

# eddielee

social physics

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## languages

spanish  
korean  
french  
german

## programming

MATLAB, Python  
R, Mathematica  
C++, Bash  
Javascript, HTML5

## big questions

How do collections of individuals reach decisions, and what is the role of conflict in the process? How might concepts, intuitions, and models from statistical physics help us find fundamental and quantitative, perhaps physical, principles that govern these phenomena? I study these questions in the context of political voting in the US Supreme Court and Congress, in synchronization of motion in dance, and in the conflict behavior of a society of pigtailed macaques.

## education

- since 2014 **Graduate student** in Physics Cornell University  
*Advisor Professor Itai Cohen*
- 2008-2012 **A.B.** in Physics, *cum laude* Princeton University  
*Certificate in Biophysics*

## positions held

- since 2015 **Research assistant** Dept. of Physics, Cornell University  
*Criticality in plastic deformation of materials under load with J. Sethna. Synchronization of human motion in dance with I. Cohen.*
- 2014-2015 **Graduate teaching assistant** Dept. of Physics, Cornell University  
*Intro. to electrostatics. Intro to optics, quantum mechanics.*
- 2013-2014 **Research associate** Wisconsin Institute for Discovery  
*Temporal and strategic dynamics of conflict in primates.*
- 2012-2013 **Research associate** Princeton University  
*Information theoretic approaches to voting in the US Supreme Court and Congress.*
- 2012 **Volunteer physics tutor** Princeton High School  
*After school help sessions with students struggling in physics at a local high school.*
- 2011 **Edward A. Knapp Fellow** Santa Fe Institute  
*Research Experience Undergraduate.*
- 2010–2011 **Peer Tutor** Princeton University  
*Peer tutor in Spanish and Physics.*
- 2010 **Laboratory intern** Instituto de Salud Carlos III, Spain  
*Infectivity of recombinant HIV.*
- 2009 **Laboratory assistant** USUHS of Dept. of Defense, Bethesda  
*Topology of sphingolipids with genetic cloning methods.*

## grants, honors, awards

2016	<b>Grant from Army Research Office</b> <i>“Determining the limits of human coordination” with Professor I. Cohen.</i>	\$60,000
2016	<b>Poster Award</b> <i>“Learning to dance like a physicist”</i>	Active Matter, Syracuse
2015	<b>Best Poster Prize</b> <i>Poster on “War &amp; peace.”</i>	Computational Social Science Summit, Northwestern University
	<b>Dirksen Center Congressional Research Grant</b> <i>Funding to study influential voters in Congress using machine learning.</i>	
	<b>NSF Graduate Research Fellowship</b> <i>Competitive national competition to fund graduate education.</i>	
2013	<b>Member of American Physical Society</b> <i>National society for physicists.</i>	
	<b>Sigma Xi Research Showcase, Divisions 1st Place</b> <i>National competition. Presented “Statistical mechanics of the US Supreme Court.”</i>	
2012	<b>Elected Member of Sigma Xi Society</b> <i>National society for scientists.</i>	Dept. of Physics, Princeton University
	<b>Kusaka Memorial Prize</b> <i>For excellence in undergraduate research.</i>	Dept. of Physics, Princeton University
	<b>Book Prize in German</b> <i>For excellence in German.</i>	Dept. of German, Princeton University
2011	<b>Kusaka Memorial Prize</b> <i>For excellence in undergraduate research.</i>	Dept. of Physics, Princeton University
2010	<b>Health Grand Challenges Initiative Grant</b> <i>To fund travel to Spain to study HIV.</i>	Princeton Environmental Institute
2008	<b>Vice President of winning team</b> <b>Best Male Speaker Award</b> <i>International Space Settlement Design Competition, NASA International competition for high school students hosted by NASA for designing a future settlement orbiting Earth.</i>	
	<b>National Merit Scholar</b> <i>National award for high school students for academic excellence.</i>	

## publications

### Published

Lee, Edward D., Daniels, Bryan C., Krakauer, David C. & Flack, Jessica C. “Collective memory in primate conflict implied by temporal scaling collapse.” *Journal of the Royal Society Interface* (2017).

Sethna, James P., Matthew K. Bierbaum, Karin A. Dahmen, Carl P. Goodrich, Julia R. Greer, Lorien X. Hayden, Jaron P. Kent-Dobias et al. “Deformation of crystals: Connections with statistical physics.” arXiv preprint arXiv:1609.05838 (2016).

Lee, Edward D., Chase P. Broedersz, and William Bialek. “Statistical Mechanics of the US Supreme Court.” *Journal of Statistical Physics*, April 10, 2015, 1-27. doi:10.1007/s10955-015-1253-6.

Lee, E., Bryan C. Daniels, David C. Krakauer & Jessica C. Flack. Capturing collective conflict dynamics with sparse social circuits. *arXiv cs.SI*, (2014).

### In preparation

Lee, E. D. & Bialek, W. Decision making on the US Supreme Court.

Lee, E. D. & Bialek, W. Statistical mechanics of US Congress.

Lee, E. D., Daniels, B. C., Krakauer, D. C. & Flack, J. C. Collective memory in pigtailed macaque society conflict.

## posters, presentations, workshops & lectures

### Invited

2016	<b>"Voting in the Supreme Court, conflict in pigtailed macaques, &amp; statistical physics"</b>	Santa Fe Institute
	<b>"Scaling in the conflict dynamics of pigtailed macaques"</b>	Cornell University
2015	<b>"It takes two to tango"</b>	Cornell University
2014	<b>"Statistical mechanics of the US Supreme Court"</b>	Cornell University
	<b>"Partitioning social circuits"</b>	Santa Fe Institute
	<b>Workshop on collective cognition</b>	Santa Fe Institute
2013	<b>"Sound arguments with sonic eloquence"</b>	Humanities Hackathon Discovery
	<b>"Simplifying the complex"</b>	Complex Systems & Systems Biology Group, Northwestern University
	<b>"From complex to simple: A principled approach to social behavior"</b>	Computational Social Workshop, University of Chicago
2012	<b>"Speculating on human behavior: A physicist's perspective"</b>	VIS Seminar Series of the Center for Complexity & Collective Computation
	<b>"Conflict and macaques: A statistical mechanics view on asymmetries in social interactions"</b>	Integrated Behavioral Research Group, Princeton

### Abstract submitted

2016	<b>"A Bethe-lattice-like mean-field model for the plastic deformation of amorphous solids"</b>	Statphys, Lyon
	<b>"Learning to dance like a physicist"</b>	Active Matter, Syracuse
	<b>"A Bethe-lattice-like mean-field model for the plastic deformation of amorphous solids"</b>	APS, Baltimore
2015	<b>"War &amp; peace"</b>	Computational Social Science Summit, Northwestern University
	<b>"Statistical mechanics of the US Supreme Court"</b>	First US-China Young Physicists Forum, American Physical Society
2014	<b>"War &amp; peace in an animal society"</b>	Collective Intelligence
	<b>"War &amp; peace in an animal society"</b>	NetSci
	<b>"Statistical mechanics of the US Supreme Court"</b>	American Physical Society
	<b>"War &amp; peace in an animal society"</b>	Dynamics Days
2013	<b>"Statistical mechanics of SCOTUS"</b>	109th Statistical Mechanics Conference
	<b>"Inductive games on a sparse strategic lattice"</b>	NetSci

## media & outreach

- 2014 **Co-director of Educational Outreach Initiative by the Center for Complexity & Collective Computation** Wisconsin Institute for Discovery  
*Developed and taught curricula on complex systems for middle and high school students in coordination with the Outreach Center.*  
**"Criticality in biological systems"** Featured essay  
<http://wid.wisc.edu/wid-picks/criticality-in-biological-systems/>
- 2013 **Volunteer at Wisconsin Science Festival**  
*Science festival drawing parents and students from around the state.*  
**Discovery Journal Club Coordinator** Wisconsin Institute for Discovery  
**"Dwarf Fortress: Just another computer game?"** Featured essay  
<https://wid.wisc.edu/wid-culture/>  
**Lecturer at the Humanities Hackathon Summer School**  
*Taught humanists how to use R to further their research.*  
**"The physics of magnets can model how Supreme Court judges vote"** Aatish Bhatia on *Wired* online  
**"Statistical mechanics of SCOTUS"** Youtube video  
[http://www.youtube.com/watch?v=ZlWmoT\\_PmRo](http://www.youtube.com/watch?v=ZlWmoT_PmRo)