Daniel Fried

Contact Information
dfried@cs.cmu.edu
dpfried.github.io

Positions
Assistant Professor, Carnegie Mellon University 2022 – present
Language Technologies Institute, School of Computer Science
Research Scientist, Meta 2024 – present

Education
UC Berkeley 2015 – 2021
Ph.D. in Computer Science
Adviser: Dan Klein
Thesis: Learning Grounded Pragmatic Communication
University of Cambridge, Churchill College 2014 – 2015
M.Phil. in Computer Science, with distinction
Adviser: Stephen Clark
Thesis: Low Rank Tensor Approximations for Compositional Distributional Semantics
University of Arizona 2010 – 2014
B.S. in Computer Science, Mathematics, and Information Science, summa cum laude
Thesis Adviser: Mihai Surdeanu
Thesis: Predicting Community Traits Using the Language of Food on Social Media

Former Positions
Postdoc, University of Washington 2021 – 2022
Host: Luke Zettlemoyer
Visiting Researcher, Facebook AI Research 2021 – 2022
Host: Mike Lewis
Research Intern, Google DeepMind Summer 2019
Hosts: Aida Nematzadeh, Stephen Clark, Chris Dyer
Project: Structured models for language-conditioned video segmentation
Research Intern, Microsoft Research Summer 2016
Hosts: Hoifung Poon, Chris Quirk, Kristina Toutanova, Scott Wen-Tau Yih
Project: Learning to rank for personalized medicine
Undergraduate Research Assistant, University of Arizona 2012 – 2014
Advisers: Mihai Surdeanu, Stephen Kobourov, Paul R. Cohen
Areas: Question answering, language grounding, data visualization
Research Intern, Nara Institute of Science and Technology Fall 2013
Host: Kevin Duh
Project: Incorporating relational semantics in word embeddings
Research Intern, RWTH Aachen University Summer 2013
Hosts: Ali Jannesari, Zhen Li
Project: Supervised learning for automatic code parallelization
Engineering Intern, Microsoft Summer 2012
Project: Data warehousing, analytics, and visualization for Xbox Live

Honors & Awards
Okawa Research Award 2023
Google Ph.D. Fellowship in Natural Language Processing 2019 – 2021
Outstanding Graduate Student Instructor, UC Berkeley 2018
Outstanding Reviewer, ACL 2018, 2020, 2021, 2022
Outstanding Reviewer, NeurIPS 2019
Tencent AI Lab Fellowship 2018 – 2019
Huawei & Berkeley AI Fellowship 2017 – 2018
Best M.Phil. Student Award, Cambridge Computer Laboratory 2015
Churchill Scholarship 2014 – 2015
NDSEG Fellowship 2014
Finalist, Hertz Graduate Fellowship 2014
Outstanding Senior Award in Research, U. Arizona College of Science 2014
Outstanding Senior Award in Academics, U. Arizona Computer Science 2014
Outstanding Senior Award in Academics, U. Arizona Information Science 2014
Barry M. Goldwater Scholarship 2013
National Merit Scholar 2010 – 2014
Flinn Scholarship, Flinn Foundation of Arizona 2010 – 2014
Presidential Scholar, U.S. Department of Education 2010

**Journal Publications**

1. **StarCoder: May the Source Be With You!**
   Raymond Li et al. (68 authors from the BigCode Project)
   *Transactions on Machine Learning Research (TMLR)*, 2023

2. **Human-Level Play in the Game of Diplomacy by Combining Language Models with Strategic Reasoning**
   FAIR Diplomacy Team
   *Science*, 2022

3. **Syntactic Structure Distillation Pretraining for Bidirectional Encoders**
   Adhiguna Kuncoro*, Lingpeng Kong*, Daniel Fried*, Dani Yogatama, Laura Rimell, Chris Dyer, and Phil Blunsom
   *Transactions of the Association for Computational Linguistics (TACL)*, 2020

4. **Higher-Order Lexical Semantic Models for Non-Factoid Answer Reranking**
   Daniel Fried, Peter Jansen, Gustave Hahn-Powell, Mihai Surdeanu, and Peter Clark
   *Transactions of the Association for Computational Linguistics (TACL)*, 2015

**Conference Publications**

5. **Comparative Knowledge Distillation**
   Alex Tianyi Xu*, Alex Wilf*, Paul Pu Liang, Alexander Obolenskiy, Daniel Fried, and Louis-Philippe Morency
   *Winter Conference on Applications of Computer Vision (WACV)*, 2024

6. **ECCO: Can We Improve Model-Generated Code Efficiency Without Sacrificing Functional Correctness?**
   Siddhant Waghjale*, Vishruth Veerendranath*, Zora Zhiruo Wang, and Daniel Fried
   *Empirical Methods in Natural Language Processing (EMNLP)*, 2024

7. **What Are Tools Anyway? A Survey from the Language Model Perspective**
   Zora Zhiruo Wang, Zhoujun Cheng, Hao Zhu, Daniel Fried, and Graham Neubig
   *Conference on Language Modeling (COLM)*, 2024

8. **Human-Agent Cooperation in Games under Incomplete Information through Natural Language Communication**
   Shenghui Chen, Daniel Fried, and Ufuk Topcu
   *International Joint Conference on Artificial Intelligence (IJCAI)*, 2024

9. **Evaluating Large Language Model Biases in Person-Steered Generation**
   Andy Liu, Mona T. Diab, and Daniel Fried
   *Findings of ACL*, 2024

10. **Is the Pope Catholic? Yes, the Pope is Catholic. Generative Evaluation of Intent Resolution in LLMs**
    Akhila Yerukola, Saujas Vaduguru, Daniel Fried, and Maarten Sap
    *Annual Meeting of the Association for Computational Linguistics (ACL)*, 2024

11. **VisualWebArena: Evaluating Multimodal Agents on Realistic Visual Web Tasks**
    Jing Yu Koh, Robert Lo*, Lawrence Jang*, Vikram Duvvuru*, Ming Chong Lim*, Po-Yu Huang*, Graham Neubig, Shuyan Zhou, Ruslan Salakhutdinov, and Daniel Fried
    *Annual Meeting of the Association for Computational Linguistics (ACL)*, 2024
12. **TroVE: Inducing Verifiable and Efficient Toolboxes for Solving Programmatic Tasks**
   Zhiruo Wang, Graham Neubig, and Daniel Fried
   *International Conference on Machine Learning (ICML), 2024*

13. **Amortizing Pragmatic Program Synthesis with Rankings**
    Yewen Pu, Saujas Vaduguru, Priyan Vaithilingam, Elena Glassman, and Daniel Fried
    *International Conference on Machine Learning (ICML), 2024*

14. **Asking More Informative Questions for Grounded Retrieval**
    Sedrick Keh, Justin T. Chiu, and Daniel Fried
    *Findings of NAACL, 2024*

15. **Generating Pragmatic Examples to Train Neural Program Synthesizers**
    Saujas Vaduguru, Daniel Fried, and Yewen Pu
    *International Conference on Learning Representations (ICLR), 2024*

16. **Sotopia: Interactive Evaluation for Social Intelligence in Language Agents**
    Xuhui Zhou*, Hao Zhu*, Leena Mathur, Ruohong Zhang, Haofei Yu, Zhengyang Qi, Louis-Philippe Morency, Yonatan Bisk, Daniel Fried, Graham Neubig, and Maarten Sap
    *International Conference on Learning Representations (ICLR), 2024*

17. **WebArena: A Realistic Web Environment for Building Autonomous Agents**
    Shuyan Zhou*, Frank Xu*, Hao Zhu**, Xuhui Zhou**, Robert Lo**, Abhishek Sridhar**, Xianyi Cheng, Yonatan Bisk, Daniel Fried, Uri Alon, and Graham Neubig
    *International Conference on Learning Representations (ICLR), 2024*

18. **API-Assisted Code Generation for Question Answering on Varied Table Structures**
    Yihan Cao*, Shuyi Chen*, Ryan Liu*, Zhiruo Wang, and Daniel Fried
    *Empirical Methods in Natural Language Processing (EMNLP), 2023*

19. **Symbolic Planning and Code Generation for Grounded Dialogue**
    Justin Chiu, Wenting Zhao, Derek Chen, Saujas Vaduguru, Alexander Rush, and Daniel Fried
    *Empirical Methods in Natural Language Processing (EMNLP), 2023*

20. **Pragmatics in Language Grounding: Phenomena, Tasks, and Modeling Approaches**
    Daniel Fried*, Nicholas Tomlin*, Jennifer Hu, Roma Patel, and Aida Nematzadeh
    *Findings of EMNLP, 2023*

21. **Execution-Based Evaluation for Open-Domain Code Generation**
    Zhiruo Wang, Shuyan Zhou, Daniel Fried, and Graham Neubig
    *Findings of EMNLP, 2023*

22. **Data Augmentation for Code Translation with Comparable Corpora and Multiple References**
    Yiqing Xie, Atharva Naik, Daniel Fried, Carolyn Rose
    *Findings of EMNLP, 2023*

23. **AutoReply: Detecting Nonsense in Dialogue Introspectively with Discriminative Replies**
    Weiyan Shi, Emily Dinan, Adi Renduchintala, Daniel Fried, Athul Paul Jacob, Zhou Yu, and Mike Lewis
    *Findings of EMNLP, 2023*

24. **Generating Images with Multimodal Language Models**
    Jing Yu Koh, Daniel Fried, and Ruslan Salakhutdinov
    *Neural Information Processing Systems (NeurIPS), 2023*

25. **Pragmatic Inference with a CLIP Listener for Contrastive Captioning**
    Jiefu Ou, Benno Krojer, and Daniel Fried
    *Findings of ACL, 2023*

26. **Contrastive Decoding: Open-ended Text Generation as Optimization**
    Xiang Lisa Li, Ari Holtzman, Daniel Fried, Percy Liang, Jason Eisner, Tatsunori Hashimoto, Luke Zettlemoyer, and Mike Lewis
    *Annual Meeting of the Association for Computational Linguistics (ACL), 2023*

27. **Grounding Language Models to Images for Multimodal Inputs and Outputs**
    Jing Yu Koh, Ruslan Salakhutdinov, and Daniel Fried
    *International Conference on Machine Learning (ICML), 2023*
28. **Coder Reviewer Reranking for Code Generation**  
   Tianyi Zhang, Tao Yu, Tatsunori B. Hashimoto, Mike Lewis, Wen-tau Yih, Daniel Fried, and Sida I. Wang  
   *International Conference on Machine Learning (ICML)*, 2023

29. **DS-1000: A Natural and Reliable Benchmark for Data Science Code Generation**  
   Yuhang Lai*, Chengxi Li*, Yiming Wang*, Tianyi Zhang*, Ruiqi Zhong*, Luke Zettlemoyer, Scott Wen-tau Yih, Daniel Fried, Sida I. Wang, and Tao Yu  
   *International Conference on Machine Learning (ICML)*, 2023

30. **InCoder: A Generative Model for Code Infilling and Synthesis**  
   Daniel Fried*, Armen Aghajanyan*, Jessy Lin, Sida I. Wang, Eric Wallace, Freda Shi, Ruiqi Zhong, Wen-tau Yih, Luke Zettlemoyer, and Mike Lewis  
   *International Conference on Learning Representations (ICLR)*, 2023

31. **Natural Language to Code Translation with Execution**  
   Freda Shi, Daniel Fried, Marjan Ghazvininejad, Luke Zettlemoyer, and Sida I. Wang  
   *Empirical Methods in Natural Language Processing (EMNLP)*, 2022

32. **Neural Theory-of-Mind? On the Limits of Social Intelligence in Large LMs**  
   Maarten Sap, Ronan Le Bras, Daniel Fried, and Yejin Choi  
   *Empirical Methods in Natural Language Processing (EMNLP)*, 2022

33. **G3: Geolocation via Guidebook Grounding**  
   Grace Luo*, Giscard Biamby*, Trevor Darrell, Daniel Fried, and Anna Rohrbach  
   *Findings of EMNLP*, 2022

34. **Inferring Rewards from Language in Context**  
   Jessy Lin, Daniel Fried, Dan Klein, and Anca Dragan  
   *Annual Meeting of the Association for Computational Linguistics (ACL)*, 2022

35. **Reference-Centric Models for Grounded Collaborative Dialogue**  
   Daniel Fried, Justin Chiu, and Dan Klein  
   *Empirical Methods in Natural Language Processing (EMNLP)*, 2021

36. **Modular Networks for Compositional Instruction Following**  
   Rodolfo Corona, Daniel Fried, Coline Devin, Dan Klein, and Trevor Darrell  
   *North American Chapter of the Association for Computational Linguistics (NAACL)*, 2021

37. **Learning to Segment Actions from Observation and Narration**  
   Daniel Fried, Jean-Baptiste Alayrac, Phil Blunsom, Chris Dyer, Stephen Clark, Aida Nematzadeh  
   *Annual Meeting of the Association for Computational Linguistics (ACL)*, 2020

38. **Cross-Domain Generalization of Neural Constituency Parsers**  
   Daniel Fried*, Nikita Kitaev*, and Dan Klein  
   *Annual Meeting of the Association for Computational Linguistics (ACL)*, 2019

39. **Are You Looking? Grounding to Multiple Modalities in Vision-and-Language Navigation**  
   Ronghang Hu, Daniel Fried, Anna Rohrbach, Dan Klein, Trevor Darrell, and Kate Saenko  
   *Annual Meeting of the Association for Computational Linguistics (ACL)*, 2019

40. **Pragmatically Informative Text Generation**  
   Sheng Shen, Daniel Fried, Jacob Andreas, and Dan Klein  
   *North American Chapter of the Association for Computational Linguistics (NAACL)*, 2019

41. **Speaker-Follower Models for Vision-and-Language Navigation**  
   Daniel Fried*, Ronghang Hu*, Volkan Cirik*, Anna Rohrbach, Jacob Andreas, Louis-Philippe Morency, Taylor Berg-Kirkpatrick, Kate Saenko, Dan Klein**, and Trevor Darrell**  
   *Neural Information Processing Systems (NeurIPS)*, 2018

42. **Policy Gradient as a Proxy for Dynamic Oracles in Constituency Parsing**  
   Daniel Fried and Dan Klein  
   *Annual Meeting of the Association for Computational Linguistics (ACL)*, 2018

43. **Unified Pragmatic Models for Generating and Following Instructions**  
   Daniel Fried, Jacob Andreas, and Dan Klein  
   *North American Chapter of the Association for Computational Linguistics (NAACL)*, 2018
44. Effective Inference for Generative Neural Parsing
   Mitchell Stern, Daniel Fried, and Dan Klein
   Empirical Methods in Natural Language Processing (EMNLP), 2017

45. Improving Neural Parsing by Disentangling Model Combination and Reranking Effects
   Daniel Fried*, Mitchell Stern*, and Dan Klein
   Annual Meeting of the Association for Computational Linguistics (ACL), 2017

46. Towards Using Social Media to Identify Individuals at Risk for Preventable Chronic Illness
   Dane Bell, Daniel Fried, Luwen Huangfu, Mihai Surdeanu, and Stephen Kobourov
   Language Resources and Evaluation Conference (LREC), 2016

47. Low-Rank Tensors for Verbs in Compositional Distributional Semantics
   Daniel Fried, Tamara Polajnar, and Stephen Clark
   Annual Meeting of the Association for Computational Linguistics (ACL), 2015

48. Analyzing the Language of Food on Social Media
   Daniel Fried, Mihai Surdeanu, Stephen Kobourov, Melanie Hingle, and Dane Bell
   International Conference on Big Data, 2014

49. Maps of Computer Science
   Daniel Fried and Stephen Kobourov
   Pacific Visualization Symposium (PacificVis), 2014

50. Predicting Parallelization of Sequential Programs Using Supervised Learning
   Daniel Fried, Zhen Li, Ali Jannesari, and Felix Wolf
   International Conference on Machine Learning and Applications, 2013

51. A Generative Probabilistic Framework for Learning Spatial Language
   Colin Dawson, Jeremy Wright, Antons Rebguns, Marco Valenzuela Escarcega, Daniel Fried, and Paul Cohen
   International Conference on Development and Learning, 2013. Best Paper Award

52. Bayesian Geometric Modeling of Indoor Scenes
   Luca Del Pero, Joshua Bowdish, Daniel Fried, Bonnie Kermsgard, Emily Hartley, and Kobus Barnard
   Conference on Computer Vision and Pattern Recognition (CVPR), 2012

**Workshop Publications**

53. SantaCoder: Don’t Reach for the Stars
   Loubna Ben Allal*, Raymond Li*, Denis Kocetkov*, et al. (41 authors from the BigCode Project)
   Deep Learning for Code Workshop, 2023. Best Paper Award

54. Modeling Perspective-Dependent Ambiguity in Grounded Collaborative Dialogue
   Justin Chiu, Wenting Zhao, Alexander M. Rush, and Daniel Fried
   Wordplay: When Language Meets Games Workshop, 2022

55. Interactive Assignments for Teaching Structured Neural NLP
   David Gaddy, Daniel Fried, Nikita Kitaev, Mitchell Stern, Rodolfo Corona, John DeNero, and Dan Klein
   Teaching NLP Workshop at NAACL, 2021

56. Challenges for Using Social Media for Early Detection of Type II Diabetes Mellitus
   Dane Bell, Daniel Fried, Luwen Huangfu, Mihai Surdeanu, and Stephen Kobourov
   International Workshop on Social Media World Sensors, 2016

57. Learning Low-Rank Tensors for Transitive Verbs
   Daniel Fried, Tamara Polajnar, and Stephen Clark
   Advances in Distributional Semantics Workshop, 2015

58. Incorporating both Distributional and Relational Semantics in Word Representations
   Daniel Fried and Kevin Duh
   International Conference on Learning Representations (ICLR) Workshop, 2015

**Preprints**

59. CodeBenchGen: Creating Scalable Execution-based Code Generation Benchmarks
   Yiqing Xie, Alex Xie, Divyanshu Sheth, Pengfei Liu, Daniel Fried, and Carolyn Rose
   arXiv, 2024
60. **Repetition Improves Language Model Embeddings**  
   Jacob Mitchell Springer, Suhas Kotha, Daniel Fried, Graham Neubig, and Aditi Raghunathan  
   *arXiv*, 2024

61. **BigCodeBench: Benchmarking Code Generation with Diverse Function Calls and Complex Instructions**  
   Terry Yue Zhuo et al. (33 authors from the BigCode project)  
   *arXiv*, 2024

62. **CodeRAG-Bench: Can Retrieval Augment Code Generation?**  
   Zora Zhiruo Wang*, Akari Asai*, Xinyan Velocity Yu, Frank F. Xu, Yiqing Xie, Graham Neubig, and Daniel Fried  
   *arXiv*, 2024

63. **Dissecting Adversarial Robustness of Multimodal LM Agents**  
   Chen Henry Wu, Rishi Shah, Jing Yu Koh, Ruslan Salakhutdinov, Daniel Fried, and Aditi Raghunathan  
   *arXiv*, 2024

64. **Tree Search for Language Model Agents**  
   Jing Yu Koh, Stephen McAleer, Daniel Fried, and Ruslan Salakhutdinov  
   *arXiv*, 2024

65. **Agent Workflow Memory**  
   Zora Zhiruo Wang, Jiayuan Mao, Daniel Fried, and Graham Neubig  
   *arXiv*, 2024

66. **Human-Aligned Chess with a Bit of Search**  
   Yiming Zhang, Athul Paul Jacob, Vivian Lai, Daniel Fried, and Daphne Ippolito  
   *arXiv*, 2024

67. **CRScore: Grounding Automated Evaluation of Code Review Comments in Code Claims and Smells**  
   Atharva Naik, Marcus Alenius, Daniel Fried, and Carolyn Rose  
   *arXiv*, 2024

68. **Improving Model Factuality with Fine-grained Critique-based Evaluator**  
   Yiqing Xie, Wenxuan Zhou, Pradhyot Prakhar, Di Jin, Yuning Mao, Quintin Fettes, Arya Talebzadeh, Sinong Wang, Han Fang, Carolyn Rose, Daniel Fried, and Hejia Zhang  
   *arXiv*, 2024

69. **AutoPresent: Designing Structured Visuals from Scratch**  
   Jiaxin Ge*, Zora Zhiruo Wang*, Xuhui Zhou, Yi-Hao Peng, Sanjay Subramanian, Qinyue Tan, Maarten Sap, Alane Suhr**, Daniel Fried**, Graham Neubig**, and Trevor Darrell**  
   *arXiv*, 2025

*bold*: equal contribution

**STUDENTS**

PhD thesis advisor:  
- Jing Yu (JY) Koh (with Ruslan Salakhutdinov)  
- Andy Liu (with Mona Diab)  
- Saujas Vaduguru  
- Zhiruo (Zora) Wang (with Graham Neubig)

MLT thesis advisor:  
- Alex Xie (with Matt Gormley and Vincent Hellendoorn)

PhD committee member:  
- Shuyan Zhou  
- Aman Madaan  
- Ta-Chung Chi
- Nikitha Rao
- Frank Xu
- Ritam Dutt
- Ruohong Zhang
- So Yeon (Tiffany) Min
- Anthony Sicilia (Northeastern)
- Xing Han Lu (Mila/McGill)
- Kush Jain
- Brendon Boldt
- Sanjay Subramanian (UC Berkeley)

**TEACHING**

*Instructor: 11-891, Neural Code Generation*, CMU, Spring 2024  
*Instructor: 11-877, Advanced Multimodal Machine Learning*, CMU, Spring 2024  
*Instructor: 11-711, Advanced NLP*, CMU, Fall 2023  
*Instructor: 11-777, Multimodal Machine Learning*, CMU, 2023 – present  
*Instructor: CS188, Artificial Intelligence*, UC Berkeley, Summer 2018  
*Teaching Assistant: CS188, Artificial Intelligence*, UC Berkeley, Fall 2017  
*Teaching Assistant: CS245, Intro to Discrete Structures*, University of Arizona, Spring 2012  
*Teaching Assistant: ISTA100, Great Ideas of the Information Age*, University of Arizona, Fall 2011  
*Project Design: CS288, Natural Language Processing*, UC Berkeley, Spring 2020

**INVITED TALKS**

*Planning and Inferring with LLMs for Grounded, Interactive Tasks*. Forum for Artificial Intelligence, UT Austin. Fall 2024  
*Benchmarks and Tree Search for Multimodal LLM Agents*. SpLU-RoboNLP Workshop, ACL 2024. Summer 2024  
*Interacting with LLMs for Grounded Tasks*. NILLI Workshop, EMNLP 2023. Spring 2023  
*Interacting with (code) LLMs*. MIT Neurosymbolic Reading Group. Spring 2023  
*InCoder, SantaCoder, and StarCoder: Findings from Training Open-Source Code LLMs*. Bloomberg AI; GitHub Next. Spring 2023  
*Using Language Strategically in Context*. CoRL Workshop on Strategic Multi-Agent Interactions, 2022; Johns Hopkins University, University of Pennsylvania, UT Austin. Spring 2023  
*Contextual Communication in Programming*. LTI Future of Code Generation Seminar, 2022  
*Reasoning About Actions and Rewards in Language Interactions*. MIT CPL, 2022. (with Jessy Lin)  
*Modularity in Grounded Interaction*. ViGIL Workshop, NAACL 2021. (with Rudy Corona)  
*Learning Grounded Pragmatic Communication*. University of Arizona, TTI-Chicago, University of Southern California, Purdue, Carnegie Mellon University, UC Irvine, Université de Montréal/Mila, Allen Institute for Artificial Intelligence, Facebook AI Research, Google Research, Stanford Cognition and Language Workshop. Spring 2021  
*Pragmatic Models for Generating and Following Grounded Instructions*. Stanford NLP Seminar, University of Arizona, USC ISI. Fall 2018–Spring 2019
Workshop co-organizer: Workshop on Large Language Models for Agents, ICLR 2024
Workshop co-organizer: 3rd UnImplicit Workshop, EACL 2024
Workshop co-organizer: 2nd UnImplicit Workshop, NAACL 2022
Workshop co-organizer: 2nd Advances in Language and Vision Workshop, NAACL 2021
Workshop advisory board: Theory of Mind in Communicating Agents, ICML 2023
Outstanding reviewer awards: ACL 2018, NeurIPS 2019, ACL 2020, ACL 2021, ACL 2022
Senior area chair: ACL 2024
Area chair: EMNLP 2022–2024, ACL 2023
Ethics chair: NAACL 2024
Reviewing: TACL 2022–2024; ACL Rolling Review 2021–2023; ACL 2018–2022; EMNLP 2016–2021; NAACL 2019, 2021; AACL-IJCNLP 2020; EACL 2017, 2021; NeurIPS 2019–2023; ICML 2019, 2023; ICLR 2021–2023; AKBC 2021; COLING 2018; *SEM 2016–2018; NAACL-SRW 2016, 2018; ACL-SRW 2020; IJCAI 2016; SpLU-RoboNLP 2019, 2021; NeuralGen 2019; ViGIL 2019, 2021; DeepLo 2019; ALVR 2020, 2021; LaReL 2020; Cooperative AI 2021; Meaning in Context 2021