

CURRICULUM VITAE

Dr. Dror Dotan

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📍 School of Education and School of Neuroscience, Tel Aviv University

✉ dotandro@tauex.tau.ac.il

🌐 <http://mathinklab.org>

EDUCATION

1995 – 1998 Tel Aviv University, Computer Science & Philosophy, BA Magna cum laude, the Program for Outstanding Students.
2003 – 2007 Tel Aviv University, Education, MA Summa Cum Laude.
2010 – 2016 Tel Aviv University, Education, PhD.

Title of Master's thesis: From seven dwarfs to four wolves: Differences in the processing of number words and other words.

Supervisor: Naama Friedmann

Title of Doctoral dissertation: Multi-digit number processing: Cognitive mechanisms and their impairment
Supervisors: Naama Friedmann, Stanislas Dehaene

FURTHER STUDIES

2016-2017 INSERM-CEA Cognitive Neuroimaging Unit, Université Paris-Saclay, Paris, France. Post-doctoral fellowship

ACADEMIC AND PROFESSIONAL EXPERIENCE

2015-2017	Tel Aviv University	School of Education	External teacher
2018-2022	Tel Aviv University	School of Education	Lecturer
2023-	Tel Aviv University	School of Education	Senior lecturer

ACADEMIC AND PROFESSIONAL AWARDS

Fellowships & grants

2022 – 2024 CIFAR-Jacobs Foundation seed funding grant: *Hippocampal streams for rule learning (HIPSTER)* (CAD 50,000). PIs: Zoe Ngo, Dror Dotan, Filip van Opfstal, Michael Skeide, Roman Feiman, Caren Walker.

2022 – 2024 CIFAR-Jacobs Foundation seed funding grant: *From reward sensitivity to personalized learning: Enhancing the real-world significance of research on reward learning* (CAD 50,000). PIs: Lisa Bardach, Filip van Opfstal, Dror Dotan, Kou Murayama.

2021 – 2026 Israel Science Foundation research grant: *The syntactic mechanisms of number processing. Investigating the difference between Programming teaching methods as reflected in the human connectome*. Grant from Tel Aviv University Sagol school of neuroscience.

2021 *The genetic correlates of dysgraphia*. Grant from Tel Aviv University MILA center.

2020 – 2022 *Jacobs Research Fellow*, Jacobs Foundation.

2019 *The genetic correlates of language disorders*. Grant from Tel Aviv University MILA center.

2012 – 2015 PhD fellowship, the Azrieli Fellows Program for Outstanding Israeli Students.
1995 – 1998 Study fellowship, Program of Outstanding Students

Prizes & Awards

- 2014 The Rennick award for the best submission of a graduate student to the INS mid-year meeting, Jerusalem, Israel.
- 2013 Best poster award in the “Interactions between space, time, and number: 20 years of research” conference, Collège de France, Paris, France.

PUBLICATIONS

REFEREED ARTICLES in Journals

1. Friedmann, N., Dotan, D., & Rahamim, E. (2010). Is the visual analyzer orthographic-specific? Reading words and numbers in letter position dyslexia. *Cortex*, 8, 982-1004. <http://doi.org/10.1016/j.cortex.2009.08.007>
2. Dotan D. & Dehaene S. (2013). How do we convert a number to a finger trajectory? *Cognition*, 129(3), 512-529. <http://doi.org/10.1016/j.cognition.2013.07.007>
3. Dotan D., Friedmann N., & Dehaene S. (2014). Breaking down number syntax: Spared comprehension of multi-digit numbers in a patient with impaired digit-to-word conversion. *Cortex*, 59, 62-73. <http://doi.org/10.1016/j.cortex.2014.07.005>
4. Dotan D. & Friedmann N. (2015). Steps towards understanding the phonological output buffer and its role in the production of numbers, morphemes, and function words. *Cortex*, 63, 317-351. <http://doi.org/10.1016/j.cortex.2014.08.014>
5. Dotan, D. & Dehaene, S. (2016). On the origins of logarithmic number-to-position mapping. *Psychological Review*, 123(6), 637-666. <http://doi.org/10.1037/rev0000038>
6. Pinheiro-Chagas, P., Dotan, D., Piazza, M., & Dehaene, S. (2017). Finger tracking reveals the covert stages of mental arithmetic. *Open Mind: Discoveries in Cognitive Science*, 1, 30-41. <http://doi.org/10.1162/OPMI.a.00003>
7. Dotan, D., Meyniel, F., & Dehaene, S. (2018). On-line confidence monitoring during decision making. *Cognition* (171), 112-121. <http://doi.org/10.1016/j.cognition.2017.11.001>
8. Dotan, D., & Friedmann, N. (2018). A cognitive model for multi-digit number reading: Inferences from individuals with selective impairments. *Cortex*, 101, 249-281. <http://doi.org/10.1016/j.cortex.2017.10.025>
9. Al Roumi, F., Dotan, D., Yang, T., Wang, L., & Dehaene, S. (2019). Acquisition of semantic and syntactic symbols in an artificial mini-language. *Cognition*, 185, 49-61. <http://doi.org/10.1016/j.cognition.2018.11.006>
10. Dotan, D., & Friedmann, N. (2019). Separate mechanisms for number reading and word reading: Evidence from selective impairments. *Cortex*, 114, 176-192. <http://doi.org/10.1016/j.cortex.2018.05.010>
11. Dotan, D., Pinheiro-Chagas, P., Al Roumi, F., & Dehaene, S. (2019). Track it to crack it: Dissecting processing stages with trajectory tracking. *Trends in Cognitive Sciences*, 23(12), 1058-1070. <http://doi.org/10.1016/j.tics.2019.10.002>
12. Dotan, D., & Friedmann, N. (2019). Reducing interference improves the memorization of multiplication facts in a case of hypersensitivity to interference. *Journal of Numerical Cognition*, 5(3), 400-430. <http://doi.org/10.5964/jnc.v5i3.203>
13. Dotan, D., & Dehaene, S. (2020). Parallel and serial processing in number-to-quantity conversion. *Cognition*, 204. <http://doi.org/10.1016/j.cognition.2020.104387>
14. Dotan, D., Eliahou, O., & Cohen, S. (2021). Serial and syntactic processing in the visual analysis of multi-digit numbers. *Cortex*, 134, 162-180. <http://doi.org/10.1016/j.cortex.2020.10.012>
15. Dotan, D., Breslavskiy, I., Diab-Copty, H., & Yousefi, V. (2021). Syntactic priming reveals an explicit syntactic representation of multi-digit verbal numbers. *Cognition*, 215, 104821. <http://doi.org/10.1016/j.cognition.2021.104821>
16. Dotan, D., & Dehaene, S. (2022). Tracking priors and their replacement: Mental dynamics of decision making in the number-line task. *Cognition*, 224, 105069. <http://doi.org/10.1016/j.cognition.2022.105069>

17. Dotan, D., & Brutmann*, N. (2022). Syntactic chunking reveals a core syntactic representation of multi-digit numbers, which is generative and automatic. *Cognitive Research: Principles and Implications*, 7, 58. <http://doi.org/10.1186/s41235-022-00409-2>
18. Schrift, G., Dotan, D., & Censor, S. (2022). Brief memory reactivations induce learning in the numeric domain. *npj Science of Learning*, 7, 18. <https://doi.org/10.1038/s41539-022-00136-9>
19. Dotan, D., & Zviran-Ginat, S. (2022). Elementary math in elementary school: To learn the multiplication table, avoid proactive interference. *Cognitive Research: Principles and Implications*, 7, 101. <http://doi.org/10.1186/s41235-022-00451-0>
20. Dotan, D. (2023). Top-down number reading: Language affects the visual identification of digit strings. *Cognitive Science*, 47(10), e13368. <http://doi.org/10.1111/cogs.13368>
21. Shalit, E. & Dotan, D. (2024). Exploring the linguistic complexity of third-grade numerical literacy. *Cognitive Research: Principles and Implications*, 9, 48. <http://doi.org/10.1186/s41235-024-00575-5>

REFEREED ARTICLES in Hebrew Journals

1. Dotan, D. & Friedmann, N. (2007). The three bears and four flies: Phonological and semantic errors – dissociation between words and numbers. *Language and Brain*, 6, 3-17.
2. Dotan, D. & Friedmann, N. (2008). Is the visual analyzer specific to words? Conclusions from letter position dyslexia. *Language and Brain*, 7, 3-22.
3. Dotan, D., & Friedmann, N. (2009). Morpho-syntactic effects in the visual analysis of numbers. *Language and Brain*, 9, 143-158.
4. Friedmann, N., Dotan, D., & Biran, M. (2012). Lexical retrieval and different types of developmental and acquired anomia. *Language and Brain*, 10, 139-168.
5. Dotan D., Friedmann N., & Dehaene S. (2014). Nonverbal comprehension of multi-digit numbers. *Language and Brain*, 11, 25-47.
6. Dotan D. & Friedmann N. (2019). Word reading and number reading use different mechanisms: Dissociations between dysnumeria and dyslexia. *Language and Brain*, 13, 1-35.

PREPRINTS

1. Feldman, A., Berger, A., Dotan, D., Tzelgov, J., & Shmueli, M. (2019). Following the finger: The development of the mental number line in elementary school children. *PsyArXiv Preprints*. <http://doi.org/10.31234/osf.io/qm43b>
2. Dotan, D. (2022). Syntax-driven number reading: The identification of digits is dominated by the number's syntactic structure. *PsyArXiv Preprints*. <http://doi.org/10.31234/osf.io/nbyx2>
3. Dotan, D. (2022). A pure syntax of multi-digit numbers in the absence of lexicon and semantics. *PsyArXiv Preprints*. <http://doi.org/10.31234/osf.io/ewmvu>
4. Handelsman, N., & Dotan, D. (2023). Reading numbers is hard, and the difficulty is a syntactic one: A descriptive analysis of number-reading patterns in readers with and without dysnumeria. *PsyArXiv Preprints*, <http://doi.org/10.31234/osf.io/87dzw>
5. Nir, S., & Dotan, D. (2023). The temporal dynamics of information flow in working memory when executing a mental algorithm: The case of multi-digit arithmetic. *PsyArXiv Preprints*, <http://doi.org/10.31234/osf.io/4g985>

CHAPTERS in books

1. Friedmann, N., Biran, M., & Dotan, D. (2013). Lexical retrieval and breakdown in aphasia and developmental language impairment. In C. Boeckx & K. K. Grohmann (Eds.), *The Cambridge Handbook of Biolinguistics*. Cambridge, UK: Cambridge University Press.

PAPERS PRESENTED AT SCIENTIFIC MEETINGS PUBLISHED IN PROCEEDINGS

1. Dotan, D. & Friedmann, N. (2010). Words and numbers in the phonological output buffer. *Procedia – Social and Behavioural Sciences*, 6, 82-83. <http://doi.org/10.1016/j.sbspro.2010.08.042>

ACTIVE PARTICIPATION IN SCIENTIFIC MEETINGS

1. Dotan, D., Rahamim, E., & Friedmann, N. (2006, November). *Is the reading mechanism specific for words or is it also used for numbers?* Presented at the 57th annual meeting of the Israeli Association of Physical and Rehabilitation Medicine. Israel.
2. Dotan, D., & Friedmann, N. (2008, January). *From seven dwarfs to four wolves: Differences in the processing of number words and other words in conduction aphasia.* Presented at the annual conference of the Israeli Society for Neuropsychology. Haifa, Israel.
3. Dotan, D., & Friedmann, N. (2008, June). *From seven dwarfs to four camels: Differences in the processing of number words and other words in conduction aphasia.* Presented at the Language and Neurons - Theoretical Approaches conference. Bar-Ilan University, Israel.
4. Dotan, D., & Friedmann, N. (2009, February). *Post-lexical retrieval processes.* Presented at the 45th annual conference of the Israeli Speech Hearing and Language Association. Ramat Gan, Israel.
5. Dotan, D., & Friedmann, N. (2010, October). *Words and numbers in the phonological output buffer.* Presented at the 48th annual conference of the Academy of Aphasia. Athenes, Greece.
6. Biran, M., Dotan, D., & Friedmann, N. (2011, February). *From owl to dowl, parrot and bus: different types of anomia and the way to distinguish among them.* Presented at the 47th annual conference of the Israeli Speech Hearing and Language Association. Tel Aviv, Israel.
7. Dotan, D., & Friedmann, N. (2011, June). *Different processing routes in lexical retrieval for words, numbers, and function words, and the selection between them.* Presented in Aphasia between Science and the Clinic: Current Findings of Language Research and their Implication for the Treatment Room. Haifa University, Israel.
8. Dotan, D., & Friedmann, N. (2012, February). *Understanding the phonological output buffer: the case of numbers, morphemes and function words.* Presented at the Brain Plasticity Symposium, Inauguration of the Sagol School of Neuroscience. Tel Aviv University, Israel.
9. Dotan, D., & Dehaene, S. (2013, February). *How do we convert a number into a finger trajectory?* Presented at the "Interactions between space, time and number: 20 years of research" meeting. Collège de France, Paris, France.
10. Dotan, D., & Dehaene, S. (2014, February). *How do we convert a number into a finger trajectory?* Presented at the first Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
11. Dotan, D., Friedmann, N., & Dehaene, S. (2014, February). *Comprehension of two-digit numbers does not require digit-to-verbal transcoding.* Presented at the first Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
12. Dotan, D. & Friedmann, N. (2014, July). *Phonological pathways of speech production: Lexical information in post-lexical stages.* Presented at the INS mid-year meeting. Jerusalem, Israel.
13. Dotan, D., Friedmann, N., & Dehaene, S. (2014, July). *Breaking down number syntax: dissociation between naming and comprehension of two-digit numbers.* Presented at the INS mid-year meeting. Jerusalem, Israel.
14. Dotan, D., & Friedmann, N. (2015, February). *Three distinct components in the visual parsing of numbers.* Presented at the 2nd Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
15. Dotan, D., & Dehaene, S. (2015, February). *On the origins of logarithmic number to position mapping.* Presented at the 2nd Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
16. Dotan, D., & Friedmann, N. (2015, April). *Reducing interference improves the memorization of multiplication facts.* Presented at the research workshop of the Israeli Science Foundation – The cognitive and Neural Basis for the Development of Numeric Understanding. Ben Gurion University, Israel.
17. Dotan, D., & Dehaene, S. (2016, February). *How do we turn a multidigit number into a single quantity?* Presented at the 3rd Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
18. Dotan, D., & Friedmann, N. (2016, February). *Number-specific dyslexia.* Presented at the 3rd Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.

19. Dotan, D., & Dehaene, S. (2016, April). *How do we turn a multidigit number into a single quantity?* Presented at the "Typical and atypical development of numerical cognition: Evidence from brain & behaviour" conference. The Hebrew University of Jerusalem, Israel.
20. Pinheiro-Chagas, P., Dotan, D., Piazza, M., & Dehaene, S. (2016, May). *Finger tracking reveals the covert stages of mental arithmetic.* Presented at Rovereto CAOs – workshop on Concepts, Actions, and Objects. Rovereto, Italy.
21. Dotan, D., & Friedmann, N. (2017, February). *A disorder of number reading.* Presented at the conference of the Israeli Neuropsychological Society. Raanana, Israel.
22. Dotan, D., & Dehaene, S., (2017, February). *Tracking the mental updating of Bayesian priors.* Presented at the 4th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
23. Dotan, D., & Dehaene, S. (2017, February). *Monitoring in real time the parallel buildup of decision and confidence.* Presented at the 4th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
24. Dotan, D., & Friedmann, N. (2018, January). *How can we make the learning of the multiplication table easier?* Presented at the 4th Learning Sciences Conference: Learning, personalized learning, and individual differences. Tel Aviv University, Israel.
25. Dotan, D., & Friedmann, N. (2018, January). *Dyslexia in number reading.* Presented at the 4th Learning Sciences Conference: Learning, personalized learning, and individual differences. Tel Aviv University, Israel.
26. Friedmann, N., Yachini, M., Haddad-Hanna, M., Dotan, D., & Balaban, N. (2018, January). *Variability in learning disabilities.* Presented at the 4th Learning Sciences Conference: Learning, personalized learning, and individual differences. Tel Aviv University, Israel.
27. Dotan, D., & Friedmann, N. (2018, February). *When 6×9 is 48: improving the learning of arithmetic by adapting to cognitive limitations.* Presented at the 5th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
28. Dotan, D., & Friedmann, N. (2019, February). *Reading words and reading numbers: Separate cognitive pathways, separate cognitive disorders.* Presented at the Conference of the European Group on Child Language Disorders (EUCLIDS). Tel Aviv, Israel.
29. Barash, T., & Dotan, D. (2019, February). *Writing multi-digit numbers is a structural-hierarchical process.* Presented at the 6th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
30. Brutman, N., & Dotan, D. (2019, February). *Structural chunking as evidence for an explicit representation of the number's verbal structure.* Presented at the 6th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
31. Dotan, D., Medina, S., & Friedmann, N. (2019, June). *Memorizing the multiplication table can be made easier by reducing similarity-induced interference.* Presented at the 2nd conference of the Mathematical Cognition and Learning Society, Ottawa, Canada.
32. Qasim-Masarwa, H., Marsel-Levi, M., & Dotan, D. (2020, February). *How do we write numbers: left-to-right digit, or first-to-last word?* Presented at the 7th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
33. Siegel, K., Fuss, G., & Dotan, D. (2020, February). *Number-like nonwords evoke a syntactic-verbal representation of numbers.* Presented at the 7th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
34. Dotan, D., Pinheiro-Chagas, P., Al Roumi, F., & Dehaene, S. (2020, February). *Finger tracking – a "behavioral EEG" for temporal dissection of cognitive tasks.* Presented at the 7th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
35. Diab-Coptly, H., Shahar, V., Breslavsky, I., & Dotan, D. (2020, February). *Syntactic priming reveals the mental structure of verbal numbers.* Presented at the 7th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
36. Dotan, D. (2020, October). *What do we mean when we talk about "number syntax"?* Presented at the 3rd conference of the Mathematical Cognition and Learning Society. Online conference.

37. Dotan, D. (2020, October). Invited talk. *How can cognitive research help to improve education?* The Open University of Israel, Online.
38. Shalit, E., Ghadeer, M., & Dotan, D. (2021, February). *Can you learn multiplication facts with dyscalculia? Yes, if they're dissimilar.* Presented at the 8th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Online conference.
39. Dotan, D. (2021, March). Invited talk. *The role of memory and language in numerical and mathematical thinking.* Presented at the linguistics department colloquium, Bar Ilan University, Israel.
40. Dotan, D. (2021, May). Invited talk. *What did we learn about number reading and writing from cognitive and neuropsychological studies?* Presented at the Mathematical Cognition Group Seminar, Loughborough University, UK.
41. Nir, S., & Dotan, D. (2022, February). *Multi-digit calculation: How task requirements and individual characteristics determine which specific working-memory mechanism is used.* Presented at the 9th conference on Cognition Research of the Israeli Society for Cognitive Psychology. Online conference.
42. Shalit, E., & Dotan, D. (2022, February). *The mystery behind reading numbers: What does it take to read numbers - knowledge, cognition, or both?* Presented at the 9th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Online conference.
43. Dotan, D., Qasim-Masarwa, H., Schwesig, R., Nuerk, H-C., & Bahmueller, J. (2022, April). *Left-to-right or first-to last: Number writing in Arabic and German adults.* Presented at the 4th conference of the Mathematical Cognition and Learning Society. Online conference.
44. Dotan, D. (2022, June). *Running an algorithm in your mind: The role of information-shifting in working memory.* Presented at the 5th conference of the Mathematical Cognition and Learning Society. Antwerp, Belgium.
45. Dotan, D. (2022, June). *Revisiting the triple-code model: Digit processing is not verbal, but it is linguistic.* Presented at the 5th conference of the Mathematical Cognition and Learning Society. Antwerp, Belgium.
46. Boguslavsky, M., & Dotan, D. (2023, February). *Why is it difficult to multiply? The types of learning disorders that impair multiplication table knowledge.* Presented at the 10th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
47. Cohen, Z., & Dotan, D. (2023, February). *From nine hundred and two to 90,02: syntactic processes in number writing and their impairment.* Presented at the 10th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
48. Dotan, D., Handelsman, N., Yablonko, A., & Yariv, L. (2023, February). *A pure syntax of multi-digit numbers in the absence of lexicon and semantics.* Presented at the 10th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
49. Dotan, D., Shanny, S., & Zviran-Ginat, S. (2023, February). *Dyscalculia arising from selective deficits in working memory.* Presented at the 10th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
50. Handelsman, N., & Dotan, D. (2023, February). *The core syntax of numbers and its dissociation from language syntax.* Presented at the 10th Conference on Cognition Research of the Israeli Society for Cognitive Psychology. Akko, Israel.
51. Dotan, D. (2023, June). *Dyscalculia: perhaps it's not a calculation deficit after all.* Presented at the 6th Conference of the Mathematical Cognition and Learning Society. Loughborough, UK.
52. Handelsman, N., & Dotan, D. (2023, June). *Core number syntax and its dissociation from language syntax.* Presented at the 6th Conference of the Mathematical Cognition and Learning Society. Loughborough, UK.
53. Dotan, D., & Nir, S. (2023, June). *The temporal dynamics of working memory use in multi-digit mental calculation.* Presented at the Numerical Cognition Meets Executive Functions Symposium. Guilford, UK.
54. Dotan, D., Shemesh, V., & Turoman, N. (2024, April). *A nonverbal representation of multiplication-like arithmetic facts.* Presented at the Relations Between Space, Language, and Numbers Workshop. Tübingen, Germany.