

What`s included in the set of alternatives?

Psycholinguistic evidence for a permissive view

Nicole Gotzner (Humboldt-Universität zu Berlin)

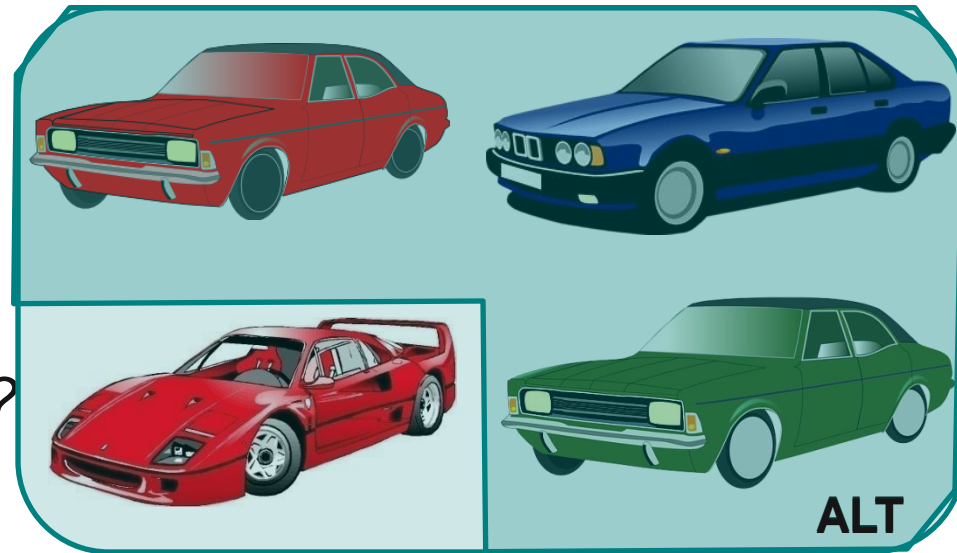
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The Issue

Focus evokes an alternative set (Rooth, 1985; 1992)

Jacopo owns [red]_F cars



Jacopo owns expensive cars?

Which elements do listeners consider as part of the alternative set?

Restriction debate

Jacopo owns [red]_F cars

- Debate concerning the restriction of alternative sets (see Rooth, 1992; Cohen, 1999; Umbach, 2004; Katzir 2013)
- **Permissive**: alternative set consists of various possible replacements, restriction pragmatically
ALT: *red, blue, expensive* (e.g., Rooth, 1992)
- **Restrictive**: alternatives need to be mutually exclusive, certain elements are excluded *a priori*
ALT: *red, blue* (e.g., Wagner, 2006, 2012)
- Psycholinguistic evidence to adjudicate between theories

Roadmap

- Focus in alternative semantics
- How psycholinguistic experiments might inform the restriction debate
- Previous evidence
- Lexical decision study
- How alternatives are determined in online processing

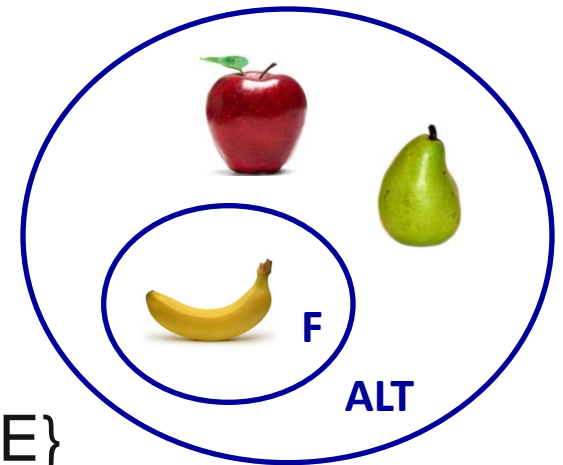
Definition of the alternative set

A focused expression has two meaning components according to Rooth (1985):

Anna ate a [banana]_F

Ordinary value: $ATE(BANANA)(ANNA)$

Focus semantic value: $\{ATE(x)(ANNA) | x \in E\}$



- Focus semantic value consists of various possible replacements
- Pragmatic and cognitive factors influence which alternatives are relevant

Contextual restriction

- Alternative set needs to be restricted in some way

Mary [read]_F the Recognitions (Rooth, 1992)

In the bar, Paul only saw [Ansgar]_F (Umbach, 2004)

- Restriction to relevant alternatives otherwise sentence could never be true
- Rooth (1992): no semantic restriction
- Covert variable C in LF (subset of focus semantic value)
- Value of C is determined by pragmatics

Focus particles

- Focus particles like *only* associate with focus, require a salient set of alternatives (Rooth, 1992)

Anna only ate a [banana]_F

- ➔ She did not eat anything else {pears, oranges,...}
(Part of truth-conditional content)

- Consideration/activation of alternatives is necessarily involved
- Comparison/contrast among alternatives

Alternatives in online processing

- What elements do listeners consider as alternatives?
- Psycholinguistic techniques to measure the activation of concepts

Context: fruit bowl with pears and bananas

Anna ate [bananas]_F

- ✓ Anna ate pears
- ✓ Anna ate apples
- ✗ Anna ate socks

Anna bought [bananas]_F

- ✓ Anna bought socks



mentioned
alternative



unmentioned
alternative



unrelated

Lexical decision task



Anna ate a banana

MELON

TOFUN

SHOE

Task: Word of English or not?

YES

NO

- Reaction times indicate whether a word is already present in the listener's mind (priming)

Prior evidence: Contrastive accents

- Braun & Tagliapietra (2010): **contrastive vs. neutral intonation**
- Lexical decision task

The dog chewed a SLIPPER



contrastive: $RT(\text{alternatives}) < RT(\text{unrelated})$

neutral: $RT(\text{alternatives}) = RT(\text{unrelated})$

- Alternatives are activated and computed online

Focus particles, contextual ALT

(Gotzner, Wartenburger & Spalek, in rev.)

- Do additional alternatives become activated when a set is listed in the context?
- How do focus particles influence the retrieval of alternatives?
- Exp. 1: Lexical decision task (n=37)
- Exp. 2: Probe recognition (n=42)
 - Similar to lexical decision but requires building a mental model, matching of a word with that model

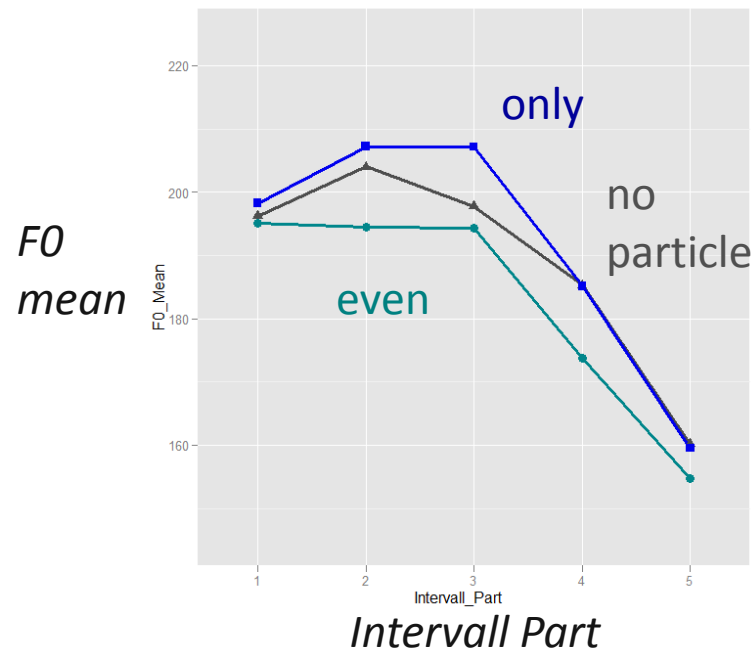
Materials (approximate translation)

In the fruit bowl, there are pears, cherries and bananas

S1: I bet Anna ate cherries and pears **ALT**

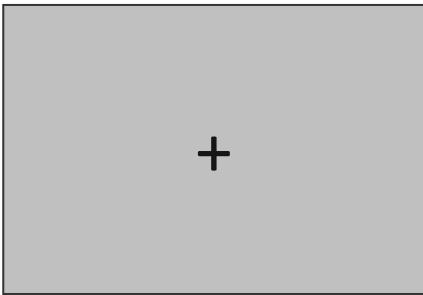
S2: No, she /only/(even) ate bananas **FOCUSED**

Pitch
accent
(focused
element):



Procedure

Auditory Presentation

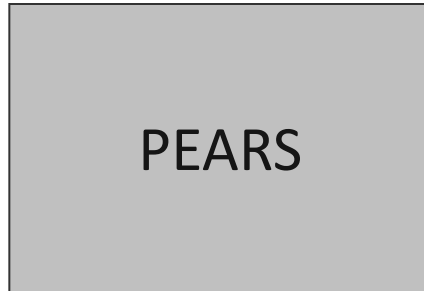


In the fruit bowl, there are pears, cherries and bananas

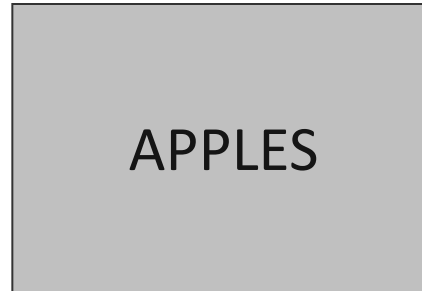
I bet Anna ate cherries and pears

No, she _/only ate bananas

Probe + Decision



mentioned



unmentioned

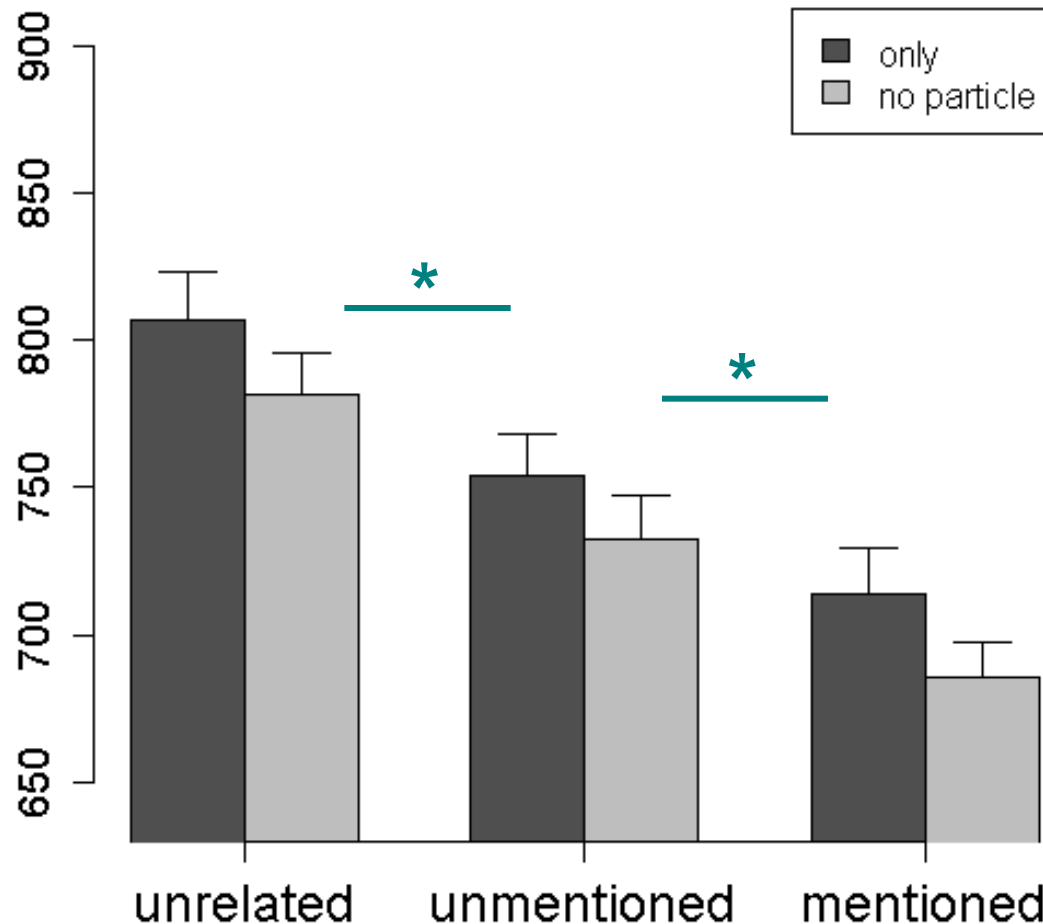


unrelated

Task: Is letterstring a word?



Results: Lexical Decision



- Mentioned alternatives receive highest amount of activation
- Additional unmentioned alternatives are activated as well

Conclusions (Exp. 1)

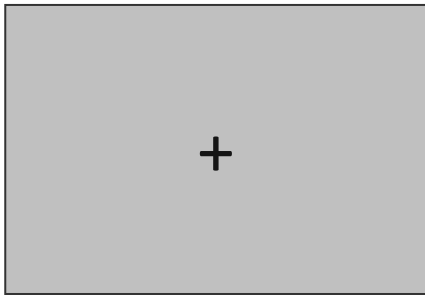
- Focus leads to the activation of a broad set of alternatives
- Even when our context was limited to a set of 3 elements!
- Intonational focus introduces alternatives or helps identifying the relevant alternatives
- Focus particles cause additional interference/competition effects

Experiment 2: Probe recognition

- Further investigate the effect of focus particles
 - What does interference reflect?
 - Compare exclusive and additive particles
- Do listeners entertain/consider mentioned and unmentioned alternatives?

Procedure

Auditory Presentation

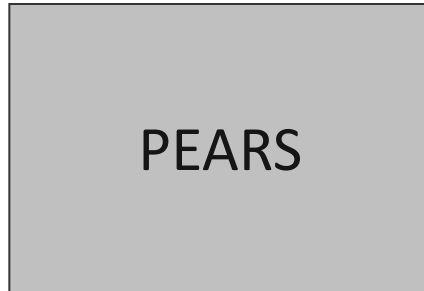


In the fruit bowl, there are pears, cherries and bananas

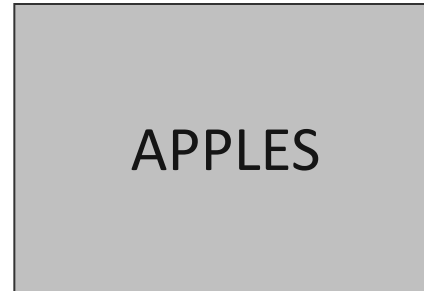
I bet Anna ate cherries and pears

No, she /only/even ate bananas

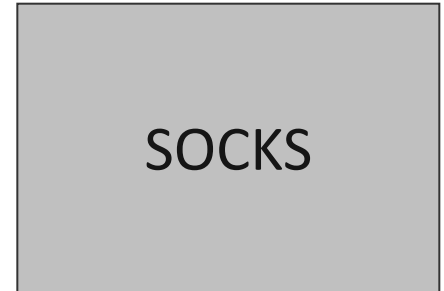
Probe + Decision



mentioned



unmentioned

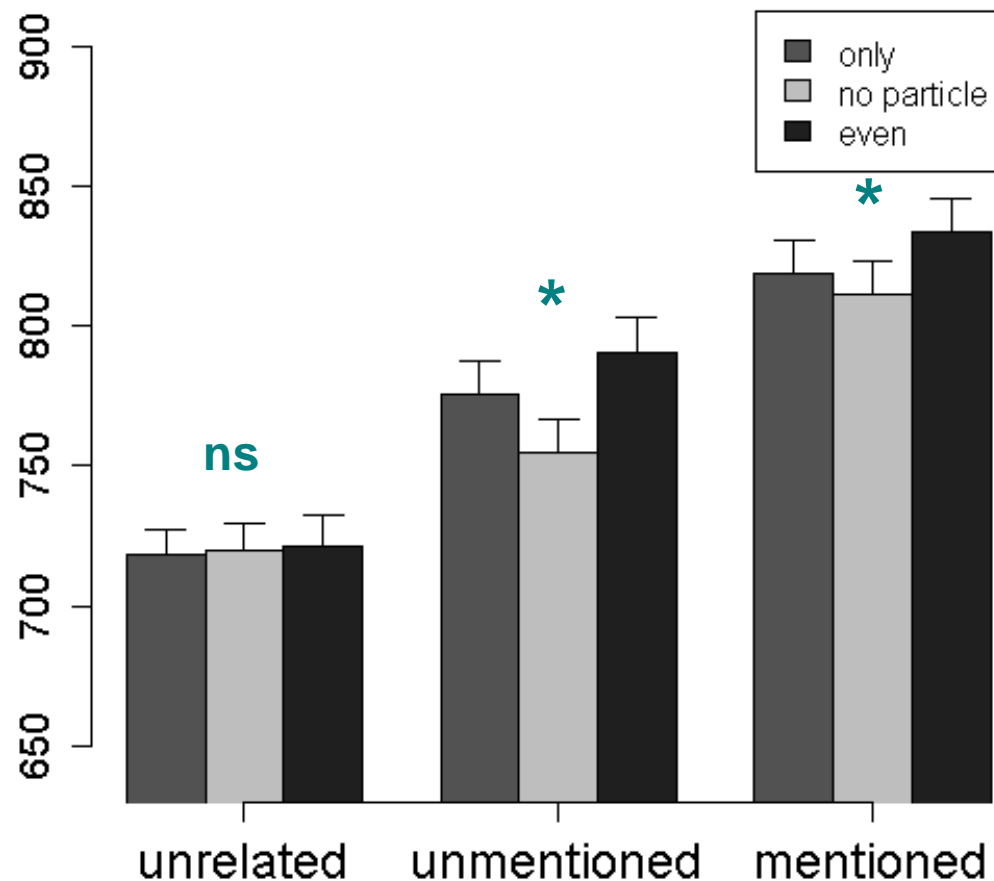


unrelated

Task: Has probe been mentioned?



Exp. 1: Probe Recognition

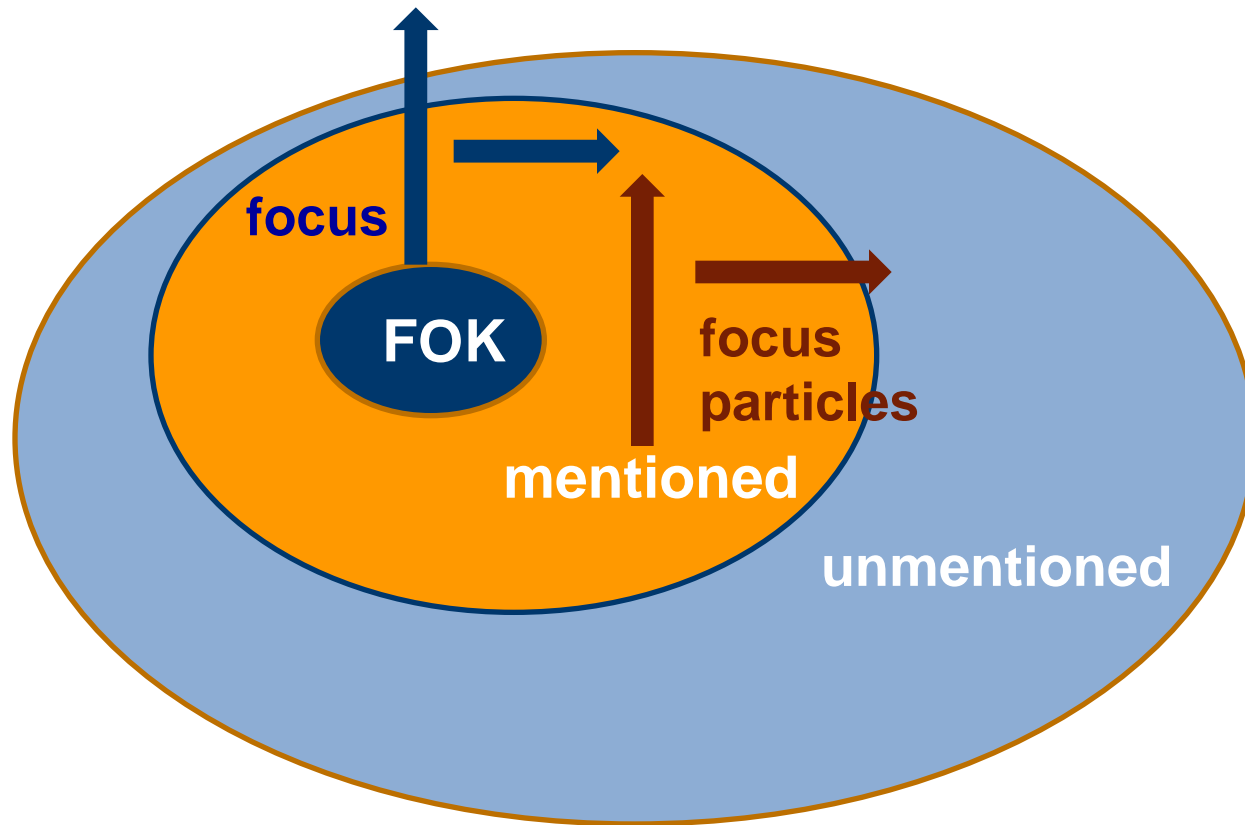


- Focus particles interfere with the retrieval of alternatives
- Listeners consider mentioned and unmentioned alternatives

Conclusions (Exp. 2)

- Focus particles induce comparison/competition among members of the alternative set
 - Highlight relationship among focused element and its alternatives
 - Competition processes help narrowing down the set over time (see also Husband & Fereirra, in rev.)
- Not just a general slow down in processing but specific interference with semantic alternatives!
- Effects are due to association with focus not specific meaning components (exclusive/additive) of focus particles

Competition between focused element and alternatives



Even when alternatives are excluded/negated (as with *only*) they need to be under consideration first!

Permissive vs. restrictive

- Data indicate that listeners consider a large set of semantic alternatives even when context enumerates specific set
- In line with permissive view of alternative sets
- Caveat: effects could rely heavily on semantic relatedness/semantic activation spreading
- What if alternatives are not of the same semantic category?

Notion of alternatives

- According to alternative semantics, alternatives are not necessarily of the same semantic category
- Rather they match the focused expression in semantic type
- Unrelated alternatives by contextual mention (see Byram-Wasburn, 2013 for experimental evidence):

Context: shopping list with shower gel and bread

Peter only bought [shower gel]_F

Unrelated items

- Similar argument about unrelated items in Experiment 1 and 2 as for mutually exclusive adjectives

Context: fruit bowl with pears, cherries and bananas

Mary bought [bananas]_F

unrelated = SOCKS

Mary bought socks?

- Are unrelated items considered as alternatives or not?

Additional analysis of unrelated items

- Possible replacement (n=16):
Matthias has bought [trousers]_F
unrelated = LYCHEES
- No replacement (n=11):
Carl has caught [flies]_F
unrelated = SOFAS
- Coding by 3 annotators, convergent items included in additional analysis
- Replacement factor as binomial predictor (YES/NO)

Predictions (Lexical decision)

Permissive

- No replacement:

unrelated > unmentioned > mentioned

- Possible replacement:

unrelated = unmentioned > mentioned

Restrictive

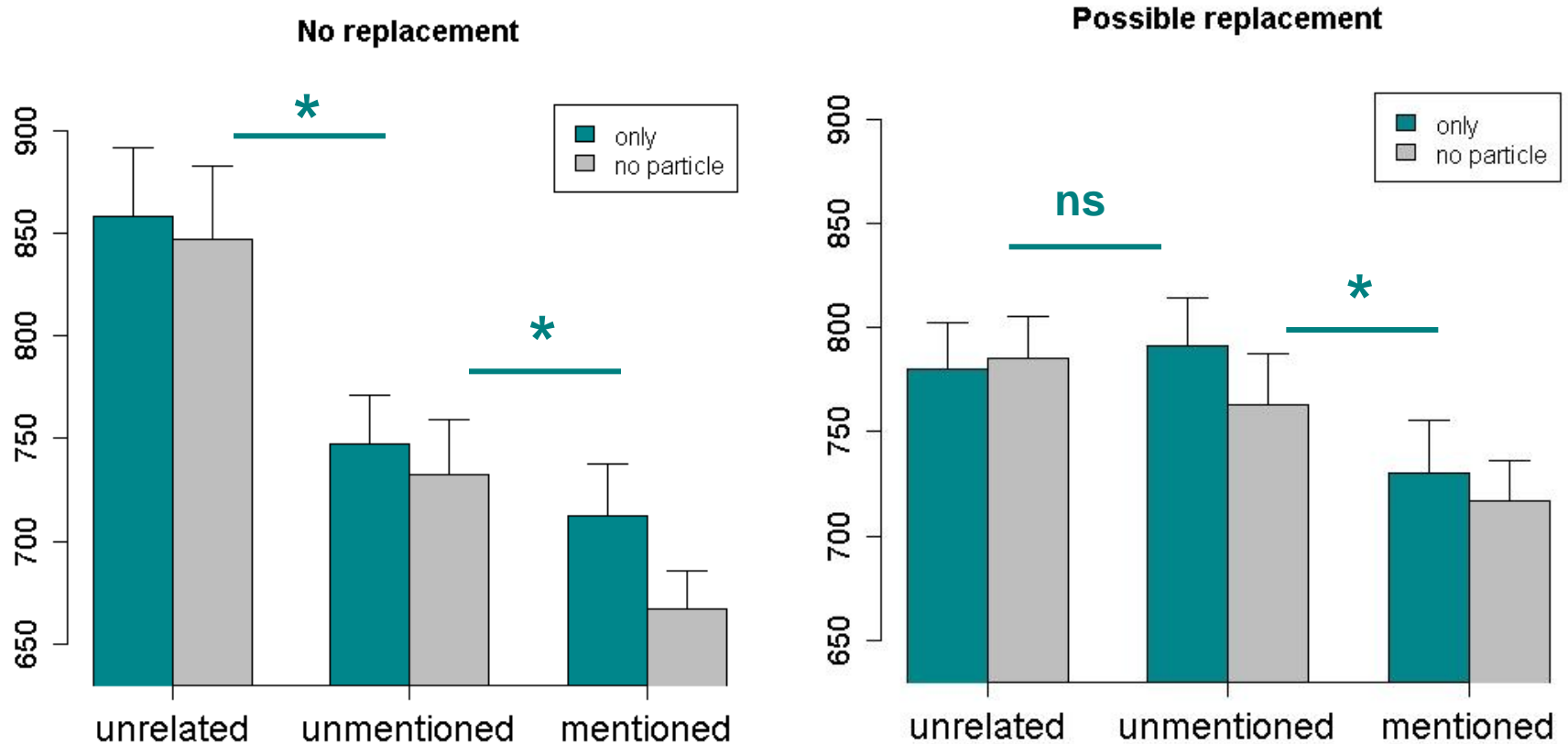
- No replacement:

unrelated > unmentioned > mentioned

- Possible replacement:

unrelated > unmentioned > mentioned

Results: replacement or not?



- Unrelated possible replacements as activated as unmentioned semantic alternatives

Interpretation

- Elements unrelated to the focused expression and context are considered as alternatives if they can replace the focused expression
 - Elements not even mentioned contextually
- Mechanism that takes into account possible replacements, i.e. alternatives, not just semantic categories
- Most consistent with permissive view: Alternative set consists of various possible replacements of a focused expression

But...

- Notion of possible replacements not purely syntactic/based on semantic type
- In many cases world knowledge involved
- Suggests that many factors influence the determination of alternatives (see Kim, 2012)
- Still, data indicate that listeners consider a broad set rather than a more restricted one!

Experiment 3 (n=24)

- Effect of focus particles specific to alternatives?
 - Comparison with general associates that cannot replace focused expression
- Similar process when no specific set is listed?
- Probe recognition task
- 2 Probe types with similar association strength:

Anna fed her [dog]_F

- alternative (possible replacement): CAT
- general associate (no replacement): LEASH

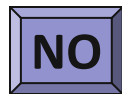
Materials

Anna wanted to eat fruit and reached into a basket

She only/also/ _ took apples out of it

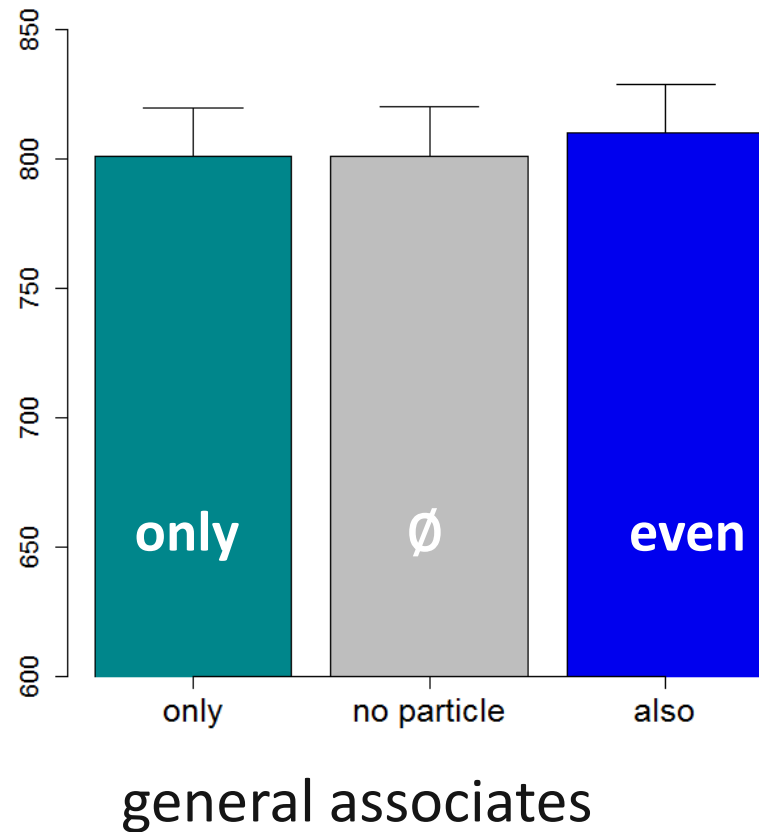
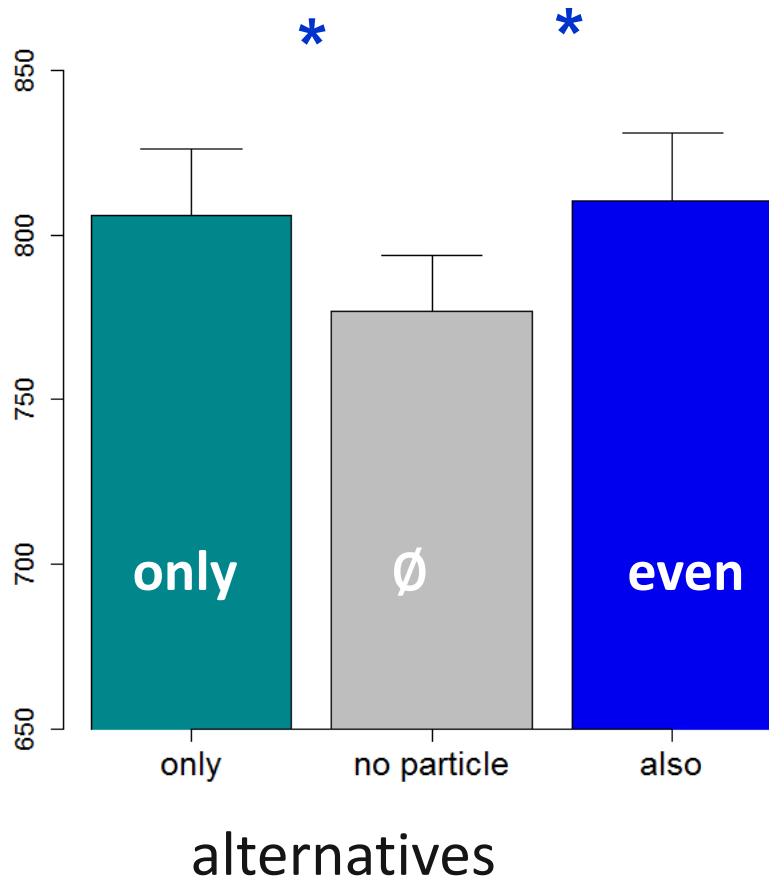
She always lived on a balanced diet

- Alternative: PEARS
- General associate: MAGGOTS



60 critical items (Latin square); 130 fillers

Results (Exp. 3)



- Focus particles interfere with possible alternatives but not general associates

Conclusions (Exp. 3)

- Effects of focus particles selective to possible replacements
- Similar processes are at play when no explicit set of alternatives is listed contextually

Processes involved in establishing alternatives

- Alternative sets are established by semantic activation spreading (among previously established categories)
- And a specialized process that determines (further) possible replacements
- Alternatives set up by context/mention (see Byram-Washburn, 2013, Kim, 2012)
- Relevant alternatives are selected by competition among members of alternative set
 - Initial cohort with various possible replacements
 - Narrowing down the set requires time in online processing (Husband & Ferreira, in revision, Spalek & Gotzner, in prep.)

Broader implications

- Alternative sets are psychologically real
- Data are consistent with Roothian view of alternative sets
- Constitute an important cognitive unit
 - Processing of focal information is complemented by the retrieval and memory storage of alternatives
- Application of methods to investigate further theoretical debates concerning alternatives
 - Mutually exclusive adjectives
 - Representation of Horn scales, symmetry problem
- Develop an algorithm that determines alternatives



Thank you!