



*Rajeev Raizada, Ph.D.  
Mathematics Teacher  
Saint Ann's School  
129 Pierrepont St  
Brooklyn, NY 11201  
rajeev.raizada@gmail.com*

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Dear Amplify,

I am writing to apply for your Interaction Developer position. I have been working as a math teacher at an independent school in NYC, and I love using Desmos as a central part of my teaching. The classes that I have taught include Algebra 2, Precalculus, Trigonometry and Calculus. For the last two years I have been making my own Desmos graphs and activities and sharing them with the broader math-education community on social media. A sampling is [here](#), and some additional examples can be found on my web page, [here](#). At the time of writing, the two Desmos creations most recently retweeted by the company's official account at <https://twitter.com/Desmos> were both made by me.

Before switching to school teaching, I was a cognitive neuroscience faculty member in a university for several years, teaching and carrying out brain imaging research. This involved carrying out a large amount of statistical data analysis, a topic that I also taught. I first started programming such analyses in Matlab, then later switched to Python, using libraries such as NumPy and scikit-learn. Some tutorial Python code that I wrote to illustrate ideas in statistics and machine learning can be found [here](#).

I especially enjoy creating interactive math demonstrations and games. Many of those I made in Desmos, and can be found in the links above. More recently, I have explored making math games in javascript, using the p5.js and p5play libraries. Two examples can be found [here](#). Both of those games include user-selected levels of difficulty that span a broad range of math, ranging from single-digit addition all the way up to calculus.

The question of how to improve math education is, of course, longstanding and urgent. I truly believe that Desmos has created the most powerful set of tools anywhere for achieving that. On the small scale of a single classroom, I have had the pleasure and opportunity of exploring this in my own teaching. This has given me direct experience of its great potential, and also of some of the practical issues that can arise in a classroom setting. I am based in NYC, and hence would easily be able to visit Amplify's NYC headquarters for workshops, collaboration or discussion. I cannot think of a more enjoyable and worthwhile job than helping to create activities to share the joys and educational potential of Desmos with teachers and their students throughout the world. It would be a thrilling opportunity, and an inspiring challenge.

Sincerely,

Rajeev D. S. Raizada, Ph.D.

# Rajeev Raizada

*Math and computer science educator in NYC*

<https://rajeevraizada.github.io>

[rajeev.raizada@gmail.com](mailto:rajeev.raizada@gmail.com)

## Summary

I am a math and computer science educator based in NYC. For the last two years I have been teaching high school and middle school math, and greatly enjoying it. Before switching to school teaching, I was a cognitive neuroscience faculty member in a university, teaching and carrying out brain imaging research.

I strongly believe 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 Desmos. I especially enjoy using it to make 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](#).

Before switching to school teaching, I was a cognitive neuroscience faculty member in a university for several years, teaching and carrying out brain imaging research. This involved carrying out a large amount of statistical data analysis, a topic that I also taught. I first started programming such analyses in Matlab, then later switched to Python, using libraries such as NumPy and scikit-learn. Some tutorial Python code that I wrote to illustrate ideas in statistics and machine learning 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: <a href="#">Patricia Kuhl</a>	2003 - 2008
MGH-NMR Center, Charlestown. Postdoc. Advisor: <a href="#">Russell Poldrack</a>	2000 - 2003
Boston Univ. Ph.D. in Cog. & Neural Systems. Advisor: <a href="#">Stephen Grossberg</a>	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 (limits, chain rule, product rule, integrals as anti-derivatives, etc.)
- Precalculus (trig, logs and exps, rational funcs, intro matrices etc.)
- Algebra 2 (systems of eqs, quadratics, exp funcs, complex numbers, etc.)
- 6th Grade (fractions, decimals, proportions, angles, intro algebra)

- Mathematical problem-solving, Grades 6-8 (assorted explorations: patterns, math games, geometry, logical reasoning)

#### Desmos creations

A collection of some of my Desmos creations can be found [here](#).

Some highlights:

- Game: snakes on trig graphs, [here](#).
- Making percentage increases and decreases more tangible, [here](#).
- Mathematical string art, [here](#).
- Explore the 17 wallpaper symmetry groups, [here](#).
- Game: radians space invaders, [here](#).

#### Interactive code tutorials

Interactive statistics tutorials, in Python and Matlab

- Webpage containing these tutorials is [here](#).
- YouTube video illustrating the interactive programs in action is [here](#).
- These tutorials have been used for teaching at U.Mass Boston, [here](#).

Python and Matlab for fMRI, General Linear Model and pattern-based analysis

- Webpage with these tutorials is [here](#).
- Used for teaching at the Univ. of Arizona, [here](#) and the Univ. of Gent, [here](#).
- YouTube video of me presenting these tutorials to a class: [here](#).

Matlab for neural networks

- Webpage containing these tutorials is [here](#).
- 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  $n^2$ ), [here](#).
- Why does a negative number times a negative number end up being positive? An intuitive explanation, [here](#).
- Make better presentations, by controlling visual attention, [here](#).

#### 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](https://doi.org/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