

A Look around at What Lies Ahead: Prediction and Predictability in Language Processing

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Multisensory Predictive Learning

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Quiz

- ◆ **What is the most compelling theoretical reason for the brain to compute predictabilities in the context of language?**

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A: Disambiguation.

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Introduction

- ◆ Traditionally, prediction has been considered an **inefficient** and cognitively **expensive** processing mechanism in domain of **language comprehension**.

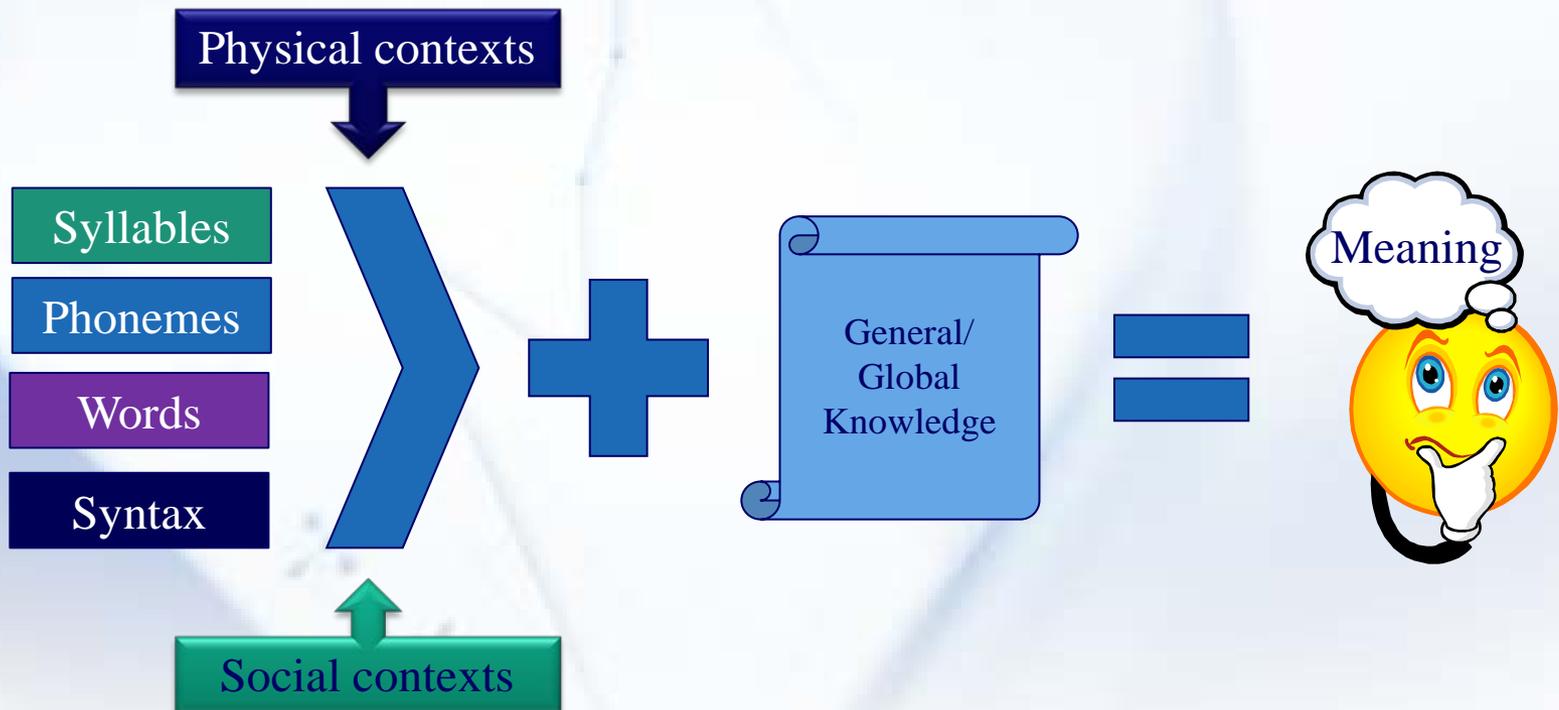


Introduction

- ◆ Traditionally, prediction has been considered an inefficient and cognitively expensive processing mechanism in domain of language comprehension.
- ◆ However, does not seem untenable given its similarity to other neural processing domains.

Potential benefits of linguistic prediction

- ◆ Linguistic comprehension requires processing a noisy sensory input to recognize processing a noisy sensory input to recognize complex structures.



This whole process occurs over mere hundreds of milliseconds

Potential benefits of linguistic prediction

- ◆ **Given the time constraints under which comprehension operates, one clear benefit of being able to predict upcoming material is that it may allow a listener or reader to produce an overt response more quickly. (Marslen-Wilson-1973)**

Using predictions about upcoming speech to achieve faster response latencies.

Potential benefits of linguistic prediction

- ◆ **Garden path sentence:**
grammatically correct sentence that starts in such a way that the readers' most likely interpretation will be incorrect.

Sentence	Initial likely partial parse	Final parse
The old man the boat .	The man, who is old . ..	The boat is manned by the old.
The man whistling tunes pianos.	The man who is whistling melodies...	The whistling man tunes pianos.
The cotton clothing is made of grows in Mississippi.	The clothing, which is made of cotton, is made of...	The cotton that clothing is made of grows in Mississippi.

Potential benefits of linguistic prediction

- ◆ **Just as comprehenders might resolve temporary ambiguities by predicting upcoming input.**
 - Predicting the speaker's intent.
- ◆ **By forming explicit predictions of upcoming material, the parser may not only ease the processing of current material.**

Anticipatory Language Processing

Eberhard et al. (1995)



Pick up the
candle!



Effects of predictability

- ◆ **Prediction:** unseen input in some way alters current processing.
- ◆ **Predictability:** How well it could have been predicted from context.
- ◆ **Smith & Levy (2008)** demonstrate predictability effects on reading time at arbitrary points in naturalistic text.

◆ **When conflicts emerge between incompatible sentential representations**

-> **reanalysis is initiated to check whether the conflict is due to processing error.**

Conclusion

- ◆ Offered evidence:
for implicit, **probabilistic anticipatory language processing**.
- ◆ Prediction in language processing fits nicely with models of predicting upcoming language input based.
- ◆ **“Look ahead”** to continued exploration of prediction issues.

Conclusion

- ◆ Investigations of how predictive linguistic processing might better be understood in terms of how the brain more generally predicts.
- ◆ Anticipatory processing should no longer be considered a lingering question in the literature.



Thank you!

