Focus Alternatives and Contextual Domain Restriction: a Visual World Eye-tracking Study on the Interpretation of Only

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Only Matt got a perfect score on the exam.
(students in some class)

Katie only has a bike.
(modes of transportation)

I only had a crush on Jared Leto.
(cast of mid-90s teen TV drama ‘My So-called Life’)

Same general problem as quantifier domain restriction

No one got a perfect score on the midterm.
(students in some class)

Almost everything is striped.
(items in my wardrobe)

Natalie always goes to Starbucks.
(on-campus coffee-buying situations)

Katie only has a [bike]f.
{bike, car, truck, skateboard, ...}

In general, what factors determine this set?

The idea is to (temporarily) restrict the domain of evaluation for the whole sentence or even the whole discourse. The pragmatics will help in choosing a suitable universe for the evaluation of a particular sentence, but the semantics can just operate abstracting away from any such choice of a universe.

von Fintel (1998)

Its reference [the context variable] is to be fixed pragmatically, subject to the constraint introduced by focus interpretation.

Rooth (1996)

The domain of quantification is understood as consisting of just three propositions, rather than the full set of propositions of the form “John introduced y to Sue”:

(24) John brought Tom, Bill, and Harry to the party, but he only introduced Bill to Sue.

Rooth (1996)

Greg is at the store.
He’s only buying [eggs].
{eggs, lettuce, lightbulbs, bread, orange juice, ...}

Some other contenders: Context Informativity
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Greg is picking up ingredients to bake a birthday cake for his sister.

*He’s only buying [eggs].*

\{eggs, flour, sugar, butter\}

Some other contenders: Conceptual Similarity

Jill likes apples and nectarines.

*Abby only likes [strawberries].*

\{strawberries, apples, nectarines, pears, grapes, broccoli, socks, fountain pens, motorcycles, \ldots\}

Outline

- Previous experimental findings on domain restriction
  - The current study
  - Eye movements and the visual world paradigm
  - Experiment 1:
    - Focus alternatives constrained by previous mention
  - Experiment 2:
    - Context informativity modulates mention effect
  - Experiment 3:
    - Preference for conceptually similar alternatives—generating hypotheses about the alternative set
- Some unanswered questions

Using the Visual World paradigm to investigate reference resolution for definite descriptions

- Tanenhaus, Spivey-Knowlton, Eberhard & Sedivy (1995):
  - Uniqueness presupposition guides reference resolution in an ambiguous visual context
- Sedivy, Tanenhaus, Chambers & Carlson (1999):
  - In the context of a definite, scalar adjectives are interpreted to satisfy uniqueness in a visual context
- Chambers, Magnuson & Tanenhaus (2004):
  - Knowledge about the world constrains what is considered a possible referent (i.e. restricts the referential domain)

Tanenhaus, Spivey-Knowlton, Eberhard & Sedivy (1995)

Uniqueness presupposition guides reference resolution in an ambiguous visual context

“Put the apple on the napkin in the box.”

Tanenhaus, Spivey-Knowlton, Eberhard & Sedivy (1995)

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Sedivy, Tanenhaus, Chambers & Carlson (1999)

In the context of a definite, scalar adjectives are interpreted to satisfy uniqueness in a visual context

“Put the tall glass above the pitcher.”

Sedivy, Tanenhaus, Chambers & Carlson (1999)

In the context of a definite, scalar adjectives are interpreted to satisfy uniqueness in a visual context

“Put the tall glass above the pitcher.”
Knowledge about the world constrains what is considered a possible referent (i.e. restricts the referential domain).

"Pour the egg in the bowl over the flour."


Knowledge about the world constrains what is considered a possible referent (i.e. restricts the referential domain).

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The current study: Restricting focus alternatives for adverbial *Only*

Jane only has some candy.

presupposes: Jane has some candy
asserts: Jane has nothing other than candy

The Visual World paradigm

Click on the *candy*.
Target = candy
Cohort competitor = candles
Unrelated = anchors, sneakers

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Experiment 1: Previous mention

Is the set of alternatives you consider in a sentence like

‘Jane only has some candy’

constrained by the set of things just mentioned in the discourse?

Mark has some candy and some pencils.

\textit{Jane only has some candy}, target

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{fig1.png}
\end{figure}

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{fig2.png}
\end{figure}

Experiment 1 results

\textit{No Mention + No Only}: late disambiguation, >500 ms.

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{fig3.png}
\end{figure}

‘Mark has some \underline{toothpicks} and some pencils.’

‘Jane has some candy.’

\textit{Mention + No Only}: disambiguation, ~375 ms.

\begin{figure}
\centering
\includegraphics[width=0.5\textwidth]{fig4.png}
\end{figure}

‘Mark has some \underline{candy} and some pencils.’

‘Jane has some candy.’

(1) Mark has some \underline{toothpicks} and some pencils.

(2) Mark has some candy and some pencils.

(3) Mark has some \underline{toothpicks} and some pencils.

(4) Mark has some candy and some pencils.
**Experiment 1 results**

*Mention + Only* earliest disambiguation, 150-200 ms.

‘Mark has *some candy* and some pencils.’
‘Jane only has *some candy*.’

**Experiment 1 results**

*No Mention + Only* latest disambiguation, >500 ms.

‘Mark has *some toothpicks* and some pencils.’
‘Jane only has *some candy*.’

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**Experiment 1 results**

Target fixations from all 4 conditions

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**Experiment 1 results**

Average point of disambiguation

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**Experiment 1**

- Main effect of Mention: earlier disambiguation when the target word was mentioned in the previous sentence.
- Mention effect strengthened by the presence of *only* given the time it takes to program and launch an eye movement, listeners seem to be disambiguating the target even before the onset of the target word.

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### Experiment 2: Context informativity

**Context type x Mention x Only (8 conditions)**

**Informative Context:** Jill and Peter are at the shoe store.
- No mention: Jill wants to buy some sneakers and some sandals.
- Mention: Jill wants to buy some boots and some sandals.
  - No only: Peter wants to buy some boots.
  - Only: Peter only wants to buy some boots.

**Underinformative Context:** Jill and Peter are at the mall.
- No mention: Jill wants to buy some dresses and some coats.
- Mention: Jill wants to buy some boots and some coats.
  - No only: Peter wants to buy some boots.
  - Only: Peter only wants to buy some boots.

### Experiment 2: Context informativity

Does providing richer contextual information have a further restrictive effect on the interpretation of only?

**Possible outcomes:**

- More informative contexts function in the same way as Mention, by restricting the domain of interpretation specifically when only is present.
  - Expect faster convergence on target item only in **Only** conditions (on top of the **Only**-Mention effect from Exp 1).

- Enriching the context has a restrictive effect on subsequent interpretation, but in a general way that isn’t specific to the presence of only.
  - Expect across-the-board faster convergence on target item in Informative conditions, irrespective of the presence of only.

### Experiment 2 results

**Informative conditions: with Mention + Only, POD ~200 ms before target onset**

- ‘Jill and Peter are at the shoe store…’

**Underinformative conditions look like Experiment 1**

- ‘Jill and Peter are at the mall…’
Experiment 2 results

Informative context + Mention + No Only

‘Jill and Peter are at the shoe store.’
‘Jill wants to buy some boots and some sandals.’
‘Peter wants to buy some boots.’

Average point of disambiguation

• Underinformative context conditions pattern like Exp 1, as expected
• Informative context has a general restrictive effect: on average 250 ms earlier convergence on target relative to corresponding Underinformative condition
• Only-dependent effect of Context Informativity: Informative context helps even more when only is present
• Largest advantage for Mention-Only condition: listeners are able to disambiguate the target referent >300 ms before the onset of the target word.

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Experiment 3: Conceptual similarity

Two explanations for what people are doing in Exp 1-2:

(1) Given the items in the visual display, they rule out certain referents as unlikely (based on the previous discourse context, etc).

(2) Using the information from the discourse context, they start generating hypotheses about what items are likely to be in the alternative set.

If listeners are actively generating candidate alternatives, they might do this on the basis of something like conceptual similarity: predicts facilitation (early disambiguation) for same-category over different-category items, even without Mention.

Experiment 3 results

Mentioned < Novel-SameCategory < Novel-DifferentCategory

Average point of disambiguation
Summary

• **Experiment 1:**
  Explicit mention is among the factors that constrains comprehenders’ expectations about what is included in the focus alternatives. The Mention effect is strengthened in the context of *Only*.

• **Experiment 2:**
  It’s not just explicit mention—enriching the discourse context (making it more informative) further narrows the set of possible interpretations.

• **Experiment 3:**
  Given the linguistic context, comprehenders (immediately) start generating hypotheses about likely focus alternatives.

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Future work

• We’ve been treating focus alternatives as analogous to quantifier domains, but whether the same factors influence domain restriction is an empirical question. Do the current findings extend to quantifier domain restriction?

• What part of these results is specific to *Only*? By comparing *Only* with other focus operators (e.g., *Also*), we can try to pull apart specific lexical contributions from general effects related to focus interpretation.

• A cue combination problem: how do prosody, discourse parallelism, discourse old/new status, other potentially relevant factors combine with each other? What happens when different sources of information conflict with each other?

Thanks!

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