Ellipsis

[ɪˈlip sis]

language construction in which a word or phrase is understood even though it is unpronounced
Mary sailed a boat, but I don’t know which boat.
Mary sailed a boat, and Janet did too.
Mary sailed Sue’s boat, and Janet sailed Amy’s.
What unifies these sentences?

Mary sailed a boat, but I don’t know which boat [Mary sailed].

Mary sailed a boat, and Janet did [sail a boat] too.

Mary sailed Sue’s boat, and Janet sailed Amy’s [boat].
What unifies these sentences?

Mary sailed a boat, but I don’t know which boat [Mary sailed].

Mary sailed a boat, and Janet did [sail a boat] too.

Mary sailed Sue’s boat, and Janet sailed Amy’s [boat].
Elided material is licensed by its relationship to a preceding portion of the discourse, called an antecedent.

Mary sailed Sue’s boat, and Janet sailed Amy’s boat.
Ellipsis is sometimes straightforward...

Mary sailed a boat, but I don’t know which boat [Mary sailed].

Mary sailed a boat, and Janet did [sail a boat] too.

Mary sailed Sue’s boat, and Janet sailed Amy’s [boat].
and sometimes more perplexing.

So well loved by all because it’s so dang easy to...
love you?
and sometimes more perplexing.

Life without pasta is not
...life?
What is fluffy coffee, and why...

is it fluffy?
does this exist?
Two Properties of Ellipsis

1. Ellipsis interpretation does not involve simply copying an antecedent.
Ellipsis is not simply copying an antecedent.

Mary sailed her boat, and Jane did [ ] too.

Whose boat did Jane sail?

Bob wants to sail round the world and Alice wants to climb Kilimanjaro, but neither of them can [ ], because money is too tight.

...do the adventure they want?

(Webber 1978; Hardt 1993; Asher 1993; Fiengo & May 1994; Frazier & Duff 2019)
Ellipsis is not simply copying an antecedent.

We’re here to do or die
Ohio, Ohio
We’ll win the game or know the reason why [ ]!

...we did not win the game.

This is a problem that physics must solve, but for a long time it wasn’t clear how [ ].

...physics could solve it.

(Santa Cruz Ellipsis Project; Kroll & Rudin 2017; Rudin 2019; Kroll 2019)
Ellipsis is not simply copying an antecedent.

I've heard that some tribbles hate some Enterprise crew members, but I don't know which ones [ ].

...which tribbles
...which crew members

Apples taste great with oranges, but I don't know if we have any [ ].

...apples
...oranges
Two Properties of Ellipsis

1. Ellipsis interpretation does not involve simply copying an antecedent.

2. Ellipsis sites can precede their antecedent.
Ellipsis sites can precede their antecedent.

Buy me some sails at the market, if you see any [ ].

If you see any [ ], buy me some sails at the market.
Ellipsis sites can precede their antecedent.

Buy me some *sails* at the market, if you see any *[sails]*.

If you see any *[sails]*, buy me some *sails* at the market.

When an ellipsis site precedes its antecedent it is called cataphoric ellipsis.
How do we construct interpretations of ellipsis sites if ellipsis interpretation is not strictly constrained by the form of a preceding antecedent?

Questions

1. Do comprehenders use prominence to choose an interpretation when more than one is available?

2. Do comprehenders engage in active search processes for interpretations?
Noun-Phrase Ellipsis

Rose bought Donna’s boat, and Donna bought Clara’s [boat].

Buy me some sails, if you see any [sails].

Why Noun Phrase Ellipsis?

* Small, localized representation.
* Easy to manipulate location.
Dissertation Overview

1. Polarity reversal sluices

2. Three offline experiments showing:
   • a subject bias in ellipsis interpretations
   • a proximity bias in ellipsis interpretations

3. Three online experiments showing:
   • an active search strategy in cataphoric ellipsis comprehension
   • methodological sensitivity in Maze vs. SPR tasks

4. Two implicit causality experiments showing:
   • an implicit causality effect in noun phrase ellipsis
   • that noun phrase ellipsis and pronominal anaphora are equally affected by implicit causality
Proximity Preferences
Question 1

1. Do comprehenders use prominence to choose an interpretation when more than one is available?

2. Do comprehenders engage in an active search process for interpretations in cataphoric ellipsis?
Proximity preference

**Anaphoric**
I saw Mary’s **dog** and Susan’s **cat** yesterday, but I didn’t see Jane’s [ ] at the time.

**Cataphoric**
I didn’t see Jane’s [ ] at the time, but I saw Mary’s **dog** and Susan’s **cat** yesterday.

![Bar chart showing choice of first or second NP by ellipsis type](chart)

**Procedure**

- Fill-in-the-blank responses.
- Dynamic experimental setting allowing control of experimental QuD.
I saw Mary’s dog and Susan’s cat yesterday, but I didn’t see Jane’s [] at the time.

Anaphoric
I saw Mary’s dog and Susan’s cat yesterday, but I didn’t see Jane’s [] at the time.

Cataphoric
I didn’t see Jane’s [] at the time, but I saw Mary’s dog and Susan’s cat yesterday.
Ellipsis resolution showed a preference to the NP in closest proximity to the ellipsis site, regardless of whether the NP was encountered before or after the ellipsis site.

Results provide additional evidence for a backward-looking search for anaphoric ellipsis, and novel preliminary evidence for a forward-looking search process in cataphoric ellipsis.
Why does the proximity preference suggest a backward-looking search process in anaphoric ellipsis?

I saw Mary’s dog and Susan’s cat yesterday, but I didn’t see Jane’s [ ] at the time.

Global, cue-based search procedure. The most recent NP has higher activation (or strength of representation) and/or greater cue similarity (retrieval match).

Why does the proximity preference suggest a forward-looking search process in cataphoric ellipsis?

I didn’t see Jane’s [ ] at the time, but I saw Mary’s **dog** and Susan’s **cat** yesterday.

Offline measurements are limited because judgments are given after full sentence parse.

Next: Online methodologies provide measures of incremental parsing.
Active Gap Strategy
Question 2

1. Do comprehenders use prominence to choose an interpretation when more than one is available?

2. Do comprehenders engage in an active search process for interpretations in cataphoric ellipsis?
Offline judgments showed a preference for resolving an ellipsis site to the closest NP

I saw Mary’s dog and Susan’s cat yesterday, but I didn’t see Jane’s [] at the time.

I didn’t see Jane’s [ ] at the time, but I saw Mary’s dog and Susan’s cat yesterday.
Processing Dependencies in Language

**Anaphoric Pronouns:**
Resolution of referent can be delayed or never completed.

**Filler-Gap Dependencies:**
Are resolved using an active search strategy.

**Ellipsis Dependencies:**
?

Processing Cataphoric Ellipsis

**Possibility 1:**
Resolution of ellipsis site is delayed until an initial parse is generated or until resolution is prompted.

**Possibility 2:**
Comprehenders engage in an active search strategy for the postcedent for an ellipsis site.
Active Search Strategy

While many are occasionally excited and energetic, most students are generally depressed.

While many [students] are occasionally excited and energetic, most students are generally depressed.

(Ng 2008; Yoshida et al. 2012)
While many are occasionally excited and energetic, most reports are generally saying that students are depressed.

ellipsis site! wait, an excited report? postcedent!

While many [students] are occasionally excited and energetic, most reports are generally saying that students are depressed.
Processing Cataphoric Ellipsis

Possibility 1:
Resolution of ellipsis site is delayed until an initial parse is generated or until resolution is prompted.

Possibility 2:
Comprehenders engage in an active search strategy for the *postcedent* for an ellipsis site.

Hypothesis:
If comprehenders engage in an active search strategy, then we will see a reading-time slow-down on an implausible postcedent.

(Yoshida et al., 2012)
Active Gap Strategy

Experimental Design

2 x 2:
Experimental Design

2 x 2: Ellipsis

Ellipsis  While some [ ] are occasionally excited and energetic, most students are generally depressed.

No Ellipsis  While some pre-meds are occasionally excited and energetic, most undergraduates are generally depressed.
<table>
<thead>
<tr>
<th>Plausibility</th>
<th>Plausible</th>
<th>Implausible</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>While some are occasionally excited and energetic, most undergraduates are generally depressed.</td>
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</table>
### Experimental Design

#### 2 x 2: Example item

<table>
<thead>
<tr>
<th>Ellipsis</th>
<th>Plausibility</th>
<th>Sentence</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Ellipsis</td>
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Active Gap Strategy

Experimental Design

2 x 2:

Ellipsis: Ellipsis / No Ellipsis

Plausibility: Plausible / Implausible

48 items, 72 participants, run on MTurk in IbexFarm

(Drummond 2014)
Experimental Procedure

Experiment was conducted in the Maze task, which forces incremental parsing.

Comprehension questions asked about sentence content, and were balanced to ask about first & second clauses.

(Freedman & Forster 1985; Forster et al. 2009, Boyce et al. 2020)
Active Gap Strategy

Maze Response Times

Cataphoric NPE reading times in Maze task

Identical across conditions within items

Main effect of Plausibility, interaction of Plausibility & Ellipsis
Maze Response Times

Cataphoric NPE reading times in Maze task

Main effect of Plausibility, interaction of Plausibility & Ellipsis
Active Gap Strategy

**Maze Response Times**

Cataphoric NPE reading times in Maze task

Main effect of Plausibility, interaction of Plausibility & Ellipsis
Greater difference between plausibility conditions in Ellipsis condition than in No Ellipsis condition.

**Main effect of Plausibility, interaction of Plausibility & Ellipsis**
Active Gap Strategy

Takeaways

- Found a significant reading time slow-down when comprehenders encountered an implausible candidate postcedent for an ellipsis site, compared to when they encountered a plausible postcedent.

- This reading time slow-down was also present in sentences without ellipsis, although the effect was less pronounced than in the ellipsis sentences.

- Active Gap Strategy: upon encountering an ellipsis site, comprehenders launched an active search for a postcedent to fill the interpretive gap.
Ellipsis sites trigger a search for an appropriate ante-post/cedent to fill the missing representation of the ellipsis site.

**Anaphoric**
- Backward search in memory
  - Search representations in memory using simultaneous cue-based search process

**Cataphoric**
- Active, forward search
  - Search incoming representations during initial parsing of sentence

Active Gap Strategy
Conclusion
Conclusion

What are the mechanisms of ellipsis?

1. Grammatical licensing component
   • where is ellipsis structurally possible?
   • e.g. Merchant’s E feature

2. Grammatical (?) interpretation component
   • What is the relationship between the content of an ellipsis site and the surrounding linguistic context?
   • e.g. e-GIVENness, Local Givenness

3. Ellipsis processing component
   • How do we build representations out of the silence of an ellipsis site?
   • e.g. cue-based retrieval (Martin & McElree 2011, Harris 2015).
Conclusion

Which facts go where?

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<tr>
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</tr>
<tr>
<td>d-linking facts?</td>
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Joe, [who once killed a man in cold blood], doesn’t even remember *#who [ ].*

Joe, [who once killed a man in cold blood], doesn’t even remember *which man [ ].*

(Barros 2014; Harris 2019)
## Conclusion

### Which facts go where?

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### Why care?

- To conflate grammatical rules with processing phenomena undermines the goal of understanding the grammatical properties of ellipsis.

- Once we understand the processing facts of ellipsis, such facts can (and should) be safely left out of a theoretical account of ellipsis interpretation.
Thank you!

Thank you to my committee
– Matt, Pranav, Adrian, and Amanda –

Thanks to Lyn Frazier, Jesse Harris, & UCLA’s Psycholinguistics Seminar for comments on the experiments presented here, my RAs Melanie Esver, Lenny Kirshbaum, & Joyce Hong, The Humanities Institute for funding, my remaining cohort Jed & Steven, & to all of you for being here!
Maze 1 item:
Despite a few vegetables dying from frost and bugs, many books are thankfully saying that tomatoes are surviving to the end of the season.

Maze 2 item:
Despite a few vegetables dying from frost and bugs, many gardeners are thankfully saying that tomatoes are surviving to the end of the season.
Implicit Causality

OE Baritones resent altos because it’s hard to find any that aren’t competitive.
SE Baritones intimidate altos because it’s hard to find any that aren’t competitive.
OA Baritones resent altos because it’s hard to find ones that aren’t competitive.
SA Baritones intimidate altos because it’s hard to find ones that aren’t competitive.
Experiment 2 Item Acceptability

Acceptability of Experiment 2 items

- Ellipsis Type:
  - Anaphoric
  - Cataphoric
- Coordination:
  - NP
  - TP

Acceptability of all Experiment 2 items

- Type:
  - Filler
  - Item
- Experimental Item Type:
  - Filler
  - Item
Maze 2 Analysis

- Incorrect trials were excluded from the analysis, as were all first region responses, responses under 200ms, and the subsequent .3% longest trials.
- Experiment analysis was conducted using brms in R.
- Mixed-effects logistic regression with full fixed and random effects structure; fitted with default priors and a shifted lognormal family.

- Word frequency for the critical nouns was computed using the SUBTLEXus corpus using a log10(frequency per billion words) measurement.
- Word length was computed for the critical nouns but failed to reach significance. It was therefore left out of the final model.

(Buerkner 2017, 2020; Barr et al. 2013)
Maze 2 Results

- Main effect of Plausibility: Plausible nouns were read more quickly than implausible nouns.

- Interaction of Plausibility & Ellipsis: The response time difference between the Plausible and Implausible nouns was greater in the Ellipsis condition than in the No Ellipsis condition.

- Main effect of Word Frequency.

- No other effects reached significance.

- A similar significance pattern was found for the be region, which immediately followed the critical region (Word Frequency was not included).