

Meaning and Compositionality

Some sentences have meanings that are more than the sum of their parts.

Complement coercion

- (1) Bill began the book.
“Bill began writing the book.”

Insertion of semantic element not syntactically represented. Shown to incur a processing cost

- MEG (Pylkkänen & McElree, 2007), EEG (Baggio et al., 2009; Kuperberg et al., 2010)
- Behavioral: McElree et al. (2002, et seq.), Traxler et al. (2001, et seq.)

Mass-count coercions

- (2) two waters (mass -> count coercion)
“two bottles of water”
- (3) Jane had lamb for dinner. (count -> mass coercion)

Enriched composition (Jackendoff, 1997) or semantic coercion operations (Pelletier, 1975) to convert between mass and count.

- Universal Grinder:** count -> mass
Universal Packager: mass -> count (object)
Universal Sorter: mass -> count (sorts)

Frisson & Frazier (2005): Assume one sense derived from the other via lexical rule. Show derived senses incur processing cost.

Icelandic Packers and Sorters

Different languages handle packing and sorting in different ways.

German uses plural morphology.

- (4) a. zwei Bier
two beer-sg.
“two (bottles of) beer” (portion interpretation)
- b. zwei Biere
two beers-pl.
“two (kinds of) beer” (sorts interpretation)

Icelandic uses gender agreement to signal mass->count shift (Wiese & Maling, 2005).

- (5) Get ég fengið annað kaffi
may I have another-neut coffee-neut
“May I have another (kind of) coffee?” (sorts interpretation)
- (6) Get ég fengið annan kaffi
may I have another-masc coffee-neut
“May I have another (cup of) coffee?” (portion interpretation)

Coercion versus extra syntax:

- (5) involves coercion. *Kaffi* “coffee” is coerced to sorts interpretation.
- (6) involves extra syntax. *Annan* “another” (masculine) agrees in gender with most likely unexpressed container noun, *bolli* “cup” (masculine), but not with mass noun.

Investigating Packers and Sorters With ERPs

Icelandic allows productive compound nouns. Manipulate expectations using noun-noun compounds.

- C1 (first constituent of compound): Force expectations regarding headedness, coercion or extra syntax
- C2 (second constituent of compound): Revise expectations, if any

Frame	Konan woman-the	þáði accepted	aðra another-fem	C1	C2
Condition	C1 (first noun)		C2 (second noun)		
Coercion	sósu sauce-fem			skál bowl-fem	
	mass-count coercion; commit to C1 as head noun		revise coercion, revise head noun to C2		
Neutral	dúkku doll-fem			kerru pram-fem	
	commit to C1 as head noun		revise head noun to C2		
Extra Syntax	romm rum-neut			flösku bottle-fem	
	gender mismatch; build unexpressed container noun into syntax; commit to container as head		unexpressed container noun now expressed; no revision to headedness		

Predictions

- C1:** N400 for **Coercion** (following Kuperberg et al., 2010; Baggio et al., 2009). Gender mismatch predicts LAN (Koester et al., 2004, 2007) or P600 or both (Gunter et al., 2000; Deutsch & Bentin, 2001)
- C2:** Predictions are less clear. Possible N400 for **Coercion** due to having to undo coercion. Due to revising expectations of headedness in **Coercion** and **Neutral** conditions, (E)LAN (Friederici, 2002) or P600 (Koester et al., 2009)

Results

C1:

50–150ms window
Extra Syntax significantly more negative than Coercion and Neu-

350–450ms window
Extra Syntax significantly more negative than Coercion and Neutral

500–700ms window
No difference between Coercion and Neutral
Extra Syntax more positive than both Coercion and Neutral

C2:

175–300ms window
Coercion and Neutral significantly more negative than Extra Syntax

500–700ms window
Coercion and Neutral significantly more positive than Extra Syntax

Acknowledgements

We would like to thank Karthik Durvusla and members of the MSU EEG Lab for their valuable input, as well as Þór Eysteinnsson, Einar Jón Einarsson, Þórhallur Eypórssón, Sigrún Helgadóttir Steinþór Steingrímsson, Jóhannes Gísli Jónsson, Brynhildur Stefánsdóttir, Sigríður Sæunn Sigurðardóttir and our participants at the University of Iceland.

Methods

- 18 native speakers of Icelandic
- 105 experimental sentences (35 per condition) + 280 fillers
- Cloze, Plausibility, and Rating task shows experimental items plausible and have the correct interpretations
- Presentation RSVP, followed by comprehension task
 - Fixation cross for 800ms, followed by 200ms blank screen, followed by first word of sentence
 - Each word appeared for 400ms with ISI of 200ms
 - Final word of each sentence was followed by a 1200ms blank screen interval
 - Task word in red letters at center of the screen, remained until response or for maximum of 3 seconds

Discussion

No significant effect for Coercion at C1: Why?

- Delogu et al. (2012): N400 response to coercion is due to surprisal. Our Cloze test established no difference between conditions for probability of occurrence of noun at C1. No surprisal, no N400?
- Frisson & Frazier (2005): Presence of a numeral cued a count interpretation. Did *another* do the same?

Clear effect for Extra Syntax at C1 relative to Coercion and Neutral conditions

- Early anterior negativity at 50-150ms. Possibly early detection of gender mismatch
- Anterior negativity at 350-450ms; we interpret this as detection of a gender mismatch
- P600; we interpret this as building unexpressed container noun into syntax

Coercion and Neutral conditions distinct from Extra Syntax at C2

- Assuming Coercion and Neutral conditions forced a commitment to C1 as head noun, this must be revised at C2
- We interpret the early anterior negativity at 175-300ms for Coercion and Neutral conditions as evidence of difficulty in building compound phrase
- We interpret positivity at 500-700ms for Coercion and Neutral as evidence of structural revision
- Extra Syntax: no restructuring necessary, as all of the restructuring was accomplished at C1 (cf. Koester et al., 2009)

