Sina Tafazoli, Ph.D. (he/him/his)
Curriculum Vitae

Princeton Neuroscience Institute
Princeton University
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Academic Position

2015 - Present **Princeton University**
Postdoctoral Researcher
Princeton Neuroscience Institute, Princeton University
Laboratory of **Dr. Tim Buschman**

Education

2014 - 2015 **International School for Advanced Studies (SISSA),** Italy
Postdoctoral researcher
Laboratory of **Dr. Davide Zoccolan**

2009 - 2014 **International School for Advanced Studies (SISSA)**, Italy
PhD in Cognitive Neuroscience
Dissertation: ***"Behavioral and neural basis of invariant object recognition in rats"***
Laboratory of **Dr. Davide Zoccolan**

2007 - 2009 **Tehran South Azad University,** Tehran, Iran
M.Sc., Electrical Engineering (control and dynamical systems)
Advisors**: Dr. Alessandro Treves**, and **Dr. Reza. Ebrahimpour**

Awards and Honors

2023 **Post-doctoral Council Seminar Series 2023 Winning Speaker,** Princeton university

2016 **Best Ph.D. Thesis of the year award**, Neuroscience Sector, SISSA, Italy

2008 **Post graduate fellowship**, visitor in lab of Dr. Alessandro Treves SISSA, Italy

2007 **Travel Grant** from University of Montreal to attend "Workshop on Mathematical Neuroscience", Montreal, Canada

2007 **3rd place,** M.Sc. Entrance Exam, Tehran South Azad University

Publications ** equal contribution*

1- **Tafazoli, S**.*, Di Filippo, A.*, and Zoccolan, D. (2012**). Transformation-Tolerant Object Recognition in Rats Revealed by Visual Priming.** Journal of

Neuroscience 32, 21–34. **(Highlighted as featured article of Journal of Neuroscience)** https://www.jneurosci.org/content/32/1/21

2- **Tafazoli, S**.*, Safaai, H.*, De Franceschi, G., Rosselli, F.B., Vanzella, W., Riggi, M., Buffolo, F., Panzeri, S., and Zoccolan, D. (2017). **Emergence of transformation-tolerant representations of visual objects in rat lateral extrastriate cortex**. eLife 6, e22794. (**Highlighted as featured article of eLife)** https://doi.org/10.7554/eLife.22794

3- **Tafazoli, S.*,** MacDowell, C.J.*, Che, Z., Letai, K.C., Steinhardt, C.R., and Buschman, T.J. (2020). **Learning to control the brain through adaptive closed-loop patterned stimulation**. Journal of Neural Engineering. 17, 056007. https://iopscience.iop.org/article/10.1088/1741-2552/abb860

4- MacDowell, C.J., **Tafazoli, S.**, and Buschman, T.J. (2022). **A Goldilocks theory of cognitive control: Balancing precision and efficiency with low-dimensional control states**. Current Opinion in Neurobiology 76, 102606. https://www.sciencedirect.com/science/article/pii/S0959438822001003

5- Muratore, P., **Tafazoli, S.**, Piasini, E., Laio, A., and Zoccolan, D. (2022). **Prune and distill: similar reformatting of image information along rat visual cortex and deep neural networks**. NeurIPS, 2022. http://arxiv.org/abs/2205.13816

6- Bouchacourt, F.*, **Tafazoli, S**.*, Mattar, M.G., Buschman, T.J., and Daw, N.D. (2022). **Fast rule switching and slow rule updating in a perceptual categorization task**. eLife 11, e82531. https://elifesciences.org/articles/82531

7- MacDowell, C.J., Libby, A.*, Jahn, C.I.*, **Tafazoli, S.***, and Buschman, T.J. (2023). **Multiplexed Subspaces Route Neural Activity Across Brain-wide Networks**. bioRxiv. https://www.biorxiv.org/content/10.1101/2023.02.08.527772v1 **Under review in Nature Communications**

8- **Tafazoli, S.**, Bouchacourt, F., Ardalan, A., Markov N.T., Uchimura, M., Mattar, M.G., Daw, N.D, Buschman T.J. **Building Compositional Tasks with Shared Neural Subspaces**. bioRxiv, February 1, 2024. https://doi.org/10.1101/2024.01.31.578263 **Under review in Nature**

9- Schottdorf, M., Rich, P. D., Diamanti, M.E., Lin, A., **Tafazoli, S.**, Nieh, E.H, and Thiberge, S.Y., **TWINKLE: An Open-Source Two-Photon Microscope for Teaching and Research,** bioRxiv, September 23, 2024. https://doi.org/10.1101/2024.09.23.612766 **Under review in PLOS ONE**

Selected Conference Publications

1. Masoud Majed, Emad Ahmadi, Mohammad Ghodsi, **Sina Tafazoli**, Abbasian Abdol Hossein, **Changes of Face Recognition after Medial Temporal Lobe Resection,** 66th American Academy of Neurology 2014.

2. **Sina Tafazoli,** Houman Safaai, Matilde Fiorini, Gioia De Franceschi and Davide Zoccolan, **Object selectivity and tolerance to variation in object appearance trade off across rat visual cortical areas V1 and TeA,** COSYNE 2013.

3. **Sina Tafazoli**, Alessandro Di Filippo and Davide Zoccolan**, Invariant perception of visual objects in rats revealed by visual priming,** COSYNE 2011.

4. **Sina Tafazoli,** Mohammad Bagher Menhaj, **Fuzzy Differential Inclusion in Neural Modeling**, 2009 IEEE Symposium on Computational Intelligence.

5. **Sina Tafazoli**, Karim Salahshoor, **Use of Combined ARX – NARX Model in Identification of Neuromuscular System**, 2009 IEEE Symposium on Computational Intelligence.

6. **Sina Tafazoli**, Mohammad Bagher Menhaj and Alireza Khanteymoori, **Modeling of Retina with Artificial Neural Networks**, 13th National and International Computer Conference, Sharif University of Tech, 2008.

7. **Sina Tafazoli**, Kate Letai, Tim Buschman, **Generating complex neural patterns with multi-site electrical microstimulation**, SfN 2016.

8. **Sina Tafazoli,** Houman Safaai, Gioia De Franceschi, Federica B Rosselli, Margherita Riggi, Federica Buffolo, Stefano Panzeri, Davide Zoccolan, **Emergence of transformation-tolerant representations of visual objects in rat visual cortex,** COSYNE 2016.

9. **Sina Tafazoli,** Camden McDowel, Kate Letai, Daniel Che, Tim Buschman, **Navigating in neural and behavioral manifolds with closed-loop multi-site electrical microstimulation system,** SfN 2017.

10. Camden MacDowell, **Sina Tafazoli**, Kate Letai, Daniel Che, Timothy Buschman, **Towards Adaptive Neural-Prosthetics: Using Closed-Loop Machine Learning Algorithms and Multi-Site Electrical Micro-Stimulation to Produce Specific Neural Firing Patterns,** American Neurological Association Conference, 2018.

11. **Sina Tafazoli**, Camden MacDowell, Kate Letai, Daniel Che and Tim Buschman, **Navigating in neural and neural and perceptual manifolds with closed-loop multi-site electrical microstimulation system,** COSYNE 2019.

12. **Sina Tafazoli,** Camden MacDowell, Kate Letai, Daniel Che, Timothy Buschman**, Navigating in neural and perceptual manifolds with a closed-loop multi-site electrical microstimulation system,** COSYNE 2020.

13. **Sina Tafazoli,** Caroline I. Jahn, Nikola Markov, Camden J. MacDowell, Timothy Buschman, **Synchronous oscillatory neural ensambles flexibly encode inference of abstract rules in prefrontal and posterior partial cortices,** SfN 2021.

14**.** Flora M. Bouchacourt, **Sina Tafazoli**, Marcello Mattar, Nathaniel Daw and Timothy Buschman, **Inferential reasoning in monkeys,** SfN 2021.

15. **Sina Tafazoli**, Flora M.Bouchacourt, Nikola T.Markov, Motoaki Uchimura, Marcelo G.Mattar, Nathaniel D.Daw and Timothy J.Buschman, **Neural representation of learning multiple abstract rules in fronto-parietal network and basal ganglia,** SfN 2022.

16. **Sina Tafazoli**, Flora M.Bouchacourt, Adel Ardalan, Nikola T.Markov, Motoaki Uchimura, Marcelo G.Mattar, Nathaniel D.Daw and Timothy J.Buschman**, Building Compositional Tasks with Shared Neural Subspaces,** SfN 2024.

17. Qinpu He, Sina Tafazoli, Timothy Buschman, **Dynamics of neural representations during learning of compositional tasks,** SfN 2024.

Invited Talks

2024	SYNAPSES (Seminars at Yale Neuroscience: Advanced Postdoc Extramural Series), Yale University
2023	Simian Collective Meeting (SimCo), Chicago
2022	SfN nanosymposium (Cortical Basis of Cognitive Control Across Species)
2021	Society for Neuromodulation journal club
2014	Division of Biology, Caltech
2014	Rockefeller University
2014	Department of Biology, Washington University
2014	Institute for Research on Fundamental Sciences, IPM, Iran
2013	McGovern Institute for brain science, MIT

Research Experience

Aug 2009 – Sep 2009	**Summer researcher at laboratory of Alessandro Treves**, Cognitive Neuroscience Sector, SISSA,
December 2010	**Visitor at Laboratory of Matteo Carandini**, Institute of Ophthalmology, University College London, London
2007	**Researcher working on** "***Modeling Retina with Neuron Software***" under the supervision of S. Gharibzadeh, Amirkabir University of Technology, Tehran, Iran,
2007	**Researcher working on** "**Neural *Sequences Based on Winnerless Competition***" in the neuroscience reading group of Hossein Abbasian, Institute for research in fundamental sciences (IPM), School of Cognitive Sciences, Tehran, Iran

Scientific Outreach and Service

2019 **Teaching assistant NeuroBridges** summer school on decision making, France

2019-2020 **Member of seminar series committee**, Princeton Neuroscience Institute

2020-2022 **Member of climate and inclusion committee**, Princeton Neuroscience Institute

2022 **Mentor at Neuromatch academy**, 2022

2023 **COSYNE 2023 workshop co-organizer**, "Dynamic geometrical transformations: Language of flexible brain computations"

Media Coverage

2012 **Rats Show Transformation-Tolerant Visual Recognition**
Author: Staff of Journal of Neuroscience

2017 **Do rats see like we see?**
Author: Nicole Rust, University of Pennsylvania

2017 **Innovative model for the study of vision**
Author: sciencedaily.com

Supervised undergraduate students

- **Gioia De Franceschi** (University of Trieste), fall 2012 – fall 2013. Neuronal substrates of invariant visual object recognition in rats.
- **Matilde Fiorini** (University of Trento), fall 2011 – fall 2012. Transformation-tolerant object recognition in rats: behavioral evidence and neuronal underpinnings.
- **Kate Letai (**Princeton University) Spring 2016 - fall 2017 Development of adaptive cognitive prosthetic.
- **Daniel Che** (Princeton University) fall 2017 - spring 2020 Development of adaptive cognitive prosthetic.

Research Interests

Executive control, Meta learning, Computational Neuroscience, Oscillations.

References

1- **Tim Buschman** (tbuschma@princeton.edu), Princeton Neuroscience Inst., Princeton University.
2. **Davide Zoccolan** (zoccolan@sissa.it), Cognitive Neuroscience Sector, SISSA, Italy.
3- **Nathaniel D. Daw** (ndaw@princeton.edu), Princeton Neuroscience Inst., Princeton University.