

# JOEL TENENBAUM

## Campus

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## Permanent

Boston, MA, 02135

- Over 11 years of teaching experience and strength in communicating and explaining abstract physical and mathematical concepts to both native English speakers and speakers of English as Second Language
- Experience in presentations, in white/blackboard, Powerpoint and Promethean (Smart) board formats, for audiences aged 13-35.
- Subject expertise in physics, statistics, mathematics, chemistry, and general science.
- Attentive to detail. Experience in independent learning.
- Avid reader, appreciation of language and writing
- Computing: C++, Python, LaTeX, Mathematica, Matlab, xmgrace, Linux, Mac OS, Windows
- Research: experience in publishing international collaborative research papers.

## EDUCATION

**Ph.D.** Physics (Boston University, Boston, MA, Defended April 13, 2012)

**M.A.** Physics (Boston University, Boston, MA, March 2008)

**B.A.** Physics and Mathematics with music minor (Goucher College, Baltimore, MD 2006)

3.82 GPA. (Physics: 3.92)

## TEACHING EXPERIENCE

**Teacher of Physics** CATS Academy, Newton, MA 2013-present

- Taught conceptual, honors, and AP-level physics to approximately 60 high school students meeting 4 hours per week for each class.
- Planned curriculum and syllabus. Created exercises, homework sets, assessments, and laboratory assignments. Assigned grades.
- Used various interactive and participatory approaches and technology, including whiteboard, Promethean (Smart) board, and internet-based class submissions.
- Coached Math and Science Club. Oversaw students' competition in WPI Math Meet, AMC12, MAML competitions.

**Teaching Fellow**, Boston University, Boston, MA 2013

- Lead discussion sections for approximately 100 students, coordinating with undergraduate courses in chemistry
- Explain concepts in chemistry using problem-based interactive discussions, based in the Socratic method
- Demonstrate solving problems in real-time on blackboard to emphasize and clarify high density information
- Provide weekly opportunities to meet individually with students for individualized tutoring

**Lecturer**, Boston University School of Management, Boston, MA 2012

- Taught statistics, including multiregression modeling and population sampling to students enrolled in the Boston University School of Management's MBA program
- Responsible for syllabus, coursework, assignments, and grades of approximately 100 MBA students of mixed international background
- Utilized creative motivating techniques to engage class and stimulate discussion

**Mentor**, BUILD Greater Boston, Boston, MA 2011-2012

- Taught entrepreneurial skills to inner-city high school freshmen in a mentorship capacity
- Engaged students in independent thinking exercises

**Tutor**, Boston University Academy, Boston, MA 2007-Present

- Directed preparatory school high school freshmen in analytic reasoning in mathematics, chemistry, and physics
- Guided students through strategies for analytic problem solving

**Teaching Fellow**, Boston University, Boston, MA 2006-Present

- Facilitated physics discussions of approximately 100 students per semester
- Guided student laboratory sections corresponding to coursework
- Demonstrated problem-solving strategies and abstract reasoning through use of blackboard, electronic media, and interactive discussion

**Tutor and Supplemental Instructor**, Goucher College, Towson, MD 2002-2006

- Facilitated supplemental class sessions for first year and second year physics
- Tutored through Academic Center for Excellence in both physics and mathematics

## AWARDS

- NSF International Travel Award to participate in the IUPAP Triennial Conference on Statistical Physics, Cairns, Australia, July 2010
- Dean's List: 2002-2006
- National Dean's List: Fall 2004
- Marvin-Perry merit-based scholarship: 2002-2006
- Charter Member: Maryland Theta Chapter Pi Mu Epsilon Mathematics Society
- Inducted member: Phi Beta Kappa
- Julia Gontrum Hill Award in Music 2005 and 2006
- Alumnae/i Prize in Physics 2006

## SCIENTIFIC PUBLICATIONS

1. **"Differential conductance of type II superconductors in high magnetic fields."** *NCUR Proceedings*, April 2005. With Sasha Dukan.

Brief description: Computational work on superconductors, predicting experimental results from energy structure.

2. **"Asymmetry in power-law magnitude correlations."** *Physical Review E: Rapid Communications*, **80**, July 17, 2009. With Boris Podobnik,\* Davor Horvatic, and H. Eugene Stanley.

Brief description: Modeling financial and physiological time series using dynamic volatility processes.

3. **"STM differential conductance of a disordered extreme type-II superconductor at high magnetic fields."** *Physical Review B*, **82**, October 4, 2010. With Sasha Dukan,\* Joe Porembski, and Karl Tata.

Brief description: Follow-up to paper 1, further results on superconductor energy structure.

4. **"Comparison between response dynamics in transition and developed economies."** *Phys. Rev. E*, **82**, October 8, 2010. With Davor Horvatic, Slavica Cosovic Bajic, Beco Pehlivanovic, Boris Podobnik, and H. Eugene Stanley.

Brief description: Modeling international financial data using dynamic volatility processes across country and time period to make statements of comparison across countries.

5. **"Statistical Laws Governing Fluctuations in Word Use from Word Birth to Word Death."** *Nature: Scientific Reports*, **2**, March 15, 2012, With Alex. M. Petersen\*, Shlomo Havlin, and H. Eugene Stanley.

Brief description: Drawing statistical comparisons across disciplines to extract the fundamental universal principles and dynamics of word use selection across time.

#### News coverage:

- a. *Wall Street Journal*: **"The New Science of the Birth and Death of Words "**
  - b. *United Press International*: **"Study tracks births, deaths of words"**, duplicated in:
    - i. *Outcome Magazine*
    - ii. *e! Science News*
  - c. *The Times of India*: **"Digital spell-check blamed for killing words: Study"**
  - d. *Science News*: **"Modern era brings death to words"**
  - e. *Innovation News Daily*: **"Languages Lose Vocab to Science and Spell-Check"**
  - f. *Mobiledia*: **"Texting Kills Off Words, But Language Survives"**
  - g. *Live Science*: **"Digital Spell-Checking May Be Killing Off Words"**, duplicated in:
    - i. *Discovery News*
    - ii. *msnbc.com*
    - iii. *News Track India*
6. **"Earthquake networks based on similar activity patterns."** *Phys. Rev. E*, **86**, October 2012. With Shlomo Havlin and H. Eugene Stanley.

Brief description: Using techniques from statistical network physics from explain and describe earthquake data

#### News coverage:

- *Technology Review*: **Earthquakes, Networks, and the Tricky Topic of Quake Prediction**
7. **"Scaling of Seismic Memory with Earthquake Size."** *Phys. Rev. E*, **86**, July 2012. With Zeyu Zheng,\* Kazuko Yamasaki, Boris Podobnik, and H. Eugene Stanley

Brief description: Correlation and scaling analysis of earthquake signal and the impact of large proximal events.

8. **“Applications of Statistical Physics to Complex Systems: Seismic Physics, Econophysics, Sociophysics.”** Ph.D. thesis, Boston University. Defended April 13, 2012. Thesis advisor: H. Eugene Stanley

Brief description: doctoral thesis.

9. **“Carbon dioxide emissions trading and hierarchical structure in worldwide finance and commodities markets”**. Phys. Rev. E, **87**, January 2013. With Zeyu Zheng\*, Kazuko Yamasai, and H. Eugene Stanley.

Brief description: applying correlation analysis, minimal spanning trees, and Euclidean metrics to analyze relationships between currency futures, commodity futures, and world financial markets.

10. **“Languages cool as they expand: Allometric scaling and the decreasing need for new words”**. *Nature: Scientific Reports*, **2**, December 10, 2012.. With Alex M. Petersen\*, Matjaz Perc, Shlomo Havlin, and H. Eugene Stanley.

Brief description: Follow-up to paper 5. Drawing statistical comparisons across disciplines to extract the fundamental universal principles and dynamics of word use selection across time.

**News coverage:**

- a. *The Hindu*: **“How big is your language?”**
- b. *Inside Science*: **“Physicists Explore The Rise And Fall of Words”**

\* denotes first author.

## PRESENTATIONS

- **“Difference Conductance of Extreme Type-II Superconductors in High Magnetic Fields”**
  - *National Conference of Undergraduate Research (NCUR)*, Lexington, VA. April, 2005.
  - *Posters on the Hill*, Council on Undergraduate Research. Washington, D.C., April, 2005
- **“Correlation Networks of Earthquakes”**. *APS March Meeting 2009*, American Physical Society. Pittsburgh, PA, March 19, 2009.
- **“Correlation Networks of Earthquakes”**. *International Workshop on Network Science 2009*. Venice, July 1, 2009
- **“Can Networks Help Understand Earthquake Physics?”** *International Conference on Statistical Physics of the International Union for Pure and Applied Physics (IUPAP) 2010*. Cairns, Australia, July 29, 2010.
- **“The Sign Effect in Emerging Markets: The Inherent Instability of Bad News”**. *HES70: Horizons in Emergence & Scaling*. Poster session. Boston, March, 2011
- **“The Sign Effect in Emerging Markets: The Inherent Instability of Bad News”**. *APS March Meeting 2011*, American Physical Society. Dallas, TX, March 21, 2011.
- **“The Growth Dynamics of Words: How Historical Context Shapes the Competitive Linguistic Environment”**. *APS March Meeting 2012*, American Physical Society. Boston, Feb 28, 2012.