Rajeev Raizada

High school math teacher in NYC, visual explainer, programmer

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Summary

I am currently a high school math teacher in an independent school in NYC. Before switching to school teaching, I was a cognitive neuroscience faculty member in a university, teaching and carrying out research. I believe strongly that the traditional follow-the-textbook mode of math instruction completely fails to do justice to the subject. Moreover, it all too often results in students trying to follow memorised tricks and procedures, without any understanding of why they work.

For all those reasons and more, I am a huge fan of Amplify Desmos Math and its curriculum. I especially enjoy using it to make interactive math games, exploiting features such as the ticker and its ability to trigger actions. A collection of some of my Desmos creations can be found here.

I enjoy sharing my Desmos creations with the broader community. Many math-related Wikipedia pages are not as clear as they could be, due to a lack of explanatory diagrams. Spurred by this, I have created and posted several Desmos-made figures and animations, collected here. I also post on social media, including on the Desmos subreddit and Twitter. A sampling of my Desmos-related tweets that have attracted some community attention can be found here.

Appointments

Math teacher, grades 6, 9, 10 & 11. St. Ann's School, Brooklyn	Sept.2022 - present
Upper school math teacher, The Birch Wathen Lenox School, NYC	Sept.2021 - Aug.2022
Assistant Professor, Dept. of Brain & Cog.Sci., Univ. of Rochester	2013 - 2021
Research Scientist, Dept. of Psychology, Cornell University	2011 - 2013
Research Scientist, Neukom Inst. for Comp. Science, Dartmouth College	2008 - 2011

Education & Training

Univ. of Washington, Seattle. Postdoc. Advisor: Patricia Kuhl	2003 - 2008
MGH-NMR Center, Charlestown. Postdoc. Advisor: Russell Poldrack	2000 - 2003
Boston Univ. Ph.D. in Cog. & Neural Systems. Advisor: Stephen Grossberg	1996 - 2000
Univ. of Birmingham, England. M.Sc. in Cognitive Science	1994 - 1995
Univ. of Oxford, England. B.A. in Mathematics & Philosophy	1991 - 1994

Teaching

School math classes

- Calculus
- Precalculus
- Algebra 2
- 6th Grade
- Mathematical problem-solving (Grades 6-8)

Desmos creations

A collection of some of my Desmos creations can be found <u>here</u>.

Some highlights:
• Game: snakes on trig graphs, <u>here</u>.
• Making percentage increases and decreases more tangible, <u>here</u>.
• Mathematical string art, <u>here</u>.
• Explore the 17 wallpaper symmetry groups, <u>here</u>.
• Game: radians space invaders, <u>here</u>.

Javascript web games

Math version of Candy Crush, <u>here</u>. Written using the javascript libraries <u>p5play</u> and <u>p5js</u>. Source code available on Github, <u>here</u>.

Coded games & tutorials

• Python implementation of "The Tax-Collector" math game, <u>here</u>.
• Text-based generator of NYT Digits puzzles using Python, <u>here</u>.

Python turtle math art:
• <u>String art circle</u>
• <u>Star</u>
• <u>Cardioid</u>
• <u>Nested twisting triangles</u>

Interactive statistics tutorials, in Python and Matlab:
• Webpage containing these tutorials is <u>here</u>.
• YouTube video illustrating the interactive programs in action is <u>here</u>.
• These tutorials have been used for teaching at U.Mass Boston, <u>here</u>.

Python and Matlab for fMRI, General Linear Model and pattern-based analysis:
• Webpage with these tutorials is <u>here</u>.
• Used for teaching at the Univ. of Arizona, <u>here</u> and the Univ. of Gent, <u>here</u>.
• YouTube video of me presenting these tutorials to a class: <u>here</u>.

Matlab for neural networks:
• Webpage containing these tutorials is <u>here</u>.
• Page includes tutorial code implementing and explaining the backpropagation algorithm, which is the core tool used for training deep neural networks.

Educational videos

I have recently experimented with making some short educational YouTube videos, in which I try to explain topics as simply and engagingly as possible.
• A mathematical pattern hidden in the American flag (explaining why the first n odd numbers sum to n^2), <u>here</u>.
• Why does a negative number times a negative number end up being positive? An intuitive explanation, <u>here</u>.
• Make better presentations, by controlling visual attention, <u>here</u>.

University classes taught

• Language and the brain
• Introduction to fMRI (functional magnetic resonance imaging)
• Cognitive Neuroscience

Selected publications

For a complete listing, please see my Google Scholar profile:
https://scholar.google.com/citations?user=PJWjx8gAAAAJ

Anderson, A. J., Lalor, E., Lin, F., Binder, J.R., Fernandino, L., Humphries, C., Conant, L., Raizada, R.D.S., Grimm, S. and Wang, X. (2018) Multiple regions of a cortical network commonly encode the meaning of words in multiple grammatical positions of read sentences. *Cerebral Cortex*, 29(6), 2396-2411. PDF.

Zinszer, B.D., Anderson, A.J., Kang, O., Wheatley, T. and Raizada, R.D.S. (2016) Semantic structural alignment of neural representational spaces enables translation between English and Chinese words. *Journal of Cognitive Neuroscience*, 28, 1749-1759. PDF.

Mackey, A.P., Raizada, R.D.S. and Bunge, S.A. (2012) Environmental influences on prefrontal development. *In: Principles of frontal lobe function (2nd Edition), edited by Donald Stuss and Robert Knight. Oxford: Oxford University Press.* PDF.

Raizada, R.D.S., Tsao, F.M., Liu, H.M., Holloway, I.D., Ansari, D. and Kuhl, P.K. (2010) Linking brain-wide multivoxel activation patterns to behaviour: examples from language and math. *NeuroImage*, 51, 462-471. PDF. Supplementary Material.

Raizada, R.D.S. and Kishiyama, M. (2010) Effects of socioeconomic status on brain development, and how Cognitive Neuroscience may contribute to leveling the playing field. *Frontiers in Human Neuroscience.* doi:10.3389/neuro.09.003.2010. PDF.

Grants and awards

Currently funded	NSF CAREER Award #1652127: "Testing models of semantic spaces in the brain." PI. $513k.	2017 - 2021

Previously funded	Google Faculty Award: "Good representations of meaning enable good inferences: Bridging between word2vec and analogical reasoning in the human brain." PI. $66k.	2015 - 2016
	NSF Award #1228261: "Measuring and modeling object similarity in the brain: combining conceptual and perceptual representations." PI. $480K.	2012 - 2015
	IARPA Award: "Knowledge representation in neural systems." Co-PI. $400K.	2014 - 2015
	NSF Award #1058753: "EAGER: Brain-mobile interfaces: Exploratory research into the development of networked NeuroPhones." Co-PI. $250K.	2010 - 2012
	NSF 0121950 Cognitive Neuroscience Pilot Grant. Co-PI. "Enhancing human cortical plasticity: Visual psychophysics and fMRI." $50K.	2001 - 2001

References

Available upon request