Luke **Hearne**

POSTDOCTORAL RESEARCHER

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Overview

I am an early career researcher interested in the large-scale functional and structural organization of the brain, and how it relates to cognition and mental health. I use a combination of neuroimaging, computational modeling and network science to investigate these questions.

Current positions

Rutgers University: Center for Molecular and Behavioral Neuroscience   *Newark - US*

POSTDOCTORAL SCHOLAR   *2018 - Current*

Previous positions

Queensland Health: Queensland Centre for Mental Health Research   *Brisbane - AU*

RESEARCH SCIENTIST   *2018 - 2018*

The University of Queensland: Queensland Brain Institute   *Brisbane - AU*

RESEARCH ASSISTANT   *2017 - 2018*

Education

The University of Queensland: Queensland Brain Institute   *Brisbane*

PhD (COGNITIVE NEUROSCIENCE)   *2014 - 2017*

The University of Queensland: School of Psychology   *Brisbane*

B. PSYCH. SCIENCE   *2008 - 2012*

Publications

PEER REVIEWED

Ito, T., **Hearne, L. J**, Mill, R., Cocuzza, C., & Cole, M. W. (2020). Discovering the computational relevance of brain network organization. *Trends in Cognitive Sciences*, *24*(1), 25–38. `https://doi.org/10.1016/j.tics.2019.10.005`

Shine, J. M., **Hearne, L. J**, Breakspear, M., Hwang, K., Müller, E. J., Sporns, O., Poldrack, R. A., Mattingley, J. B., & Cocchi, L. (2019). The low-dimensional neural architecture of cognitive complexity is related to activity in medial thalamic nuclei. *Neuron*, *104*(5), 849–855.e3. `https://doi.org/10.1016/j.neuron.2019.09.002`

Hearne, L. J, Lin, H.-Y., Sanz-Leon, P., Tseng, W.-Y. I., Gau, S. S.-F., Roberts, J. A., & Cocchi, L. (2019). ADHD symptoms map onto noise-driven structurefunction decoupling between hub and peripheral brain regions. *Molecular Psychiatry*. `https://doi.org/10.1038/s41380-019-0554-6`

Hearne, L. J, Cocchi, L., Zalesky, A., & Mattingley, J. B. (2017). Reconfiguration of brain network architectures between resting-state and complexity-dependent cognitive reasoning. *The Journal of Neuroscience*, *37*(35), 8399–8411. `https://doi.org/10.1523/jneurosci.0485-17.2017`

Cocchi, L., Yang, Z., Zalesky, A., Stelzer, J., **Hearne, L. J**, Gollo, L. L., & Mattingley, J. B. (2017). Neural decoding of visual stimuli varies with fluctuations in global network efficiency. *Human Brain Mapping*, *38*(6), 3069–3080.

`https://doi.org/10.1002/hbm.23574`

Hearne, L. J, Mattingley, J. B., & Cocchi, L. (2016). Functional brain networks related to individual differences in human intelligence at rest. *Scientific Reports*, *6*(1). `https://doi.org/10.1038/srep32328`

Hearne, L. J, Cocchi, L., Zalesky, A., & Mattingley, J. B. (2015). Interactions between default mode and control networks as a function of increasing cognitive reasoning complexity. *Human Brain Mapping*, *36*(7), 2719–2731. `https://doi.org/10.1002/hbm.22802`

Preprints

Hearne, L. J, Mill, R., Keane, B., Repovs, G., Anticevic, A., & Cole, M. (2020). Activity flow underlying abnormalities in brain activations and cognition in schizophrenia. *bioRxiv*.

Theses

Hearne, Luke J. (2017). Characterisation of Functional Brain Networks underlying Cognitive Reasoning and Intelligence. *PhD Thesis, Queensland Brain Institute, the University of Queensland*. `https://doi.org/10.14264/uql.2018.95`

Hearne, Luke J. (2012). Dissociable effects of focal inhibition and excitation of primary motor cortex on functional connectivity within the motor network. *Honours Thesis, School of Psychology, the University of Queensland*. `https://espace.library.uq.edu.au/view/UQ:698631`

Data

Hearne, L. J, Cocchi, L., & Mattingley, J. (2019). Latin Square Task fMRI Dataset. *The University of Queensland Data Collection*. `https://doi.org/10.14264/uql.2019.780`

Funding and awards

Funding

2020-2025	NHMRC Emerging Leader 1 Investigator Grant	*AUD$645,205*
2015	Graduate School International Travel Award	*AUD$3000*
2014-2017	Australian Postgraduate Award	*AUD$25,000 p.a.*
2014-2017	Science of Learning Centre Scholarship	*AUD$5,000 p.a.*
2014-2017	Queensland Brain Institute Scholarship	*AUD$5,000 p.a.*

Awards

2018	Australasian Cognitive Neuroscience Society Presentation Award	
2017	Australasian Cognitive Neuroscience Society Presentation Award	
2016	Organization for Human Brain Mapping Merit Abstract Award	*USD$2000*
2016	The University of Queensland Graduate Student International Travel Award	*AUD$5000*
2015	Australasian Cognitive Neuroscience Society Presentation Award	*AUD$150*

Presentations

Invited talks

2020	An attempt to explain dysfunctional cognitive activations in schizophrenia using an activity flow framework. Zalesky lab, University of Melbourne, Melbourne, Australia (remote)
2016	Symposium Chair: Dynamic functional architectures of the human brain. Australasian Cognitive Neuroscience Society, Shoal Bay, Australia
2016	Segregated and integrated brain dynamics underlying higher cognitive reasoning in humans. Computational Cognitive Neuroscience Lab (PI: Olaf Sporns), Indiana University, Indiana, USA
2016	Functional brain architectures supporting reasoning . Centre of Advanced Imaging seminar, University of Queensland, Brisbane, Australia

Conference talks

2018	Behavioural correlates of lesion-network mapping in stroke. Australasian Cognitive Neuroscience Society, Melbourne, Australia
2016	Flexibility in brain module topology supports active reasoning and fluid intelligence. Organization for Human Brain Mapping, Geneva, Switzerland
2016	Dynamic brain modular architectures supporting higher cognition. NeuroEng, Brisbane, Australia
2015	Functional brain networks underlying high-level cognitive reasoning and fluid intelligence. Australian Cognitive Neuroscience Society, Auckland, New Zealand
2015	Interactions between default mode and control networks with increases in complexity during cognitive reasoning. Cortical Connections, Brisbane, Australia
2012	Reorganization of Intrinsic Functional Brain Connectivity Induced by Local Cortical Excitation and Inhibition. Australasian Cognitive Neuroscience Society, Brisbane, Australia

Conference posters

2020	Activity flow models reveal the role of schizophrenia network abnormalities. Organization for Human Brain Mapping, Montreal, USA (online)
2017	Anomalous functional network integration in response to cognitive control demands in human callosal dysgenesis. Australasian Cognitive Neuroscience Society, Adelaide, Australia
2016	Flexibility in brain module topology supports active reasoning and fluid intelligence. Organization for Human Brain Mapping, Geneva, Switzerland
2015	Segregated and integrated brain dynamics underlying higher cognitive reasoning in humans. Society for Neuroscience, Chicago, USA
2015	Flexibility in brain module topology supports active reasoning and fluid intelligence. Systems and Computational Neuroscience Downunder conference, Brisbane, Australia

Teaching, service and public outreach

Supervision

2020 - Current	Conor Robinson	*PhD co-supervisor*

Service

2016 - Current	Organization for Human Brain Mapping	*Current member*
2014 - Current	Australiasian Cognitive Neuroscience Society	*Current member*
	The Journal of Neuroscience	*Ad hoc reviewer*
	Communications Biology	*Ad hoc reviewer*
	Neuroimage	*Ad hoc reviewer*
	Neuroimage: Clinical	*Ad hoc reviewer*
	Cerebral Cortex	*Ad hoc reviewer*
	Human Brain Mapping	*Ad hoc reviewer*
	Nature: Science of Learning	*Ad hoc reviewer*
	Biosystems	*Ad hoc reviewer*

Media coverage

2019	Centre for Integrative Brain Function article: **Complex tasks reveal a weakness in newly created brain pathways**
2019	Centre for Integrative Brain Function article: **What do brain activity and your daily commute have in common?**
2019	Brisbane Times (local newspaper) article: **Top minds pinpoint ADHD cause by thinking big over 20 years**
2019	The Courier Mail (national newspaper) article: **Huge discovery inside ADHD brains**
2018	Centre for Integrative Brain Function article: **Greater flexibility in brain networks helps you solve harder puzzles**