



*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 Desmos Coach position. I am currently a math teacher at an independent school in NYC, teaching grades 6, 9, 10 and 11. I love using Desmos as a central part of my teaching, and have made many of my own graphs, activities and math games. A sampling is [here](#). Math can often seem forbiddingly abstract to students, but Desmos can make it wonderfully tangible. Students can literally push and pull mathematical objects around, and poke them to see what happens.

Through my use of Desmos in the classroom, I have a great deal of experience showing novice users how to create Desmos graphs and how to use Desmos activities. Having created and shared many activities myself, linked above, I have developed substantial fluency in their use. Above all, I know firsthand just how much fun playing around in Desmos can be. I hope and believe that my fluency and enthusiasm both come across when I show students how to use the tools.

As an illustrative example, here is a math game that I made: [snakes on trig graphs](#). Through a series of levels, progressing from easy to more advanced, students see snakes moving sinusoidally across a graph on which some apples are scattered. There is a math-equation input box, and the snake follows the path of whichever function the student types into it. Their task is to figure out the equation that will make the snake eat all the apples. In the first level, only the amplitude varies, but by Level 4 they need to choose the correct amplitude, period and midline. I have used this game in my own classes, and my students have told me that they find it to be engaging and fun. Several of my other Desmos games and activities can be found in [this collection](#).

I am also a big fan of Mathigon's Polypad tool, and was excited to see how it can now be incorporated as a screen in any Desmos activity. I frequently use it with my 6th grade class. They particularly enjoy the music-making features: the way musical rhythm integrates with fraction bars has great educational potential. Examples of my exploring this are [here](#) and [here](#). I have also been using Polypad's balance scales to make simple algebraic equations more tangible. The 6th graders are just starting out on algebra, and sometimes tend to forget that operations must be applied to both sides of an equation. When they see how a previously balanced scale can become unbalanced, that abstract idea comes to life.

The question of how to improve math education is longstanding and urgent. I truly believe that Amplify Desmos Math offers the most powerful set of tools anywhere for achieving that. On the small scale of a single classroom, I have direct experience of these tools' great potential, and also of some of the practical issues that can arise in a classroom setting. I greatly enjoy sharing my enthusiasm for Desmos with my own students, but as a coach I would be able to share it on a much broader scale. It would be a thrilling opportunity, and an inspiring challenge.

Sincerely,

Rajeev D. S. Raizada, Ph.D.

Rajeev Raizada

High school math teacher in NYC, visual explainer, programmer

rajeev.raizada@gmail.com | 617-817-4513

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

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| 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

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| 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)

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| Desmos creations | <p>A collection of some of my Desmos creations can be found here.</p> <p>Some highlights:</p> <ul style="list-style-type: none"> • 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. |
| Javascript web games | <p>Math version of Candy Crush, here. Written using the javascript libraries p5play and p5js. Source code available on Github, here.</p> |
| Coded games & tutorials | <ul style="list-style-type: none"> • Python implementation of “The Tax-Collector” math game, here. • Text-based generator of NYT Digits puzzles using Python, here. <p>Python turtle math art:</p> <ul style="list-style-type: none"> • String art circle • Star • Cardioid • Nested twisting triangles <p>Interactive statistics tutorials, in Python and Matlab:</p> <ul style="list-style-type: none"> • 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. <p>Python and Matlab for fMRI, General Linear Model and pattern-based analysis:</p> <ul style="list-style-type: none"> • 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. <p>Matlab for neural networks:</p> <ul style="list-style-type: none"> • 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 | <p>I have recently experimented with making some short educational YouTube videos, in which I try to explain topics as simply and engagingly as possible.</p> <ul style="list-style-type: none"> • 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 | <ul style="list-style-type: none"> • 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

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|-------------------|---|-------------|
| 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