

David Danks

Curriculum Vitae

Contact Information

Department of Philosophy
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Carnegie Mellon University
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Country of citizenship: United States

Academic Career

Carnegie Mellon University
Louis Leon (L. L.) Thurstone Professor of Philosophy & Psychology 2016 -
Head, Department of Philosophy 2014 -
Professor of Philosophy & Psychology 2014 - 2016
Associate Professor of Philosophy & Psychology 2008 - 2014
Assistant Professor of Philosophy 2003 - 2008

Affiliate & adjunct appointments:

Carnegie Mellon Neuroscience Institute
Affiliate member 2019 -
H. John Heinz III College of Information Systems and Public Policy, CMU
Affiliate faculty 2017 -
Center for the Neural Basis of Cognition, CMU
Member 2014 -
Department of History & Philosophy of Science, University of Pittsburgh
Adjunct faculty 2014 -
Center for Philosophy of Science, University of Pittsburgh
Associate fellow 2005 -

Past appointments:

Center for Advanced Study of Language, University of Maryland
Adjunct member 2008 - 2019
Florida Institute for Human & Machine Cognition (UARI with Univ. of Florida system)
Research Scientist 2001 - 2012
Philosophy Dept., Colorado College
Visiting Assistant Professor (2 courses) 2002 - 2003

Education

University of California, San Diego (La Jolla, Calif.)
Philosophy Department (Ph.D., 6/2001; M.A., 12/1999) 1996 - 2001
Dissertation: *The Epistemology of Causal Judgment*
Carnegie Mellon University (Pittsburgh, Pa.)
Logic, Computation, and Methodology (visiting graduate student) 1998 - 1999
Princeton University (Princeton, N.J.)
Major: Philosophy (A.B. *cum laude*, 5/1996) 1992 - 1996

Publications *[links to most papers available on webpage]*

Books:

Danks, David. (2014). *Unifying the mind: Cognitive representations as graphical models*. Cambridge, MA: The MIT Press.

Reviews: *Notre Dame Philosophical Reviews* by Steven Horst (2014); *Choice* by Steven Horst (March, 2015); *PsyCRITIQUES* by Donald MacGregor (March 23, 2015); *Zagadnienia Naukoznawstwa* by Pawel Kawalec (2015) [review in Polish]; *Philosophical Psychology* by Christopher Burr (2016)

Danks, David, & Ippoliti, Emiliano. (Eds.) (2018). *Building theories: Heuristics and hypotheses in science*. Berlin: Springer-Verlag.

Journal articles and book chapters:

- [53] Danks, D., & Harrell, M. (in press). Chaos, causation, and describing dynamics. In C. K. Waters (Ed.), *Causal reasoning in biology*. Minneapolis: University of Minnesota Press.
- [52] Dinh, P., & Danks, D. (in press). Causal pluralism in philosophy: Empirical challenges and alternative proposals. *Philosophy of Science*.
- [51] McCaffrey, J., & Danks, D. (in press). Mixtures and psychological inference with resting state fMRI. *British Journal for the Philosophy of Science*. <https://doi.org/10.1093/bjps/axx053>
- [50] Danks, D. (2019). Probabilistic models. In M. Colombo & M. Sprevak (Eds.), *Routledge handbook of the computational mind* (pp. 149-158). New York: Routledge.
- [49] Danks, D. (2019). Safe-and-substantive perspectivism. In M. Massimi & C. D. McCoy (Eds.), *Understanding perspectivism: Scientific challenges and methodological prospects* (pp. 127-140). New York: Routledge.
- [48] Danks, D., & Plis, S. M. (2019). Amalgamating evidence of dynamics. *Synthese*, 196(8), 3213-3230.
- [47] Schnetz, M. P., Hochheiser, H. S., Danks, D. J., Landsittel, D. P., Vogt, K. M., Ibinson, J. W., Whitehurst, S. L., McDermott, S. P., Duque, M. G., & Kaynar, A. M. (2019). The Triple Variable Index combines information generated over time from common monitoring variables to identify patients expressing distinct patterns of intraoperative physiology. *BMC Medical Research Methodology*, 19(1): 17 pages. doi:10.1186/s12874-019-0660-9
- [46] Danks, D. (2018). LPCD framework: Analytical tool or psychological model? [Commentary] *Behavioral and Brain Sciences*, 41, E230. doi:10.1017/S0140525X18001383
- [45] Danks, D. (2018). Privileged (default) causal cognition: A mathematical analysis. *Frontiers in Psychology*, 9: 498. doi:10.3389/fpsyg.2018.00498
- [44] Danks, D. (2018). Richer than reduction. In D. Danks & E. Ippoliti (Eds.), *Building theories: Heuristics and hypotheses in science* (pp. 45-61). Berlin: Springer-Verlag.
- [43] Malinsky, D., & Danks, D. (2018). Causal discovery algorithms: A practical guide. *Philosophy Compass*, 13, e12470. doi:10.1111/phc3.12470
- [42] Roff, H. M., & Danks, D. (2018). "Trust but Verify": The difficulty of trusting autonomous weapons systems. *Journal of Military Ethics*, 17, 2-20.
- [41] Broger, T., Roy, R. B., Filomena, A., Greef, C. H., Rimmele, S., Havumaki, J., Danks, D., & 11 additional authors. (2017). Diagnostic performance of tuberculosis-specific IgG antibody profiles in patients with presumptive TB from two continents. *Serology*. doi:10.1093/cid/cix023
- [40] Danks, D. (2017). Singular causation. In M. R. Waldmann (Ed.), *Oxford handbook of causal reasoning* (pp. 201-215). Oxford: Oxford University Press.
- [39] Danks, D., & London, A. J. (2017). Regulating autonomous systems: Beyond standards. *Intelligent*

Systems, 32(1), 88-91.

- [38] Hyttinen, A., Plis, S., Järvisalo, M., Eberhardt, F., & Danks, D. (2017). A constraint optimization approach to causal discovery from subsampled time series data. *International Journal of Approximate Reasoning*, 90, 208-225.
- [37] Danks, D. (2016). Causal search, causal modeling, and the folk. In J. Syttsma & J. W. Buckwalter (Eds.), *Blackwell companion to experimental philosophy* (pp. 463-471). Oxford: Wiley Blackwell.
- [36] Danks, D., & Danks, J. H. (2016). Beyond machines: Humans in cyber operations, espionage, and conflict. In F. Allhoff, A. Henschke, & B. J. Strawser (Eds.), *Binary bullets: The ethics of cyberwarfare* (pp. 177-197). Oxford: Oxford University Press.
- [35] Wellen, S., & Danks, D. (2016). Adaptively rational learning. *Minds & Machines*, 26(1), 87-102. DOI: 10.1007/s11023-015-9370-1
- [34] Danks, D. (2015). Goal-dependence in (scientific) ontology. *Synthese*, 192, 3601-3616. DOI: 10.1007/s11229-014-0649-1
- [33] Danks, D. (2014). Learning. In K. Frankish & W. M. Ramsey (Eds.), *Cambridge handbook to artificial intelligence* (pp. 151-167). Cambridge: Cambridge University Press.
- [32] Danks, D. (2014). A modern Pascal's wager for mass electronic surveillance. *Telos*, 169, 155-161.
- [31] Danks, D., Rose, D., & Machery, E. (2014). Demoralizing causation. *Philosophical Studies*, 171(2), 251-277.
- [30] Kummerfeld, E., & Danks, D. (2014). Model change and methodological virtues in scientific inference. *Synthese*, 191(12), 2673-2693.
- [29] Danks, D. (2013). Functions and cognitive bases for the concept of actual causation. *Erkenntnis*, 78(1), 111-128. DOI: 10.1007/s10670-013-9439-2
- [28] Danks, D., & Danks, J. H. (2013). The moral permissibility of automated responses during cyberwarfare. *Journal of Military Ethics*, 12(1), 18-33.
- [27] Mayo-Wilson, C., Zollman, K. J. S., & Danks, D. (2013). Wisdom of crowds vs. groupthink: Learning in groups and in isolation. *International Journal of Game Theory*, 42(3), 695-723.
- [26] Rose, D., & Danks, D. (2013). In defense of a broad conception of experimental philosophy. *Metaphilosophy*, 44(4), 512-532.
- [25] Danks, D. (2012). Human causal learning. In N. Seel (Ed.), *Encyclopedia of the sciences of learning*. Springer.
- [24] Rose, D., & Danks, D. (2012). Causation: Empirical trends and future directions. *Philosophy Compass*, 7(9), 643-653.
- [23] Danks, D., & Eberhardt, F. (2011). Integration in both directions: The need for an account of algorithmic rationality [Commentary]. *Brain & Behavioral Sciences*, 34, 197.
- [22] Eberhardt, F., & Danks, D. (2011). Confirmation in the cognitive sciences: The problematic case of Bayesian models. *Minds and Machines*, 21(3), 389-410.
- [21] Mayo-Wilson, C., Zollman, K. J. S., & Danks, D. (2011). The independence thesis: When individual and social epistemology diverge. *Philosophy of Science*, 78(4), 653-677.
- [20] Danks, D. (2010). Not different kinds, just special cases [Commentary]. *Behavioral and Brain Sciences*, 33(2/3), 208-209.
- [19] Danks, D., Fancsali, S., Glymour, C., & Scheines, R. (2010). Comorbid science? [Commentary]. *Behavioral and Brain Sciences*, 33(2/3), 153-155.
- [18] Danks, D., & Rose, D. (2010). Diversity in representations, uniformity in learning [Commentary].

- [17] Glymour, C., Danks, D., Glymour, B., Eberhardt, F., Ramsey, J., Scheines, R., Spirtes, P., Teng, C. M., & Zhang, J. (2010). Actual causation: A stone soup essay. *Synthese*, 175(2), 169-192.
- [16] Ramapriyan, H., Isaac, D., Yang, W., Bonnlander, B., & Danks, D. (2010). An intelligent archive testbed incorporating data mining. In L. Di & H. K. Ramapriyan (Eds.), *Standard-based data and information systems for earth observations* (pp. 165-188). Berlin: Springer-Verlag.
- [15] Danks, D. (2009). The psychology of causal perception and reasoning. In H. Beebe, C. Hitchcock, & P. Menzies (Eds.), *Oxford handbook of causation* (pp. 447-470). Oxford: Oxford University Press.
- [14] Danks, D., & Eberhardt, F. (2009). Conceptual problems in statistics, testing and experimentation. In J. Symons & F. Calvo (Eds.), *Routledge companion to the philosophy of psychology* (pp. 214-230). New York: Routledge. 2nd edition (in press). [includes new section on the “replication crisis”]
- [13] Danks, D., & Eberhardt, F. (2009). Explaining norms and norms explained [Commentary]. *Behavioral and Brain Sciences*, 32 (1), 86-87.
- [12] Wimberly, F., Danks, D., Glymour, C., & Chu, T. (2009). Problems for structure learning: Aggregation and computational complexity. In S. Das, S. M. Welch, D. Caragea, & W. H. Hsu (Eds.), *Computational methodologies in gene regulatory networks* (pp. 310-332). Hershey, PA: IGI Global Publishing.
- [11] Danks, D. (2008). Rational analyses, instrumentalism, and implementations. In N. Chater & M. Oaksford (Eds.), *The probabilistic mind: Prospects for Bayesian cognitive science* (pp. 59-75). Oxford: Oxford University Press.
- [10] Jantzen, B., & Danks, D. (2008). Biological codes and topological causation. *Philosophy of Science*, 75, 259-277.
- [9] Townsend, K. A., Wollstein, G., Danks, D., Sung, K. R., Ishikawa, H., Kagemann, L., Gabriele, M. L., & Schuman, J. S. (2008). Heidelberg Retina Tomography III machine learning classifiers for glaucoma detection. *British Journal of Ophthalmology*, 92, 814-818.
- [8] Danks, D. (2007). Causal learning from observations and manipulations. In M. C. Lovett & P. Shah (Eds.), *Thinking with data* (pp. 359-388). New York: Lawrence Erlbaum Associates.
- [7] Danks, D. (2007). Theory unification and graphical models in human categorization. In A. Gopnik & L. Schulz (Eds.), *Causal learning: Psychology, philosophy, and computation* (pp. 173-189). Oxford: Oxford University Press.
- [6] Glymour, C., & Danks, D. (2007). Reasons as causes in Bayesian epistemology. *Journal of Philosophy*, 104(9), 464-474.
- [5] Scheines, R., Easterday, M., & Danks, D. (2007). Teaching the normative theory of causal reasoning. In A. Gopnik & L. Schulz (Eds.), *Causal learning: Psychology, philosophy, and computation* (pp. 119-138). Oxford: Oxford University Press.
- [4] Danks, D. (2005). Scientific coherence and the fusion of experimental results. *The British Journal for the Philosophy of Science*, 56, 791-807.
- [3] Danks, D. (2005). The supposed competition between theories of human causal inference. *Philosophical Psychology*, 18 (2), 259-272.
- [2] Gopnik, A., Glymour, C., Sobel, D. M., Schulz, L. E., Kushnir, T., & Danks, D. (2004). A theory of causal learning in children: Causal maps and Bayes nets. *Psychological Review*, 111 (1), 3-32.
- [1] Danks, D. (2003). Equilibria of the Rescorla-Wagner model. *Journal of Mathematical Psychology*, 47, 109-121.

Peer-reviewed conference proceedings:

- [37] Lu, J., Lee, D., Kim, T. W., & Danks, D. (2020). Good explanation for algorithmic transparency. In *Proceedings of the 2020 AAAI/ACM Conference on Artificial Intelligence, Ethics, & Society*.
- [36] Zhou, Y., & Danks, D. (2020). Different “intelligibility” for different folks. In *Proceedings of the 2020 AAAI/ACM Conference on Artificial Intelligence, Ethics, & Society*.
- [35] Danks, D. (2019). The value of trustworthy AI. In *Proceedings of the 2019 AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society*.
- [34] Geary, T., & Danks, D. (2019). Balancing the benefits of autonomous vehicles. In *Proceedings of the 2019 AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society*.
- [33] Parker, J., & Danks, D. (2019). How technological advances can reveal rights. In *Proceedings of the 2019 AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society*.
- [32] LaRosa, E., & Danks, D. (2018). Impacts on trust of healthcare AI. In *Proceedings of the 2018 AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society*. doi:10.1145/3278721.3278771
- [31] London, A. J., & Danks, D. (2018). Regulating autonomous vehicles: A policy proposal. In *Proceedings of the 2018 AAAI/ACM Conference on Artificial Intelligence, Ethics, and Society*. doi:10.1145/3278721.3278763
- [30] Danks, D., & London, A. J. (2017). Algorithmic bias in autonomous systems. In C. Sierra (Ed.), *Proceedings of the 26th International Joint Conference on Artificial Intelligence* (pp. 4691-4697).
- [29] Kazman, R., Stoddard, R., Danks, D., & Cai, Y. (2017). Causal modeling, discovery, & inference for software engineering. In *Proceedings of 39th International Conference on Software Engineering (ICSE 2017)* (pp. 172-174). Piscataway, NJ: IEEE Press.
- [28] Hyttinen, A., Plis, S., Järvisalo, M., Eberhardt, F., & Danks, D. (2016). Causal discovery from subsampled time series data by constraint optimization. In A. Antonucci, G. Corani, & C. P. de Campos (Eds.), *JMLR Workshop & Conference Proceedings* (vol. 52): *Proceedings of the 8th International Conference on Probabilistic Graphical Models* (pp. 216-227).
- [27] Plis*, S., Danks*, D., Freeman, C., & Calhoun, V. (2015). Rate-agnostic (causal) structure learning. In C. Cortes, N. D. Lawrence, D. D. Lee, M. Sugiyama, & R. Garnett (Eds.), *Advances in neural information processing systems 28* (pp. 3303-3311). La Jolla, CA: The NIPS Foundation.
[*first two authors contributed equally]
- [26] Plis*, S., Danks*, D., & Yang, J. (2015). Mesochronal structure learning. In M. Meila & T. Heskes (Eds.), *Uncertainty in artificial intelligence 31 (UAI-2015)* (pp. 702-711). Corvallis, OR: AUAI Press.
[*first two authors contributed equally]
- [25] Danks*, D., & Plis*, S. (2014). Learning causal structure from undersampled time series. In *JMLR: Workshop and Conference Proceedings*. [*authors contributed equally]
- [24] Wellen, S., & Danks, D. (2014). Learning with a purpose: The influence of goals. In P. Bello, M. Guarini, M. McShane, & B. Scassellati (Eds.), *Proceedings of the 36th annual conference of the cognitive science society* (pp. 1766-1771). Austin, TX: Cognitive Science Society.
- [23] Kummerfeld, E., & Danks, D. (2013). Tracking time-varying graphical structure. In C.J.C. Burges, L. Bottou, M. Welling, Z. Ghahramani, & K.Q. Weinberger (Eds.), *Advances in neural information processing systems 26* (pp. 1205-1213). La Jolla, CA: The NIPS Foundation.
- [22] Danks, D. (2013). Moving from levels & reduction to dimensions & constraints. In M. Knauff, M. Pauen, N. Sebanz, & I. Wachsmuth (Eds.), *Proceedings of the 35th annual conference of the cognitive science society* (pp. 2124-2129). Austin, TX: Cognitive Science Society.
- [21] Nevins, J. E., Danks, D., Wollstein, G., Ishikawa, H., Kagemann, L., Sigal, I. A., & Schuman, J. S.

- (2013). Machine classifier clustering of ocular structure measurements poorly corresponds with longitudinal functional performance in glaucoma. *Association for Research in Vision and Ophthalmology (ARVO) 2013*.
- [20] Wellen, S., & Danks, D. (2012). Actor-observer asymmetries in judgments of intentional actions. In N. Miyake, D. Peebles, & R. P. Cooper (Eds.), *Proceedings of the 34th annual conference of the cognitive science society* (pp. 2523-2528). Austin, TX: Cognitive Science Society.
- [19] Wellen, S., & Danks, D. (2012). Learning causal structure through local prediction-error learning. In N. Miyake, D. Peebles, & R. P. Cooper (Eds.), *Proceedings of the 34th annual conference of the cognitive science society* (pp. 2529-2534). Austin, TX: Cognitive Science Society.
- [18] Lally, D. R., Wollstein, G., Danks, D., Ishikawa, H., Kagemann, L., & Schuman, J.S. (2009). Combining OCT, HRT and GDx through machine learning classifiers for glaucoma detection. *Association for Research in Vision and Ophthalmology (ARVO) 2009*.
- [17] Tillman, R. E., Danks, D., & Glymour, C. (2008). Integrating locally learned causal structures with overlapping variables. In D. Koller, D. Schuurmans, Y. Bengio, & L. Bottou (Eds.), *Advances in neural information processing systems 21* (pp. 1665-1672). La Jolla, CA: The NIPS Foundation.
- [16] Nichols, W., & Danks, D. (2007). Decision making using learned causal structures. In D. S. McNamara & J. G. Trafton (Eds.), *Proceedings of the 29th annual meeting of the cognitive science society* (pp. 1343-1348). Austin, TX: Cognitive Science Society.
- [15] Townsend, K. A., Wollstein, G., Danks, D., Sung, K., Ishikawa H., Kagemann, L., Gabriele, M. L., & Schuman, J. S. (2007). Heidelberg Retina Tomography 3 machine learning classifiers for glaucoma detection. *Association for Research in Vision and Ophthalmology (ARVO) 2007*.
- [14] Zhu, H., & Danks, D. (2007). Task influences on category learning. In D. S. McNamara & J. G. Trafton (Eds.), *Proceedings of the 29th annual meeting of the cognitive science society* (pp. 1677-1682). Austin, TX: Cognitive Science Society.
- [13] Danks, D. (2006). (Not) learning a complex (but learnable) category. In R. Sun & N. Miyake (Eds.), *Proceedings of the 28th annual meeting of the cognitive science society* (pp. 1186-1191). Mahwah, NJ: Lawrence Erlbaum Associates.
- [12] Danks, D., & Schwartz, S. (2006). Effects of causal strength on learning from biased sequences. In R. Sun & N. Miyake (Eds.), *Proceedings of the 28th annual meeting of the cognitive science society* (pp. 1180-1185). Mahwah, NJ: Lawrence Erlbaum Associates.
- [11] Ramapriyan, H. K., Isaac, D., Yang, W., Bonnlander, B., & Danks, D. (2006). An intelligent archive testbed incorporating data mining lessons and observations. In *Proceedings of the IEEE geoscience and remote sensing symposium* (pp. 3482-3485).
- [10] Danks, D., & Schwartz, S. (2005). Causal learning from biased sequences. In B. G. Bara, L. Barsalou, & M. Bucciarelli (Eds.), *Proceedings of the 27th annual meeting of the cognitive science society* (pp. 542-547). Mahwah, NJ: Lawrence Erlbaum Associates.
- [9] Bunch, L., Breedy, M., Bradshaw, J. M., Carvalho, M., Danks, D., & Suri, N. (2004). Flexible automated monitoring and notification for complex processes. In F.-Y. Wang (Ed.), *Proceedings of the IEEE international conference on networking, sensing, and control* (pp. 443-448). Tucson, AZ.
- [8] Danks, D. (2004). Constraint-based human causal learning. In M. Lovett, C. Schunn, C. Lebiere, & P. Munro (Eds.), *Proceedings of the 6th international conference on cognitive modeling (ICCM-2004)* (pp. 342-343). Mahwah, NJ: Lawrence Erlbaum Associates.
- [7] Danks, D., Glymour, C., & Spirtes, P. (2003). The computational and experimental complexity of gene perturbations for regulatory network search. In W. H. Hsu, R. Joehanes, and C. D. Page

- (Eds.), *Proceedings of IJCAI workshop on learning graphical models for computational genomics* (pp. 22-31).
- [6] Danks, D., Griffiths, T. L., & Tenenbaum, J. B. (2003). Dynamical causal learning. In S. Becker, S. Thrun, & K. Obermayer (Eds.), *Advances in neural information processing systems 15* (pp. 67-74). Cambridge, MA: MIT Press.
- [5] Hewett, R., & Danks, D. (2003). Integration of learning with probabilistic and compact relational models. In *Proceedings of the 3rd predictive methods conference*. Newport Beach, CA.
- [4] Kushnir, T., Gopnik, A., Schulz, L. E., & Danks, D. (2003). Inferring hidden causes. In R. Alterman & D. Kirsh (Eds.), *Proceedings of the 25th annual meeting of the cognitive science society* (pp. 699-703). Boston: Cognitive Science Society.
- [3] Danks, D. (2002). Learning the causal structure of overlapping variable sets. In S. Lange, K. Satoh, & C. H. Smith (Eds.), *Discovery science: Proceedings of the 5th international conference* (pp. 178-191). Berlin: Springer-Verlag.
- [2] Danks, D., & Glymour, C. (2001). Linearity properties of Bayes nets with binary variables. In J. Breese & D. Koller (Eds.), *Uncertainty in artificial intelligence: Proceedings of the 17th conference (UAI-2001)* (pp. 98-104). San Francisco: Morgan Kaufmann.
- [1] Wheeler, W., Danks, D., Ramsey, J., Scheines, R., Smith, J., & Thompson, A. (2001). Developing and deploying online courses with Jcourse. In *Proceedings of the association of the advancement of computing in education (AACE)*.

Popular writings, whitepapers, and blogposts:

- [13] Persi Paoli, G., Vignard, K., Danks, D., & Meyer, P. (2020). *Modernizing arms control: Exploring responses to the use of AI in military decision-making*. Geneva, Switzerland: UNIDIR.
- [12] Danks, D. (2020). Ubiquitous surveillance and the politics of refusal. In *Mirror with a memory: Photography, surveillance, and artificial intelligence*.
- [11] Danks, D. (2020). How adversarial attacks could destabilize military AI systems. *IEEE Spectrum*, 26 February 2020.
- [10] Danks, D., & Parker, J. (2019). *Ethical analysis of responses to synthetic and manipulated media*. Memo for Carnegie Endowment for International Peace.
- [9] Danks, D., & Parker, J. (2019). *The un/ethical status of synthetic media*. Memo for Carnegie Endowment for International Peace.
- [8] Major contributor for UNIDIR Observation Paper 9 (2019), *Algorithmic bias and the weaponization of increasingly autonomous technologies*. Geneva, Switzerland.
- [7] Danks, D. (2019). Trust and values, bodies and AI. In catalog for *Paradox: Body in the age of AI* (art exhibit at the Miller Institute for Contemporary Art).
- [6] Danks, D. (2018). AI & global governance: Supporting the ties that bind. UNU Centre for Policy Research, October 15, 2018. <<https://cpr.unu.edu/ai-global-governance-supporting-the-ties-that-bind.html>>
- [5] Danks, D., & London, A. J. (2018). How driverless cars think. In "Forum." *Issues in Science and Technology*, 34(4).
- [4] Taylor, S., Pickering, B., Boniface, M., Anderson, M., Danks, D., Følstad, A., Leese, M., Müller, V., Sorell, T., Winfield, A., & Woollard, F. (2018). Responsible AI: Key themes, concerns & recommendations for European research and innovation. DOI:10.5281/zenodo.1303253
- [3] London, A. J., & Danks, D. (2017). Self-driving, but not self-regulating. *Pittsburgh Post-Gazette*, April 2, 2017. <<http://www.post-gazette.com/opinion/Op-Ed/2017/04/02/Self-driving-but-not-self-regulating>>

- [2] Danks, D. (2016). Finding trust and understanding in autonomous technologies. *The Conversation*. December 30, 2016. <<http://theconversation.com/finding-trust-and-understanding-in-autonomous-technologies-70245>>
- [1] Roff, H. M., Danks, D., & Danks, J. H. (2015). Fight ISIS by thinking inside the bot. *Slate*. October 21, 2015. <http://www.slate.com/articles/technology/future_tense/2015/10/using_chatbots_to_distract_isis_recruiters_on_social_media.html>

Book reviews and technical reports:

- [R4] Danks, D. (in press). Review of *The mind in nature* (C. B. Martin). *The Review of Metaphysics*.
- [R3] Danks, D. (2014). Review of *Perception, causation, & objectivity* (J. Roessler, H. Lerman, & N. Eilan, Eds.). *Mind*, 123(490), 635-639.
- [R2] Danks, D. (2005). Review of *Natural-born cyborgs: Minds, technologies, and the future of human intelligence* (A. Clark). *Philosophical Psychology*, 18 (3), 383-387.
- [R1] Danks, D. (2002). Review of *Graphical models: Foundations of neural computation* (M. I. Jordan & T. J. Sejnowski, Eds.). *Pattern Analysis and Applications*, 5 (4), 401-402.
- [T7] Hyttinen, A., Plis, S., Järvisalo, M., Eberhardt, F., & Danks, D. (2016). Causal discovery from subsampled time series data by constraint optimization. arXiv:1602.07970.
- [T6] Davis, I., Kummerfeld, E., Danks, D., & Plis, S. (2015). Inferring observed structure for dynamic graphs with unobserved variables. Technical report CMU-PHIL-193. November 23, 2015.
- [T5] Kummerfeld, E., & Danks, D. (2010). Online causal structure learning. Technical report CMU-PHIL-189. December 9, 2010.
- [T4] Mayo-Wilson, C., Zollman, K., & Danks, D. (2010). Wisdom of the crowds vs. Groupthink: Learning in groups and in isolation. Technical report CMU-PHIL-188. November 30, 2010.
- [T3] Chu, T., Danks, D., & Glymour, C. (2005). Data-driven methods for nonlinear Granger causality: Climate teleconnection mechanisms. Technical report CMU-PHIL-171. June 7, 2005.
- [T2] Danks, D. (2004). Psychological theories of categorization as probabilistic models. Technical report CMU-PHIL-157. July 15, 2004.
- [T1] Danks, D. (2003). Learning integrated structure from distributed databases with overlapping variables. Technical report CMU-PHIL-149. October 28, 2003.

Professional Presentations

160 professional presentations to date (48 peer-reviewed; 112 invited); full list available upon request

Fellowships, Awards, and Grants

External:

<i>Cognizant Center of Excellence on Content Moderation</i>	2020-22
Cognizant Foundation	
\$750,000 (total costs); co-P.I. with K. Carley (CMU)	
<i>Center for Informed Democracy and Social Cybersecurity (IDeaS)</i>	2019-25
John S. & James L. Knight Foundation	
\$5,000,000 (total costs); co-P.I. with K. Carley (CMU) & D. Sicker (CMU)	
<i>Autonomy and Moral Attribution</i>	2019-21
Templeton World Charity Foundation	

\$234,000 (total costs); co-P.I. with T. Lombrozo (Princeton)	
<i>Misinformation Pipeline // Algorithmic Collusion</i>	2019-20
Accenture Labs gift	
\$100,000 (direct costs); sole P.I.	
<i>Triple Variable Index</i>	2019-20
Coulter Program, University of Pittsburgh	
\$100,000 (direct costs); co-P.I. with M. Schnetz, A. Mahajan, & M. Kaynar (UPMC)	
<i>Regulation of Defense and Security AI Technologies: Options Beyond Traditional Arms Control</i>	2018-19
CIFAR workshop grant	
\$80,000 CAD (direct costs); co-P.I. with K. Vignard (UNIDIR) & P. Meyer (Simon Fraser)	
<i>CONTEXTS - Causal modeling for Knowledge Transfer, Exploration, and Temporal Simulation</i>	2017-20
DARPA (subcontract to BAE Systems)	
\$548,918 (CMU total costs); sole CMU P.I.	
<i>Trust in an Age of Autonomous Technologies</i>	2017-19
Andrew Carnegie Fellowship	
\$200,000 (direct costs); sole P.I.	
<i>Peer & Panel Review of Interdisciplinary Grant Proposals & Research Projects</i>	2015-16
James S. McDonnell Foundation planning grant	
\$50,000 (direct costs); sole P.I.	
<i>Center for Causal Modeling and Discovery of Biomedical Knowledge from Big Data</i>	2014-19
National Institutes of Health	
\$1,682,229 (CMU theory group total costs); co-I. with C. Glymour & P. Spirtes	
<i>Learning Causal Structure from Complex Time Series Data</i>	2013-16
National Science Foundation	
\$217,497 (CMU total costs); co-P.I. with S. Plis (Mind Research Network)	
<i>Case Studies of Causal Discovery with Model Search</i>	2012-13
National Science Foundation	
\$45,000 (total costs); co-P.I. with R. Scheines	
<i>Integrating Causal Cognition, Concepts, and Decision-making</i>	2008-14
James S. McDonnell Foundation Scholar Award	
\$600,000 (direct costs); sole P.I.	
<i>Causal learning: Computational Learning Mechanisms and Cognitive Development</i>	2005-10
James S. McDonnell Foundation Collaborative Initiative	
\$2.25 million (direct costs); one of 12 core members (Lead: A. Gopnik)	
<i>The Bayesian Network Lens</i>	2002-03
James S. McDonnell Foundation grant	
\$49,615 (direct costs); sole P.I.	

Internal:

<i>An Integrated Framework for Studying and Regulating Human-AI Hybrid Decision-Making Systems</i>	2020-21
Block Center seed grant (\$60,000; co-PI with Zack Lipton & Sina Fazelpour)	
<i>Trustworthy Transfer Learning: Determining the Limits of AI Robustness (DLAR)</i>	2019-20
SEI LENS project (\$350,000; co-I with PI Robert Stoddard)	
<i>Explanations, Trust, and AI</i>	2018-20

Carnegie Bosch Institute Research Award (\$200,000; co-I with PI Tae Wan Kim)	
<i>Integrated Causal Model for Software Cost Prediction & Control (SCOPE)</i>	2017-20
SEI Line project (\$2,000,000; co-I with PI Michael Konrad)	
<i>Innovating Air Force Jet Engine System Reliability Test using Machine Learning Integrated with Causal Modeling</i>	2016-18
SEI Line project (\$2,000,000; co-I with PI Robert Stoddard)	
<i>Why Does Software Cost So Much? Towards a Causal Model</i>	2016-17
SEI LENS project (\$500,000; co-I with PI Robert Stoddard)	
Wimmer Faculty Fellowship (one of four)	2007
Travel grant from Berkman Faculty Development Fund to attend 2004 International Congress of Psychology (\$2,511)	2004
<i>Building Webs of Causal Knowledge</i> (CMU Falk fellowship)	2003-05
\$3,840 (direct costs) [sole P.I.]	
UCSD Philosophy Department Dissertation Fellowship	2000-01
UCSD Humanities Research Fellowship	1996-97

Professional Service

Internal to CMU:

Center for Informed Democracy and Social Cybersecurity (IDeaS)	Founding co-Director: 2019 -
Block Center for Technology & Society	Chief Ethicist: 2019 -
K&L Gates Endowment for Ethics & Computational Technologies	Co-chair: 2017 -
Center for the Future of Work (Heinz College)	Affiliate: 2017 -
Center for Ethics & Policy	Member: 2016 -
Institute for Strategic Analysis	Faculty advisory committee: 2014 -
Center for the Arts in Society	Advisory committee: 2014 -
Humanities Center	Advisory committee (<i>ex officio</i>): 2014 -
Laboratory for Empirical Approaches to Philosophy (LEAP)	Director: 2006 -
President's Task Force on Campus Climate	Co-chair: 2018-19
CMU Middle States reaccreditation process	Co-chair, Ethics & Integrity: 2016-18
BrainHub	Steering committee: 2015-18
Center for Machine Learning & Health	Executive advisory committee: 2014-16
Vice-Chair, University Education Committee	2010-11
Director of Graduate Studies, Philosophy Department [sabbatical in 2011-2012]	2009-14
Budget and Financial Affairs committee [sabbatical in 2011-2012]	2009-14
Institutional Review Board [sabbatical in 2011-2012]	Member: 2004-14 Chair: 2009-14
Summer School in Logic and Formal Epistemology	Instructor: 5 times Co-director: 2008-11
Faculty Senate	Senator from Philosophy: 2008-11 Member-at-large of Executive Committee: 2008-10
Director of Graduate Admissions, Philosophy Department	2006-09

External:

AI4People (EU)	Automotive expert committee: 2020 -
National Security Commission on Artificial Intelligence	SGE for Ethics LOE: 2019 -
Grefenstette Center for Ethics in Science, Tech., & Law (Duquesne)	Advisory Board: 2019 -
Fellowships at Auschwitz for the Study of Professional Ethics	Academic Committee: 2019 -
Hillman Photography Initiative	Creative Team member: 2019 -
Liftoff PGH 2020	Advisory Board: 2019 -
Free Machine (non-profit)	Advisory Board: 2019 -
Partnership to Advance Responsible Technology	Founding Board member: 2018 -
Salesforce Ethical & Responsible Use advisory council	External member: 2018 -
Glushko Dissertation Prize selection committee	2018 -
Philosophy of Cognitive Science, <i>Stanford Encyclopedia of Philosophy</i>	Co-editor: 2018 -
<i>Frontiers in Psychology</i> (Theoretical and Philosophical Psychology)	Associate editor: 2017 -
Center for Philosophy of Science (Pitt)	Advisory Board (<i>ex officio</i>): 2014 -
Understanding Human Cognition program, James S. McDonnell Foundation	Advisory Board: 2010 -
<i>Minds & Machines</i>	Editorial Board: 2010 -
IBM Watson AI XPRIZE competition	Lead/Presiding judge: 2017-20
“Belief revision in early childhood: Learning about learning in the lab and museum” (NSF-funded center)	Advisory Board: 2017-20
Expert roundtable on Technology, Safety, & Unintentional Risk	2016
UNIDIR program on the Weaponization of Increasingly Autonomous Technologies	
Summer Seminars in Neuroscience & Philosophy	Instructor: 2016
Varieties of Understanding program & conferences	Commentator-at-large: 2014-16
North American Summer School in Logic, Language, & Information	Instructor: 2014
Foundation for Innovative New Diagnostics	Consultant: 2012-16
Cognitive Science program review, Carleton University (Ottawa, Canada)	2010
<i>The Philosopher’s Annual</i>	Nominating Editor: 2008-18

Workshop & Symposium co-organization:

- Workshop, “Models of morality, Morality of models” (2020)
- Workshops, “Regulation of defense and security AI technologies: Options beyond traditional arms control” (2019/20 (two workshops); co-org)
- 2x CMU-K&L Gates Conferences on Ethics & Computational Technologies (2018, 2020; co-org)
- Workshop at DALI, “Causality: Dialogues between machine learning and psychology” (2017; co-org)
- Symposium at Philosophy of Science Association biennial meeting, “Bayesianism in cognitive science and neuroscience: An assessment” (2016; co-org)
- Workshop, “Peer review of interdisciplinary grant proposals” (2016; co-org)
- Symposium at International Association on Computing & Philosophy meeting, “Automated and autonomous conflicts: AI, ethics, and the conduct of hostilities” (2016; co-org)
- Workshop, “Case studies of causal discovery with model search” (2013; co-org)

Special Session at AI & Mathematics, “Causal Learning from Complex Data Structures” (2012)
Symposium at Eastern Psychological Association Annual Meeting, “Causal reasoning and decision-making” (2009)
Workshop for McDonnell Causal Learning Collaborative, “Problems of variable definition and selection” (2008)
Symposium at James S. McDonnell Foundation Annual Program Meeting, “Worth a thousand words? The ups and downs of using photos, film, and the outputs from imaging tools as primary data” (2007; organizer and moderator)
Workshop at NIPS, “Structured data and representations in probabilistic models for categorization” (2004; co-org)
Workshop, “Would the world look different if we viewed it through a Bayes Net lens” on behalf of the James S. McDonnell Foundation (2003)

Journal reviewing (multiple times for many):

American Philosophical Quarterly; Animal Behavior Cognition; Applied Artificial Intelligence; Australian & New Zealand Journal of Public Health; Behavioral & Brain Sciences; Behavioural Processes; British Journal for Philosophy of Science; Canadian Journal of Experimental Psychology; Cognition; Cognitive Psychology; Cognitive Science; Computers & Geosciences; Connection Science; Dialectica; Engaging Science, Technology, and Society; Episteme; Ergo; Erkenntnis; European Journal for Philosophy of Science; European Review of Philosophy; Int'l. Journal of Intelligent Systems; J. of Cognitive Psychology; J. of Educational and Behavioral Statistics; J. of Experimental Psychology: General; J. of Experimental Psychology: Learning, Memory, Cognition; J. of Machine Learning Research; J. of Mathematical Psychology; Memory & Cognition; Mind; Minds & Machines; Open Mind: Discoveries in Cognitive Science; Personality Neuroscience; Philosophia Mathematica; Philosophical Psychology; Philosophy Compass; Philosophy of Science; Proc. of the National Academy of Sciences (PNAS); Proc. of the Royal Society B; Psychological Bulletin; Psychological Reports; Psychological Review; Psychological Science; Psychonomic Bulletin and Review; Royal Society Open Science; Studies in History and Philosophy of Science; Synthese; Thinking & Reasoning; Topics in Cognitive Science (TopiCS); Transportation Research Interdisciplinary Perspectives; Trends in Cognitive Science

Grant proposal reviewing:

National Science Foundation (U.S.) [Programs: Cognitive Neuroscience // Decision Risk & Management Science // Linguistics // Perception, Action, & Cognition // Robust Intelligence // Science, Technology, & Society]
Economic & Social Research Council (UK)
European Research Council (multiple)
Netherlands Organisation for Scientific Research (NWO)
L'Agence Nationale de la Recherche (ANR) (multiple programs)
Swiss National Science Foundation
Varieties of Understanding research program (Templeton-funded)
University of Crete

Conference reviewing:

IJCAI (Senior Program Committee: 2021)
AAAI/ACM conference on AI, Ethics and Society (Program Committee: 2018-20)
Annual Conference of the Cognitive Science Society (2003-14; Program Committee: 2012-20)
NASSLLI (Program Committee: 2018)
IJCAI Special Track on AI & Autonomy (2017)

Society for Philosophy & Psychology Conference (2009-10, 2012, 2016, 2020)
 International Workshop on Artificial Intelligence and Cognition (Program Committee: 2013-16)
 European Philosophy of Science Association (Program Committee: 2014-15)
 “Models and Decisions” (6th Munich-Sydney-Tilburg conference, 2013; Program Committee)
 Neural Information Processing Systems (2005-10)
 Philosophy of Science Association Biannual Meeting (Program Committee: 2009-10)
 Conference on Uncertainty in Artificial Intelligence (2003; Program Committee: 2004-06)
 Conference on Computing and Philosophy (2005; 07)
 Pacific Symposium on Biocomputing (2004-05)
 AAAI National Conference on Artificial Intelligence (2004)

Teaching Experience

Carnegie Mellon University

Graduate seminars:

<i>Coherence</i>	[F-17]
<i>Computational Models of Cognition</i>	[F-09]
<i>Current Topics in Philosophy of Science</i>	[F-07]
<i>Ethics & Policy of AI</i>	[S-19]
<i>Graphical Models in Cognitive Science</i>	[S-06]
<i>Normativity in Cognitive Psychology</i>	[S-04]
<i>Philosophical Foundations (Core seminar)</i>	[11 times from S-08 to S-20]

Undergraduate courses:

<i>AI & Ethics</i>	[F-19 micro]
<i>AI, Society, & Humanity</i>	[F-18; F-19; F-20]
<i>Cyberspace & Philosophy (Freshman seminar)</i>	[S-17]
<i>Learning Media Principles</i>	[S-15; S-16; S-17; S-18]
<i>The Nature of Reason</i>	[F-04; F-08]
<i>Nietzsche</i>	[S-05; S-07; F-09; S-11; S-14; S-16; S-18]
<i>Philosophy and Psychology</i>	[S-04; S-06; S-07; F-08]
<i>Philosophy of Biology</i>	[S-05; S-08]
<i>Philosophy of Mind</i>	[F-03; F-04; F-05]
<i>Probability and Artificial Intelligence</i>	[F-07]
<i>Thinking about Thinking (Freshman seminar)</i>	[S-13]

Colorado College

<i>Philosophy of Biology</i>	[S-03]
<i>Philosophy of Mind</i>	[F-02]

Thesis Advising and Committee Participation

Primary Advisor

Alejandra Arciniegas (Ph.D., Logic, Computation, & Methodology, in progress; M.S., 2019)
 M.S. thesis: *Unification through division: A model of temporal perception informed by atypical states*
 Phuong Dinh (Ph.D., Psychology, in progress; joint with D. Rakison)
 James Michelson (Ph.D., Logic, Computation, & Methodology, in progress)
 Jack Parker (Ph.D., Logic, Computation, & Methodology, in progress)
 Dasha Pruss (Ph.D., History & Philosophy of Science (Pitt), in progress)

Dustin Updyke (M.S., Logic, Computation, & Methodology, in progress)

Isaac Davis (Ph.D., Logic, Computation, & Methodology, in progress; M.S., 2017; Ph.D., 2020)
 M.S. thesis: *Understanding the role of perception in language learning and language evolution*
 Ph.D. dissertation: *Learning a theory of mind*

Chike Robertson (U.S. Army War College Fellow, 2020)
 Research project: *A framework for the ethical use of artificial intelligence in the U.S. Army*

Amelia Smith (M.A., Philosophy, 2019)
 Thesis: *Educational values, education technology, and emancipation*

Yishan Zhou (Undergraduate honors thesis, Cognitive Science, 2019)
 Thesis: *Modeling responsibility attribution in a group*

Kendra Chilson (M.S., Logic, Computation, & Methodology, 2018; course-based)

Timothy Brooks (Undergraduate honors thesis, Logic & Computation, 2017)
 Thesis: *Joint demosaic and super-resolution using deep learning*

Daniel Malinsky (Ph.D., Logic, Comp., & Methodology, 2017; joint w/C. Glymour & P. Spirtes)
 Dissertation: *Data-driven causal modeling for policy*

Alexander Markham (M.S., Logic, Computation, & Methodology, 2017)
 Thesis: *A computational model of reward in visual perceptual learning*

Elizabeth Silver (Ph.D., Logic, Computation, & Methodology, 2017; joint with P. Spirtes)
 Dissertation: *Transfer learning for large causal graphical models, applied to genetic regulatory networks*

Joseph McCool (M.S., Logic, Computation, & Methodology, 2016; joint with T. Seidenfeld)
 Thesis: *The psychological structure of “outcomes”: Experienced utility as a multi-attribute function*

Patricia Rich (Ph.D., Logic, Computation, & Methodology, 2015; joint with K. Zollman)
 Dissertation: *Rationality in context: Practical guidance through a hybrid approach*

Sarah Wellen (Ph.D., Logic, Computation, & Methodology, 2015; M.S., 2011)
 M.S. thesis: *Local associative structure learning: An algorithmic model of human causal learning*
 Dissertation: *The influence of practical goals on learning: A theoretical and empirical study*

Adam Brodie (M.S., Logic, Computation, & Methodology, 2014)
 Thesis: *Identifying endogenous latent causal structure under linearity and sparsity assumptions*

Stephen Fancsali (Ph.D., Logic, Computation, & Methodology, 2013; joint with R. Scheines)
 M.S. thesis: *Cronbach’s Alpha, latent variables, and causal inference* (2008)
 Dissertation: *Constructing variables that support causal inference*

David Zornik (M.S., Logic, Computation, & Methodology, 2013; joint with M. Simons)
 Thesis: *Concept, definitions, and inheritance: Interpreting the atoms of lexical decomposition*

Conor Mayo-Wilson (Ph.D., Logic, Computation, & Methodology, 2012)
 Dissertation: *Combining causal theories and dividing scientific labor*

Erich Kummerfeld (M.S., Logic, Computation, & Methodology, 2011)
 Thesis: *Causal dynamism and causal epistemology: A tale of cars and fish*

David Rose (M.S., Logic, Computation, & Methodology, 2011)
 Thesis: *Against the standard view of actual causation*

Patrick Beukema (M.S., Logic, Computation, & Methodology, 2011)
 Thesis: *Causal inference with a recurrent neural network*

Jayna Bonfini (M.A., Philosophy, 2010)
 Thesis: *Bottomed out: Grounding activities in causal perception*

Daniel Malkiel (M.S., Logic, Computation, & Methodology, 2009)
 Thesis: *Bandit problems in professional sports*

Ari Klein (Undergraduate honors thesis, Philosophy, 2008)
 Thesis: *Locke and Nietzsche: God as the distinction between two epistemological perspectives*

William Nichols (M.S., Logic, Computation, & Methodology, 2007)
 Thesis: *Causal learning and decision making: An empirical approach*

Benjamin Jantzen (M.A., Philosophy, 2006)
 Thesis: *Biological codes: An explication via a formal extension of classical coding theory*

Kevin Jarrett (M.S., Logic & Computation, 2006)
 Thesis: *Fine-grained selection communication and the hippocampus*

Huichun Zhu (M.S., Logic & Computation, 2006)
 Thesis: *Effects of category application on category learning*

Joanna Tamburino (M.S., Logic & Computation, 2004)
 Thesis: *Emotional learning: How we implicitly learn to feel*

Committee member / Second reader

Mark Cheung (Ph.D., Electrical & Computer Engineering, in progress)

Mahi Hardalupas (Ph.D., History & Philosophy of Science (Pitt), in progress)

Mauricio González Soto (Ph.D., Computer Science, INAOE (Mexico), in progress)

Katie Creel (Ph.D., History & Philosophy of Science (Pitt), 2020)

Morgan Thompson (Ph.D., History & Philosophy of Science (Pitt), 2020)

Zina Ward (Ph.D., History & Philosophy of Science (Pitt), 2020)

Deon Benton (Ph.D., Psychology, 2019)

Cory Derringer (Ph.D., Psychology (Pitt), 2019)

Alec Walker (M.A., Philosophy, 2019)

Liam Bright (Ph.D., Logic, Computation, & Methodology, 2018)

Ruben Sanchez-Romero (Ph.D., Logic, Computation, & Methodology, 2018)

Mate Szabo (Ph.D., Logic, Computation, & Methodology, 2017)

Joseph McCaffrey (Ph.D., History & Philosophy of Science (Pitt), 2016)

Michael Dacey (Ph.D., Philosophy-Neuroscience-Psychology (Wash U.), 2015)

Erich Kummerfeld (Ph.D., Logic, Computation, & Methodology, 2015)

Alan Jern (Ph.D., Psychology, 2013)

Alex Davis (Ph.D., Social & Decision Sciences, 2012)

Ruth Poproski (Ph.D., Logic, Computation, & Methodology, 2012)

Jonah Schupbach (Ph.D., History & Philosophy of Science (Pitt), 2011)

Rob Tillman (Ph.D., Logic, Computation, & Methodology, 2011)

Karin Howe (M.S., Logic, Computation, & Methodology, 2010)

Nathan Lubchenco (M.S., Logic, Computation, & Methodology, 2010)

James Tremblay (M.S., Logic, Computation, & Methodology, 2010)

Francis Cartieri (Senior honors thesis, History & Philosophy of Science (Pitt), 2009)

Michael Freenor (M.S., Logic, Computation, & Methodology, 2009)

Conor Mayo-Wilson (M.S., Logic, Computation, & Methodology, 2009)

Arthur Tu (M.S., Logic, Computation, & Methodology, 2009)

Umit Guvenc (Ph.D., Engineering & Public Policy, 2005)

James Soto (M.S., Logic & Computation, 2005)