

# SAM BERENS

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## PERSONAL STATEMENT

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An enthusiastic, ambitious, and industrious early career researcher with a keen interest in computational modelling and systems neuroscience, particularly regarding learning and memory. Skilled in designing, running, and analysing behavioural/neuroimaging experiments that rigorously test quantitative models of cognition. Committed to open, transparent, and reproducible scientific practice.

## ACADEMIC PUBLICATIONS

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### Lead author

- Berens, S. C.**, & Bird, C. M. (2022). Hippocampal and medial prefrontal cortices encode structural task representations following progressive and interleaved training schedules. *bioRxiv*. <https://doi.org/10.1101/2021.08.11.455977>.
- Berens, S. C.**, Joensen, B. H., & Horner, A. J. (2021). Tracking the emergence of location-based spatial representations in human scene-selective cortex. *Journal of Cognitive Neuroscience*, *33*(3), 445-462. [https://doi.org/10.1162/jocn\\_a\\_01654](https://doi.org/10.1162/jocn_a_01654).
- Berens, S. C.**, Bird, C. M., & Harrison, N. A. (2020). Minocycline differentially modulates human spatial memory systems. *Neuropsychopharmacology*, 1-8. <https://doi.org/10.1038/s41386-020-00811-8>.
- Berens, S. C.**, Richards, B. A., & Horner, A. J. (2020). Dissociating memory accessibility and precision in forgetting. *Nature Human Behaviour*, 1-12. <https://doi.org/10.1038/s41562-020-0888-8>.
- Berens, S. C.**, Horst, J. S., & Bird, C. M. (2018). Cross-situational learning is supported by propose-but-verify hypothesis testing. *Current Biology*, *28*(7), 1132-1136.e35. <https://doi.org/10.1016/j.cub.2018.02.042>.
- Berens, S. C.**, & Horner, A. J. (2017). Theta Rhythm: Temporal Glue for Episodic Memory. *Current Biology*, *27*(20), R1110-R1112. <https://doi.org/10.1016/j.cub.2017.08.048>.
- Berens, S. C.**, & Bird, C. M. (2017). The role of the hippocampus in generalizing configural relationships. *Hippocampus*, *27*(3), 223-228. <https://doi.org/10.1002/hipo.22688>.

### Contributing author

- Joensen, B. H., Harrington, M., **Berens, S. C.**, Cairney, S., Gaskell, M. G., & Horner, A. J. (2022). Targeted memory reactivation during sleep can induce forgetting of overlapping memories. *PsyArXiv*. <https://doi.org/10.31234/osf.io/bx3ew>.
- Horner, A. J., & **Berens, S. C.** (2022). Précis of Berens, Richards, and Horner (2020): Dissociating memory accessibility and precision in forgetting. *The Cognitive Psychology Bulletin*, 7-11.
- Cockcroft, J. P., **Berens, S. C.**, Gaskell, M. G., & Horner, A. J. (2021). Schematic information influences memory and generalisation behaviour for schema-relevant and-irrelevant information. *PsyArXiv*. <https://doi.org/10.31234/osf.io/nzurq>.
- Greenhouse-Tucknott, A., Wrightson, J. G., **Berens, S. C.**, Dekerle, J., & Harrison, N. A. (2021). Perceived fatigue does not alter effort-based decision making, but does undermine confidence in the ability to perform physical actions. *PsyArXiv*. <https://doi.org/10.31234/osf.io/pf2jy>.
- Knowland, V. C., **Berens, S. C.**, Gaskell, M. G., Walker, S. A., & Henderson, L. M. (2021). Does the maturation of early sleep patterns predict language ability at school entry? A Born in Bradford study. *Journal of Child Language*, 1-23. <https://doi.org/10.1017/S0305000920000677>.
- Oedekoven, C. S., Keidel, J. L., **Berens, S. C.**, & Bird, C. M. (2017). Reinstatement of memory representations for lifelike events over the course of a week. *Scientific Reports*, *7*(1), 14305. <https://doi.org/10.1038/s41598-017-13938-4>.

De Visscher, A., **Berens, S. C.**, Keidel, J. L., Noël, M. P., & Bird, C. M. (2015). The interference effect in arithmetic fact solving: An fMRI study. *NeuroImage*, *116*, 92-101. <https://doi.org/10.1016/j.neuroimage.2015.04.063>.

Bird, C. M., **Berens, S. C.**, Horner, A. J., & Franklin, A. (2014). Categorical encoding of color in the brain. *Proceedings of the National Academy of Sciences*, *111*(12), 4590-4595. <https://doi.org/10.1073/pnas.1315275111>.

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## ACADEMIC POSITIONS

**Postdoctoral Research Fellow**, School of Psychology 2020 - present  
University of Sussex, Brighton, UK. *Supervisor: Prof Chris Bird.* ℳ 2015 - 2016

**Postdoctoral Research Associate**, Department of Psychology 2016 - 2020  
University of York, York, UK. *Supervisor: Dr Aidan Horner.*

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## EDUCATION

**PhD in Psychology, University of Sussex, UK.** 2012 - 2015  
1<sup>st</sup> Supervisor: Prof Chris Bird; 2<sup>nd</sup> Supervisor: Prof Jennifer Rusted.  
*Thesis title: "The roles of hippocampal and neocortical learning mechanisms in the human brain".*

**MSc in Cognitive Neuroscience (Distinction), University of Sussex, UK.** 2011 - 2012  
Dissertation supervisor: Prof Chris Bird; Advisor: Prof Jamie Ward.  
*Dissertation title: "Neural colour representations: Categorical and metric effects in fMRI adaptation".*

**BSc (1<sup>st</sup> class, Dual Hons) in Psychology and Music Technology.** 2008 - 2011  
Keele University, UK. Dissertation supervisor: Prof Nicola Edelstyn.  
*Dissertation title: "Recognition memory in the context of a unilateral mediodorsal thalamic lesion".*

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## RESEARCH METHODS EXPERTISE

Experienced programmer capable of quickly generating high quality applications for stimulus presentation, data acquisition (behavioural, fMRI, electrophysiological), and data analysis. Proficient in a verity of programming languages including: Python, R, Julia, MATLAB, Shell languages, C++, Max/MSP/PD & web-based languages (HTML, JavaScript, PHP & SQL).

Regularly use a wide range of analysis techniques including (but not limited to):

- Machine learning with deep neural networks
- General/generalised linear mixed-effects models.
- Parameter optimisation for non-linear models.
- Multinomial response modelling.
- Bayesian model selection.
- State-space/mixture/Markov model estimation (via EM and MCMC algorithms).

Also experienced in developing virtual reality environments with Unreal Engine, document typesetting in  $\LaTeX$ , and low-level audio/image manipulation. Good working knowledge of fundamental mathematics including calculus, linear algebra, and complex analysis.

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## SOFTWARE/EDUCATIONAL RESOURCES

**HoopStats:** A library of MATLAB functions for analysing circularly distributed data. Includes functions for fitting multiple distributions with unknown parameters and calculating information theoretic measures of bias and dispersion. <http://samberens.co.uk/HoopStats/Index.html>.

**Sam's fMRI tools:** A collection of MATLAB functions for designing and analysing functional neuroimaging experiments. <http://samberens.co.uk/CodeIndex.html>.

**Sam's stats blog:** Articles that aim to demystify statistical methods by providing intuitive illustrations. <http://samberens.co.uk/Blog/Index.html>.

## SELECTED ORAL PRESENTATIONS

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### **Dissociating memory accessibility and precision in forgetting.**

- *Invited oral presentation at Royal Holloway, University of London.* 24<sup>th</sup> January 2022.
- *Keynote presentation at the BPS Cognitive Section Conference.* 3<sup>rd</sup> September 2021.

### **Learning and memory in an uncertain world.**

- *Invited oral presentation at the University of Bristol, UK.* 29<sup>th</sup> March 2019.

### **Integrating scenes into location-based representations.**

- *Oral presentation at Neuroscience 2018 (SfN), San Diego, USA.* 5<sup>th</sup> November 2018.
- *Oral presentation at the EPS Leicester Meeting, UK.* 20<sup>th</sup> April 2018.

### **Unsupervised learning from ambiguous events.**

- *Oral presentation at the Greater Yorkshire Memory Meeting, UK.* 20<sup>th</sup> December 2016.

### **Middle frontal gyrus represents colour categories but not metric differences in colour.**

- *Oral presentation at the British Association of Cognitive Neuroscience, UK.* 19<sup>th</sup> April 2013.

## SELECTED POSTER PRESENTATIONS

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**Berens, S. C., & Bird, C. M. (2022).** Hippocampal and medial prefrontal cortices encode structural task representations despite poor generalisation performance. *Poster presentation at the British Association of Cognitive Neuroscience.* 24<sup>th</sup> May 2022.

**Berens, S. C., & Bird, C. M. (2021).** Medial prefrontal cortices integrate reward contingencies and structural task knowledge to guide memory generalisations. *Poster presentation at the Festival of Neuroscience, British Neuroscience Association.* 14<sup>th</sup> April 2021.

**Berens, S. C., Joensen, B. H., & Horner, A. J. (2019).** Integrating scenes into location-based representations. *Poster presentation at the Festival of Neuroscience, British Neuroscience Association, Dublin, Ireland.* 14<sup>th</sup> April 2019.

**Berens, S. C., Richards, B. A., & Horner, A. J. (2018).** What we lose when we forget: Dissociating loss of memory accessibility and precision. *Poster presentation at Replay@CUBRIC, University of Cardiff UK.* 14<sup>th</sup> September 2018.

**Berens, S. C., Horst, J. S., & Bird, C. M. (2017).** Unsupervised learning from ambiguous events. *Poster presentation at the EPS workshop: Events in Memory, University of York, UK.* 10<sup>th</sup> January 2017.

**Berens, S. C., Horst, J. S., & Bird, C. M. (2016).** The brain systems underpinning cross-situational learning. *Poster presentation at ICOM 6, Budapest, Hungary.* 19<sup>th</sup> July 2016.

**Berens, S. C., & Bird, C. M. (2015).** Configural learning engages the semantic memory system but generalisation involves the hippocampus. *Poster presentation at Neuroscience 2015 (SfN), Chicago, USA.* 19<sup>th</sup> October 2015.

**Berens, S. C., Maud, P., Bird, C. M., Doeller, C. F., & Harrison, N. A. (2015).** The effect of minocycline on hippocampal and non-hippocampal memory systems. *Poster presentation at BNA2015: Festival of Neuroscience, Edinburgh, UK.* 13<sup>th</sup> April 2015.

**Berens, S. C., & Bird, C. M. (2014).** Configural memory representations: An event-related fMRI study of structural and non-structural learning. *Poster presentation at the 21<sup>st</sup> Annual Meeting of the Cognitive Neuroscience Society, Boston USA.* 7<sup>th</sup> April 2014.

## TEACHING

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<b>Guest lecturer on MSc course</b> <i>Functional Magnetic Resonance Imaging</i> , University of Sussex, UK.	2016, 2020 - 2022
<b>Part supervision of various BSc student projects</b> University of York, UK.	2017 - 2019
<b>Part supervision of various MSc &amp; BSc student projects</b> University of Sussex, UK.	2013 - 2016
<b>Class tutor on various MSc and BSc courses</b> “ <i>Linear Models</i> ” and “ <i>Discovering Statistics</i> ” University of Sussex, UK.	2013 - 2014

## PUBLIC ENGAGEMENT TALKS

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<b>Public lecture at the Emergence Salon</b> <i>Modelling the mind in machines</i> , 24 <sup>th</sup> April 2022, Brighton, UK.	2022
<b>Speaker at St Augustine Catholic High School</b> <i>Skype a Scientist</i> , 13 <sup>th</sup> December 2021.	2021
<b>Public lecture at the Pint of Science Festival</b> <i>The science of mind reading</i> , 20 <sup>th</sup> May 2019, York, UK.	2019
<b>Speaker at widening participation events</b> <i>An introduction to neuroscience research</i> , Brighton & York, UK.	2013, 2014, 2017, 2018
<b>Speaker at Brighton, Hove and Sussex Sixth Form College</b> <i>Introducing academic career paths and research.</i>	2013

## GRANTS AND AWARDS

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<b>BPS Cognitive Section Annual Award</b> Awarded by the British Psychological Society at the Cognitive Section Conference 2021.	2021
<b>BNA poster prize</b> Awarded by the British Neuroscience Association at the Festival of Neuroscience 2019.	2019
<b>Brain travel grant</b> Awarded by Guarantors of Brain for the Festival of Neuroscience 2019 and SfN 2015.	2019 & 2015
<b>EPS Grindley grant</b> Awarded by the Experimental Psychology Society to present at SfN 2015.	2015
<b>Wellcome Trust travel award</b> Awarded by the Wellcome Trust at the EBPS Immunopsychiatry Workshop 2014.	2014
<b>ESRC and University of Sussex match funded PhD studentship</b>	2012
<b>Prize for the best performance on the MSc in Cognitive Neuroscience</b> Awarded by the University of Sussex.	2012
<b>James Hartley Prize for the best student project</b> Awarded by Keele University.	2011
<b>Nuffield undergraduate research bursary</b> Awarded by the Nuffield Foundation to investigate source memory deficits in Parkinson’s disease.	2010
<b>Dean’s scholarship for excellent A-level performance</b> Awarded by Keele University.	2008