

Joanna C. Chang

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Education

PhD, Computational Neuroscience

IMPERIAL COLLEGE LONDON | London, UK

Oct 2020 - exp. Oct 2024

MSc, Bioinformatics and Theoretical Systems Biology

IMPERIAL COLLEGE LONDON | London, UK

Sep 2019 - Sep 2020

Distinction (81%), Top student in cohort

BA, Biology & Minor in Computer Science

POMONA COLLEGE | Claremont, CA, US

Aug 2015 - May 2019

Summa Cum Laude (GPA: 3.99/4.0)

Experience

PhD Candidate | Imperial College London

SUPERVISORS: DR. JUAN A. GALLEGO, DR. CLAUDIA CLOPATH

Oct 2020 - present

- Develop artificial neural network frameworks to model neural population activity during motor learning and brain-computer interface (BCI) control
- Collaborate in development of subcortical BCI that leverages neural signals from the basal ganglia to improve control of skilled movements in mice
- Demonstrated the similarity of neural dynamics across animals of the same species with high-dimensional neural spike data from mice & monkeys in 3 behavioral tasks

STEM Leader | Dangoor Reach-Out Makerspace

Nov 2019 - present

- Create and lead hands-on workshops in 10-week-long Maker Challenges that follow the design engineering process from idea to product
- Guide hands-on projects with technologies such as 3D printing, laser cutting, & CAD

Data Analyst | Synthace

Aug 2020 - Dec 2020

- Analyzed data to assess audience engagement and identify areas for improvement in the Computer-Aided Biology Community sector of a biotech startup

Postgraduate Researcher | Imperial College London

Jan 2020 - Sep 2020

- Engineered interactive web app integrating gene pathway, protein-protein interaction, and protein expression data for ~10K proteins from 3 multi-omic databases to aid disease detection for protein variants
- Created biophysical models to examine frequency selectivity in the inner ear
- Analyzed circular RNA expression in pediatric tuberculosis to identify potential diagnostic biomarkers

Research Assistant | Harvey Mudd College

Apr 2017 - Nov 2019

- Directed investigation that integrated agent-based modeling and laboratory experiments to examine ant nest network formation under spatial constraints
- Supervised 4-person team to execute experiments

Software Development Intern | Middle Tree

Jan 2019 - May 2019

- Developed back-end to facilitate customer registration and record data into customer management systems

National Science Foundation Fellow | Tufts University

May 2016 - Aug 2016

- Investigated the effects of essential amino acids on social immunity and foraging behavior in honeybees
- Utilized thermal imaging programs to track colony-level fever

Publications

Safaie M*, **Chang JC***, Park J, Miller LE, Dudman J, Perich MG[†], Gallego JA[†]. 2023. Preserved neural dynamics across animals performing similar behaviour. *Nature*.

Chang JC, Gallego JA[†], Clopath C[†]. 2023. Sequential learning in recurrent neural networks create memory traces of learned tasks. *COSYNE*.

Chang JC, Perich MG, Miller LE, Gallego JA[†], Clopath C[†]. 2023. *De novo* motor learning creates structure in neural activity space that shapes adaptation. *bioRxiv*. 2nd round of review at *Nature Communications*.

Fortunato C, Bennasar-Vázquez J, Park J, **Chang JC**, Miller LE, Dudman JT, Perich MG, Gallego JA. 2023. Nonlinear manifolds underlie neural population activity during behaviour. *bioRxiv*.

Love K, Cao D, **Chang J**, Dal’Bello LR, Ma X, O’Shea DJ, Schone HR, Shahbazi M, Smoulder A. 2023. Highlights from the 32nd Annual Meeting of the Society for the Neural Control of Movement. *Journal of Neurophysiology*.

Chang J, Powell S, Robinson E, Donaldson-Matasci M. 2021. Nest choice in arboreal ants is an emergent consequence of network creation under spatial constraints. *Swarm Intelligence*.

Bonoan RE, Iglesias Feliciano PM, **Chang J**, Starks PT. 2020. Social benefits require a community: the influence of colony size on behavioral immunity in honey bees. *Apidologie*.

Presentations

TALKS

2024	Sensorimotor Circuits for Limb Control Workshop	Okinawa, Japan
2023	Mila Neuro-AI Reading Group	online for Quebec, Canada
	Bernstein Conference	Berlin, Germany
	Neural Control of Movement Conference	Victoria, Canada
	COSYNE Conference	Montreal, Canada

POSTERS

2024	Sensorimotor Circuits for Limb Control Workshop	Okinawa, Japan
2023	Bernstein Conference	Berlin, Germany
	COSYNE Conference	Montreal, Canada
2022	Society for Neuroscience (SFN) Conference	San Diego, CA, US
	Neural Control of Movement Conference	Dublin, Ireland
	COSYNE Conference	Lisbon, Portugal
2018	SACNAS Conference for Diversity in STEM, <i>Travel grant</i>	San Antonio, TX, US
	International Union for the Study of Social Insects Conference	São Paulo, Brazil

Awards & Fellowships

2023	Neural Control of Movement (NCM) Scholarship , 1 of 10 recipients	
2020	Wellcome Trust 4-Year PhD Studentship	
	Eurofins Foundation Postgraduate Prize, <i>for top student in MSc course</i>	
2019	University of Edinburgh Biological Sciences Postgraduate Bursary, <i>declined</i>	€ 10,000
	Bessie Reiner Dill Award	\$ 10,000
	Sherwood Heiser Fellowship	\$ 5,000
	Phi Beta Kappa Honor Society Award	\$ 2,000
2018	Harvey Mudd Summer Research Fellowship	
	Phi Beta Kappa Honor Society, <i>1 of 8 students nominated for early induction</i>	
	Rose Hills Foundation Scholarship	\$ 17,000

Awards & Fellowships (cont.)

2017	Howard Hughes Medical Institute Undergraduate Research Fellowship	
	Edison STEM Scholarship	\$ 3,000
	Robinson Scholarship	\$ 20,000
2016	NSF Research Experience for Undergraduates Fellowship	
	Brown Scholarship	\$ 16,000
	Steele Foundation Scholarship	\$ 11,000
2014	California Institute of Technology Summer Research Connection Fellowship	

Teaching Experience

2023	Computational Neuroscience	<i>Imperial College London</i>
2022	Computational Neuroscience	<i>Imperial College London</i>
2021	Programming II	<i>Imperial College London</i>
2020	Probability and Statistics	<i>Imperial College London</i>
2019	Biochemistry with Lab	<i>Pomona College</i>
2018	Biochemistry with Lab	<i>Pomona College</i>
2017	Genetics	<i>Pomona College</i>
	General Chemistry II	<i>Pomona College</i>
2016	General Chemistry I	<i>Pomona College</i>

Service & Outreach

Organizer | Pint of Science

Dec 2023 - present

- Coordinate 3-day event with scientific talks and interactive activities for general audiences centered on the theme "Beautiful Minds"

Coordinator | Tech for Good

Jan 2019 - May 2019

- Recruited and oversaw teams on 3 coding projects that emphasized using technology for social good
- Cleaned and analyzed survey data through a partnership with ActiveSGV, a public health non-profit

Fellow | Quantitative Skills Center

Jan 2017 - Dec 2018

- Provided individual mentoring partnerships for biology, chemistry, and computer science courses

MENTORING

- 2023-24 Mara Ivan, MEng, Imperial College London
- 2022-23 Alvaro Fernandez-Moris, MEng, Imperial College London
- 2021-22 Ciara Gibbs, MEng, Imperial College London
- 2021 Mireia Munoz Rojo, BSc, Imperial College London

PEER REVIEW

Reviewed for: Current Biology | Nature Neuroscience | Proceedings of the National Academy of Sciences (PNAS)

Skills

Knowledge

Deep learning • recurrent neural networks • simulation modeling • signal processing • neural population analysis • Neuropixel & behavioral recordings • experimental design

Programming

Python (PyTorch, sklearn, pandas, jupyter) • Java • MATLAB • SQL • Git • LaTeX