

# TAHRA L. EISSA

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University of Colorado Boulder ◊ Department of Applied Mathematics

## CURRENT POSITION

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### Postdoctoral Research Associate

*September 2018-Present*

University of Colorado Boulder; Department of Applied Math; Boulder CO

PI: Zachary Kilpatrick (co-PIs: Joshua Gold - UPenn, Krešimir Josić- UHouston)

*Decision making in dynamic environments*

## EDUCATION

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**University of Chicago** Chicago, IL

*2012-2017*

PhD in Neurobiology **Awarded "Best Dissertation in Neurobiology: 2017-2018"**

**Cornell University** Ithaca, NY

*2008-2012*

BS in Bioengineering, Concentration: Biomedical Engineering

## PAST RESEARCH EXPERIENCE

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### Postdoctoral Research Scientist

*2017-2018*

Columbia University; New York, NY; PI: Catherine Schevon

*Effects of traveling waves during seizure activity*

### Doctoral Candidate

*2012-2017*

University of Chicago; Chicago, IL; PI: Wim van Drongelen

*Interactions of seizure activity across spatial scales*

### Research Assistant

*2012*

University of Chicago; Chicago, IL; PI: Christian Hansel

*Motor deficits associated with cerebellar abnormalities in mouse model of autism*

### Research Assistant

*2010-2012*

Cornell University; Ithaca, NY; PI: Joseph Fetcho

*Role of microglia in spinal cord injury in larval zebrafish*

### Research Assistant

*2010-2012*

Northwestern University: Feinberg School of Medicine; Chicago, IL; PI: CJ Heckman

*Early degeneration of motor neurons in mouse model of Amyotrophic Lateral Sclerosis*

## AWARDS, GRANTS, AND FELLOWSHIPS

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1. **BRAIN Initiative K99/R00** NINDS NIH *2023*
2. **Emerging Leaders in Neuroscience Fellow** Weill Cornell Medicine *2023*
3. **Allen Institute Next Generation Leader** Allen Institute *2022*
4. **Cornell FIRST Future Faculty Fellow** Cornell University *2022*
5. **NEURO-YES Fellow** University of Rochester *2022*
6. **Neurobiology of Cognition GRC Travel Award** Gordon Research Conference *2022*
7. **Grass Foundation Achievement Award** The Grass Foundation *2022*
8. **Leading Edge Fellow** Janelia Research *2022*
9. **Neuroscience Futures Fellow** Oregon Health Science University *2022*
10. **Mount Sinai Neuroscience Fellow** Icahn School of Medicine *2022*
11. **"Be Boundless" Fellow** University of Washington *2021*
12. **BRAINS Fellow** University of Washington *2019*
13. **Hojjat Adeli Award** International Journal of Neural Systems *2019*
14. **Best Dissertation in Neurobiology 2017-18** University of Chicago, Chicago IL *2018*
15. **Travel Grant** ICTALS Conference; Minneapolis MN *2017*

16. **Best Translational Research Poster** University of Chicago Pediatric Day; Chicago IL 2016
17. **Best Translational Research Poster** University of Chicago Pediatric Day; Chicago IL 2015
18. **ArtScience Grant** University of Chicago; Chicago IL 2014-2015
19. **Joseph A Blazek Foundation Scholarship** Joseph A Blazek Foundation; Cook County IL 2008-2010

## PUBLICATIONS

### Preprints

co-first<sup>†</sup>; co-last <sup>‡</sup>

1. **Eissa TL**, Kilpatrick ZP. Learning efficient representations of environmental priors in working memory. *bioRxiv* (2022). doi:10.1101/2022.07.05.498889 [in review]

### Journal Articles

1. Cihak H, **Eissa TL**, Kilpatrick ZP. Distinct excitatory and inhibitory bump wandering in a stochastic neural field. *SIAM J Appl Dyn Syst* (2022). doi: 10.1137/22M1482329
2. **Eissa TL**, Gold JJ<sup>‡</sup>, Josić K<sup>‡</sup>, Kilpatrick ZP<sup>‡</sup>. Suboptimal human inference can invert the bias-variance trade-off for decisions with asymmetric evidence. *PLOS Comp. Biol.* (2022). doi:10.1371/journal.pcbi.1010323
3. Gill BJA, Wu X, Khan FA, Sosunov AA, Liou JY, Dovas A, **Eissa TL**, Banu MA, Bateman LM, McKhann GM II, Canoll PD, Schevon CA. Ex vivo Multi-Electrode Analysis Reveals Spatiotemporal Dynamics of Ictal Behavior at the Infiltrated Margin of Glioma. *Neurobio. Dis.* (2020). doi: 10.1016/j.nbd.2019.104676
4. Tryba AK<sup>†</sup>, Merricks EM<sup>†</sup>, Lee S, Pham T, Cho SJ, Nordli DR, **Eissa TL**, Schevon CA<sup>‡</sup>, van Drongelen W<sup>‡</sup>. The role of paroxysmal depolarization in focal seizure activity. *J. Neurophys.* (2019). doi:10.1152/jn.00392.2019
5. **Eissa TL**, Schevon CA, Emerson RG, Goodman RR, Mckhann GM, Van Dronglen W. The Conversion of Ictal Multi-Unit Activity into EEG Seizure Activity. *IJNS* (2018). doi: 10.1142/S0129065718500272  
*Awarded the Hojjat Adeli Award for Outstanding Contributions in Neural Systems*
6. **Eissa TL**<sup>†</sup>, Dijkstra K<sup>†</sup>, Brune C, Emerson RG, Goodman RR, McKhann GM, Schevon CA, van Drongelen W<sup>‡</sup>, van Gils S<sup>‡</sup>. The Cross-Scale of Feedforward Inhibition during Human Neocortical Seizure Activity. *PNAS* (2017). doi: 10.1073/pnas.1702490114  
*Featured Editor's Choice in Science (2017) 358: 317*
7. **Eissa TL**, Tryba AK, Marcucilli CM, Ben-Mabrouk F, Smith E, Lew S, Emerson RG, Goodman RR, McKhann GM Jr, Frim DM, Pesce LL, Kohrman MH, Emerson RG, Schevon CA, van Drongelen W. Multiscale Aspects of Generation of High Gamma Activity during Seizures in Human Neocortex. *eNeuro* (2016). doi: 10.1523/ENEURO.0141-15.2016
8. Meijer HE<sup>†</sup>, **Eissa TL**<sup>†</sup>, Kiewiet B, Neuman JF, Schevon CA, Emerson RG, Goodman RR, McKhann GM Jr, Marcuccilli CJ, Tryba AK, Cowan JD, van Gils SA<sup>‡</sup>, van Drongelen W<sup>‡</sup>. Modeling Focal Epileptic Activity in the Wilson-Cowan model with Depolarization Block. *J. Math. Neurosci.* (2015) doi: 10.1186/s13408-015-0019-4
9. Piochon C, Kloth AD, Grasselli G, Titley H, Nakayama H, Hashimoto N, Wan V, Simmons D, **Eissa T**, Miyazaki T, Watanabe M, Takumi T, Kano M, Wang SH, Hansel C. Deficits in Cerebellar Plasticity and Motor Learning in a Copy Number Variation Mouse Model of Autism Spectrum Disorder. *Nature Comm.* (2014). doi: 10.1038/ncomms6586

### Book Chapters

1. Canavan SV, **Eissa TL**, Schevon CA, McKhann GM Jr, Goodman RR, Emerson RG, van Drongelen W. *Epileptogenic networks: applying network analysis techniques to human seizure activity*. In: Validating Neuro-Computational Models of Neurological and Psychiatric Disorders (Basabdatta B, Fahmida C, ed): Springer. (2015) doi: 10.1007/978-3-319-20037-8-11
2. ElBasiouny SM, Quinlan KA, **Eissa TL**, Heckman CJ. *Electrophysiological abnormalities in SOD1 transgenic models in Amyotrophic Lateral Sclerosis: the commons and differences*. In: Amyotrophic Lateral Sclerosis (Maurer MH, ed): InTech (2011) doi: 10.5772/30711

## Commentaries and Reviews

1. **Eissa TL**. Mathematical Models of Decision-Making. *Oxford Research Encyclopedia of Neuroscience*. (2022). [in review] **Invited Contribution**
2. Kilpatrick ZP, Holmes WR, **Eissa TL**, Josić K. Optimal Models of Decision Making in Dynamic Environments. *Curr. Op. Neurobiol.* (2019). doi: 10.1016/j.conb.2019.06.006
3. Schevon CA, Tobochnik S, **Eissa TL**, Merricks EM, Gill BJA, Parrish RR, Bateman LM, McKhann Jr GM, Emerson RG, Trevelyan AJ. Multiscale Recordings Reveal the Dynamic Spatial Structure of Human Seizures. *Neurobiol. Dis.* (2019). doi: 10.1016/j.nbd.2019.03.015
4. **Eissa TL** and Schevon CA. The Role of Computational Modeling in Seizure Localization. *Brain* (2017). doi: 10.1093/brain/aww332

## Peer Reviewed Conference Proceedings

1. **Eissa TL**, Kilpatrick ZP<sup>‡</sup>. Learning representations of environmental priors in visual working memory. *Cosyne*; Montreal, CA *March 2023*
2. **Eissa TL**, Kilpatrick ZP<sup>‡</sup>. Learning efficient attractor-based working memory representations in heterogeneous environments. *CCN*; San Francisco, CA *August 2022*
3. **Eissa TL**, Gold JI<sup>‡</sup>, Josić K<sup>‡</sup>, Kilpatrick ZP<sup>‡</sup>. Normative decision asymmetries with symmetric priors but asymmetric evidence. *Cosyne*; virtual *February 2021*
4. **Eissa TL**<sup>†</sup>, Barendrghdt NW<sup>†</sup>, Gold J, Josić K<sup>‡</sup>, Kilpatrick ZP<sup>‡</sup>. Hierarchical inference interactions in dynamic environments. *Cosyne*; Lisbon, Portugal *February 2019*
5. Elbasiouny SM, **Eissa TL**, Comparison of anatomically-detailed and reduced compartmental models in simulating spinal motoneuron firing behaviors. *CIBEC*; Cairo, Egypt *December 2010*

## **PRESENTATIONS AND POSTERS**

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### Invited Talks

1. **Mount Sinai Center for Computational Psychiatry**  
New York, NY *February 2023*
2. **Weill Cornell Medical School Emerging Leaders Seminar**  
New York, NY *February 2023*
3. **University of Rochester NeuroYES**  
Rochester, NY *October 2022*
4. **Cornell University Department of Biomedical Engineering**  
Ithaca, NY *October 2022*
5. **NeuroBridges Summer School**  
Cluny, France *September 2022*
6. **GRC: Neurobiology of Cognition**  
Gordon Research Conference, Sunday River, Maine *July 2022*
7. **Neuroscience Futures Seminar Series**  
OHSU Department of Neurology, Portland, OR, virtual *June 2022*
8. **Mount Sinai Neuroscience Seminar**  
Icahn School of Medicine at Mount Sinai, New York, NY *May 2022*
9. **College of Engineering Seminar**  
Illinois Institute of Technology, Chicago, IL *April 2022*
10. **Biofrontiers Institute: Quantitative Exploration and Discussion**  
University of Colorado Boulder, Boulder, CO; **Panelist** *April 2022*
11. **Society for Industrial and Applied Mathematics Boulder Chapter**  
University of Colorado Boulder, Boulder, CO; **Panelist** *February 2022*
12. **California State University BRAIN Alliance Seminar**  
California State University, CA *January 2022*

13. **World Wide Theoretical Neuroscience Seminar**  
CNRS, France, virtual *December 2021*
14. **“Be Boundless” Neuroscience Seminar**  
University of Washington; Seattle, WA, virtual *March 2021*
15. **“Expanding Horizons: Diverse Perspectives in Computational Neuroscience” Workshop**  
Cosyne, virtual *February 2021*
16. **Synapse- Neuroscience Research Seminars**  
University of Chicago; Chicago, IL *August 2020*
17. **Theoretical and Computational Neuroscience Conference**  
Gulf Coast Consortia; Houston, TX **Plenary Speaker** *January 2020*
18. **Depts. Applied Math and Computer Science Postdoc Seminar**  
University of Colorado Boulder, Boulder, CO *November 2018*
19. **Dept. Mathematics: Networks Seminar;**  
University of Houston; Houston, TX; *November 2018*
20. **Dept. Applied Math: Dynamical Systems Seminar**  
University of Colorado Boulder; Boulder, CO *September 2018*
21. **Dept. Neurology Seminar Series**  
Northwestern University; Chicago, IL *November 2016*

#### Oral Presentations

1. **Building Networks: Women in Complex and Nonlinear Systems Workshop**  
Banff International Research Station, Alberta, Canada *September 2022*
2. **Leading Edge Fellows Symposium**  
virtual *July 2022*
3. **CRCNS Investigators Meeting**  
NYU, New York, NY *October 2021*
4. **Dynamical Principles of Biological and Artificial Neural Networks Workshop**  
Banff International Research Station, Alberta, Canada, virtual *January 2022*
5. **Theoretical and Computational Neuroscience Conference**  
Gulf Coast Consortia; Houston, TX *January 2021*
6. **Decision-Making Micro-Symposium**  
NeuroMatch 3.0; Virtual; *October 2020*
7. **Learning and Decision Making: Nanosymposium**  
Society for Neuroscience Conference, Chicago, IL *October 2019*
8. **Mechanisms of Epilepsy: Nanosymposium**  
Society for Neuroscience Conference; Chicago, IL *October 2015*
9. **Pediatric Grand Rounds**  
University of Chicago, Chicago, IL *June 2014*

#### Posters

1. **Eissa TL**, Kilpatrick ZP. CCN; San Francisco *August 2022*
2. **Eissa TL**, Gold JI, Josić K, Kilpatrick ZP. Cosyne; Virtual Meeting *February 2021*
3. **Eissa TL**, Gold J, Josić K, Kilpatrick ZP. Brain Initiative Conference; Virtual Meeting *June 2020*
4. **Eissa TL**, Gold J, Josić K, Kilpatrick ZP. GCC TCN; Houston, TX *Jan 2020*
5. Van Drongelen W, Tryba AK, Pham T, Merricks E, Bhansali A, **Eissa TL**, Pesce L, Cho S, Lee S, Nordli DR, Schevon CA, Society for Neuroscience Conference; Chicago, IL *October 2019*
6. **Eissa TL**, Gold J, Josić K, Kilpatrick ZP. CRCNS Investigators Meeting; Austin, TX *Sept 2019*
7. Kilpatrick ZP, **Eissa TL**, Barendrgdt NW, Gold J, Josić K. CNS Meeting; Barcelona, Spain *July 2019*
8. Faye G, **Eissa TL**, Kilpatrick ZP ICMNS; Copenhagen, Denmark *June 2019*

9. Kilpatrick ZP, **Eissa TL**, Barendrgdt NW, Radillo A, Gold J, Josić K. Brain Initiative Meeting; Washington DC *April 2019*
10. **Eissa TL**<sup>†</sup>, Barendrgdt NW<sup>†</sup>, Gold J, Josić K<sup>‡</sup>, Kilpatrick ZP<sup>‡</sup>. Cosyne; Lisbon, Portugal *February 2019*
11. **Eissa TL**, Emerson R, Goodman R, McKhann G, Schevon CA, van Drongelen W. ICTALS; Minneapolis, MN **Invited Attendee Grant** *August 2017*
12. **Eissa TL**, Schevon CA, Dijkstra K, Brune C, Emerson R, McKhann G, Goodman R, van Gils S, van Drongelen W. AES Conference; Houston, TX *December 2016*
13. **Eissa TL**, Schevon CA, Emerson R, McKhann G, Goodman R, van Drongelen W UCMC Pediatrics Day; Chicago, IL **Best Translational Research Poster** *June 2016*
14. **Eissa TL**, Tryba AK, Ben-Mabrouk F, Lew SM, Marcuccilli CJ, Schevon CA, van Drongelen W. Society for Neuroscience Conference; Washington DC *November 2015*
15. **Eissa TL**, Tryba AK, Ben-Mabrouk F, Lew SM, Marcuccilli CJ, Schevon CA, van Drongelen W. UCMC Pediatrics Day; Chicago, IL **Best Translational Research Poster** *June 2015*
16. Quinlan KA, Manual M, Jiang MC, Elbasiouny SM, Lamano JB, Ahmed S, **Eissa TL**, Gomaa M, Heckman CJ. Society for Neuroscience Conference; Washington DC *November 2011*

## TEACHING

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### Instructor

**University of Colorado Boulder:** Calculus 1 for Engineers (Undergrad) *2019-2021*

### Guest Lecturer

**University of Colorado Boulder:** Computational Neuroscience (Grad) *2020*

**University of Chicago:** Signal Processing for Neuroscientists (Grad) *2015-present*

**University of Chicago:** Computational Methods for Cognitive Neuroscience (Grad) *2015-present*

### Teaching Assistant

**University of Chicago:** Introduction to Neuroscience (Undergrad) ; Neurobiology of Disease (Grad)

**Cornell University:** Cellular-Molecular Bioengineering (Undergrad); Properties of Biomaterials (Undergrad)

**NeuroBridges Summer School:** Decision-Making (Grad)

## OTHER TRAINING AND AFFILIATIONS

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### Training

**Pathobiology and Translational Neuroscience Training Program** *2012-2017*

University of Chicago; Chicago, IL

**Clinical and Translational Research for PhDs** *2015*

National Institutes of Health; Bethesda, MD

### Affiliations

**Society for Neuroscience**

## SCIENTIFIC SERVICE

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### Reviewer

**Cosyne**

**BMC Neurology**

**Nature Reviews Neuroscience**

### Mentor

**CU Boulder Applied Math Postdoc- Grad Student Mentoring Program Founder** *Present*

Boulder CO

**NeuroMatch Academy:** Mentor *2021*

virtual

**Association for Women in Mathematics- Boulder Chapter:** Mentor *2018-Present*

Boulder CO

Service

<b>Denver Botanic Gardens:</b> Scientific Engagement Volunteer Denver CO	<i>Present</i>
<b>CU Boulder Applied Math Postdoc Liason</b> Boulder CO	<i>Present</i>
<b>Douglas County School District:</b> Behavioral Specialist Guest Speaker Highlands Ranch CO	<i>2023</i>
<b>Center for Teaching and Learning Seminar Series</b> Presenter Boulder CO	<i>2021</i>
<b>Career Development Seminar Series</b> Coordinator and Presenter Boulder CO	<i>2021</i>
<b>Lang Youth Medical Program:</b> Guest Scientist New York, NY	<i>2017</i>
<b>Sisters 4 Science:</b> Guest Scientist Chicago, IL	<i>2015-2016</i>
<b>University of Chicago IMSD:</b> Mentor Chicago, IL	<i>2014-2017</i>
<b>Chicago Symposium on Translational Research:</b> Volunteer Chicago, IL	<i>2013-2017</i>
<b>Backyard Brains:</b> Volunteer Teaching Assistant Chicago, IL	<i>2013-2017</i>
<b>Museum of Science and Industry:</b> Volunteer, Captain Chicago, IL	<i>2013-2017</i>