

Arseny Finkelstein – CV

Date of birth: September 1st, 1984 Citizenship: Israeli Familial status: Married + 1 child
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Employment

2022 – Senior Lecturer (tenure track, equivalent to Assistant Professor), Department of Physiology and Pharmacology, Faculty of Medical & Health Sciences, Tel Aviv University, Israel. Sagol School of Neuroscience, Tel Aviv University, Israel.

Education

2016 – 21 Postdoctoral Associate, Janelia Research Campus, Howard Hughes Medical Institute, USA.
Advisor: Dr. Karel Svoboda.

2010 – 16 Ph.D., Department of Neurobiology, Weizmann Institute of Science, Israel.
Advisor: Prof. Nachum Ulanovsky.

2006 – 09 M.Sc., Department of Neurobiology, Weizmann Institute of Science, Israel.
Advisor: Prof. Michal Schwartz.

2001 – 03 B.Sc. (Life Sciences), *magna cum laude*, Hebrew University of Jerusalem, Israel.

Academic Awards/Honors

2024 European Research Council (ERC) Starting Grant

2021 Azrieli Early Career Faculty Fellow

2018 FENS-Kavli network of excellence Ph.D. Thesis Prize.

2016 Human Frontiers Long-term Fellowship (received and declined due to Rothschild and EMBO fellowships).

2016 EMBO Long-Term Fellowship for postdoctoral studies.

2016 Rothschild Fellowship for postdoctoral studies abroad, awarded to the top 12 Israeli postdoctoral students in all scientific fields and engineering.

2016 Young Investigator Award, International Society for Neuroethology.

2016 The John F. Kennedy Prize for outstanding Ph.D. research awarded by the Weizmann Institute of Science.

2015 Winner of the Capranica Prize, from the International Society for Neuroethology, for the most outstanding paper published in 2015 by a young scientist.

2015 Nomination as a young scientist delegate for the 65th Lindau Nobel Laureate meeting, Lindau.

2015 Winner of a travel grant for Computational and Systems Neuroscience (Cosyne) meeting, Salt Lake City.

2014 Winner of the Israeli Society for Neuroscience student travel award, for attending FENS Forum of Neuroscience (Milan).

2014 Travel grant for 'How to Read a Map: understanding structure-function relationships in the brain' (Janelia Research Campus).

2013 Scholarship for Methods in Computational Neuroscience course, Marine Biology Laboratory, Woods Hole.

2012 Clore Foundation fellowship – 3-year full scholarship stipend for excellence in graduate studies and research accomplishments (Up to 10 scholarships in natural and exact sciences are awarded nationwide).

2012 Wolf Foundation award for excellence in graduate research.

2001 Etgar honors program for B.Sc. distinguished students (Hebrew University of Jerusalem).

2001 President prize for distinguished B.Sc. students (Hebrew University of Jerusalem).

Academic activities

2024 Serving on the scientific program committee of COSYNE 2025.

2024 Session co-organizer and chair: Israel Society for Neuroscience meeting (Forthcoming).

2024 Grant Reviewer for National Science Foundation (NSF) Collaborative Research in Computational Neuroscience.

2023 Conference co-organizer, International Conference of the CRCNS (Collaborative Research in Computational Neuroscience), Tel-Aviv, Israel.

2013,15 Symposium organizer and chair: Spring Hippocampal Research Conference, Taormina, Italy.

Reviewer for: *Nature*, *Nature Neuroscience*, *Nature Communications*, *Journal of Neurophysiology*, *Journal of Neuroscience*, *Hippocampus*, *PLoS Computational Biology*, *eLife*, *Current Biology*.

Invited Talks

1. European Symposium on Ultrafast Laser driven Biophotonics. 'Optical mapping of neural interactions on multiple spatial scales during behavior'. Jena, Germany (2024).
2. Charles University. 'Optical mapping of neural interactions on multiple spatial scales'. Prague, Czech Republic (2024).
3. COSYNE; Workshop. 'High-dimensional communication across cortical networks during behavior', Cascais, Portugal (2024).
4. Ben-Gurion University, Mechanisms of cortical communication during action-selection (2024).
5. Bernstein Center Berlin, 'Mechanisms of cortical communication during decision-making' (2023).
6. International Conference of the CRCNS (Collaborative Research in Computational Neuroscience), 'Mechanisms of cortical communication during goal-directed behavior', Tel-Aviv, Israel (2023).
7. Princeton University, 'Mechanisms of cortical communication during decision-making' (2023).
8. Hebrew University of Jerusalem, Faculty of Medicine, 'Mechanisms of cortical communication during decision-making' (2022).
9. Optical Interest Group – Australian Biomedical Group. 'Optogenetic Mapping of Neuronal Interactions'. (virtual, 2022).
10. COSYNE; Workshop. 'A cognitive map for action selection in the frontal cortex', (2022), Cascais, Portugal (2022).
11. Houston area Neurotheory and Machine Learning group, 'Cortical mechanisms of information flow during behavior' (2021).
12. World Wide NeuRise, 'Talks by rising stars in neuroscience'. 'Cortical mechanisms of information flow during behavior' (2021).
13. FMI, Basel. Young Investigator Seminar Series, 'Cortical mechanisms of information flow during behavior' (2021).
14. Janelia Annual Symposium, nominated talk, 'From neuronal connectivity to behavior' (2021).
15. Tel Aviv University, 'Mechanisms of cortical communication during behavior' (2020).
16. Technion Institute of Technology, 'Mechanisms of cortical communication during behavior' (2020).
17. ELSC, Hebrew University of Jerusalem, 'Mechanisms of cortical communication during decision-making' (2020).
18. Weizmann Institute of Science, 'Mechanisms of cortical communication during behavior' (2020)
19. University of Geneva, 'Mechanisms of intracortical communication during decision making' (2018).
20. Ecole Polytechnique Federal de Lausanne, 'Mechanisms of intracortical communication during decision making' (2018).
21. EMBO fellows meeting, 'Selective communication between sensory and motor cortices in the course of motor planning', Heidelberg (2018).
22. Johns Hopkins University, Bodian Seminar, 'Neural mechanisms of goal-directed navigation and action selection', (2017).
23. Young Investigator Award Symposium, 12th International Congress of Neuroethology, 'Optimal population coding by mixed-dimensionality neurons: insights from bat head-direction cells', Montevideo (2016).
24. Ludwig-Maximilians University of Munich, 'Goal-directed navigation with 3D neural compasses: insights from the bat brain' (2015).
25. Spring Hippocampal Research Conference, 'Representation of goals in the bat hippocampus', Taormina (2015).
26. Weizmann Institute of Science, Neuroscience Seminar Series, 'Goal-directed navigation with 3D neural compasses' (2015).
27. Technion Institute of Technology, 'Goal-directed navigation with 3D neural compasses: insights from the bat brain' (2015).
28. University of Chicago, 'Pure and conjunctive codes for the head-direction signal' (2015).
29. Northwestern University, 'Encoding of directions and goals in the bat brain' (2015).
30. Israel Institute for Biological Research, 'What Art and Bats can teach us on the perception of 3D space?' (2015).
31. Princeton University, '3D maps and compasses in the brain: insights from freely moving bats' (2014).
32. Stanford University, '3D maps and compasses in the bat brain' (2014).
33. Symposium on "Linking Behavior and Physiology in Animal Navigation and Orientation", American Physiology Society Meeting: Comparative approaches to grand challenges in physiology, '3D neural compass in the bat brain', San Diego (2014).
34. University of California San Diego, '3D maps and compasses in the bat brain' (2014).
35. Duke University, '3D maps and compasses in the brain: insights from freely moving bats' (2014).
36. Janelia Research Campus, "How to Read a Map" conference, 'Functional organization of 3D neural compasses in the bat brain', (2014).
37. University of Pennsylvania, 'Maps and compasses in the brain: from 3D to pictorial space' (2013).
38. Harvard Medical School, Systems Neuroscience Club, 'On bats, maps and compasses in the brain' (2013).
39. Boston University, Center for Memory and Brain, '3D maps and compasses in the brain: insights from freely moving bats', (2013).
40. Spring Hippocampal Research Conference, '3D neural compass: head-direction cells in bats', Taormina (2013).
41. 10th International Congress of Neuroethology '3D head-direction cells in the bat presubiculum', Maryland (2012).
42. University of California Los Angeles, 'Immunomodulatory therapy for stroke and other neurodegenerative conditions' (2008).
43. Israel Institute for Biological Research, 'Boosting neurogenesis in the adult brain following stroke' (2006).

Contributed Talks

44. COSYNE (main meeting), 'Optogenetic mapping of circuit connectivity in the motor cortex during goal-directed behavior', Lisbon (2022)
45. 23rd Meeting of the Israel Society for Neuroscience, 'Representation of goals in the bat hippocampus', Eilat (2014).

46. Weizmann Institute of Science, Neuroscience retreat, 'How is 3D head-direction represented in the mammalian brain?' (2014).
47. SPACEBRAIN meeting, 'Representation of multiple spatial scales by hippocampal CA1 neurons', Tel Aviv- Jaffa (2014).
48. 21st Meeting of the Israel Society for Neuroscience, '3D Neural Compass: head direction cells in the bat presubiculum', Eilat (2012).
49. Weizmann Institute of Science, Neuroscience retreat, 'Neural codes for 3D space in the presubiculum of bats' (2012).
50. Weizmann Institute of Science, 'Science and Arts', 'Does neural representation of 3D space influence artistic imagination?' (2012).

Publications

Major peer-reviewed publications:

1. CM Kim, **Finkelstein A**, Chow CC, Svoboda K, Darshan R. Distributing task-related neural activity across a cortical network through task-independent connections. [Nature Communications](#) (2023)
2. Inagaki HK, Chen S, Daie K, **Finkelstein A**, Fontolan L, Romani S, Svoboda K. Neural algorithms and circuits for motor planning. [Annual Review of Neuroscience](#) (2022).
3. **Finkelstein A***, Fontolan L*, Economo MN, Li N, Romani S, Svoboda K. Attractor dynamics gate cortical information flow during decision-making. [Nature Neuroscience](#) (2021).
4. **Finkelstein A**, Ulanovsky N, Tsodyks M, Aljadeff Y. Optimal dynamic coding by mixed-dimensionality neurons in the head-direction system of bats. [Nature Communications](#) (2018).
5. **Finkelstein A**. Motor control: three-dimensional metric of head movements in the mouse brain. [Current Biology](#) (2018).
6. Eliav T, Geva-Sagiv M, Yartsev MM, **Finkelstein A**, Rubin A, Las L, Ulanovsky N. Nonoscillatory phase-coding and synchronization in the bat hippocampal formation. [Cell](#) (2018).
7. Sarel A*, **Finkelstein A***, Las L, Ulanovsky N. Vectorial representation of spatial goals in the hippocampus of bats. [Science](#) (2017). [See also [News & Views by de Cothi and Spiers](#), [rated "Exceptional" on Faculty of 1000](#)]
8. **Finkelstein A**, Las L, Ulanovsky N. 3-D maps and compasses in the brain. [Annual Review of Neuroscience](#) (2016).
9. **Finkelstein A***, Derdikman D*, Rubin A, Foerster JN, Las L, Ulanovsky N. Three-dimensional head-direction coding in the bat brain. [Nature](#) (2015). [See also [News & Views by Rowland and Moser](#). Highlighted in *The Guardian*, *The Washington Post*, *BBC*, *The Verge*, *The Scientist*, and ~150 other News Media; [rated "Exceptional" on Faculty of 1000](#)]
10. Eisenkraft A, Falk A, **Finkelstein A**. The role of glutamate and the immune system in organophosphate-induced CNS damage. [Neurotoxicity Research](#) (2013).
11. **Finkelstein A***, Kunis G*, Berkutzki T, Ronen A, Krivoy A, Yoles E, Last D, Mardor Y, Van Shura K, McFarland E, Capacio BA, Eisner C, Gonzales M, Gregorowicz D, Eisenkraft A, McDonough JH, Schwartz M. Immunomodulation by poly-YE reduces organophosphate-induced brain damage. [Brain Behavior Immunity](#) (2012).
12. **Finkelstein A***, Kunis G*, Seksenyan A, Ronen A, Berkutzki T, Azoulay D, Koronyo-Hamaoui M, Schwartz M. Abnormal changes in NKT cells, the IGF-I axis, and liver pathology in an animal model of ALS. [PLoS One](#) (2011).
13. Ziv Y*, **Finkelstein A***, Geffen Y*, Kipnis J, Smirnov I, Shpilman S, Vertkin I, Kimron M, Lange A, Hecht T, Reyman KG, Marder JB, Schwartz M, Yoles E. A novel immune-based therapy for stroke induces neuroprotection and supports neurogenesis. [Stroke](#) (2007).

Other peer-reviewed publications:

14. Hoffman A, Eisenkraft A, **Finkelstein A**, Schein O, Rotman E, Dushnitsky T. A decade after the Tokyo sarin attack: a review of neurological follow-up of the victims. [Mil Med](#) 172, 607-10 (2007).
15. Krivoy A, **Finkelstein A**, Rotman E, Layish I, Tashma Z, Hoffman A, Schein O, Yehezkelli Y, Dushnitsky T, Eisenkraft A. Cyanides – treatment beneath the shade of terror. [Harefuah](#) 146, 228-34 (2007).
16. Eisenkraft A, Markel G, Simovich S, Layish I, Hoffman A, **Finkelstein A**, Rotman E, Dushnitsky T, Krivoy A. Mobile chemical detector (AP2C+SP4E) as an aid for medical decision making in the battlefield. [Mil Med](#) 172, 997-1001 (2007).
17. **Finkelstein A**, Rotman E, Krivoy A, Laish I, Tashma Z, Hoffman A, Yehezkelli Y. Political poisoning with dioxins – a weapon of chemical "disgracefulness". [Harefuah](#) 144, 729-35 (2005).
18. Bar-Haim E, Aran A, Marcus N, **Finkelstein A**, Amsalem Y, Yehezkelli Y. Laboratory methods for detection and identification of

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biological pathogens. *Harefuah* 144, 341-6 (2005).

19. Layish I, Krivoy A, Rotman E, **Finkelstein A**, Tashma Z, Yehezkeli Y. Pharmacologic prophylaxis against nerve agent poisoning. *Isr Med Assoc J* 7, 182-7 (2005).

Preprints:

20. **Finkelstein A**, Daie K, Rózsa M, Darshan R, Svoboda K. Connectivity underlying motor cortex activity during naturalistic goal-directed behavior. [bioRxiv](#) (2023).
21. **Finkelstein A**, Rouault H, Romani S, Ulanovsky N. Dynamic control of cortical head-direction signal by angular velocity. [bioRxiv](#) (2019).

* Equal contribution

Teaching and Outreach Activities

- 2024 –present Lecturer in the undergraduate course ‘Introduction to Neurobiology’, Tel Aviv University, Israel
- 2023 –present Lecturer in the graduate course ‘Methods in Neurophysiology’, Tel Aviv University, Israel
- 2022 –present Lecturer in the graduate course ‘Introduction to Computational Neuroscience’, Tel Aviv University, Israel
- 2022 –present Lecturer in the undergraduate course ‘Introduction to Systems Neuroscience’, Tel Aviv University, Israel
- 2018-19 Lecturing for neuroscience undergraduate students on ‘Elementary Decision Making’, Janelia Research Campus, USA.
- 2017-18 Instructor in data-analysis for neuroscience boot camp for John Hopkins University graduate students, USA.
- 2017 Judging student science projects of Loudoun County Public Schools Academy of Science, Virginia, USA.
- 2016 Opening Lecture in the Rothschild Caesarea Foundation series on popular science, ‘*Navigation through physical and pictorial space*’, Tel-Aviv, Israel.
- 2015 Lecturer at ‘Science on Tap’ public event organized by the Weizmann Institute of Science, ‘*Brain, Art, Space, and Virtual Navigation*’, Tel-Aviv, Israel.
- 2013 Cofounder (together with Alon Rubin) and lecturer in the graduate course ‘*Neuroscience and Art*’ for M.Sc. and Ph.D. students, Weizmann Institute of Science, Israel.
- 2013–15 Teaching Assistant in the course ‘*Systems Neuroscience Reading Seminar*’, for M.Sc. and Ph.D. students, Weizmann Institute of Science, Israel.
- 2012 Lecturing for B.Sc. students at ‘The Amos de-Shalit Ulpana in Life Sciences’, part of the Amos De- Shalit Foundation, Israel.
- 2011–15 Lecturing for high school students, in the Davidson Institute for Science Education, Weizmann Institute of Science, Israel.
- 2011–15 Lecturing for high school students, in the Young at Science Unit of the Weizmann Institute of Science, Israel

Other Research Experience

- 2008 Visiting Scientist. Department of Neurosurgery, Cedars-Sinai Medical Center, Los-Angeles, USA. Research topic: ‘*Immune based therapies for amyotrophic lateral sclerosis (ALS)*’.
- 2002–03 Research assistant. Department of Biological Chemistry, Hebrew University of Jerusalem. Advisor: Prof. Hermona Soreq. Research topic: ‘*Genetic predisposition to stress and anticholinesterase sensitivity*’.

Military service

- 2003–06 Researcher in the Medical Corps, Israel Defense Forces.

Selected Abstracts

1. Chamilevsky T. & **Finkelstein A**. Mesoscale dynamics of cell resolution cortical activity across brain-areas in naturalistic goal-directed behavior. FENS Forum of Neuroscience, Vienna (2024).
2. Shmueli N. & **Finkelstein A**. Functional organization of the cognitive map for naturalistic reaching behavior in the motor cortex. FENS Forum of Neuroscience, Vienna (2024).
3. Susman L, Aljaeff J, Kern T, Svoboda K, **Finkelstein A**. High-dimensional communication and gating of behavioral information across cortical areas. Computational and Systems Neuroscience (Cosyne), Lisbon (2024).
4. Susman L, Aljaeff J, Svoboda K, **Finkelstein A**. Mesoscale dynamics of neural populations reveal high-dimensional communication across cortical areas. Meeting of the Society for Neuroscience, Washington, DC (2023).
5. **Finkelstein A**, Daie K, Rózsa M, Darshan R, Svoboda K. Local network connectivity underlying goal-directed neural activity

- in the motor cortex. Meeting of the Society for Neuroscience, Washington, DC (2023).
6. **Finkelstein A**, Daie K, Rózsa M, Darshan R, Svoboda K. Optogenetic mapping of neuronal interactions in the motor cortex during goal-directed behavior. Meeting of the Society for Neuroscience, San Diego (2022).
 7. **Finkelstein A**, Daie K, Rózsa M, Darshan R, Svoboda K. Optogenetic mapping of neuronal interactions in the motor cortex during goal-directed behavior. Meeting of the Israel Society for Neuroscience, Eilat (2022).
 8. **Finkelstein A**, Daie K, Darshan R, Svoboda K. Optogenetic mapping of neuronal interactions in the motor cortex during goal-directed behavior. FENS Forum of Neuroscience, Paris (2022).
 9. **Finkelstein A**, Daie K, Darshan R, Svoboda K. Optogenetic mapping of circuit connectivity in the motor cortex during goal-directed behavior. Computational and Systems Neuroscience (Cosyne), Lisbon (2022).
 10. **Finkelstein A**, Fontolan L, Economo MN, Li N, Romani S, Svoboda K. Attractor dynamics gate cortical information flow during decision-making. Meeting of the Society for Neuroscience, Chicago (2019).
 11. **Finkelstein A**, Rouault H, Romani S, Ulanovsky N. Gating and scaling of head-direction signal by angular velocity. Meeting of the Society for Neuroscience, Washington, DC (2017).
 12. **Finkelstein A**, Ulanovsky N, Tsodyks M, Aljadeff Y. Optimal population coding by mixed-dimensionality neurons in the head-direction system of bats. Meeting of the Society for Neuroscience, San Diego (2016).
 13. **Finkelstein A**, Aljadeff Y, Rubin A, Ulanovsky N, Tsodyks M. Conjunctive population codes: insights from bat 3D head-direction cells. Computational and Systems Neuroscience (Cosyne), Salt Lake City (2015).
 14. **Finkelstein A**, Sarel A, Las L, Ulanovsky N. Representation of goals in the bat hippocampus. Meeting of the Israel Society for Neuroscience, Eilat (2014).
 15. **Finkelstein A**, Derdikman D, Rubin A, Foerster J, Las L, Ulanovsky N. 3D head direction cells in bats on a vertical ring and in flight. Meeting of the Society for Neuroscience, Washington, DC (2014).
 16. **Finkelstein A**, Sarel A, Las L, Ulanovsky N. Representation of goals in the bat hippocampus. International Congress of Neuroethology, Sapporo (2014).
 17. **Finkelstein A**, Derdikman D, Rubin A, Foerster J, Las L, Ulanovsky N. 3D head direction cells in crawling and flying bats. FENS Forum of Neuroscience, Milan (2014).
 18. Ginosar G, **Finkelstein A**, Fellous JM, Las L, Ulanovsky N. In search of 3-D grid cells in flying bats. FENS Forum of Neuroscience, Milan (2014).
 19. **Finkelstein A**, Derdikman D, Rubin A, Foerster J, Las L, Ulanovsky N. 3D head direction cells in crawling and flying bats. Neural Networks in the Arctic, Spitsbergen (2014).
 20. **Finkelstein A**, Derdikman D, Rubin A, Foerster J, Las L, Ulanovsky N. Functional organization of 3D neural compasses in the bat brain. Janelia conference on 'How to Read a Map: understanding structure-function relationships in the brain'. Janelia Farm Research Campus (2014).
 21. **Finkelstein A** & Ulanovsky N. Representation of multiple spatial scales by place cells during 2D versus 3D navigation in bats. Meeting of the Israel Society for Neuroscience, Eilat (2013).
 22. **Finkelstein A** & Ulanovsky N. Hippocampal representation of multiple spatial scales during 2D versus 3D navigation in bats. Meeting of the Society for Neuroscience, San Diego (2013).
 23. **Finkelstein A**, Derdikman D, Rubin A, Foerster J, Las L, Ulanovsky N. 3D neural compass: head-direction cells in bats. Spring Hippocampal Research Conference, Taormina (2013).
 24. **Finkelstein A**, Derdikman D, Rubin A, Foerster J, Las L, Ulanovsky N. A toroidal neural compass: three-dimensional head direction cells in bats. Royal Society conference on 'Space in the brain: cells, circuits, codes and cognition', London (2013).
 25. **Finkelstein A**, Derdikman D, Foerster J, Las L, Ulanovsky N. 3D neural compass: head direction cells in the bat presubiculum. Meeting of the Israel Society for Neuroscience, Eilat (2012).
 26. **Finkelstein A**, Derdikman D, Foerster J, Las L, Ulanovsky N. 3D head-direction cells in the bat presubiculum. Meeting of the Society for Neuroscience, New-Orleans (2012).
 27. **Finkelstein A**, Derdikman D, Foerster J, Las L, Ulanovsky N. 3D head-direction cells in the bat presubiculum. International Congress of Neuroethology, University of Maryland (2012).
 28. **Finkelstein A**, Derdikman D, Foerster J, Las L, Ulanovsky N. 3D head-direction cells in the bat presubiculum. FENS Forum of European Neuroscience, Barcelona (2012).
 29. **Finkelstein A**, Derdikman D, Foerster J, Ulanovsky N. 3-D head-direction cells in the bat presubiculum. Meeting of the

Israel Society for Neuroscience, Eilat (2011).