Big questions	What are the mathematical laws that constrain living matter like society and biology? I am inspired by concepts, intuition, and models from statistical physics to search for fundamental principles in collective behavior that connect biology and society.
Education 2014-2019 2008-2012	Ph.D. in Physics from Cornell University Quantitative modeling of collective behavior. Advised by Paul Ginsparg A.B. in Physics & Certificate in Biophysics from Princeton University Degree awarded cum laude
Work experience 2021-2025	Postdoctoral fellow at Complexity Science Hub Independent position with PhD student. Universality & scaling in social dynamics
2020-2021	Program Postdoctoral Fellow at Santa Fe Institute Universality & scaling in conflict dynamics. Metabolic scaling in biology
2018-2019 2015-2018	Santa Fe Institute Graduate Fellow Funding for work on conflict dynamics & statistical physics of voting through Omega Miller program National Science Foundation Graduate Research Fellow
	Theoretical analysis of plastic deformation & experiments in virtual reality for exploring interpersonal coordination of motion
Grants, honors, awards	
2022	Austrian Science Fund ESPRIT Fellowship Farly career award €300,000
2017	STIR grant from Army Research Office "Determining the limits of human coordination" (drafted by me). PLItai Cohen. \$60,000
2015	Dirksen Congressional Center Dissertation Grant Influential voters in Congress

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	NSF Graduate Research Fellowship
	Competitive national competition to fund graduate
	education
2011, 2012	Kusaka Memorial Prize
	For excellence in undergraduate research
Publications	Lee, E. D., Kwan, A. P., Hanel, R., Bhatt, A., Neffke, F.
	Information consumption and firm size. Preprint at
	http://arxiv.org/abs/2210.07418 (2022). Accepted.
	Lee, E. D., Flack, J. C., Krakauer, D. C. Constructing
	stability: optimal timescales of adaptation in noisy
	ecological niches. Preprint at https://arxiv.org/abs/
	2209.00476 (2022). Accepted.
	Lee, E. D. & Cantwell, G. T. Valence and interactions in
	judicial voting. Philosophical Transactions of the Royal
	Society A 20230140 (2024) doi:10.1098/
	rsta.2023.0140.
	Lee, E.D., Kempes, C. P. & West, G. B. Idea engines: A
	unified theory of innovation and obsolescence from
	markets and genetic evolution to science. Accepted at
	PNAS (2023).
	Kushwaha, N. & Lee, E.D. Discovering the mesoscale for
	chains of conflict. PNAS Nexus 2, pgad228 (2023). DOI:
	https://doi.org/10.1093/pnasnexus/pgad228
	Lee, E.D., Chen, X. & Daniels, B.C. Discovering sparse
	control strategies in neural activity. PLoS Comput Biol
	18, e1010072 (2022). DOI:https://dx.plos.org/10.1371/
	journal.pcbi.1010072.
	Lee, E.D., Kempes, C.P. & West G.B. Growth, death, and
	resource competition in sessile organisms. PNAS 118,
	e2020424118 (2021). DOI:https://doi.org/10.1073/
	pnas.2020424118
	Lee, E.D., Daniels, B.C., Myers, C.R., Krakauer, D.C. &
	Flack, J.C. Scaling theory of armed-conflict avalanches.
	Phys. Rev. E 102, 042312 (2020). DOI:https://doi.org/
	10.1103/PhysRevE.102.042312

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Lee, E.D., Katz, D.M., Bommarito II, M.J. & Ginsparg, P.H. Sensitivity of collective outcomes identifies pivotal components. Journal of The Royal Society Interface 17 (2020). DOI:https://doi.org/10.1098/rsif.2019.0873 Lee, E.D., Esposito, E. & Cohen, I. "Audio cues enhance coordination of motion when visual cues are scarce." Journal of the Royal Society Interface, 16(154) (2019). DOI:https://doi.org/10.1098/rsif.2018.0903

Lee, E.D. & Daniels, B.C. "Convenient Interface to Inverse Ising (ConIII): A Python 3 Pack- age for Solving Ising-Type Maximum Entropy Models." Journal of Open Research Software, 7(3):1-8 (2019). DOI:https://doi.org/ 10.5334/jors.217

Lee, E.D. "Partisan Intuition Belies Strong, Institutional Consensus and Wide Zipf's Law for Voting Blocs in US Supreme Court." Journal of Statistical Physics 173(6):1722-1733 (2018). DOI:https://doi.org/10.1007/ s10955-018-2156-0

Lee, E.D., Daniels, B.C., Krakauer, D.C. & Flack, J.C. "Collective Memory in Primate Conflict Implied by Temporal Scaling Collapse." Journal of the Royal Society Interface, 14:20170223 (2017). DOI:http:// dx.doi.org/10.1098/rsif.2017.0223 Sethna, J.P., Bierbaum, M.K., Dahmen, K.A., Goodrich, C.P., Greer, J.R., Hayden, L.X., Kent-Dobias, J.P., Lee, E.D., Liarte, D.B., Ni, X. & Quinn, K.N."Deformation of crystals: Connections with statistical physics." Annual Review of Materials Research, 47(14):1-13 (2017). DOI:https://doi.org/10.1146/annurevmatsci-070115-032036

Lee, E.D., Broedersz, C.P. & Bialek, W. "Statistical Mechanics of the US Supreme Court." Journal of Statistical Physics, 160(2):275-301 (2015). DOI:https:// doi.org/10.1007/s10955-015-1253-6

Working papers Lee, E.D., Daniels, B.C., Myers, C.R., Krakauer, D.C. & Flack, J.C. "Emergent regularities and scaling in armed

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conflict data," arXiv:1903.07762, 2019. https://arxiv.org/ abs/1903.07762.

Lee, E.D. Closely estimating the entropy of sparse graph models. Preprint at http://arxiv.org/abs/ 2301.04768 (2023).

Research presentations (selected) 2024

2023

Session on Statistical Physics of Political Systems,
Keynote speaker, DPG March meeting
"Information consumption & firm size," Social
Computing, HKUST Guangzhou
"Discovering components, mechanism, and structure,"
IDS, Hong Kong University
"Following the thread of information," Data Science and
Complex Systems Group, KIAS
"Following the thread of information," Statphys seminar,
Seoul National University
"Rethinking a statistical mechanics of voting,"
Complexity in Law & Governance, Vanderbilt Law School
"Idea engines: Unifying innovation & obsolescence from
markets & evolution to science," invited minisymposium,
SIAM Dynamical Systems, Portland
"Scaling in the information costs of firms," Santa Fe
Institute seminar
"Discovering components, mechanism, and structure"
in "The Database of Religious History and Cultural
Evolutionary Analysis," Santa Fe Institute working group
"Diversity and universality in the laws of life," Visualizing
Complexity Science Workshop, Complexity Science Hub
Vienna
"Idea engines," Complex Systems Seminar, Physics,
Northwestern
"The multiple scales of armed conflict," Theoretical
Ecology Lab Tea, Princeton



	"Idea engines," NetSI, Northeastern
	"Following the information footprint of firms," INET,
	Oxford
	"Growth, death, and resource competition in sessile
	organisms," <i>Exeter</i>
	"Following the information footprint of firms,"
	Methodology seminar, LSE
	"A theory of innovation and obsolescence," Imperial
	College, Complex Systems Seminar
	"Idea engines," Kings College, Disordered Systems
	Group
	"Fluctuations in growth, death, and resource
	competition in sessile organisms," Potsdam Institute for
	Climate Science, Keynote speaker, ESRI
2022	"Idea engines," Colloquium on Complex and Biological
	Systems, Potsdam University
	"Idea engines," Dutch Institute for Emergent
	Phenomena
	"Innovation, obsolescence, & the space of the possible,"
	Organized workshop with invited participants
2021	"Growth, death, and resource competition in sessile
	organisms" University of Bristol, Engineering
	Mathematics seminar
	"Measuring institutional integrity with the judiciary,"
	Organized working group with invited participants
2019	"Emergent regularities and scaling in armed conflict
	data," SIAM, online minisymposium "Modeling collective
	human behavior in social systems"
	"Dynamics of growth, death, and resource competition
	in sessile organisms," March APS
	"Coarse-graining armed conflict," March APS, Boston
2018	"Keeping it together: How humans coordinate motion
	with low information," March APS, Los Angeles
	"Collective memory in primate conflict implied by
	temporal scaling collapse," Bifi, Zaragoza
	"Renormalization group & armed conflict"
	Santa Fe Institute

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2016	"Statistical physics of collective behavior" Santa Fe Institute
	"Voting in the Supreme Court, conflict in pigtailed
	macaques, & statistical physics," Santa Fe Institute
Service & outreach	Reviewer for American Political Science Review,
	Cliodynamics, Journal of Statistical Mechanics, MDPI
	Social Sciences, Nature Communications Physics
	Neuroscience Letters, Physica A, PLoS Computational
	Biology, PLoS One, Royal Society Open Science,
	Science Advances, NPJ Complexity
2024	Netsci program committee
	Netsci-X program committee
	Session chair, DPG, Berlin
	CSS program committee
	IC2S2 program committee
2023	Netsci Program committee
	IC2S2 Program committee
	Session chair, DPG
	Session chair, IC2S2
2022	Talk workshop series for students at CSH
2020	Colloquium Committee Chair at SFI
	STEM Santa Fe volunteer
	Math festival for middle-schoolers
2019-2020	Participant in Letters to Pre-Scientist
	Pen pal program with elementary school students
2018	Cornell Center for Material Research outreach volunteer
	Physics Dept. colloquium committee student
	representative
2017	Physics representative to Graduate & Professional
	Student Assembly
2015-2016	Education Outreach Initiative Wisconsin Institute for
	Discovery
	Developed and taught curriculum on complex systems
	for middle school students in coordination with the
	Discovery Outreach Center

2014	Lecturer at Humanities Hackathon at Wisconsin Institute
	for Discovery
	A weeklong course about using R for the digital
	humanities
2012	Volunteer physics tutor at Princeton High School
	After school help sessions with students in physics
Media	
2021	Conflict research cited in Bloomberg Opinion by Niall
	Ferguson
	"Cascading Conflicts: What is the Science of Violence?"
	Santa Fe Council on Int'l Relations
	Panelist in conversation moderated by policy analyst
	Rachel Kleinfeld
2020	Swing voter work covered by Cornell Chronicle and SFI
	Press
2019	Conflict research covered by Cornell Chronicle
2018	Conflict research covered in <u>Cosmos Magazine</u>
	Supreme Court paper covered in the Cornell Chronicle
2014	and <u>Ars Technica</u>
	Supreme Court paper covered in Wired