Insights into speech production from ASR

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Speech is a primary means of human communication.

Exemplar of human motor coordination.

The variability problem.

Message

Comprehension
Goal – Oriented Speech Motor Control

Movement Goals:
Goal – Oriented Speech Motor Control

Auditory-Perceptual (Acoustic) Goals:
Goal – Oriented Speech Motor Control

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Message Comprehension:

The amount of acoustic signal information depends on non-signal information available to listener.

*Information* \(\rightarrow\) formant contrast

Identification of an intended utterance, sound to the exclusion of other utterances, sounds.

*Non-signal information* \(\rightarrow\) context
Goal – Oriented Speech Motor Control

A Comprehension Account:
Speech production as decision-making to derive sufficient contrast

• Prior Knowledge $\rightarrow$ Language Model (ASR)
  • Utterance, sound predictability as a likelihood function

• Cost $\rightarrow$ movement effort

• Reward $\rightarrow$ accurate comprehension by listener