

# YANG XU

Curriculum Vitae

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Department of Computer Science  
College of Sciences  
San Diego State University

## RESEARCH INTERESTS

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Dr. Yang Xu's research interest lies in the intersection of natural language processing, machine learning, psycholinguistics, and cognitive sciences. He has worked extensively on developing multi-modal machine learning models for human language, developing computational methods for the short-term adaptation in dialogue, designing human-centered interaction systems, and studying long-term change in language. The research questions that CLCS lab looks into include: how people adjust their language to reach better coordination in dialogue and to maintain efficient communication, how do certain linguistic constructions correspond to the cognitive constraints of human mind, how the vector space representations of word semantics evolve historically etc. Dr. Yang Xu is also actively involved in using theories, findings, and inspirations from the cognitive sciences perspectives to improve the design of artificial intelligence (AI) systems.

## PROFESSIONAL EXPERIENCE

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<i>Assistant Professor of Computer Science</i> Department of Computer Science, San Diego State University	Aug 2018 – Present
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## EDUCATION

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<i>Ph.D in Information Sciences and Technology</i> The Pennsylvania State University, USA	Aug 2013 – May 2018
<i>Master of Art</i> Department of Psychology, Tsinghua University, China	Sep 2010 – July 2013
<i>Bachelor of Engineering</i> Department of Electronic Engineering, Tsinghua University, China	Sep 2006 – July 2010

## RESEARCH GRANTS

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PI, NSF-CRII-HCC (**awarded**), \$166K, 2021 – 2023  
Modeling Computer-Mediated Task-Oriented Dialogues with Multi-Modality Information Theoretic Approaches  
Award ID: 2105192

Co-PI, NIH (subaward to SDSU HealthLink) (**awarded**), \$50K, 2021 – 2022  
An NLP Approach to Analyze the Past and Present, and Inform the Future of Health Disparities Research

Co-PI, NSF-SCH, \$1.4M (pending), 2021  
Examine Your Eye: Smart Translation of Erythrocyte moving pattern for iLLness prediction (EYES TELL)

PI, NSF-RETTL, \$800K (unfunded), 2021  
Enabling Interactive Online Education based on Multimodal Analysis and Multi-Modality Machine

PI, NSF-CRII, \$200K (unfunded), 2019

Towards Explainable Word Embeddings: A Historical Language Change Perspective

Co-PI, DoE, \$1.5M (unfunded), 2019

Machine Learning Enhanced Automatic and Rapid Design of Electric Power Converters

PI, NSF-IIS, \$500K (unfunded), 2018

Computational Studies of Long-term Language Change by Fine-tuning Word Embedding Models

## PUBLICATIONS

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### In submission

Bruce I. Gaynes, Mark B. Shapiro, Jie Xu, Abel Saju Augustine, **Yang Xu**, Yang Lin, Parisa Mirbod, Robert Dieter, Yang Cheng, Mengren Wu, Harish Venkataraman, Yuan Gao, and Plamen Petrov. Hierarchical data visualization of experimental erythrocyte aggregation employing cross correlation and optical flow applications. 2022. (In submission)

**Yang Xu**, Riya Bhatia, and Yang Cheng. Speaking rationally by gestures: Information theoretic insights from multi-modal language models. 2022. (In submission)

**Yang Xu**, Jeremy Cole, and David Reitter. Linguistic alignment affected more by low-level linguistic features rather than social power. 2022. (In submission)

### Published

1. **Yang Xu**. Global divergence and local convergence of utterance semantic representations in dialogue. In *Proceedings of the Society for Computation in Linguistics*, volume 4, pages 116–124. 2021
2. **Yang Xu** and Zheng-sheng Zhang. Historical changes in semantic weights of sub-word units. In Adam Jatowt, Nina Tahmasebi, Yang Xu, and Lars Borin, editors, *Computational Approaches to Semantic Change*, pages 169–187. Language Science Press, 2021
3. M Alex Kelly, **Yang Xu**, Jesús Calvillo, and David Reitter. Which sentence embeddings and which layers encode syntactic structure? In *Proceedings of the 42nd Annual Meeting of the Cognitive Science Society*, pages 2375–2381, 2020
4. **Yang Xu**, Jiasheng Zhang, and David Reitter. Treat the word as a whole or look inside? subword embeddings model language change and typology. In *Proceedings of the 1st International Workshop on Computational Approaches to Historical Language Change*, pages 136–145, Florence, Italy, 2019. Association for Computational Linguistics
5. **Yang Xu**, Jeremy Cole, and David Reitter. Linguistic alignment is affected more by lexical surprisal rather than social power. *Proceedings of the Society for Computation in Linguistics*, 2(1):349–352, 2019
6. **Yang Xu**, Jeremy Cole, and David Reitter. Not that much power: Linguistic alignment is influenced more by low-level linguistic features rather than social power. In *Proceedings of the 56th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*, volume 1, pages 601–610, 2018
7. **Yang Xu** and David Reitter. Information density converges in dialogue: Towards an information-theoretic model. *Cognition*, 170:147–163, 2018

8. **Yang Xu** and David Reitter. Spectral analysis of information density in dialogue predicts collaborative task performance. In *Proceedings of the 55th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*, pages 623–633, Vancouver, Canada, 2017
9. **Yang Xu** and David Reitter. Entropy converges between dialogue participants: Explanations from an information-theoretic perspective. In *Proceedings of the 54th Annual Meeting of the Association for Computational Linguistics (Volume 1: Long Papers)*, pages 537–546, Berlin, Germany, August 2016. Association for Computational Linguistics
10. **Yang Xu** and David Reitter. Convergence of syntactic complexity in conversation. In *Proceedings of the 54th Annual Meeting of the Association for Computational Linguistics (Volume 2: Short Papers)*, pages 443–448, Berlin, Germany, August 2016. Association for Computational Linguistics
11. **Yang Xu** and David Reitter. An evaluation and comparison of linguistic alignment measures. In *Proceedings of Cognitive Modeling and Computational Linguistics (CMCL)*, pages 58–67, Denver, CO, 2015. Association for Computational Linguistics
12. Alexander G. Ororbia II, **Yang Xu**, Vito D’Orazio, and David Reitter. Error-correction and aggregation in crowd-sourcing of geopolitical incident information. In N. Agarwal et al., editor, *Social Computing, Behavioral Modeling and Prediction*, volume 9021 of *Lecture Notes in Computer Science*, pages 381–387. Springer, 2015
13. David Reitter, **Yang Xu**, Patrick Craven, Anik Sndor, R. Chris Garrett, E. Vince Cross, and Jerry L. Franke. Cognitive models predicting surprise in robot operators. In *Proc. International Conference on Cognitive Modeling*, pages 190–191, Groningen, Netherlands, 2015
14. **Yang Xu** and Hong Li. Influence of visibility range and degree of urgency on efficiency of evacuation: Mediating effect of herding behavior. *Studies of Psychology and Behavior*, 13(3):311–319, 2015. (Published in Chinese)
15. Hong Li, **Yang Xu**, Shi Chen, and Anqi Gao. Effects of intuition and analysis on the adoption of sources of information in escape decision-making. *Studies of Psychology and Behavior*, 10(6):452–458, 2012. (Published in Chinese)

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## CONFERENCE PRESENTATIONS

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### INVITED TALKS

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Westlake University, China	Nov 2019
<i>Host:</i> NLP Group of Dr. Yue Zhang	<i>Title:</i> Dialogue from an Information-Theoretic Perspective
Shanghai Jiao-Tong University, China	Nov 2019
<i>Host:</i> College of Engineering	<i>Title:</i> Efficient Communication in Dialogue
Tsinghua University, China	Nov 2019
<i>Host:</i> Dept. of Psychology	<i>Title:</i> An Information Theoretic Psycholinguistic Model of Dialogue
San Diego State University	Oct 2019
<i>Host:</i> Dept. of Math and Stats	<i>Title:</i> Statistical Methods Used in Natural Language Processing
San Diego State University	Oct 2019
<i>Host:</i> SDSU A.I. Seminar	<i>Title:</i> Recent Advances in Natural Language Processing
San Diego State University	Feb 2018
<i>Host:</i> Dept. of CS	<i>Title:</i> Computational Understanding of Dialogue and Language

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## HONOR AND AWARDS

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Award for Research Excellence	Penn State, College of Information Sciences and Technology, 2018
Outstanding Graduates Award	Tsinghua University, 2013
Distinguished Master Thesis Award	Tsinghua University, 2013
Fellowship of Excellence in College Entrance Exam	Changxing, Zhejiang, 2006

## PROFESSIONAL SERVICES

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Reviewer for ACL 2020	2020
Reviewer for CONLL 2019	2019
Reviewer for ACL 2019	2019
Reviewer for CogSci 2019	2019
Reviewer for CogSci 2018	2018

## COURSES TAUGHT

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<i>CS560 Algorithms and Their Analysis</i>	Spring 2020/2019
<i>CS596 Machine Learning</i>	Fall 2019/2018