CURRICULUM VITAE

Dr. Dror Dotan

December, 2022

School of Education and School of Neuroscience, Tel Aviv University
dotandro@mail.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-	Tel Aviv University	School of Education	Lecturer

REVIEWING

Ad-hoc referee for scientific journals

Cortex
Dash – the journal of the Israeli Association of Speech Therapists
Frontiers in Education
Frontiers in Human Neuroscience
Journal of Cognition
Journal of Cognitive Psychology
Journal of Experimental Child Psychology
Journal of General Psychology
Journal of Numerical Cognition
Language and Brain
PLOS One
Psychological Research
Psychological Science
Quarterly Journal of Experimental Psychology
SAGE Open

Scientific Reports
The Medicine – the journal of The Israeli Medical Association

Reviewer for professional publisher

Elsevier

Reviewer for grants

Azrieli Foundation
Binational Science Foundation (BSF)

MEMBERSHIP IN PROFESSIONAL SOCIETIES

2018 – Now Mathematical Cognition and Learning Society

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.*

2022 *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

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). Basic syntactic hierarchy in the visual processing of digit strings. *PsyArxiv Preprints*. http://psyarxiv.com/nbyx2
3. Dotan, D. (2022). A pure syntax of multi-digit numbers in the absence of lexicon and semantics. *PsyArxiv Preprints*. http://psyarxiv.com/ewmvu

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. Dotan, D., & Friedmann, N. (2018, February). *When 6 x 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.
27. 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.
28. 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.
29. 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.

30. 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.
31. 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.
32. 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.
33. 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.
34. Diab-Copty, 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.
35. 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.
36. Dotan, D. (2020, October). Invited talk. *How can cognitive research help to improve education?* The Open University of Israel, Online.
37. 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.
38. 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.
39. 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.
40. 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.
41. 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 9thConference on Cognition Research of the Israeli Society for Cognitive Psychology. Online conference.
42. Dotan, D., Qasim-Masarwa, H., Schwesig, R., Nuerk, H-C., & Bahnmueller, 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.
43. 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, Belguim.
44. 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, Belguim.

STUDENTS SUPERVISED

MA Students

1.	2019-2020	Shira Shanny	How do we perform calculation algorithms and why is it difficult for some of us?
2.	2018-2021	Tamar Barash	A multi-digit number writing model based on a hierarchical representation of the number syntax.
3.	2018-2021	Nadin Brutman	Syntactic mental representation of verbal numbers.
4.	2020-2022	Ella Shalit	How do children read numbers? Explicit-knowledge acquisition versus cognitive development.
5.	2021-2022	Maayan Boguslavsky	Why is it difficult to multiply? The types of learning disorders that impair multiplication table knowledge.
6.	2020-2022	Sharon Zviran	How are calculation errors related to working memory?
7.	2020-	Shibolet Nir	How do we perform cross-decade addition, why is this hard, and what can it teach us about algorithms?
8.	2021-	Zohar Cohen	Disorders of number writing.
9.	2021-	Roni Menahem	Binding mechanisms in working memory and speech in the case of multi-digit calculation.
10.	2022-	Lihi Catz	Mental simulation of code: an operation requiring working memory, an exercise to improve working memory, or both?
11.	2022-	Hadar Efodi-Klerman	Short-term memory processes for numbers versus words.
12.	2022-	Ligal Yariv	Learning disorders in performing calculation algorithms: the precise role of working memory.