

# Approaching Unknown Communication Systems With Unsupervised Deep Neural Networks Trained on Speech

March 31<sup>st</sup> (Thursday): 4-5pm ET

## Prof. Gašper Beguš



How do we approach a communication system in which the unknown is not only what is meaningful, but also how to test what is meaningful? I will use unsupervised generative modeling of speech as a testing ground for identifying ways to decipher the communication system of sperm whales. More specifically, I propose an extension of the GAN neural network architecture in which learning of meaningful linguistic units emerges from raw unsupervised speech data only from a requirement that the networks output informative data. I argue that symbol-like rule-like computation can emerge in such fully connectionist and unsupervised models and propose techniques to test a causal relationship between meaningful units in the output and in the networks' internal representations. Such modeling has the potential to provide insights about meaningful units not only in speech, but also in other forms of communication for which no ground truth exists.

[Gašper Beguš](#) an Assistant Professor at the Department of Linguistics at UC Berkeley where he directs the [Berkeley Speech and Computation Lab](#). Before coming to Berkeley, he was an Assistant Professor at the University of Washington and before that he graduated with a Ph.D. from Harvard. His research focuses on developing deep learning models for speech data. More specifically, he trains models to learn representations of spoken words from raw audio inputs. He combines machine learning and statistical modeling with neuroimaging and behavioral experiments to better understand how neural networks learn internal representations in speech and how humans learn to speak.

Hosted by the [Soft Math Lab](#).

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