

# SETH FREY, PH.D.

Assistant Professor

University of California, Davis

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*Frey sounds like 'fry'*

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## SUMMARY

I am a computational social scientist and cognitive scientist. I study social decision making using computational methods, large datasets, and web-based experiments. My specialties are computational approaches to institutional behavior and the cognitive science of strategic behavior.

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## EDUCATION

- 2013** **Ph.D. in Cognitive Science and Informatics**, Indiana University, Bloomington  
Focus on cognitive science of strategic reasoning. *Advisor*: Robert L. Goldstone
- 2004** **B.A. in Cognitive Science**, University of California, Berkeley  
Focuses in cognitive neuroscience and cognitive psychology.
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## RESEARCH EXPERIENCE

### POSITIONS

- 2017–present** **Assistant Professor**, Communication Department, University of California, Davis  
Computational Social Science DE, Computer science graduate group, Psychology graduate group, Animal behavior graduate group, Data Science and Informatics affiliate
- 2015–2018** **Neukom Postdoctoral Fellow**, The Neukom Institute for Computational Science, Dartmouth College
- 2013–2015** **Postdoctoral researcher**, Disney Research Zurich, Walt Disney Imagineering, The Walt Disney Company
- 2015** **Lecturer**, Department of Human, Social, and Political Sciences (D-GESS), Swiss Federal Institute of Technology (ETH), Zürich, Switzerland

### OTHER TRAINING

- 2015-present** Mentee, Luke Chang, Computational Social Affective Neuroscience, Dartmouth
- 2016** Student, Consortium for Sociotechnical Systems (CSST) Summer Institute, WA, USA
- 2009–2013** Student, Robert L. Goldstone, Percepts and Concepts Lab, IU
- 2010–2013** Trainee, NSF/IGERT in the Dynamics of Brain-Body-Environment Systems, IU
- 2012** Student, Santa Fe Institute Complex Systems Summer School, Santa Fe, NM, USA
- 2012** Guest, Yuzuru Sato, RIES Complex Systems, Hokkaido University, Sapporo, Japan
- 2009** Student, Elinor Ostrom & Michael McGinnis, Institutional Analysis and Design, Workshop on Political Theory and Policy Analysis, IU
- 2006–2008** Student, Yanee Bar-Yam, New England Complex Systems Institute (NECSI)

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## PUBLICATIONS

### ONGOING RESEARCH

- Frey, S. "The dynamics of rules: How amateurs learn to govern"
- Schneider, N., Tan, J., Filippi, P., Frey, S. "Modular Politics: Toward a Governance Layer for Online Communities"
- Bulat, B., Frey, S. "Spatial computational communication: Crowd detection in high-rate GIS data"
- Zhong, Q., Frey, S. "Mutual influence of culture and governance in a population of online communities"
- Flynn, D. J., Frey, S. "Shooting friends and missing enemies: Approaching polarized policy preferences as signal detection problems"
- Frey, S., Sowinski, D. "Estimating the cognitive upper limit on communication in teams: A maximum entropy analysis of expert coordination in the NBA"

### PEER-REVIEWED ARCHIVAL PUBLICATIONS

- Frey, S., Atkisson, C. (*in submission*) "A dynamic over games drives selfish agents to win-win outcomes. <https://arxiv.org/abs/1907.06338>
- Hilbert, M., Barnett, G., Blumenstock, J., Contractor, N., Diesner, J., Frey, S., González-Bailón, S., Lamberson, P.J., Pan, J., Peng, T.-Q., Shen, C., Smaldino, P.E., van Atteveldt, W., Waldherr, A., Zhan, J., Zhu, J.J.H. (2019). Computational Communication Science: A Methodological Catalyzer for a Maturing Discipline. *International Journal of Communication*, 13, 23. <https://ijoc.org/index.php/ijoc/article/view/10675>
- Frey, S., Krafft, P. M. and Keegan, B.C. (2019). "This Place Does What It Was Built For": Designing Digital Institutions for Participatory Change. *Proc. ACM Hum.-Comput. Interact.* 3, CSCW, <https://doi.org/10.1145/3359134>
- Frey, S., Sumner, R.W. (2019) Emergence of integrated institutions in a large population of self-governing communities. *PLoS ONE* 14(7): e0216335. <https://doi.org/10.1371/journal.pone.0216335>
- Cook, A., Frey, S. (2018) "Reading in Time: Cognitive Dynamics and the Literary Experience of Shakespeare," In L. Magnusson, & D. Schalkwyk, (Eds.), *The Cambridge Companion to Shakespeare's Language*. Cambridge: Cambridge University Press.
- Strimling P., Frey, S. (2018) Emergent Cultural Differences in Online Communities' Norms of Fairness. *Games and Culture*. <http://doi.org/gd84gz>
- Frey, S., Donnay, K., Helbing, D., Sumner, R. W., Bos, M. W. (2018) The rippling dynamics of valenced messages in naturalistic youth chat. *Behavior Research Methods*. <https://doi.org/10.3758/s13428-018-1140-6>
- Frey, S. & Goldstone, R.L. (2018) Cognitive mechanisms for human flocking dynamics. *Journal of Computational Social Science* 1:349. <https://doi.org/10.1007/s42001-018-0017-x>
- Frey, S., Albino, D. K., & Williams, P. L. (2018). Synergistic Information Processing Encrypts Strategic Reasoning in Poker. *Cognitive science*. <http://doi.org/gdzpj6>
- Frey, S., Bos, M. W., and Sumner, R. W. (2017) "Can you moderate an unreadable message? 'Blind' content moderation via human computation" *Human Computation* 4:1:78–106. DOI: 10.15346/hc.v4i1.5
- Frey, S., Goldstone, R. L. (2016). "Does successful small-scale coordination help or hinder

coordination at larger scales?" *Interaction Studies* 17(3). Available at <http://dx.doi.org/10.1075/is.17.3.03fre>

- Baghestanian, S., Frey, S. (2016). "GO Figure: Analytic and strategic skills are separable." *Journal of Behavioral and Experimental Economics* 64(10) 71–80. <http://www.sciencedirect.com/science/article/pii/S2214804315000774>
- Müller, S., Solenthaler, B., Kapadia, M., Frey, S., Klingler, S., Mann, R. P., Sumner, R. W., Gross, M. (2015). "HeapCraft: Interactive Data Exploration and Visualization Tools for Understanding and Influencing Player Behavior in Minecraft." In *Motion in Games (ACM MIG)*
- Müller, S., Kapadia, M., Frey, S., Klingler, S., Solenthaler, B., Mann, R. P., Sumner, R. W., Gross, M. (2015). "Statistical analysis of player behavior in Minecraft." In *Foundations of Digital Games (FDG)*, Pacific Grove, California.
- Müller, S., Frey, S., Kapadia, M., Klingler, S., Mann, R. P., Solenthaler, B., Sumner, R. W., Gross, M. (2015). "Quantifying and Predicting Collaboration in Shared Virtual Worlds." In *Artificial Intelligence and Interactive Digital Entertainment 2015 (AAAI AIIDE)*
- Huber, R., Scheibehenne, B., Chapiro, A., Frey, S., Sumner, R. (2015). "The Influence of Visual Salience on Video Consumption Behavior: A Survival Analysis Approach." *ACM Web Science*, Oxford-United Kingdom, 2015.
- Frey, S. (2014). "Mixed human/entity games and the anomalous effects of misattributing strategic agency." *Adaptive Behavior* 22(4) 266-276, <http://adb.sagepub.com/content/22/4/266.abstract>
- Galati, A., Bourchas T., Siby, S., Frey S., Olivares M., Mangold S. (2014) "Mobile-enabled delay tolerant networking in rural developing regions" In *IEEE Global Humanitarian Technology Conference (GHTC 2014)*.
- Frey, S., Goldstone, R. L. (2013). Cyclic game dynamics driven by iterated reasoning. *PLoS ONE* 8(2): e56416. doi:10.1371/journal.pone.0056416. <http://dx.plos.org/10.1371/journal.pone.0056416>
- Goldstone, R. L., Wisdom, T. N., Roberts, M. E., Frey, S. (2013). Learning along with others. In B. H. Ross (Ed.), *Psychology of Learning and Motivation* 58. (pp. 1-45). Academic Press, MA, USA.
- Willer, R., Sharkey, A., Frey, S. (2012) Reciprocity on the Hardwood: Passing Patterns among Professional Basketball Players. *PLoS ONE* 7(12): e49807. <http://www.plosone.org/article/info:doi/10.1371/journal.pone.0049807>
- Frey, S. (2013) "Complex collective dynamics in human higher-level reasoning. A study over multiple methods," Dissertation, Indiana University. Available at <http://gradworks.umi.com/35/99/3599175.html>
- Deaton, S., Frey, S. (2009). Investigations of attractor behavior over the decay of modular RBNs. 10th European Conference on Artificial Life. Available at <http://arxiv.org/pdf/1005.3510>

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## GRANTS, HONORS, AND AWARDS

### MAJOR GRANTS, HONORS, AND AWARDS

- |             |                                                                                                               |
|-------------|---------------------------------------------------------------------------------------------------------------|
| <b>2019</b> | <b>NSF RCN: Coordinating and Advancing Analytical Approaches for Policy Design.</b> \$460,000                 |
| <b>2018</b> | <b>Innovative Learning Technology Initiative,</b> University of California Office of the President. \$109,000 |
| <b>2015</b> | <b>Neukom Postdoctoral Fellowship,</b> Neukom Institute for Computational Science,                            |

- Dartmouth College. *Three years of support.*
- 2012** **Indiana Space Grant Consortium (NASA/INSGC) Fellowship.** *One year of support.*
- 2010** **NSF IGERT Traineeship in the Dynamics of Brain-Body-Environment Systems.** *Two years of support.*
- 2006** **NECSI Advanced Training Program Student Fellowship.** *Two years of support.*

## OTHER GRANTS, HONORS, AND AWARDS

- 2019** ACM CSCW 2019. *Honorable mention award for best paper*
- 2014** Indiana University Cognitive Science Program. *“Outstanding dissertation” award.*
- 2017** Neukom Institute for Computational Science Workshop Support. *\$11,000*
- 2012** NSF IGERT Summer Internship Program. *One summer of support.*
- 2012** NSF IGERT Summer Travel Award. *One month of travel support.*
- 2012** NSF Travel Grant & Research Fellowship. *One month of travel support.*
- 2011** NSF EAPSI. *One summer of support.*
- 2011** JSPS Summer Program Fellowship, Hokkaido University. *One summer of support.*
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## TALKS

### INVITED TALKS

- Information theory and social information processing.** *Physics Dept. Colloquium, UC Davis; Invited speaker, Networks in Cognitive Science Satellite at NetSci2019*
- Social cognition with large online game datasets.** *Keynote at MUCSC, Indiana University; MIS Research Seminar, MSU East Lansing; Invited talk, BBN Technologies; Invited talk, Champlain College; Physics Colloquium, UC Davis; Center for Mind and Brain Idea Blitz, UC Davis.*
- Governance of online designer societies.** *Major Transitions Workshop, CRI Paris; Recomputing Social Science, UC Davis; SEGS Talk, University of Vermont; Panelist talk, IEEE Self-Adaptive and Self-Organizing Systems; Invited talk, Global Footprint Network.*
- Behavioral science of user-generated content.** *Tech talk, Disney Research.*
- Expert information extraction and encryption in online poker.** *School of Computer Science Colloquium, McGill University; Behavioral Studies Colloquium, ETH Zürich; VRVis Center for Visualization Research, Austria; Economic Psychology, University of Basel; Business Administration, University of Zurich; Disney Data Analytics Conference, The Walt Disney Company.*
- Cyclic game dynamics driven by iterated reasoning.** *International Conference on Computational Social Science (IC2S2 2015), Helsinki, Finland; Helbing Lab, ETH Zürich; Crisis Lab, IMT Lucca; Behavioral Group, University of Warwick; Cognition, Action, & Perception Speaker Series, University of Cincinnati; 2012 NSF/IGERT Competition, NSF IGERT, Washington DC; Behavioral Economics Seminar, Indiana University; Behavioral Sciences Group, Hokkaido University.*
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## TEACHING

- Courses:** Simulating Communication Processes, 2019S; Simulating Communication Processes, 2018F;

Simulating social systems, 2018W; Experimental study of social behavior, 2018W; Science of Anarchy, 2017W; Social Modeling and Mechanism Design, 2015; Brain and Cognition in Cognitive Science, 2013; Experiments and Models in Cognitive Science, 2012; Autonomous Robotics, 2010; Experiments and Models in Cognitive Science, 2009.

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## ACADEMIC SERVICE

**Journal reviewing:** Communication Research; Communication Methods and Measures; ACM TAAS; Behavior Research Methods; Nature Human Behavior; Cognition; Perspectives on Psychological Science; Complexity; Proceedings of the Royal Society B: Biological Sciences; Journal of the Royal Society: Interface; Cognitive Science; PLoS ONE; Journal of Experimental Psychology: General.

**Conference reviewing and committees:** ICA; PC, SocInfo; PC, CHI LBW; PC, International Conference on Computational Social Science (IC2S2); Cognitive Futures; European Conference on Cognitive Science; Cognitive Science Society; AC, ACM SIGGRAPH; Collective Intelligence; Midwest Cognitive Science Conference; ACM TAAS, HICSS.

**Organizing:** Organizer, "Science of Counter-Earth" Workshop, Hanover, NH, USA 2017; <http://sites.dartmouth.edu/neukom/counter-earth/>

**Guest editor:** *Grassroots Economic Organizing*, Ostrom Special Issue: <http://geo.coop/vol-2/issue-9>

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## MEDIA AND PUBLIC OUTREACH

### POPULAR ARTICLES AND TALKS

Frey, S., Benefield, G., Bernier, C., Bos, M., Budak, C., DeDeo, S., Farzan, R., Hill, B., Jacobs, A., Savage, S., Shaw, A. (2019) "Org-scale analytics: Today's startups build societies. Do it right." *Towards Data Science*. Available at <https://towardsdatascience.com/org-scale-analytics-todays-startups-build-societies-do-it-right-4f6185e81482>

Frey, S. (2019) "Bringing data to the science of community: Minecraft Edition" *Towards Data Science*. Available at <https://towardsdatascience.com/bringing-big-data-to-the-science-of-community-minecraft-edition-25938f43961a>

Frey, S., House, P., (2016). "The Unexpected Humanity of Robot Soccer." *Nautilus* 39. Available at <http://nautil.us/issue/39/sport/the-unexpected-humanity-of-robot-soccer>

Hinchliffe, J.P., Frey, S. (2014). "Shakespeare's Genius is Nonsense." *Nautilus* 18. Available at <http://nautil.us/issue/18/genius/shakespeares-genius-is-nonsense>

Frey, S. (2011) *TEDxBloomington*, Bloomington, IN, USA. Video available at <http://www.youtube.com/watch?v=DoO2WQMzCm4>

### PRESS

**Governance of designer societies.** Featured in *New York Times Magazine*, 14 April 2016.

**Cyclic dynamics driven by iterated reasoning.** Interviewed in *BBC Radio 4* documentary, 5 Aug, 2015; Featured on *Smithsonian Magazine blog*, 21 Feb, 2013; Featured on *NBCnews.com*, 19 Feb, 2013; Interviewed in *Indiana University Alumni Magazine*.

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## OTHER ACTIVITIES

**2005-present** Hobbyist in printing and book arts

**2015-present** Consulting for major media company, engagement in user-generated content  
**2015** Inventor on two filed patents, area of predictive video analytics  
**2008–2013** Co-founder and board of directors, Bloomington Cooperative Living Inc.  
Grew organization's membership to 50, and its assets from \$10,000 to \$1 million  
**2010–2013** Board of directors, National Association of Students of Cooperation (NASCO)  
**2008–2010** Paid to solve puzzles for Jerry Slocum Collection of puzzles at IU's Lilly Library  
**2006** Fired by Buddhists; scientific career begins