Linguistic expressions encode literal meanings:
FORM-MEANING MAPPING

Utterances used in context can have augmented meanings:
A: Don’t ___!

Verb phrase ellipsis: Expression is inherently incomplete!
A: *Don’t ___!*  

Verb phrase ellipsis: Expression is inherently incomplete!

**Today:** How do we interpret verb phrase ellipsis?  

**More broadly:** How do we recruit linguistic and contextual information to interpret context-sensitive expressions?
B: I’m going to move this candle.
A: Don’t ___!

Observation 1:
A prior linguistic antecedent is sufficient for interpretation.

Identity of form:
(Sag 1976, Hankamer & Sag 1976, Rooth 1992, Fiengo & May 1994, i.a.)

Identity of meaning:

Identity w.r.t. augmented antecedent:
(Fox 1999, Arregui et al. 2006, van Craenenbroeck 2013, Thoms 2015, i.a.)
B: *I’m going to move this candle.*
A: *Don’t move this candle!*

**Observation 1:**
A prior linguistic antecedent is sufficient for interpretation.
A: *Don’t ___!*

**Observation 2:**
An informative context is sufficient for interpretation.

Interpretation w.r.t. context:
A: Don’t touch the flame!

Observation 2:
An informative context is sufficient for interpretation.
B: I’m going to move this candle!
A: Don’t ___!

Don’t move the candle?
Don’t touch the flame?
How is VPE interpreted in complex discourse contexts?

1) General discourse resolution
2) Interpretation via linguistic antecedent
3) A combination of both strategies

More broadly, the missing material in VPE makes it a good case study for probing the mapping between **linguistic form**, mental representations of **discourse contexts**, and **meaning**.
General Discourse strategy:
(cf. Miller & Pullum 2013)

Interpret VPE by retrieving the most salient proposition from the discourse context.
Linguistic Antecedence strategy:

Preferentially use linguistic antecedent to fill in missing content at ellipsis site.
Linguistic Antecedence strategy:

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Linguistic Antecedence strategy:

Preferentially use linguistic antecedent to fill in missing content at ellipsis site.

Use discourse information when antecedent interpretation fails.
CURRENT STUDY

Experiments 1 & 2: Assessing VPE interpretation in context
Neither the General Discourse nor the Linguistic Antecedence strategy sufficiently predicts VPE interpretation

Modeling:
The best model of VPE interpretation proportionally combines both strategies

The linguistic antecedent influences interpretation beyond its contribution to discourse status.
Son: I want to buy candy bars!

Father: We can’t.
Son: I want to buy candy bars!

Father: We can’t.
Context 1
low support

Context 2
middle support

Context 3
high support

increasing contextual support for number information
Son: I want to buy candy bars!

Father: We can’t.

linguistic antecedent
(3-way manipulation)
Son: I want to buy candy bars!

Son: I want to buy five candy bars!
Son: I want to buy candy bars!

Father: We can’t.
Given the manipulations in

**contextual** support for number information

**formal** support for number information

Is the **VPE site** interpreted as **containing number information**?
Son: I want to buy candy bars!

Full data available in question period
Son: I want to buy candy bars!  

Father: We can’t buy candy bars.  

Use linguistic antecedent content
Son: I want to buy candy bars!

Father: We can’t.
First, we’ll assess the most salient proposition intended by the son.

Son: I want to buy candy bars!

Father: We can’t.
EXPERIMENT 1: MOST SALIENT PROPOSITION

Son: I want to buy candy bars!

Which of the following do you think is most likely?
Which of the following do you think is most likely?

A: The son wants to buy candy bars, but doesn’t care how many.

B: The son wants to buy a specific number of candy bars.

> 0

no numeral

= n

numeral
**Son:** I want to buy candy bars!

Contextual support for number information significantly changes ratings of proposition intended by son.
EXPERIMENT 2: VPE INTERPRETATION

Son: I want to buy candy bars!

Father: We can’t.

Do you think it is more likely that the father meant:

Context 1 or Context 2 or Context 3
Do you think it is more likely that the father meant:

A:
We can’t buy any candy bars.

B:
We can’t buy five candy bars, but maybe we could buy fewer.
Son: I want to buy candy bars!
Father: We can’t (buy candy bars).

Strict Linguistic Antecedence strategy predicts categorical preference for no numeral interpretation (red).

What does the father mean? No numeral interpretation (red).

This prediction fails.
Father: We can’t.

General Discourse strategy predicts interpretation will closely track salient proposition in discourse.

This prediction also fails.
Neither interpretive strategy on its own can adequately predict the observed data.

The observed interpretations are intermediate between the predictions of the two models.

This points to an interpretive mechanism combining both strategies.

To explicitly model this interaction, we constructed three models of interpretation.
General Discourse model:
Interpretation with respect to discourse status

Linguistic Antecedence model:
Interpretation with respect to linguistic antecedent

Hybrid model:
Proportionally combines the two interpretive strategies
P(Interpretation) \propto [\text{utterance}] \cdot \text{Prior}

estimated in Expt 2

1 or 0

estimated in Expt 1

General Discourse model

\[ P(\text{Interpretation}) \propto \left[ VPE \right]_{\text{discourse}} \cdot \text{Prior} + \text{Noise} \]

Formally:

\[ P(m|u, c) = (1 - \epsilon) \cdot P(m|c) + \epsilon \frac{1}{|M|} \]
Linguistic Antecedence model

\[
P(\text{Interpretation}) \propto [\text{VPE}]_{\text{linguistic}} \cdot \text{Prior} + \text{Noise}
\]

1 or 0 depending on linguistic antecedent

Formally:

\[
P(m|u, c) = (1 - \epsilon) \frac{[u]_{\text{linguistic}}^{m,c} \cdot P(m|c)}{\sum_{m' \in M} [u]_{\text{linguistic}}^{m',c} \cdot P(m'|c)} + \epsilon \frac{1}{|M|}
\]
Overestimates role of broad discourse status

Underestimates role of broad discourse status
Hybrid model

\[ P(\text{Interpretation}) \propto \beta \cdot \text{Linguistic} + (1 - \beta) \cdot \text{Discourse} + \text{Noise} \]

Formally:

\[
P(m|u, c) = (1 - \epsilon) \left( \beta \cdot \frac{[u]^{m,c}_{\text{linguistic}} \cdot P(m|c)}{\sum_{m' \in M} [u]^{m',c}_{\text{linguistic}} \cdot P(m'|c)} + (1 - \beta) \cdot P(m|c) \right) + \epsilon \cdot \frac{1}{|M|}
\]
Hybrid model

Maximum Likelihood Estimate:

\[ \beta = 0.420 \]

Based on all data (9 conditions)

What does the father mean?

- No numeral
- Numeral

Contextual support for number

Proportion

1 - low
2 - middle
3 - high
CONCLUSION

Both experimental and modeling evidence show that VPE interpretation is sensitive to both the linguistic antecedent’s form and the interpretations’ broader discourse status.

Interpretation is constrained by linguistic antecedents beyond their contribution to discourse status.

The mechanism by which the two information sources are combined is unspecified and worthy of study.
THANKS TO...

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REFERENCES


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Experiment 1 (prior) results – 9 conditions

What does the son want?
- No numeral
- Numeral

Contextual support for numeral

Proportion
Experiment 2 (VPE interpretation) results – 9 conditions
Expt 1 vs. Expt 2 – 9 conditions

Antecedentless

No numeral

Numeral

Proportion

Contextual support for number

What does the father mean?

No numeral

Numeral

1 - low  2 - middle  3 - high

1 - low  2 - middle  3 - high

1 - low  2 - middle  3 - high
General Discourse model – 9 conditions

What does the father mean?
- No numeral
- Numeral
Linguistic Antecedence model – 9 conditions

What does the father mean?

- No numeral
- Numeral
Hybrid model – 9 conditions

What does the father mean?

- No numeral
- Numeral
I want to buy candy bars.
We can’t.
I want to buy candy bars. We can’t.
\([VPE]_{\text{linguistic}}?\)

*I want to buy candy bars.*
*We can’t buy candy bars.*

0

no numeral
✓ \([VPE] = 1\)

3

numeral
✗ \([VPE] = 0\)