The Psycholinguistics of Ellipsis

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Overview

• Grammatical alternatives

• Experimental investigations of ellipsis: 3 leading themes
• Spoiler: these themes don’t resolve today’s debate
• Theme #1: mismatching antecedents

• Interlude: theories and experiments on wh-movement and anaphora
• Theme #2: accessing information about antecedents
• Theme #3: does size matter (or distance)?

Slides available at http://www.ling.umd.edu/colin, under downloadable papers
Alternatives

A. Nature of antecedent
- semantic/discourse
  - Dalrymple et al. 1991
  - Hardt 1993, etc.
- syntactic (roughly)

B. Content of ellipsis site
- detailed structure
- pointer/anaphor

C. Derivational status of structure at ellipsis site
- only pre spell-out
  - Baltin
- only post spell-out
  - Li
- throughout
  - Merchant

Alternatives

Many!

Sag 1976, Williams 1977,
Fiengo & May 1994, etc.
Experiments on Ellipsis: Three Themes

1. Mismatching antecedents

   What to make of mismatches between antecedent and ellipsis site
   e.g., *Seeing the comet was nearly impossible, but John did __.*

2. Accessing information about antecedents

3. Does size (or distance) matter?
Alternatives

Consistent judgments/RTs
Interesting stories
Early days in testing what’s inside/outside grammar

Mismatch Studies
Mostly acceptability ratings
Exploring grammatical status of mismatches

e.g., Arregui, Clifton, Frazier, & Moulton, 2006; Kim, Kobele, Runner, & Hale, 2010

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Experiments on Ellipsis: Three Themes

1. Mismatching antecedents

What to make of mismatches between antecedent and ellipsis site
e.g., *Seeing the comet was nearly impossible, but John did __.*

2. Accessing information about antecedents

Does processing of the ellipsis site involve accessing words from the antecedent
(semantics or phonology)? Are binding relations between elided and non-elided
material rapidly computed?

3. Does size (or distance) matter?
Alternatives

Various interesting effects
Shows rapid access to antecedent … but does this show what’s in ellipsis site?

Accessing Antec. Features

Cross-modal lexical decision
Visual world eye-tracking
Self-paced reading, etc.

e.g., Shapiro & Hestvik 1995; Snider & Runner 2010; Yoshida, Dickey, & Sturt, 2011; Kaan, Wijnen, & Swaab, 2004
Experiments on Ellipsis: Three Themes

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2. Accessing information about antecedents

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   (semantics or phonology)? Are binding relations between elided and non-elided
   material rapidly computed?

3. Does size (or distance) matter?

   Does resolution of ellipsis become slower/harder for larger/distant antecedents?
Alternatives

A number of studies, and emerging consensus that size does not matter (different morals drawn) ... but are the findings conclusive?

**Size/Distance Studies**
- “Got it” semantic judgments
- Self-paced reading
- Speed-accuracy tradeoff (SAT)

  e.g., Murphy 1985; Frazier & Clifton 2001; Martin & McElree 2008

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They agree: detailed structural representation in ellipsis site

They disagree: derivational “timing”

They don’t tell us: how their derivations relate to real-time mechanisms

So we’ll make something up for them ...

A. Very little relation (cf. Townsend & Bever, 2001) → no predictions

B. Real-time mechanism incrementally builds a representation that includes sound (PF), meaning (LF), plus mediating structure → identical predictions

Any evidence of building structure at ellipsis site fits all 3 proposals

Moral
For psycholinguists to help with your grammatical disputes, it helps to come clean about your mentalistic commitments

(for menu of options, cf. Phillips & Lewis 2010)
Theme #1: Mismatches

“This information could have been released by Gorbachev, but he chose not to release this information.”

attributed to Daniel Schorr, NPR cited in Hardt 1993
Theme #1: Mismatches

- ‘Acceptability cline’ across various forms of antecedent-ellipsis mismatches (Arregui, Clifton, Frazier, & Moulton 2006; Kim, Kobele, Runner, & Hale 2010)

- Various judgment studies fine-tune generalizations
  Appeal to parser properties to account for mismatches

- **Active-Passive > Passive-Active**
  a. The advisor praised the student, and the old school-master was.
  b. The student was praised by the old school-master, and the advisor did too.

**Verbal Gerunds > Nominal Gerunds**
 a. Singing the arias tomorrow night will be difficult, but Maria will.
 b. Tomorrow night’s singing of the arias will be difficult, but Maria will.

**Category N-VP > Adj-VP**
 a. The criticism of Roy was harsh, but Kate didn’t.
 b. The report was critical of Roy, but Kate didn’t.
Theme #1: Mismatches

Arregui, Clifton, Frazier, & Moulton 2006
- VPE requires syntactic identity
  ... standard notion
- VPE mismatches are ungrammatical
- Partial acceptability reflects repair

- VP-repair (‘recycling’)
  - Transform mismatching antecedent
  - Rules guide repair process
  - Cline reflects amount of repair work

Kim, Kobele, Runner, & Hale 2010
- VPE requires syntactic identity
  ... in a novel gram. analysis
- VPE mismatches are grammatical
- Partial acceptability reflects search

- Search heuristics
  - Search for matching antecedent
  - Constraints guide search for matching antecedent
  - Cline reflects amount of search work
Interlude

Experimental findings in other theoretically contentious domains
Competing accounts of ellipsis

He ate something but I don’t know what he ate __.
Null structure at foot of dep.
All of today’s speakers

He ate something but I don’t know what.
No/minimal null structure
Anaphor/‘pointer’ account
Competing accounts of wh-dependencies

What do Englishmen cook \textit{gap/trace/copy}

Null structure at foot of dep. Transformational Grammar (\textit{--> Projection Principle})

What do Englishmen cook

Direct Association
HPSG/GPSG
Categorial Grammar
Dependency Grammar etc.
Competing accounts of anaphora

John thinks that Mary hates him.  

-Pronominalization (Postal)
Movement theory of control/reflexives (Hornstein et al.)

John thinks that Mary hates him.

Standard view
Anaphor points to content elsewhere in syntax/discourse
Experiments as Theory Arbitrators

Many of the themes raised in experiments on ellipsis have been investigated in experiments on wh-dependencies and anaphora.

Wh-dependencies: much discussion of whether expt. findings are decisive regarding gaps/traces vs. direct association.

Conclusion: the timing evidence probably isn’t decisive (yet).
Gibson & Hickok 1993; Phillips & Wagers 2007; Kempen, LSA 2011

So it’s interesting to see parallel arguments being presented as theoretically decisive in the case of ellipsis.

Anaphora: nobody thinks they’re testing pronominalization etc.
Cross-modal Priming

Semantic Associate Priming

Rhyme Priming
Tanenhaus, Carlson, & Seidenberg 1985

The policeman saw the boy that the crowd at the party accused ___ of the crime.

The man was surprised at which beer/wine the judges awarded the first prize to __.
Eye-fixations in visual world

Q: Can you tell me...
Wh: ... what Emily was eating the cake with ___?
YN: ... if Emily was eating the cake with the fork?

Fixations on picture of cake

Omaki, Trock, Wagers, Lidz & Phillips, 2009
Pronouns & Lexical Properties

• In pronoun generation (production) phonological properties of the antecedent are accessed

  (Schmitt, Meyer, & Levelt 1999)

• In pronoun comprehension, effects of lexical frequency of the antecedent

  (van Gompel & Majid 2004; Lago, Chow, & Phillips in prep.)

• These effects show how antecedents are accessed

  Few would consider them as evidence for Postal-style pronominalization
Point of the Interlude ...

- In *wh-dependencies* and *anaphora*, many interesting experiments show how antecedent information is accessed, and when.

  This is all very useful for building an account of real-time computation.

- But evidence on access to antecedent properties does not show whether there’s unpronounced structure at the foot of the dependency.

  For any argument for full structure at an ellipsis site, ask this question:

  *Would the same argument convince us of the need for (i) traces/gaps for *wh*-movement, or (ii) a transformational analysis of anaphora?*
Theme #2

Accessing Antecedents
Accessing Words in Antecedent

Cross-modal lexical decision shows semantic priming of noun inside antecedent (Shapiro, Hestvik, Lesan, & Garcia, 2003)

The old professor \([_{vp\text{ loved the ocean}}]\), and the teenager [...] did __ too ...

→ Syntactically-defined antecedent accessed at ellipsis site.
Accessing Antecedent Properties

**Experiment 1: semantic associates**

The security guard opened the lock, and the night manager did too.

These arguments for syntactic structure in ellipsis parallel earlier findings on wh-dependencies and pronoun processing.

**Experiment 2: phonological associates**

The customer dropped the lock, and the manager did too.

“Only if syntactic structure is present in ellipsis site should phonological information be reactivated.”

Snider & Runner, AMLaP 2010 (& Sat. 10:30am)
Fast Use of Syntactic Constraints

- Rapid building of binding relations in sluicing (Yoshida, Dickey, & Sturt 2011)

  Jane’s {grandfather | grandmother} told some stories at the family reunion, but we couldn’t remember which story about himself ...

  Gender mismatch effect at reflexive when sluicing is a viable option (No corresponding effect at reflexive when pied-piped wh-PP blocks sluicing)

- Rapid sensitivity to islands in sluicing vs. sprouting (Yoshida et al. 2010)

  Nick’s father was startled ... because he smoked secretly in the garden because he smoked something in the garden

  ... but it wasn’t clear what ...

  Evidence of immediate sensitivity to islands for sprouting vs. sluicing

- Clever contrasts – but they motivate structure at ellipsis site to the same extent that connectivity effects in wh-movement motivate traces.
Fast resolution of gapping

- ERPs suggest rapid detection of implausibility in gapped sentences (Kaan, Wijnen, & Swaab 2004)

Ron took the planks for the bookcase, and Bill ___ the hammer ...
Ron sanded the planks for the bookcase, and Bill ___ the hammer ...

N400 to implausible verb-noun combination

“the sentence processor [...] reconstructs the verb information at the earliest possible occasion” (p. 584)

Any mechanism that gets the meaning can capture this.
Theme #3: Does size matter?

• “The canonical interpretation of a literal copy mechanism is that copying more information should take more time. One could simply assert that ‘copying’ does not require time, but we suggest that in that case, the notion ‘copy’ is no longer explanatory.” (Martin & McElree 2008, p. 894)

• A number of studies have tested whether size/complexity affects the time needed for ellipsis resolution.

  Mixed results.
  But most currently assume that the evidence shows no size cost.

• Size effect ≠ copy mechanism
  No size effect = no copy mechanism

  Reason: merely accessing a complex antecedent could take a while
Yes – size matters!

• Shorter antecedents yield shorter response times in an end-of-sentence “got it” task (Murphy 1985)

**Short Antecedent:** Jimmy swept the tile floor behind the chair

**Long Antecedent:** Jimmy swept the tile floor behind the chair free of hair and cigarettes.

**Ellipsis:** Later, his uncle did too. long antecedent: 244ms slower RTs

• Size effect only holds for nearby antecedents. It disappears when distance between antecedent and ellipsis is increased by adding an intervening sentence.

Evidence criticized by Tanenhaus & Carlson (1990) based on poss. confounds
No – it doesn’t!

- Widely cited lack of antecedent size effects in VPE (Frazier & Clifton 2000, 2001)

  **Short Antecedent:** Sarah *left her boyfriend* last May.
  **Long Antecedent:** Sarah *got up the courage to leave her boyfriend* last May.

  **Ellipsis:** Tina *did too.*

- F&C conclude *cost free copying* ... what Martin & McElree call non-explanatory

- Although F&C’s paper reports multiple studies, this is the only specific test of the antecedent size effect.

  **Measure:** reading time to **final region** in self-paced reading – not best practice.
  Small study: half the size of a regular study (*→ reduced power*), intermittent comprehension questions.
  **No effect?** Numerical slowdown in some comparisons (50ms), not reliable.
No – it doesn’t!

Version 2 – Martin & McElree 2008

Speed-Accuracy Tradeoff (SAT)
Memory Access
SAT: Possible Outcomes

Asymptotic difference
Reflects the strength of the representation or the likelihood of completing a parse/process.

Rate/intercept difference
Reflects the speed of processing: how quickly information accumulates continuously, or the differences in an underlying discrete finishing time distribution.
VP-complexity manipulation (Expt 3)

The history professor understood Roman mythology ...
The history professor understood Rome’s swift and brutal destruction of Carthage ...

... but the principal was displeased to learn that the overworked students [...] did not.
... but the principal was displeased to learn that the overly worn books [...] did not

Antecedent distance effect (Expt 1)

- distance affects asymptote, but not dynamics
- no effect of complexity on dynamics or asymptote

Martin & McElree 2008
**VP-complexity manipulation** (Expt 3)

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... but the principal was displeased to learn that the overworked students [...] did not.
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![Graph showing no effect of complexity on dynamics or asymptote](graph.png)

**But ...**

The time course profile measures the *sensicality judgment task*. Task requires only matching of subject with antecedent verb. Added complexity isn’t relevant.

**Needed**: a version of this study where entire VP is task relevant.

Martin & McElree 2008
Cautionary Note from Wh-studies

• Larger antecedents sometimes correspond to shorter reading times at foot of wh-dependency (Hofmeister 2007)

  What did the reporter that Scooter avoided discuss ...
  Which poll did the reporter that Scooter avoided discuss ...
  Which political poll did the reporter that Scooter avoided discuss ...

  It was a communist who the members of the club banned ...
  It was an alleged communist who the members of the club banned ...
  It was an alleged Venezuelan communist who the members of the club banned ...

• Hofmeister attributes effects to elaboration or depth of encoding in memory.

  Moral: bigger antecedents aren’t all harder
Conclusions

1. Psycholinguists are helping with the overgeneration problem that syntactic theories of ellipsis face.

2. Many interesting findings about rapid access to information in ellipsis resolution. But this is different than showing structure in the ellipsis site.

3. No experiments yet resolve the differences between today’s speakers.

A linking hypothesis from syntactic derivations to real-time computations would be a good start.
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Other works cited


Other works cited


