



Welcome to the RIO 2019 Newsletter!

After another fantastic RIO group meeting at Bielefeld University in April, we return with the third edition of the Research in Imagery and Observation (RIO) group newsletter! The purpose of this newsletter is to provide updates relevant to RIO and to highlight research developments from individuals and groups within RIO.

Save the Date – 25-26 April 2019 RIO Group Meeting

The RIO group organisers are looking forward to seeing all group members for the 2019 RIO group meeting in the North East of England. This year's meeting will take place on the 25-26th April at Teesside University, and will be hosted by Daniel Eaves as local organiser. We hope to build on the success of recent meetings and it will be great to see everyone at the event! We are excited to confirm our invited speakers for RIO 2019:

[Dr Robert Hardwick \(KU Leuven, Belgium\)](#)



Dr Robert Hardwick examines how humans control movements and learn skills, using a multimodal approach that combines behavioural experiments, non-invasive brain stimulation, and neuroimaging. He examines how we initially learn movement skills, and automate skills through extensive practice. He investigates adverse effects of age and stroke on motor control, and how imagining and observing actions affects the motor system. We believe Rob's research bridges several areas of interest for RIO members.

[Dr Richard Ramsey \(Bangor University\)](#)



Under the directorship of Dr. Richard Ramsey and Prof. Emily Cross (University of Glasgow), research in the Social Brain in Action (SoBA) Lab explores how humans perceive and interact with other people (and robots!) in a social world. Broadly speaking, SoBA Lab research falls within the domains of Social Cognition, Social Neuroscience and Cognitive Neuroscience. We believe this work, comprising Richard's behavioral and neuroimaging research into automatic imitation will be insightful for RIO members.

Abstract submission and conference details

We encourage all delegates to present their research (oral presentations and posters) at the annual RIO Group conference 2019

To submit an abstract, please download an abstract submission form from the website: [link](#)

The deadline for abstract submission is at midnight on Monday 4 March 2019

Please send your completed abstract submission form to: riogroup.weebly@gmail.com

We intend to send an email to each speaker to confirm acceptance of their presentation within two weeks of submitting the form. Please indicate in your submission email if this time frame is suitable, for example, in relation to your institution's internal conference booking timelines

The conference is free for all our speakers and delegates to attend

In the run up to the event we will update all members via email. If you wish to be removed from this mailing list, please send a message to the above email address

For travel arrangements, please see information on the university website: [link](#)

Accommodation information will be posted soon on our own website. For any questions in the mean time, feel free to contact the local organiser Dr Daniel Eaves (d.eaves@tees.ac.uk)

We look forward to receiving your abstracts and welcoming you to Teesside University, for yet another engaging and thought provoking RIO Group event!

You may also wish to follow us on twitter: [@_RIOgroup_](#)



[The Laboratory for Brain Recovery and Function](#) recently wrapped up a project examining the role of the inferior parietal lobe in processes underlying motor imagery - showing that the inferior parietal lobe is critical to the manipulation/controllability of motor images.



A recently published paper (Ingram et al. 2018) also examining imagery showed that it can be used to learn a complex motor skill. These results are driving work that we are currently undertaking related to how errors are detected and corrected via imagery. One study in this line of research evaluates the inferior parietal lobe's importance in motor imagery-based learning. Stay tuned for the papers reporting these findings!



We also wrapped up a project comparing the evolution of learning via motor imagery relative to physical practice, assessing changes in both brain activation and improvements in performance (this work will likely be presented at the upcoming RIO meeting)! Lastly, we have launched a project examining cortical excitability during motor imagery, to inform on the optimal parameters for imagery-based practice.



Finally, we are undertaking a new line of work employing paradigms from the motor control literature to investigate the nature of information being acquired when using motor imagery to learn motor tasks. Our team is looking forward to the upcoming RIO meeting in Teesside, particularly as we want to explore possibilities for some trans-Atlantic research projects in imagery and/or observation.



Recent publications:

- [Ingram TGJ, Solomon JP, Westwood DA, Boe SG. Movement related sensory feedback is not necessary for learning to execute a motor skill. Behavioural Brain Research, 2018 In-press](#)
- [Solomon JP, Kraeutner SN, Boe Process dissociation procedure improves assessment of motor imagery ability using implicit sequence learning. Imagination, Cognition & PersonalitySG., 2018 In-press](#)
- [Kraeutner SN, McWhinney SR, Solomon JP, Dithurbide L, Boe SG. Experience modulates motor imagery-based brain activity. European Journal of Neuroscience, 2018, 47\(10\), 1221-1229. doi: 10.1111/ejn.13900](#)

For more information on this or other projects in our lab, contact Shaun Boe (s.boe@dal.ca) or follow us on Twitter, [@dalLBRF](https://twitter.com/dalLBRF).



In collaboration with Prof. David Shearer (University of South Wales), I am continuing to research imagery and observation-based interventions as a means to improve performance in sport. Several of our BSc and MSc students are exploring the effectiveness of AO+MI as either motor learning or performance interventions across different individual and team sports, with some hoping to present at the RIO meeting in Teesside this year.



Samantha Chye has started her PhD at Roehampton in October under the supervision of Dave and I. Samantha previously studied Psychology at University College London and both competes in and coaches Brazilian Jiu-Jitsu. Her PhD is exploring the effects of AO+MI as a learning and performance intervention in this combat sport.



I had a productive research sabbatical in Spring 2018 and managed to submit and publish several papers on imagery and observation. I also managed to spend several weeks in Manchester with Dave Wright and the MMU group and completed data collection on an exciting project exploring AO+MI using TMS and eye-tracking (watch this space!).

Recent publications:

- [Diss, C. E., Doyle, S., Moore, I. S., Mellalieu, S. D., & Bruton, A. M. \(2018\). Examining the effects of combined gait retraining and video self-modeling on habitual runners experiencing knee pain: A pilot study. *Translational Sports Medicine*, 1\(6\), 273-282. doi: 10.1002/tsm2.47](#)
- [Shearer, D., Bruton, A., Short, S., & Roderique-Davies, G. \(2018\). Effects of sleep quality on imagery ability in athletic populations. *Imagination, Cognition and Personality*, 37\(4\), 394-411](#)
- [Wright, D. J., Wood, G., Eaves, D. L., Bruton, A. M., Frank, C., & Franklin, Z. C. \(2018\). Corticospinal excitability is facilitated by combined action observation and motor imagery of a basketball free throw. *Psychology of Sport and Exercise*, 39, 114-121. doi:10.1016/j.psychsport.2018.08.006](#)



We are looking forward to hosting RIO 2019 at Teesside University, 25-26 April! It's been a productive year at Teesside University. We continue to explore the neural and behavioural effects of action observation and motor imagery, producing a number of publications in the last year. We anticipate data from at least three on-going projects will be presented at RIO 2019.



We have been investigating combined observation and imagery effects in target populations, including children with and without developmental coordination disorder, stroke survivors and adults with depression and/or agency misattribution. In the former, Matt Scott recently submitted his first PhD study for journal review. In the latter, Jonathan Emerson is using functional near-infrared spectroscopy to examine hemispheric lateralisation effects, aiming to present at the next RIO event. For Jack Binks' PhD, our collaborative research with Teesside Stroke Club, in partnership with Public Health South Tees, has presented us with many opportunities. Working with stroke patients, who are in various stages of motor recovery, has been inspiring. We are currently investigating if combined action observation and motor imagery therapy is a useful way to enhance post-stroke motor rehabilitation, supported by our recent paper on this topic (Emerson et al., 2018).



In our team, Ryan Kenny has submitted three of his PhD chapters for publication review – well done Ryan! Ryan is investigating the effects of textured insoles on the cortical control of balance, using EEG.

Dan is also involved in the Many Smiles Collaboration: A Multi-Lab Foundational Replication of the Facial Feedback Hypothesis, which examines automatic imitation in facial expression, in collaboration with Dr Natalie Butcher at Teesside University.

Recent publications:

- [Eaves DL, Griffiths N, Burridge E, McBain T, Butcher N \(in press\) Seeing a drummer's performance modulates the subjective experience of groove when listening to popular music drum patterns. *Musicae Scientiae*](#)
- [Emerson JR, Binks JA, Scott MW, Kenny RPW, Eaves DL \(2018\) Combined action observation and motor imagery therapy: a novel method for post-stroke motor rehabilitation. *AIMS Neuroscience*. 5 \(4\) 236-252](#)
- [Wright DJ, Wood G, Eaves DL, Bruton AM, Frank C, Franklin ZC \(2018\). Corticospinal excitability is facilitated by combined action observation and motor imagery of a basketball free throw. *Psychology of Sport and Exercise*, 39, 114-121](#)
- [Eaves DL, Emerson JR, Binks JA, Scott MW, Kenny RPW \(2018\) Imagery ability: the individual difference gradient and novel training methods. *European Journal of Neuroscience*. 1-2](#)

Press release:

- [New rehabilitation methods for improving recovery after a stroke](#)

Update from Cornelia Frank, Bielefeld University



Thank you all for coming to Bielefeld for our annual meeting last year; we enjoyed having you around and discussing RIO pieces of work!



In the [Social Motor Learning Lab](#) of the Neurocognition and Action Group at Bielefeld University in Germany, our RIO work continues: I've published work on observation and the development of action representations (Frank et al. 2018a) as well as team action imagery and the development of tactical skill representations (Frank et al. 2018b). Work in collaborative teams has led into publications with David Wright on corticospinal excitability comparing AO, MI and AO+MI (Wright et al. 2018), on imagery and learning in gymnastics in competitive sports (Simonsmeier et al., 2018) and imagery in physical education (Menze-Sonneck et al., in press). More recently, I've used immersive virtual reality to investigate new types of augmented feedback during AO+ME as well as AO+MI (e. g., watching myself together with a skilled performance whilst executing (Hülsmann, Frank et al., under review) or watching myself performing at a future skill level whilst imagining).



PhD student Taeho Kim has published two manuscripts in the last year (Kim et al., 2018; Park et al., 2018) and participated in the Congress of the Asian-South Pacific Association of Sport Psychology (ASPASP) as well as in the RIO meeting. He is currently in the process of finishing his thesis.



PhD student Alessio D'Aquino is continuing his investigation into eye movements in both motor imagery and execution. He attended workshops in Bayesian modeling (Bayesian Modeling for Cognitive Science 2018) and eye-tracking research and applications (ETRA 2018), joined the last RIO meeting and recently submitted his first manuscript "Exploring Gaze Behavior in Motor Execution and Motor Imagery during Manual Interception" to the Journal of Vision (JOV).

Maaike Esselaar finished her master thesis and moved to Manchester to start pursuing her PhD in the group of Paul Holmes – viel Erfolg!

Recent publications:

- [Frank, C., Kim, T., & Schack, T. \(2018a\). Observational practice promotes action-related order-information in long-term memory. Journal of Motor Learning and Development, 6\(1\), 53-72](#)
- [Frank, C., Linstromberg, G.-L., Hennig, L., Heinen, T., & Schack, T. \(2018b\). Team action imagery: Imagery of game situations and required team actions promotes a functional structure in players' representations of team-level tactics. Journal of Sport and Exercise Psychology, 40, 20-30](#)
- Kim, T. Park, & Schack, T. (in press). A functional link between mental representation in long-term memory and cognitive performance in working memory. *Advances in Cognitive Psychology*
- Menze-Sonneck, A., Bekemeier, K., & Frank, C. (in press). Stell dir vor! Vorstellungstraining zur Unterstützung von Lernprozessen am Beispiel des Schulturnens in der Sekundarstufe II. *Sportunterricht*
- [Park, H., & Kim, T. \(2018\). Effect of stromotion action observation on activation of the supplementary motor area. International Journal of Sport Psychology, 49\(4\), 349-361](#)
- [Simonsmeier, B. A., Frank, C., Gubelmann, H., & Schneider, M. \(2018\). The effects of motor imagery training on performance and mental representation of 7- to 15-year-old gymnasts of different levels of expertise. Sport, Exercise, and Performance Psychology, 7, 155-168](#)
- [Wright DJ, Wood G, Eaves DL, Bruton AM, Frank C, Franklin ZC \(2018\). Corticospinal excitability is facilitated by combined action observation and motor imagery of a basketball free throw. Psychology of Sport and Exercise, 39, 114-121](#)



The research of the group is allocated at the intersection of neuropsychology and neurorehabilitation. In brief, we are interested in how the treatment of impairments resulting from central nervous disorders can benefit from neurocognitive approaches and theories. Our research currently focuses on using motor imagery to support neurorehabilitation, for instance following stroke or in Parkinson's disease. We conduct studies with healthy volunteers and patients in which we combine motor imagery with lab-based or mobile neurofeedback setups. As feedback modalities we focus on EEG and fNIRS. Just as important for our group is research aimed at learning more about motor imagery and motor cognition in the absence of neurofeedback. We strive to implement what we learn from our studies with healthy volunteers in our work with patients.



The group currently consists of head Conny Kranczioch, Master student Julius Welzel, PhD students Mareike Daeglau and Franziska Klein, postdoc Joost Meekes and affiliated postdoc Catharina Zich. In the past year, we presented our research on motor imagery at RIO 2018, CuttingEEG in Paris, the meeting of the fNIRS society in Tokyo, the 3rd International Mobile Brain/Body Imaging Conference in Berlin, Psychologie & Gehirn, the meeting of the Biopsychology and Neuropsychology section of the German Psychological Society, and a national meeting where Master's students present their research (Forschen und Lehren in studentischer Hand). Here Julius won the Best Poster Award for a poster presenting his pre-thesis research on EEG neurofeedback.



Recent publications:

- [Braun N., Kranczioch C., Liepert J., Dettmers C., Zich C., Büsching I., Debener S. \(2017\). Motor Imagery Impairment in Postacute Stroke Patients. *Neural Plasticity*](#)
- [Zich C., Debener S., Thoene A.K., Chen L.C., Kranczioch C. \(2017\). Simultaneous EEG-fNIRS reveals how age and feedback affect motor imagery signatures. *Neurobiology of Aging*, 49, 183-197](#)
- [Zich C., Debener S., Schweinitz C., Sterr A., Meekes J., Kranczioch C. \(2017\). High-Intensity Chronic Stroke Motor Imagery Neurofeedback Training at Home: Three Case Reports. *Clinical EEG and Neuroscience*](#)
- [Zich C., Harty S., Kranczioch C., Mansfield K.L., Sella F., Debener S., Cohen Kadosh R. \(2017\). Modulating hemispheric lateralization by brain stimulation yields gain in mental and physical activity. *Scientific Reports*, 7, article 13430](#)



[The Motor Cognition Research Group](#) are continuing to explore the cortical and behavioural effects of action observation and motor imagery interventions. This research has resulted in several publications within the past year (see below). In addition, we have data collected or under review for a number of other projects and anticipate that we will present data from at least two of these projects in Teesside at RIO 2019. Martin Riach and Ben Marshall both defended their PhDs successfully within the last couple of months and both have secured employment in industry positions. Ben is now working as an Account Manager for Tobii Pro UK Limited and Martin will start a graduate training scheme with IBM in March. Congratulations to both of them!



Three new PhD students have joined the team in January and will work on projects related to action observation and motor imagery.



River Rea joined from Liverpool Hope University and will work with Niki Ray, Paul Holmes, Chesney Craig and Dave Wright to explore the effects of combined action observation and motor imagery interventions in Parkinson's patients.



Maaike Esselaar has joined us from Bielefeld University and will work with Zoe Franklin, Paul Holmes, Dave Wright, Jo Nijs and Dave Smith to explore the effects of attentional biases in action observation in pain patients.



Jodi Ventre, a past MSc student at Manchester Met, will work with Chesney, Paul, and Niki to explore some of the psychophysiological and motor control aspects of falls in middle aged adults.



We hope that River, Maaike, and Jodi will attend and present their work at future RIO events.

Recent publications:

- [Franklin, Z. C., Holmes, P. S., & Fowler, N. E. \(2019\). Eye gaze markers indicate visual attention to threatening images in individuals with chronic back pain. Journal of Clinical Medicine, 8, 31. doi:10.3390/jcm8010031](#)
- [Riach, M., Holmes, P. S., Franklin, Z. C., & Wright, D. J. \(2018\). Observation of an action with a congruent contextual background facilitates corticospinal excitability: A combined TMS and eye-tracking experiment. Neuropsychologia, 119, 157-164](#)
- [Romano-Smith, S., Wood, G., Wright, D. J., & Wakefield, C. J. \(2018\). Simultaneous and alternate action observation and motor imagery combinations improve aiming performance. Psychology of Sport and Exercise, 38, 100-106](#)
- [Smith, D., Romano-Smith, S., Wright, D. J., Deller-Rust, B., & Wakefield, C. J. \(in press\). The effects of combining PETTLEP imagery and action observation on bicep strength: A single case design. Journal of Applied Sport Psychology](#)
- [Wright, D. J., Wood, G., Eaves, D. L., Bruton, A., Frank, C., & Franklin, Z. C. \(2018\). Corticospinal excitability is facilitated by combined action observation and motor imagery of a basketball free throw. Psychology of Sport and Exercise, 39, 114-121](#)

Update from Martina Parizkova, Charles University, Prague, Czech Republic

In the Spatial Cognition Lab which is a part of the Cognitive Centre at the Department of Neurology we are interested in early cognitive changes in neurodegenerative diseases. We focus especially on Alzheimer's disease, where spatial navigation impairment is present in the very early stages. We use experimental cognitive tasks derived from animal research including real-space, two- and three-dimensional computerized spatial navigation tasks. The second focus of our lab are neural brain correlates of cognitive functions, especially of spatial navigation. For this purpose we use structural brain MRI with volumetric and DTI sequences. This year we have published a manuscript on spatial navigation strategies and associated brain structures in Alzheimer's disease. We showed that progression of cognitive deficit is associated with a shift in preference of navigational strategies and can be related to hippocampal and basal forebrain atrophy.

Recently, we have started using eye-tracking to analyze spatial navigation behavior and to investigate changes of gaze behavior during navigation as it may be useful for identifying individuals who are at higher risk of developing Alzheimer's disease. We also work on implementation of spatial navigation tasks into virtual reality to investigate spatial navigation in realistic-looking environment in participants at higher risk of developing Alzheimer's disease.

Recent publication:

- [Parizkova M, Lerch O, Moffat SD, Andel R, Mazancova AF, Nedelska Z, Vyhnalek M, Hort J, Laczó J \(2018\). The effect of Alzheimer's disease on spatial navigation strategies. *Neurobiology of Aging*; 64:107-115](#)

Martina, we look forward to welcoming you and your team at a RIO event in the future!

RIO Notices

Journal Special Issues

- It was excellent to see a substantial special issue published in *Neural Plasticity* titled [Boosting Action Observation and Motor Imagery to Promote Plasticity and Learning](#) edited by Ambra Bisio and colleagues
- There was also a highly informative Special Issue in the *Journal of Motor Development* on [Observation and Motor Skill Acquisition](#) edited by Diane Ste-Marie

We would like thank all group members who contributed towards this information-packed newsletter and hope it has been an interesting read. We look forward to seeing you all in Teesside!

