependent multisensory weightings in reaching. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

In adults, vision plays a dominant role in the perceived location of the arms when stationary, and when reaching. Recently, Bremner and colleagues (submitted) examined changes in visual dominance across early childhood. They used the mirror illusion task (Holmes et al., 2004), in which participants see their left hand on both the left and the right (by virtue of a mirror placed at the midline, facing the left arm, and obscuring the right). The accuracy of reaching was measured when proprioceptive and visual cues to the location of the right arm were put into conflict in the azimuthal dimension (by placing the arms at different distances from the mirror), and also when only proprioceptive information was available (i.e., when the mirror was covered). Bremner et al. (submitted) found that visual capture developed substantially between 5 and 5.75 years, reaching a level comparable with adults by 6.5 years. Here, we report the findings from a second study, in which we compared visual capture of reaching in the mirror illusion task, under conditions of visual-proprioceptive conflict in the azimuthal and radial depth dimensions. Initial findings confirm that children change in the degree to which they are susceptible to the mirror illusion in the azimuthal dimension ($F(3,46)=4.2$, $p<.05$), but indicate no developments in multisensory weightings in the radial depth dimension ($F<1$). These findings are interpreted in the light of demonstrations that adults rely more on vision for locating their limbs in the azimuthal than in the radial depth dimensions (Snijders et al., 2007; van Beers et al., 2002).

References

[Snijders HJ](#), [Holmes NP](#), [Spence C](#) (2007) Direction-dependent integration of vision and proprioception in reaching under the influence of the mirror illusion. *Neuropsychologia*, **45**(3):496-505.

[Holmes NP](#), [Crozier G](#), [Spence C](#) (2004) When mirrors lie: "Visual capture" of arm position impairs reaching performance. *Cognitive, Affective, and Behavioral Neuroscience*, **4**(2):193-200.

[van Beers RJ](#), [Wolpert DM](#), [Haggard P](#) (2002) When feeling is more important than seeing in sensorimotor adaptation. *Current Biology*, **12**(10):834-837.

Marjolein P Kammers

Institute of Cognitive Neuroscience, University College, London

"Touching on temperature and pain"

Citation:

[Kammers MPM](#) (2010) Touching on temperature and pain. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

The inhibitory effects of touch on pain have been extensively studied, and are widely-known: When one hand is hurt, we immediately grab it with the other hand and squeeze hard. This modulation of pain has been studied in terms of low-level interactions between touch and nociception. Here, we show that a classic model of low-level interactions within the pain system (the thermal grill illusion) can be modulated by increasing coherence in the higher-level body representation via self-touch. In the thermal grill illusion, people touch two warm objects surrounding a central, mildly cool object. Paradoxically the central, cool object feels painfully hot, by suppression of the normal inhibition of the pain pathway. Many studies have already linked reorganization of neural body representations, such as somatosensory maps, to central pain. Our main finding shows that increasing the coherence of one's body representation through self-touch provokes a dramatic reduction of acute thermal pain. Tactile and thermal control conditions show that this paradoxical release from paradoxical heat cannot be explained solely by low-level interactions. Instead, this reduction of acute pain is shaped not only by touch and/or by temperature feedback per se, but also by the restored body coherence and knowledge that one is touching oneself.

Alyanne de Haan

Utrecht University

"Fingers crossed! An investigation of somatotopic representations using temporal order judgements"

Citation:

[de Haan A](#) (2010) Fingers crossed! An investigation of somatotopic representations using temporal order judgements. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

Processing of tactile stimuli requires both localization of the stimuli on the body surface according to a somatotopic reference frame, and combination of this information with a representation of external space. Yamamoto and Kitazawa (2001) showed that, when processing tactile stimuli applied to crossed hands, the system first assumes a prototypical positioning of the limbs. The crossed posture is included within 300ms, and the representation of the stimuli is remapped accordingly. Since the fingers have been suggested to be represented in a mainly somatotopic reference frame, we expected that it might lack this remapping system. We asked participants to report the direction of movement of two tactile stimuli, applied successively to the crossed or uncrossed index and middle finger of one hand with different inter-stimulus intervals (ranging from 15 to 750ms). Participants reversed the perceived direction of the stimuli when crossing the fingers, even after 750ms, suggesting that they did not integrate the crossed finger positions. Thus, our results are in agreement with the idea that the processing of tactile stimuli at first assumes a prototypical positioning of limbs, by processing the input according to a somatotopic reference frame. While for hands, this representation can be remapped to include the spatial posture of the hands, the representation of fingers does not seem to have such flexibility. This suggests that the localization of stimuli in a somatotopic reference and the integration of an external reference frame are two distinctly separate processes that are applied differently to the hands and fingers.

Reference

[Yamamoto S](#), [Kitazawa S](#) (2001) Reversal of subjective temporal order due to arm crossing. *Nature Neuroscience*, **4**(7):759-765.

Christa Nijens

Utrecht University

"The influence of object identity on obstacle avoidance reaching behaviour"

Citation:

[Nijens C](#) (2010) The influence of object identity on obstacle avoidance reaching behaviour. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

When reaching out for target objects, we hardly ever collide with other objects located in our working environment. Behavioural studies have demonstrated that the introduction of non-target objects into the workspace alters both spatial and temporal parameters of reaching trajectories. Although this obstacle avoidance takes place without effort, and often unconsciously, complex mechanisms are involved that incorporate visual information about the location of potential obstacles into motor plans and execution. Recent studies on neurological patients revealed the crucial role of the visual dorsal stream in obstacle avoidance, while intact visual ventral stream processing does not seem to be required (Schindler et al., 2004; Rice, 2006; McIntosh et al., 2003). However, obstacle identity (involving ventral stream processing), may also play a role in programming avoidance responses, as this allows prediction of possible negative consequences of collision. In this study, we test this hypothesis by asking participants to reach towards a target as quickly as possible, in the presence of an empty or a full glass of water. While the spatial features of these obstacles are the same, the consequences of collision are clearly different. Results will be discussed in terms of influences of obstacle identity on reaching trajectories and motor planning.

References

[Rice NJ](#), [McIntosh RD](#), [Schindler J](#), [Mon-Williams M](#), [Démonet J](#), [Milner AD](#) (2006) Intact automatic avoidance of obstacles in patients with visual form agnosia. *Experimental Brain Research*, **174**(1):176-188.

[McIntosh RD](#), [McClements KJ](#), [Schindler J](#), [Cassidy TP](#), [Birchall D](#), [Milner AD](#) (2004) Avoidance of obstacles in the absence of visual awareness. *Proceedings of the Royal Society of London, B: Biological Sciences*, **271**(1534):15-20.

[Schindler J](#), [Rice NJ](#), [McIntosh RD](#), [Rossetti YRC](#), [Vighetto A](#), [Milner AD](#) (2004) Automatic avoidance of obstacles is a dorsal stream function: evidence from optic ataxia. *Nature Neuroscience*, **7**(7):779-784.

Annalisa Xaiz, Juliette Richetin, Angelo Maravita, & Marco Perugini

Facolta di Psicologia, Universita di Milano Bicocca

"Is this mine? Self body recognition depends on implicit self-esteem"

Citation:

Xaiz A, Richetin J, Maravita A, Perugini M (2010) Is this mine? Self body recognition depends on implicit self-esteem. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

The past few years have seen a remarkable increase in research on visual perception of the human body. In the present study, we focused on the ability to recognize self body-parts. Our aim was twofold: First, we examined the extent to which people are able to recognize their own body-parts among distractors; Second, and importantly, we investigated whether this self-recognition ability is modulated by personality traits such as self-esteem. Both explicit (self-esteem scale, Rosenberg, 1965) and implicit (implicit association test, IAT, Greenwald et al., 1998) measures of self-esteem were used. Results in the explicit body recognition task showed an equal frequency of correct responses with self and other stimuli. However, participants responded faster to their own body-parts. The self-esteem IAT was significantly correlated with the d' score in the explicit body recognition task, implying that people with higher implicit self-esteem are more capable of recognizing their own body-parts. This result was confirmed, and further qualified, by a significant interaction between the self-esteem IAT and the explicit self-esteem scale, as detected in a multiple regression on the d' score. The explicit self-esteem was not a significant predictor, whereas the decomposition of the interaction effect revealed that participants who scored high on both implicit and explicit self-esteem (defined in the relevant literature as "secure self-esteem") were remarkably good at recognizing their own body-parts. The results therefore imply that the recognition of one's own body, rather than being a basic invariant capability, can be systematically affected by stable individual differences.

References

[Rosenberg M](#) (1965) *Society and the adolescent self-image*. Princeton University Press, Princeton, NJ.

[Greenwald AG](#), [McGhee DE](#), [Schwartz JLK](#) (1998) Measuring individual differences in implicit cognition: The implicit association test. *Journal of Personality And Social Psychology*, **74**(6):1464-1480.

Guido Orgs & Patrick Haggard

Institute of Cognitive Neuroscience, University College, London

"Temporal binding during illusory movement of the human body"

Citation:

Orgs G, Haggard P (2010) Temporal binding during illusory movement of the human body. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

We report a study investigating apparent biological motion and its influence on time perception. We presented pairs of pictures of a human body in different postures, separated by six different stimulus onset asynchronies (SOAs). The shortest movement path between the two postures was always biomechanically impossible. Participants performed two tasks: In a direct task, participants judged whether they saw a possible or an impossible path between the two pictures; In an indirect task, participants judged how long a picture pair had been presented. At longer SOAs, participants were more likely to see a biomechanically possible movement (direct task), and underestimated the duration of body picture pairs, as compared to trials displaying scrambled control stimuli (indirect task). We argue that subjective time may be biased by dynamic representations of human movement, providing a new method to study biological motion perception in the absence of kinematic cues.

Duncan Brown

Goldsmiths, University of London

"The attentional brain network and motor preparation in adults with developmental coordination disorder: An EEG study"

Citation:

[Brown D](#) (2010) The attentional brain network and motor preparation in adults with developmental coordination disorder: An EEG study. *Body Representation Workshop*, Goldsmiths University of London, 29th March.

Abstract:

Individuals with developmental coordination disorder (DCD) often present with dysfunctional motor skills, associated with impaired attention and executive functioning. The objective of this study was to examine the impact of DCD on attentional cognitive processes and motor preparation. Relationships between spatial attention and motor responses were investigated by means of the electroencephalogram (EEG). Measurements involved EEG potentials elicited by covert shifts of attention, as well as by the selection of a hand or target location for responding. Adult participants with (N=15) and without DCD (N=15) performed a stimulus compatible or incompatible go-nogo task, during which covert visual probes were presented to the effector or target location. Lateralised event-related potential (ERP) components indicated that individuals with DCD exhibit a distinctive difference regarding activation and a decision-related function of the frontoparietal attention network, as compared to the control group. This may suggest a deficiency in the ability of DCD individuals to modulate spatial attention during the motor programming phase of coordinated unimanual movement.