

# ELSA FOURAGNAN

Brain Research Imaging Center • University of Plymouth • United Kingdom •  
• elsa.fouragnan@plymouth.ac.uk •  
www.elsa-fouragnan.com

---

## ACADEMIC CAREER AND EMPLOYMENT

University of Plymouth, UK	UKRI Future Leader Fellow, Decision and Learning Lab Head of Stimulation Laboratory, Brain Research Imaging Centre Lecturer in Neuroscience, Faculty of Health May 2020 – Present
University of Oxford, UK	Postdoctoral Research Fellow, Decision and Action Lab <i>Advisor: Prof. Matthew Rushworth</i> May 2016 – May 2018
University of Glasgow, UK	Postdoctoral Research Fellow, Philiastides Lab <i>Advisor: Dr. Marios Philiastides</i> April 2013 – May 2016
DARPA, San Diego, USA	Biomedical Engineer (Research & development) Quantum Applied Sciences & Research, DARPA research March 2008 – June 2009

---

## EDUCATION

University of Trento, Italy University of Southern California, Los Angeles, USA	PhD in Computational Neuroscience <i>Advisors: Prof. Giorgio Coricelli, Prof. Paolo Avesani</i>
University of Bordeaux, France	MEng (distinction) in Biomedical Engineering Received in 2008, Polytechnic institute (INP-ENSC)
University of Bordeaux, France	BA (1st class with distinction) in Maths applied to Life Sciences Received in 2005, Victor Segalen, Bordeaux II

---

## GRANTS, FELLOWSHIPS AND AWARDS

### RESEARCH GRANTS

- Wellcome Trust Career Development Award (SIF) 2023-2031 (£2,140,669)  
*Collaborator "Characterising the circuitry underlying simulation and how it misbehaves to create worry"*
- Strategic Investment Fund (SIF) 2021-2022 (£116,200)  
*PI "New generation of ultrasound brain stimulation device for double-blinded investigations"*
- UKRI Future Leaders Fellow 2020-2024 (£1,030,995)  
*PI "Mapping the neural basis of credit assignment for a new targeted intervention in addiction"*
- Leverhulme 2019-2022: Award to Patric Bach (PI) (£462,995)  
*Co-I "Social perception as Bayesian hypothesis testing and revision"*
- Wellcome Trust; WT100973AIA: SI Award to MFS Rushworth (PI) (£1,851,544)  
*Full postdoctoral at the University of Oxford "Neural mechanisms for foraging in uncertain environments"*

BBSRC; grants BB/J015393/1-2 to MG Philiastides (PI) (£397,955 - £260,141)

Full postdoctoral at the University of Glasgow "Spatiotemporal characteristics of reward-based learning"

PhD European fellowship, 2009-2013

PhD candidate in Cognitive Neuroscience, advised by Prof. Giorgio Coricelli

#### SMALL RESEARCH GRANTS

Plymouth Institute of Health and Care Research (PIHR) 2022-2023 (£2,947)

PI "The effects of transcranial ultrasound stimulation of the anterior cingulate cortex in a human model of secondary hyperalgesia: a pilot study"

Multiple BRIC Pump Priming (>£30,000)

PI "Neuromodulation of hyperalgesia with TUS on the anterior cingulate cortex" 2022-2023

PI "Neurochemical and functional connectivity effects of TUS in humans" 2021-2022

PI "Effects of TUS on early visual detection" 2021-2022

Co-I "The Neuropsychological Markers of Specific Digital Harms: Highly Visual Social Media & Body Image Concern" 2022-2023

Co-I "Double dissociation of the dmPFC and TPJ in social counterfactual learning" 2022-2023

Co-I "Optimizing acquisition of prefrontal signal with multiband-multiecho fMRI" 2021-2022

Praxis Clinical Grant 2012: Award to Remi Neveu (£2000)

Co-I "The role of emotions and impulsivity in eating disorders"

Travel grant for J-1 exchange visitor (6 months), USC, Los Angeles, USA, 2010

PhD visitor Scholar, KAP Economics Department, University of Southern California

#### AWARDS

Science and PINS prize for Neuromodulation, followed by a Prize Essay in the journal *Science* (awarded to supervised PhD student Davide Folloni for co-authored papers)

Vice Chancellor's Award - University of Plymouth - Research and Impact Excellence, 2022

Award for best Neuroscientific contribution (~\$20,000) by the Hong Kong Polytechnic University, 2019

Best poster price, Foundation for Focused Ultrasound, Oxford University, September 2019

Best poster price, Neuroeconomics Summer School, Amsterdam University, June 2012

Award for exceptional performance in Mathematics, Atomic Energy Commissariat, Toulouse, 2006

---

#### PEER-REVIEWED JOURNAL PUBLICATIONS

\* indicates equal contribution

h-index (google scholar): 13

i10-index (google scholar): 14

Total number of citations: >910 (more than 500 in the last 2y)

**21- Fouragnan E**, Hosking B, Rushworth M, Sel A *Timing along the cardiac cycle modulates neural signals of reward-based learning* (in revision at Nature Communications)

**20- Yaakub S**, White T, Kerfoot E, Verhagen L, Hammers A, **Fouragnan E** *Pseudo-CT from T1 weighted image for planning transcranial ultrasound study: an open source tool* *Brain Stimulation*, Vol 16, issue 1 P75-78, 2023

**19- Attali\***, Tiennot\*, Schafer, **Fouragnan**, Sallet, Caskey, Chen, Darmani, Bubrick, Butler, Stagg, Klein-Flügge, Verhagen, Yoo, Butts Pauly\*, Aubry\* *Three-Layer Model with Absorption for Conservative Estimation of the Maximum Acoustic Transmission Coefficient Through the Human Skull for Transcranial Ultrasound Stimulation* [Brain Stimulation](#)

**Consortium paper from ITRUSST**

- 18- Pisauro M\*, **Fouragnan E\***, Arabadzhyska, Apps M\*, Philiastides M\*  
*Neural Implementation of Bayesian mechanisms underlying the continuous trade-off between cooperation and competition* Nature Communication November 2022, 13 (1), 1-18  
**Judged to be 4\* for the REF**
- 17- Arabadzhyska D, Garrod O, **Fouragnan E**, De Luca E, Schyns P, Philiastides M  
*A common neural account for social and non-social decisions* Journal of Neuroscience October 2022  
doi:10.1523/JNEUROSCI.0375-22.2022
- 16- Komarnyckyj M, Retzler C, Cao Z, Ganis G, Murphy A, Whelan R, **Fouragnan E**  
*At-risk alcohol users have disrupted valence discrimination during reward anticipation* July 2022  
Addiction Biology 27 (3), e13174, doi: doi.org/10.1111/adb.13174
- 15- Darmani G, Bergmann TO, Butts Pauly, Caskey, de Lecea, Fomenko, **Fouragnan E**, Legon W, Murphy, Nandi T, Phipps, Pinton G, Ramezanpour H, Sallet, Yaakub, Yoo, Chen R.  
*Non-invasive transcranial ultrasound stimulation for neuromodulation* January 2022 Clinical Neurophysiology, 135 (51-73), doi:/10.1016/j.clinph.2021.12.010
- 14- Folloni D\*, **Fouragnan E \***, Wittmann M, Roumazeilles L, Tankelevitch L, Sallet J, Rushworth M  
*Ultrasound modulation of macaque prefrontal cortex selectively alters credit assignment-related activity and behavior* 2021 Science advances 7 (51), 2021 eabg7700  
**Judged to be 4\* for the REF**  
**PINS prize for Neuromodulation, followed by a Prize Essay in the journal Science**
- 13- Trudel N, Wittmann MK, Scholl J, Klein-Flügge M, **Fouragnan E**, Tankelevitch L, Rushworth M  
*Polarity of subjective uncertainty in ventromedial prefrontal cortex changes with behavioural adaptation across time* Nature Human Behavior. 2021 Aug 31. doi: 10.1038/s41562-020-0929-3.
- 12- Wittmann M K, **Fouragnan E**, Folloni D, Klein-Flügge M, Chau B, Khamassi M, Rushworth M  
*Global reward state affects learning, the raphe nucleus, and anterior insula in monkeys.* Nature Communication 11, 3771 (2020). doi:10.1038/s41467-020-17343-w  
**Judged to be 4\* for the REF**
- 11- Lopez-Persem A, Roumazeilles L, Folloni D, Marche K, **Fouragnan E**, Khalighinejad N, Rushworth M, Sallet J. *Differential functional connectivity underlying asymmetric reward-related activity in human and non-human primates* PNAS November 10, 2020 117 (45) 28452-28462; doi:10.1073/pnas.2000759117
- 10- **Fouragnan E**, Chau B, Folloni D, Kolling N, Verhagen L, Klein-Flügge M, Tankelevitch L, Papageorgiou GK, Aubry JF, Sallet J, Rushworth M. *The macaque anterior cingulate cortex translates counterfactual choice value into actual behavioral change.* Nature Neuroscience, 22(5), 797-808. 2019. doi: 10.1038/s41593-019-0375-6  
**Judged to be 4\* for the REF**  
**Award for best Neuroscientific contribution, Hong Kong Polytechnic University**
- 9- Queirazza F, **Fouragnan E**, Cavanagh J, Steele D, Philiastides M  
*Neural signatures of reinforcement learning in unmedicated depressed patients predict response to Cognitive Behavioural Therapy.* Forthcoming – Science Advances. 2019  
**Judged to be 4\* for the REF**
- 8- Folloni D, Verhagen L, Mars R, **Fouragnan E**, Aubry JF, Rushworth MFS, Sallet J  
*Non-invasive and reversible manipulation of activity in deep structures of the primate brain using focal ultrasound neurostimulation.* Neuron. 101, 1109–1116. February 2019
- 7- **Fouragnan E**, Retzler C, Philiastides MG  
*Separate neural representations of prediction error valence and surprise: Evidence from an fMRI meta-analysis.* Hum Brain Mapp. 2018;00:1–20. March 2018
- 6- **Fouragnan E**, Retzler C, Mullinger K, Philiastides MG  
*Spatiotemporal neural characterization of prediction error valence and surprise during reward learning in humans.* Scientific Reports. July 2017 (7):4762.

- 5- Pisauro A, **Fouragnan E**, Retzler C, Mullinger K, Philiastides MG  
*Neural correlates of evidence accumulation during value-based decisions revealed via simultaneous EEG-fMRI.* Nature Communications. July 2017 (8): 15808.  
**Judged to be 4\* for the REF**
  - 4- Neveu R, **Fouragnan E**, Barsumian F, Carrier E, Lai M, Sultan J, Nicolas A, Coricelli G  
*Preference for safe rather than risky options in binge eating.* March 2016. Front. Behav. Neurosci. doi: 10.3389/fnbeh.2016.0006
  - 3- **Fouragnan E**, Retzler C, Mullinger K, Philiastides M  
*Two spatiotemporally distinct value systems shape reward-based learning in the human brain.* August 2015. Nature Communication (6):8107doi: 10.1038/ncomms9107
  - 2- Neveu R et D, Barsumian F, **Fouragnan E**, Carrier E, Lai M, Sultan J, Nicolas A, Coricelli G  
*Improved planning abilities in binge eating.* August 2014. PLoS ONE 9(8):e105657
  - 1- **Fouragnan E**, Chierchia G, Greiner S, Neveu R, Avesani P, Coricelli, G  
*Reputational priors magnify striatal responses to violation to trust.* February 2013. Journal of Neuroscience 33(8):3602-3611
- 

## PREPRINT

Komarnyckyj M, Retzler C, Whelan R, Young O, **Fouragnan E\***, Murphy A\*  
*Reward Dysfunction in Alcohol Dependence: An Electroencephalography Monetary Incentive Delay Task Study* bioRxiv 2022

**Fouragnan E**, Hosking B, Cheung Y, Prashak BA, Rushworth M, Sel A  
*Timing along the cardiac cycle modulated reward-based learning* bioRxiv 2022:  
10.1101/2022.07.07.498947

---

## TECHNICAL REPORTS AND SCHOLAR DISSERTATION

**Fouragnan E.** The Neural Computation of Trust and Reputation. (April 2013) PhD thesis  
<http://eprints-phd.biblio.unitn.it/970/>

Matthews R, Soussou W, **Fouragnan E**, Turner P J, Shelby R A. (June, August, October, December 2008) *Wearable Electrophysiological Sensor Array for Detection of Neurotoxic Effects*. Defence Advanced Research Projects Agency Phase II [bi-monthly reports and final report submitted to DARPA]

Matthews R, **Fouragnan E**, McDonald N J, Soussou W, Turner P J, Shelby RA. (August, October 2008) *Real-Time Bio-Sensors for Enhanced C2ISR Operator Performance*. Air Force Research Laboratory (AFRL) Phase II [bi-monthly reports and final report submitted to DARPA]

Soussou W, Turner PJ, **Fouragnan E**, Trejo J. (November 2008) *EEG Electrode Noise/Classification trade-off study and CMR/Classification experimentation* [QUASAR internal report]

**Fouragnan E**, Lofi A, Hugon E, Danoy P. (July 2002) *Which services for wellbeing, stress and anxiety management?* [Technical Reports of Nouvelles Frontières]

---

## INVITED TALK AND CONFERENCE POSTERS PRESENTATIONS

*Key speaker:*

Society for Psychophysiological Research, *Presidential Symposium*, September 2022

3<sup>rd</sup> International Symposium on Focused Ultrasound, September 2022

Welcome for Integrative Neuroscience, Launch Symposium, Oxford, November 2017

*Chair:*

8th International Symposium on Focused Ultrasound, September 2022  
Computational Properties of the Prefrontal Cortex, Oxford, May 2021

*Invited guest lecturer:*

Paris Brain Institute, ICM - Institut du Cerveau et de la Moelle épinière, January 2023  
Liverpool internal seminar series, January 2023  
Workshop NIBS Copenhagen, December 2022  
Seminar series, University of Liverpool, December 2022  
Workshop Nijmegen, Invited lecturer by Lennart Verhagen, September 2022  
32nd International Congress of Clinical Neurophysiology, September 2022  
18th NWG-funded NIBS-course "TUS: Best Practice", July 2022  
Seminar on Ultrasound Neurostimulation. Oxford, July 2022  
15<sup>th</sup> World congress of the International Neuromodulation Society, Barcelona, May 2022  
International Symposium on Biology of Decision Making. Oxford, May 2020  
ISAM Neuroscience Interest Group (NIG), seminar, February 2020  
Seminar series Huddersfield, UK. September, 2019  
British Association for Cognitive Neuroscience, Glasgow, UK. September, 2019  
INSPIRE Interdisciplinary Meeting. School of medicine, Plymouth, April 2019  
Seminar series. University of Huddersfield. Huddersfield, UK, November 2018  
Seminar series. University of Plymouth. Plymouth, UK, October 2018  
Cognitive & Behavioural Neuroscience Seminar. Oxford, UK, January 2017  
LNiF series, Centre for Brain and Cognitive Science. Trento, Italy, June 2015  
Centre for Cognitive Neuroscience. CNRS, Lyon, France, January 2015  
Centre for Decision Research & Experimental Economics. Nottingham, UK, February 2013  
LNiF series, Centre for Brain and Cognitive Science, Trento, Italy, April 2012,  
Department of Economics KAP, USC, Los Angeles, USA, November 2010  
Alptis Conferences and debates. Annual congress, Pessac, France, October 2008

*Poster presentation as first author:*

British Association for Cognitive Neuroscience, Plymouth, UK, September, 2017  
Society for Neuroscience. Washington, USA, October 2017  
Neuroeconomics Society, Annual Conference, Toronto, Canada. October, 2017  
International Symposium on Biology of Decision Making, Bordeaux, France, May 2017  
Society for Neuroscience. Chicago, USA, October 2015  
Organisation for Human Brain Mapping, Hamburg, Germany, June 2014  
Society for Neuroeconomics. Lausanne, Switzerland, June 2013  
Society for Neuroeconomics. Miami, USA, September 2012  
Concepts, Actions and Object (CAOs), Rovereto, May 2011

*Poster presentation as last author:*

8th International Symposium on Focused Ultrasound, September 2022  
Federation of European Neuroscience Societies (FENS) Forum, Paris, France, July 2022  
6TH HBP student conference on interdisciplinary brain research, February 2022  
Faculty of Health PGR showcase, Plymouth, June 2022  
Computational Properties of the Prefrontal Cortex, Oxford, May 2022  
International Symposium on Biology of Decision Making (online), 2021  
Neurofrance (online), May 2021  
SSA PhD symposium (online), November 2021  
SSA Annual conference (online), November 2021  
International Symposium on Biology of Decision Making (online), May 2020

---

## MEDIA COVERAGE

### YouTube Video

Stanford Online course, invited by Kim Pulls Pauly

[https://www.youtube.com/watch?v=ReP\\_66XKl4s](https://www.youtube.com/watch?v=ReP_66XKl4s)

Educational video on Low Intensity Focused ultrasound:

<https://www.youtube.com/watch?v=KsuqRldCspU>

How do we learn? Insights from the brain (2017) video available at:

<https://www.youtube.com/watch?v=IDxYD5b8GIU>

### NEWS ARTICLE

BBC radio 4 - Mental Health and change of Cognitive Based Therapy (BBC News and Current Affairs)

New Medical Life Science: Study shows how low-intensity ultrasonic waves can modulate decision-making process in the brain (2019)

Science Daily, EurekAlert, MedicalXpress, Technology Network, Long Room, The medical news: Low-intensity ultrasound can change decision-making process in the brain (2019)

Focused Ultrasound Federeation, news: Focused Ultrasound Used to Identify Behavior-specific Regions of the Brain (2017)

MedicalXpress, Separate brain systems process the consequences of our decisions (2017)

### SCIENTIFIC BLOGS, INTERVIEWS

Neuroscience RSS Feeds - Neuroscience News Updates: Low-intensity ultrasound can change decision making process in the brain (2019)

ReliaWire: Counterfactual thinking causally related to the anterior cingulate cortex (2019)

Medical Research News and Interviews: Pulse Ultrasound to the Brain could be Used to Affect Decision Making (2019)

PSI-COMM newsletter

BBSRC, [bbsrc.tumblr.com/post](https://bbsrc.tumblr.com/post), Mapping the consequences of our decisions in the brain

---

## TEACHING & SUPERVISION

### *Post-Doctoral SUPERVISION*

Dr. Siti Yaakub, University of Plymouth, UK, 2022 – Present

### *PhD SUPERVISION (3 completed, 5 current)*

Mathilde Lojkiewiez, PhD in Neuroscience, University of Plymouth, UK, 2022 – Present

Nomiki Koutsoumpari, PhD in Neuroscience, University of Plymouth, UK, 2022 – Present

Tomithy Palmer, PhD in Neuroscience, University of Plymouth, UK, 2021 – Present

Kenza Kadri, PhD in Psychology, University of Plymouth, UK, 2020 – Present

Mica Komarnyckyj, PhD in Psychology, University of Huddersfield, UK, 2018 – 2022 (VIVA November 2022) – Now postdoc at the University of Manchester

Eleonora Parrotta, PhD in Psychology, University of Aberdeen, UK, 2018 – Present

Nadescha Trudel, PhD in Psychology, University of Oxford, UK, 2018 – VIVA 2021 – Now postdoc at Max Planck UCL Centre for Computational Psychiatry and Ageing, London

Davide Folloni, PhD in Psychology, University of Oxford, UK, 2018 – VIVA 2021 - Now postdoc at Icahn School of Medicine at Mount Sinai; USA; Science and PINS prize for Neuromodulation, followed by a Prize Essay in the journal *Science* (on co-authored papers).

### *PhD EXAMINER*

Nicholar Clairis, PhD at the Sorbonne University, Paris, France, 2018 – Viva passed in 2022

Paul Knytl, PhD at the University of Surrey, School of Psychology, UK, 2018 - Viva passed in 2021

Elodie Levy, PhD at the Sorbonne University, Science and Engineering, Paris, France, 2020 - Present

### *LECTURING*

Each course includes lectures and workshops/tutorials. In the methodological courses, I teach on a range of topics, including brain analyses and connectivity, model-based fMRI analyses, Bayesian model comparison and behavioural models of reinforcement learning

MA in Human Neuroscience (four modules) – *Basic and Advance Physics of Neuroimaging (module leader)*  
– *Fundamental in spatial and temporal neural signals –fMRI tools and analyses*, Plymouth, 2020 – Present  
MA in Psychology (two modules) – *Issues in Cognitive and Brain Science – The neural basis of decisions*,  
Plymouth, 2018 – Present  
UG in Psychology (two modules) – *From Neurons to Behaviours – Introduction to cognitive neuroscience*,  
Plymouth, 2018 – Present  
UNIQ (summer school) - *Dopamine and Learning*, University of Oxford, Summer 2017  
MA in Cognitive Sciences - *Reinforcement Learning and Value-Based Decision*, Trento, Italy, 2012  
Operating Centre, Central Air Navigation Systems, *Cognitive Properties of Human Factors and Error*  
*Models in Engineering*, Bordeaux, France, June 2007  
MA in Psychotherapy - *Mental Imagery, Neurobiology, Stress*, Institute of Hydrotherapy, France, 2006  
UG Sports Management - *Mental Imagery for Cognitive Science*, Bordeaux, France, 2005

#### TUTORING

Dissertation Project, University of Plymouth, 2018 - present  
Saint Peter College, University of Oxford, Hilary term 2018  
Sarah Lawrence Programme, Wadham College, University of Oxford, Michaelmas Term 2017  
UNIQ summer school, University of Oxford, July 2017  
Critical review, University of Glasgow, first semester 2015, 2016  
Dissertation Project, University of Glasgow, second semester 2015, 2016

---

### PROFESSIONAL SERVICE

#### *Contribution to the University:*

*Grant Mentor, Adviser for the UKRI FLF scheme*, University of Plymouth, 2021 - Present  
*Impact case preparation for next Research Excellence Framework*, University of Plymouth, 2021 - Present  
*PhD Psychological Research Admissions Committee*, University of Plymouth, 2022  
*Board member of the Brain & Mind strategy group*, University of Plymouth, 2021 – Present  
*Head of the Stimulation laboratory*, University of Plymouth, 2018 – Present  
*Executive member of ITRUSST, Leader of the Safety group*, 2018 – Present  
*Head of the NIBS laboratory, Brain research Imaging Center*, University of Plymouth, 2018 – Present  
*Board member of the Change Group, WIN*, University of Oxford, 2017-2018

#### *Ad hoc reviewer:*

*Faculty Ethics Committee*, University of Plymouth, UK  
**Grants:** ANR (France, rapporteure et lectrice), ERC, BBSRC, MRC, ESRC, Wellcome Trust (UK);  
**Journals:** Nature Communication, Nature Human Behavior, Science Advance, Scientific Report,  
Neuron, Brain Stimulation, Neuroimage, Journal of neuroscience, Iscience, Frontiers, IEEE

---

### CONFERENCE AND WORKSHOP ORGANISATION

3-days hands on Workshop on Focused Ultrasound in humans, sponsored by BrainBox, May 2023  
8th International Symposium on Focused Ultrasound, September 2022  
Computational Properties of the Prefrontal Cortex, Oxford, May 2021

---

### REFERENCES

Prof. Stephen Hall, Director of BRIC, University of Plymouth  
Phone: (0044) 175 258 - 4819 Email: stephen.hall@plymouth.ac.uk

Prof. Giorgio Ganis, School of Psychology, University of Plymouth  
Phone: (0044) 175 258 - 4812 Email: giorgio.ganis@plymouth.ac.uk

Prof. Matthew Rushworth, Experimental Psychology, University of Oxford

Phone: (0044) 186 527 - 1444    Email: matthew.rushworth@psy.ox.ac.uk

Prof. Sebastien Bouret, Brain and Spine Institute, Paris

Phone: (0033) 15 727 - 4000    Email: sebastien.bouret@icm-institute.org

Prof. Marios Philiastides, Institute for Psychology and Neuroscience, University of Glasgow

Phone: (0044) 141 330 - 4774    Email: marios.philiastides@glasgow.ac.uk

Prof. Giorgio Coricelli, Department of Economics, University of Southern California

Phone: (001) 213 740 - 2432    Email: giorgio.coricelli@usc.edu