Bestmannlab.com

**"Without actions, our thoughts remain silent"**

ABOUT

A fundamental feature of our behaviour is the ability to flexibly and efficiently prepare and specify our actions in response to changes in the world. Our current research a focuses on how the value of actions, our temporal expectations, or the emotional valence of events are ultimately transformed into actions.

**WHAT**

"***Thinking is easy, acting is difficult, and to put one's thoughts into action is the most difficult thing in the world***" – after Johann Wolfgang von Goethe

<http://en.wikipedia.org/wiki/Johann_Wolfgang_von_Goethe>

Perception, cognition, and action selection have traditionally been considered (and studied) as largely independent processes. The brain, however, is unlikely to adhere to these text book divisions, and while functional specialization is critical, activity deployment in the brain does not follow these boundaries.

One of the unresolved questions that have bedazzled neuroscientists ever since Charles Sherrington <http://en.wikipedia.org/wiki/Charles_Scott_Sherrington> provided the first detailed ‘motor map’ of the primate motor cortex: How does our brain transform our thoughts into actions?  
  
Addressing this question is important for understanding how the brain enables interaction with an ever-changing and uncertain environment, and how this ability declines with ageing or in pathological conditions that are characterised by impairments of both action and cognition, such as Parkinson’s disease, Depression, or Stroke.

RESEARCH

Our research is organised along several complementary themes:

**Action preparation and selection**

**Value-based decisions for actions**

**Reinforcement and rehabilitation**

**Uncertainty and skilled action**

**Emotions and Action**

We approach each theme with a variety of techniques:

**Concurrent TMS-fMRI** **and combined TMS-neuroimaging**

**Neuromodulation**

**Pharmacology**

**Modelling**

**How:**

We apply a multi-disciplinary and approach and use a number of different yet complementary state-of-the-art techniques of complementary strengths to address our research questions.

Neurostimulation and Neuromodulation

TMS and tDCS

functional neuroimaging

fMRI, EEG, MRS

Computational modelling and model-based analyses

Pharmacology

drug, neurostimulation, concurrent TMS-fMRI

#### Funding

BBSRC David Phillips Fellowship (2008-2013). Principal Investigator. “Biasing influence on the motor system during action preparation: a multimodal neuroimaging-computationally informed approach

European Research Council (ERC) Starting Grant (2011-2016). Principal Investigator. “Action Selection under Contextual Uncertainty: the Role of Learning and Effective Connectivity in the Human Brain.”

BBSRC international partnering award (2011-2015). Principal Investigator. “Establishing a trans-atlantic partnership for studying the neural networks for motor skill learning in the human brain”

**Sources of funding:**

European Research Council (**[ERC](http://erc.europa.eu/" \t "_blank)**)

**[Medical](http://www.wellcome.ac.uk/" \t "_blank)** Research Council

Brain research trust

Biotechnology and Biological Sciences Research Council (**[BBSRC](http://www.bbsrc.ac.uk/" \t "_blank)**)

Our collaborators at UCL:

**[Nick Ward](http://www.ion.ucl.ac.uk/departments/sobell/Research/NWard" \t "_blank)** (Sobell Department, Institute of Neurology, UCL) 

Paul Bays

John Rothwell

Steve “Lord” Kennerley

Ray Dolan

Karl Friston

Peter Dayan

And those working elsewhere:

**[Chris Chambers](http://www.cardiff.ac.uk/psych/contactsandpeople/researchfellows/chambers-chris-dr-overview_new.html" \t "_self)** (CUBRIC, Cardiff)

**[Rogier Mars](http://www.rbmars.dds.nl/" \t "_blank)** (University of Oxford)

**[Marom Bikson](http://bme.ccny.cuny.edu/people/faculty/mbikson" \t "_blank)** (City College of New York)

**[Joe Galea](http://www.birmingham.ac.uk/schools/psychology/people/profile.aspx?ReferenceId=52657" \t "_self)** (University of Birmingham)

Bas Neggers (Utrecht University, Holland)

Michael Nitsche (University Goettingen, Germany)

Hiroaki Gomi (NYY, Japan)

**TEAM**

**Sven Bestmann**

**Brief CV**

#### PhD

**PhD**(Neurological studies), University College London, UK

Title: “Physiological characterisation of Transcranial Magnetic Stimulation (TMS) using Functional Magnetic Resonance Imaging (fMRI)”. Funded by the European Graduate School “Neuroplasticity: From Molecules to Systems”

**Post-doc:** Functional imaging lab (FIL), under supervision of Prof Jon Driver

**Alumni / past lab members:**

**[Miriam Klein-Flügge](http://www.fil.ion.ucl.ac.uk/~mklein/" \t "_blank)**, PhD student; Currently a Post-Doc working with Tim Behrens at the FIL

Dorothea Hammerer, Visiting Post-Doc; currently working at the Max Plank Institute for Human Development, Berlin

Friederike Schuur, PhD student; currently a Post-Doc with Larry Maloney at NYU

Helen Barron, PhD Student; currently a PhD student with Tim Behrens at the FIL

Harriet Feldman, PhD Student; currently a PhD student with Karl Friston at the FIL

Bastian Söhnchen, MSc Student; Currently a PhD student at the University of Würzburg

Katie Fisher, MSc student, now a PhD student at Birkbeck College London

David Nobbs, MSc Student; currently a PhD student at the Institute of Child Health

Eleonore Haussner, BSc in Psychology Student

Yezen Sammaraiee, BSc student

**Contact details**

Sven Bestmann

Reader in Motor Neuroscience

**ERC** Starting Grant Holder

***Member Young Academy of Europe***

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Feel free to **[email](mailto:s.bestmann@ion.ucl.ac.uk" \t "_self)** me with any questions.

**Where?**

Our labs and offices are located at Queen Square 33, 4th floor.

Our imaging studies (using functional MRI and magnetoencephalography) are conducted at the Wellcome Trust Centre for Neuroimaging (**[FIL](http://www.fil.ion.ucl.ac.uk/" \t "_self)**), which is just across the Square

How to get to us?

Tubing/Bussing  
Queen Square is halfway between the Holborn (Piccadilly and Central Lines) and Russell Square (Piccadilly Line) Tube stations.

By Car:  
This is central London, so best not to come by car. The traffic wardens are notoriously efficient. And traffic often awful.

By Rail:  
Queen Square is roughly half a mile south of St. Pancras, Kings Cross and Euston Stations. From Kings Cross, Russell Square underground is one stop on the Piccadilly Line. Euston Station it is a short walk down Woburn Place.

By Air:  
**[London Heathrow](http://www.heathrowairport.com/" \t "_blank)** is on the Piccadilly Line, journey time one hour. **[Gatwick Airport](http://www.gatwickairport.com/" \t "_blank)** has a fast link with London Victoria Station, journey time 30-35 mins and **[London Stansted](http://www.stanstedairport.com/" \t "_blank)** has a fast connection to London Liverpool Street Station, journey time 45 mins. London City Airport is about 40 minutes from here.

**NEWS**

**December 2013**

2nd-3rd Dec Sven will visit NTT, Tokyo, Japan

**November 2013**

22-23rd Nov Sven will speak at the **[2013 NYC Neuromodulation](http://nycneuromodulation.com/program.html" \t "_self)** conference

**September 2013**

**Louise Marshall and Archy de Berker are joining the lab as a PhD students!**

New paper "Predicting the behavioural impact of transcranial direct current stimulation: issues and limitations" by de Berker, Bikson, Bestmann accepted in **Frontiers Human Neuroscience**

**August 2013**

**INTERLULL**

**July 2013**

New paper "High Precision Anatomy for MEG" by Troebinger L, Lopez JL, Lutti A, Bradbury D, Bestmann S, Barnes G accepted for publication in **Neuroimage**

**May 2013**

**Graziella Quattrocchi joined our Lab as a PhD student!**

Sven to speak about action selection and decision making at the Danish Research Centre for Magnetic Resonance

Louise Marshall and Archy de Berker have started their lab rotations!

Sven will speak at the Aalto TMS symposium in Helsinki on the 17th.

**April 2013**

Sven to give the keynote lecture at this year's British Association for Cognitive Neuroscience meeting in Nottingham, on "Action selection"

**Feb 2013**

New paper "Combined neurostimulation and neuroimaging in cognitive neuroscience: past, present and future" accepted for publication in **Annals of the New York Academy of Science**, by **Bestmann** **S** & Feredoes E

**Jan 2013**

Miriam's paper**"**"Variability of human cortico-spinal excitability tracks the state of action preparation" by Klein-Flugge M, Nobbs D, Pitcher J, Bestmann S has been accepted in the**Journal of Neuroscience**

**Jan 2013**

Book chapter "Noninvasive Brain Stimulation and Neuroimaging: Novel Ways of Assessing Causal Relationships in Brain Networks" by O'Shea, Thut and Bestmann, has been published in "**Transcranial Magnetic Stimulation" of the Frontiers in Neuroscience Series**, Eds. Miniussi, Paulus, Rossini.

Joe's new paperaccepted in the**Journal of Neuroscience: "**Punishment induced behavioural and neurophysiological variability reveals dopamine-dependent selection of kinematic movement parameters" by Galea J, Ruge D, Buijink A, Bestmann S, Rothwell JC.

**Dec 2012**

14th Departmental Christmas party!!!! Don't plan anything the day after!

7th Sven attends the 1st Annual meeting of the Young Academy of Europe (http://www.yacadeuro.org/index.htm)

**Nov 2012**

New paper entitled "Muscle and timing-specific functional connectivity between the dorsolateral prefrontal cortex and the primary motor cortex" accepted in **Journal of Cognitive Neuroscience**, by Hasan, Galea, Casula, Falkai, Bestmann, Rothwell.

Bastian Soehnchen from Maastricht University joined our lab for 9 months

**Oct 2012**

Sven will attend this year's Society for Neuroscience meeting in New Orleans. He will present Miriam's poster "Variability of cortico-spinal excitability tracks the preparatory state of human motor cortex"Poster number 890.15, MM3\*\*, Wednesday 3-4pm

**26-29th** Reatreat time. This year in the lovely Pyrenees mountains!!!!!!

23rd Sven will give a lecture at the Donders Centre in Nijmegen, on "Mechanisms for turning decisions into actions"

4th Sven will speak at the Foundation of Human Social Behaviour seminar series, University of Zurich, about "Mechanisms for turning decisions into actions"

**Sept 2012**17-20th Sven to give two lectures at the III International Symposium on Neuromodulation, in Sao Paulo, Brazil.

New paper accepted in the **Journal of Neuroscience**, entitled "Left dorsal premotor cortex and supramarginal gyrus complement each other during rapid action reprogramming" by Hartwigsen, Bestmann, Ward, Woerbel, Mastroeni, Granert, Siebner

**August 2012**16-17th Sven is speaking at the "Motivation and Action" ESF workshop, in Copenhagen. His talk is entitled "Decisions for valuable actions shape action representations"

**June 2012**Sven will talk on "Dopamine and Action Sequences" at the first Free Energy Principle workshop, Wellcome Trust Centre for Neuroimaging, London.

**May 2012**12-13th Magstim Neuroscience Conference and Workshop will take place in Oxford. For details, please click **[here](http://www.magstim.com/magstim-neuroscience-conference" \t "_self)**

Miriam's paper "Time-dependent changes in human cortico-spinal excitability reveal value-based competition for action during decision processing", by Klein-Flugge M, Bestmann S has been accepted in **Journal of Neuroscience**   
  
**April 2012**

20-21st: See our joint UCL-JHU workshop "Unresolved questions in motor control"

Programme and registration are here: **[http://ucljhu.eventbrite.com/](http://ucljhu.eventbrite.com/" \t "_self)**

**March 2012**

Dorothea Haemmerer from the Max Planck Institute for Human Development has joined our lab for 6 months.

**November 2011**

Sven and Miriam will be attending this years Society for Neuroscience Conference in Washington, DC.

New paper accepted in **Journal of Neuroscience** - "Action reprogramming in Parkinson's disease: response to prediction error is modulated by levels of dopamine", by Galea J\*, Bestmann S\*, Beigi M, Jahanshahi M, Rothwell JC. \* equal contribution

New paper "Dopamine, affordance and active inference", by Friston, Shiner, Fitzgerald, Galea, Adams, Brown, Dolan, Moran, Stephan, and Bestmann accepted in **PLoS Computational Biology**.

**October 2011**

New article "Relationship between physiological measures of excitability and levels of glutamate and GABA in the human motor cortex" by Stagg, Bestmann, Constantinescu, MorenoMoreno, Allman, Mekle, Woolrich, Near, Johansen-Berg, and Rothwell accepted in **Journal of Physiology**

New paper "Corticomotor representation to human arm muscle changes following cervical spinal cord injury" by Freund, Rothwell, Craggs, Thompson, Bestmann now in press in***European Journal of Neuroscience***

**September 2011**

New Post-doc, **Alessandro Tomassini**, has started in our lab, funded through an ERC Starter grant.

New paper "Active inference, attention, and motor preparation" by Brown, Friston, and Bestmann published in **Frontiers Psychology**

**25-29th**Sven, Ana and Friederike will be attending the 11th International Conference on Cognitive Neuroscience (**[ICON](http://www.icon11mallorca.org/" \t "_blank)**) in Mallorca, Spain

**July 2011**

**1st** Friederike and Ana will be presenting posters at the UCL Neuroscience Symposium

**June 2011**

**24-25th** Sven and Miriam will be attending the "The 2nd North America Meeting on Neuroimaging and Brain Stimulation" in Quebec City, Canada. Sven will speak about concurrent TMS and fMRI.  
The meeting will take place just before the annual Human Brain Mapping meeting (**[OHBM](http://www.humanbrainmapping.org/i4a/pages/index.cfm?pageID=3419" \t "_self)**), which will also be in Quebec

**26-30th** Sven and Miriam will be attending HBM in Quebec City, Canada. Miriam is presenting in the Symposium on "Decision Making" on Monday 27th (5:30-7:00pm, #2156)and her poster is #368WTh (Wed 29th-Thu 30th)

**May 2011**

**26th** Sven is giving a seminar on action selection and biased competition at the Laboratory for Clinical Neuroscience Centre for Biomedical Technology, Madrid, Spain

**April 2011**

**29th April-1st May**Workshop "Sixth Scientific Workshop on "Combining brain Imaging techniques" at which Sven will present

**Helen Barron** started her rotation in our lab as part of her 4 year MRC-funded PhD (until June 2011)

**March 2011**

**24th-25th** Sven will talk at the "Scientific workshop on multimodal transcranial magnetic stimulation in the study of brain and cognition" meeting, in Helsinki, Finland (**[Programme here](http://www.erni-hsf.eu/tmshelsinki/index.html" \t "_blank)**)

**18th** Sven to speak at the "55. Jahrestagung der Deutschen Gesellschaft fur Klinische Neurophysiologie und Funktionelle Bildgebung" in Muenster, Germany (**[Programme here](http://www.congrex.ch/dgkn2011/wissenschaftliches-programm/freitag-18-maerz-2011.html" \t "_blank)**)

**November 2010**

See us at the Society for Neuroscience meeting in San Diego:

**16th** - Friederike to present her poster "Independent contribution of GABAa and GABAb mediated inhibition during action preparation in man". 10-11AM. Poster number: 592.3

15th - Miriam to present her poster "Dissociating action-linked decisions from abstract value-based decisions in intra-parietal cortex" 11-12AM, Poster number: 401.12/LLL33

**14th** - Sven to speak at the mini-Symposium "Functional Modulation of the Primary Motor Cortex: From Animal Models to Clinical Applications". Speakers are Andy Jackson, Giacomo Koch, Monica Perez, Matthias Wahl, Zhen Ni, and Sven Bestmann

**October 2010**

**29th**- Sven to give a talk at the 29th International Congress of Clinical Neurophysiology, Kobe, Japan (**[Programme here](http://www.iccn2010kobe.com/" \t "_blank)**)

**8th** - Sven will speak at the "Recent Advances in Brain Stimulation" meeting in Montreal, Canada (**[Programme here](http://www.douglasresearch.qc.ca/events?date=2010-10-07" \t "_blank)**)

**September 2010**

**16-19th** - Miriam will be at **[Neuroscience Student Conference](http://www.neurostudentconference.com/Site/Home.html" \t "_blank)** in Split, Croatia

**August 2010**

Friederike will visit the lab of **[Lawrence Maloney](http://www.psych.nyu.edu/maloney/" \t "_self)** in NYC for a period of three months. Her trip is sponsored through a Bogue Fellowship.

See also our **Special Issue** on"Cognitive Control, Uncertainty, and the Brain"in Frontiers Human Neuroscience