Extraction from clausal adjuncts in Czech: A rating study

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Adverbial clauses: Between subordination and coordination

University of Cologne
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Adjunct islands

Clausal tensed adjuncts are traditionally considered islands for extraction:

(1) *Who did Mary cry [after John hit t]?   Huang 1982

Exceptions noted frequently: Grosu 1981; Deane 1991; Kluender 1998; a.o.

(2) This is the watch OP that I got upset [when I lost t]

(3) The person who I would kill myself [if I couldn't marry t] is Jane.

Growing experimental evidence
       Dal Farra 2019; Kush et al. 2019; Bondevik et al. 2021

(4) […] men [$_{CT}$ takkekortene]   blir   hun skuffet   [om de   glemmer
     but   thank.you.cards.DEF becomes she disappointed if   they forget
   å   sende ut   t med en   gang].
   to send   out   with one time
   '[…] but the thank you cards she will be disappointed if they forget to send our
   right away.'   (Norwegian)

Extraction from clausal adjuncts in Czech

Extraction from **conditional** adjuncts: Lešnerová & Oliva 2003

(5) Na každé hračce je nálepka, kterou [když dítě odevzdá t], obdrží   dárek.
     on every toy   is sticker   which when child hands.in   receives gift
     'On every toy there's a sticker such that when a child hands the sticker in, they
     receive a gift.'

Extraction from other clausal adjunct types: Biskup & Šimík 2019

(6) **Correlative clause**
     To je ten chlap, kterému [co   dáš   t], to ztratí.
     that is the man   which.DAT what give.2SG   that loses
     'That's the man such that he will lose whatever you give him.'

(7) **Purpose clause**
     To je řečník, kterého [aby   nalákali t], museli by mít peníze.
     that is speaker which.ACC in.order attract   must SBJV have money
     'That's a speaker such that they'd have to have money in order to attract him.'

(based on corpusd data/intuitions)

Left vs. right adjunct

Extraction from left adjuncts is acceptable; not so from right adjuncts:

Biskup & Šimík 2019

(8) **Correlative (left) vs. free relative (right) clause**

     a.   To je ten chlap, kterému [co dáš   t], to ztratí.
        that is the man which.DAT what give.2SG   that loses

     b.   *To je ten chlap, kterému ztratí [co dáš   t].
        that is the man which.DAT loses what give.2SG
        (Intended:) 'That's the man such that he will lose whatever you give him.'

(9) **Purpose clause (left vs. right)**

     a.   To je řečník, kterého [aby   nalákali t], museli by mít peníze.
        that is speaker which.ACC in.order attract   must SBJV have money

     b.   *To je řečník, kterého by museli mít peníze [aby   nalákali t].
        that is speaker which.ACC SBJV must have money in.order attract
        (Intended:) 'That's a speaker such that they'd have to have money in order
        to attract him.'

(based on intuitions)

Terminological note: left = peripheral, right = central

Relative vs. interrogative

Relative extraction more acceptable than interrogative extraction:

(10) **Relative vs. interrogative (out of correlative)**

    a.   To   je ten chlap, kterému   [co   dáš   t], to   ztratí.
        that is the man   which.DAT what give.2SG   that loses
        'That's the man such that he will lose whatever you give him.'

    b. ?Nevím,   kterému chlapovi [co   dáš   t], to   ztratí.
        NEG.know which   man.DAT what give.2SG   that loses
        Intended: 'I don't know which man is such that he will lose whatever you give him.'

(11) **Relative vs. interrogative (out of purpose)**

    a.   To   je řečník, kterého   [aby   nalákali t], museli by   mít peníze.
        that is speaker which.ACC in.order attract   must SBJV have money
        'That's a speaker such that they'd have to have money in order to attract him.'

    b. ?Nevím,   kterého řečníka   [aby   nalákali t], museli by   mít
        NEG.know which   speaker.ACC in.order attract   must SBJV have
        peníze.
        money
        Intended: 'I don't know which speaker is such that they'd have to have money in order to attract him.'

(based on intuitions)

Summary of preliminary data

Extraction from left adjuncts   ✓
Extraction from right adjuncts ✗

Extraction of relative pronouns   ✓
Extraction of interrogative phrases ✗

Summary of preliminary data

Extraction from left adjuncts ✓
Extraction from right adjuncts ✗

Left adjuncts are believed to be

- more complex than right adjuncts   Haegeman 2003
- in derived positions/specifiers   Huang 1982; Müller 2010
- backgrounded/presupposed/topicalized   Mathesius 1947; Declerck & Reed 2001; a.o.

→ **wrongly** expected to be opaque for extraction (by most locality theories)

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Extraction of relative pronouns   ✓
Extraction of interrogative phrases ✗

Relative pronouns/operators are believed to be

- more complex than interrogative ones   Rudin 2009; Daskalaki 2020
  (e.g. Bulgarian interrogative *koj* vs. relative *kojto*)
- backgrounded/anaphoric (not focused)   Abeillé et al. 2020

→ **correctly** expected to be more mobile (by most locality theories)

Conceivable approaches

> Syntax/Semantics-based approach [SynSem]

Left vs. right

- Left clausal adjuncts are clausal (propositional), syntactically part of the host clause (not orphans) restricting modal/conditional operators
  <div align="right">Kratzer 2012</div>

  (12) $\forall w[\text{ACC}(w, w_0) \land [\![CP_{\text{adjunct}}]\!](w) \rightarrow [\![\text{consequent}]\!](w)]$

- Right clausal adjuncts are nominal, i.e. entity-denoting free relatives, arguments in the event structure   Hall & Caponigro 2011; Haegeman 2022; Souza de Paula 2022

  (13) $\exists e[[\![\text{verb}]\!](e) \land \theta(e, [\![NP_{\text{adjunct}}]\!])]$

- Clauses are transparent for extraction; complex nominals are not.

- Adjunct island reduced to complex NP island.
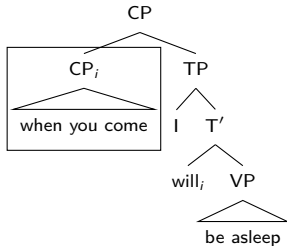
  <div align="right">Biskup & Šimík 2019</div>

Relative vs. interrogative

- Relative phrases/operators are structurally more complex than interrogative ones; e.g. Bulgarian *kojto* vs. *koj*.   Rudin 2009; Daskalaki 2020

- More complex/featurally specific phrases are more syntactically mobile.
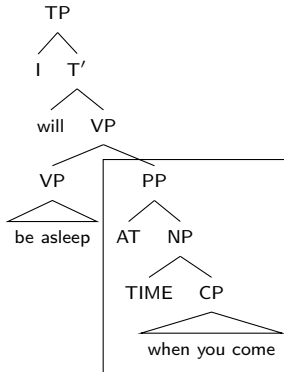 <div align="right">Starke 2001; Abels 2012</div>

Conceivable approaches

Syntax/Semantics-based approach [SynSem]

Left adjunct – proposition


```
          CP
        ┌──┴──┐
      CP_i     TP
   ┌────┐    ┌──┴──┐
  when you come  I    T'
              │   ┌──┴──┐
            will_i    VP
                      │
                  be asleep
```

(14) $\lambda s \forall s'[R(s', s) \wedge \boxed{\exists t[\text{you come}(s', t)]}$
$\rightarrow \text{I'm asleep}(s', t)]$

Right adjunct – time interval

```
        TP
      ┌──┴──┐
     I      T'
          ┌──┴──┐
        will     VP
              ┌───┴───┐
             VP       PP
              │     ┌──┴──┐
          be asleep AT    NP
                       ┌──┴──┐
                    TIME    CP
                          ┌──┴──┐
                       when you come
```

(15) $\lambda s \forall s'[R(s', s) \rightarrow \text{I'm asleep}(s',$
$\boxed{\iota t \text{ you come}(s', t)})]$

cf. Heycock 2022

Conceivable approaches

Information structure-based approach [InfoStr]

Left vs. right

- **Left** clausal adjuncts are informationally **backgrounded** and hence expected to be **less transparent**.

- **Right** clausal adjuncts are informationally **focused** and hence expected to be **more transparent**.

- This goes counter to the reported Czech data.

Erteschik-Shir 1973; Goldberg 2006; Abeillé et al. 2020

Relative vs. interrogative

- **Relative** pronouns are **backgrounded**. Extraction from backgrounded clauses is therefore expected to be **acceptable**.

- **Interrogative** phrases are **focused**. Extraction from backgrounded clauses is therefore expected to **unacceptable**.

- No difference expected for extraction from right clauses.

(16) **Focus–background conflict (FBC) constraint**
A focused element should not be part of a backgrounded constituent.

Abeillé et al. 2020

Research questions and hypotheses

Q1 Does ADJUNCT POSITION play a role for extraction?

Q2 Does the TYPE of the extracted WH-PHRASE play a role?

Q3 Does an overt NOMINAL LAYER in the adjunct play a role?

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References

Research questions and hypotheses

Q1 Does ADJUNCT POSITION play a role for extraction?

- SynSem: left > right
- InfoStr: right > left

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Research questions and hypotheses

Q1 Does ADJUNCT POSITION play a role for extraction?

- SynSem: left > right
- InfoStr: right > left

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- SynSem: relative > interrogative (within left)
  (relative & interrogative equally bad within right)
- InfoStr: relative > interrogative (within left)
  (relative & interrogative equally good within right)

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- SynSem: relative > interrogative (within left)
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- InfoStr: relative > interrogative (within left)
  (relative & interrogative equally good within right)

Q3 Does an overt NOMINAL LAYER in the adjunct play a role?

- SynSem: absent > present (within left)
  (absent & present equally bad within right)
- InfoStr: absent > present (by assumption)
  (within right & for rel within left)

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References

Design, materials, participants, task

stimulus (schematic)	ADJUNCT POSITION	WH-PHRASE TYPE	NOMINAL LAYER
song which [when hear t] relax	left	rel	abs
song which [at time when hear t] relax	left	rel	pres
wonder which song [when hear t] relax	left	inter	abs
wonder which song [at time when hear t] relax	left	inter	pres
song which relax [when hear t]	right	rel	abs
song which relax [at time when hear t]	right	rel	pres
wonder which song relax [when hear t]	right	inter	abs
wonder which song relax [at time when hear t]	right	inter	pres

- $2 \times 2 \times 2$ crossed design; 8 unique conditions
- within-items & within-subjects manipulation
- Latin Square distribution of stimuli
- 48 experimental items & 64 fillers (subexperiments; see section on fillers)
- 96 participants (non-experts)
- 576 observations per condition
- naturalness rating (1 completely unnatural – 7 completely natural)
- administration and pseudo-randomization via L-Rex   Starschenko & Wierzba 2021

Materials: Example and properties

(17) left+rel+abs/pres
Znám   písničku, kterou   [{když / ve chvíli, kdy} posloucháš t], lépe   se
know.1SG song   which.ACC   when   at time   when listen.2SG   better REFL
soustředíš.
concentrate.2SG
'I know a song such that you can concentrate better when you listen to it.'
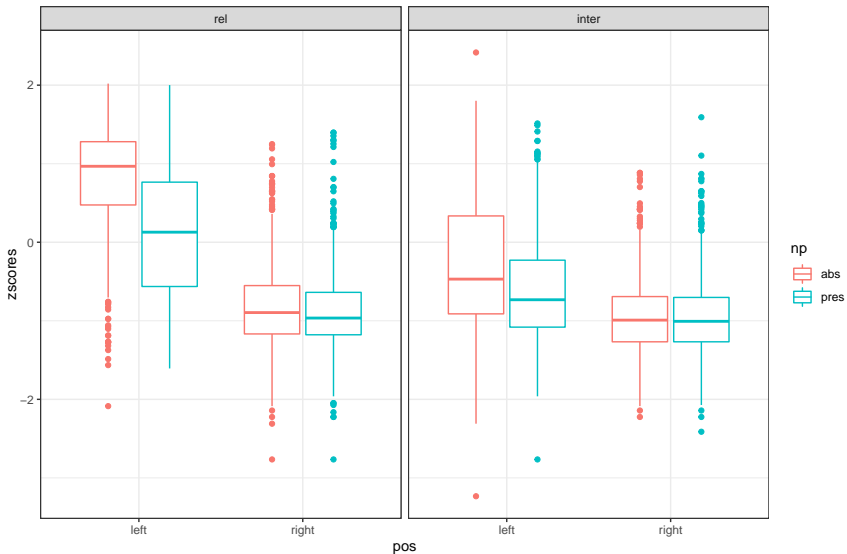
(18) left+inter+abs/pres
Nevím,   kterou písničku [{když / ve chvíli, kdy} posloucháš t], lépe   se
NEG.know.1SG which song.ACC   when   at time   when listen.2SG   better REFL
soustředíš.
concentrate.2SG
'I don't know which song is such that you can concentrate better when you listen to it.'

Constant properties of items:

* relative pronoun *který* 'which' (most common and neutral)
* embedded interrogatives with *který NP* 'which NP' (syntactically and semantically closest to the corresponding relative)

Varying properties of items:

* syntactic function of extracted element (mostly objects, 10 adverbial, 5 subjects)
* grammatical number of extracted element (41 sg, 7 pl)
* adjunct type (mostly conditional/temporal of different types, 9 purpose)
* overt NP (mostly nominal, sometimes modified by a demonstrative, sometimes only demonstrative)
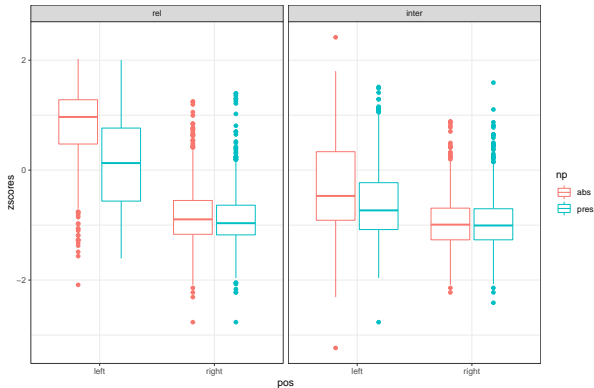* pronominal/pro in main clause bound by extracted operator (43 absent, 5 present)

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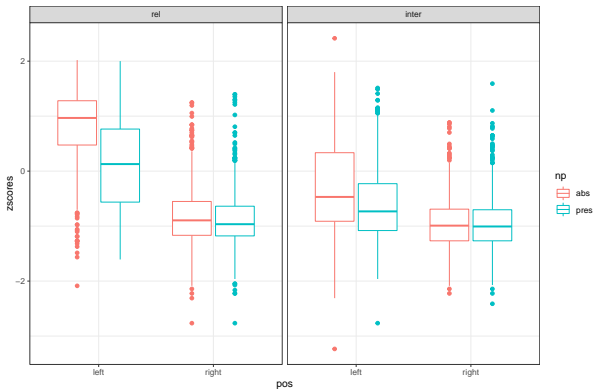○○○○

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Results (i)

Main effect of ADJUNCT POSITION $[t = 9.214, p < 0.0001]$

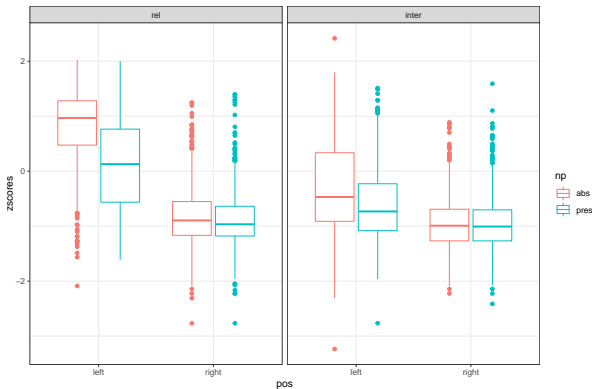- Extraction from left adjuncts more natural than from right adjuncts.

Results (i)

Main effect of ADJUNCT POSITION $[t = 9.214, p < 0.0001]$

- Extraction from left adjuncts more natural than from right adjuncts.

- SynSem ✓   InfoStr ✗

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Results (ii)

Interaction between ADJUNCT POSITION and NOMINAL LAYER $\quad [t = 5.703, p < 0.0001]$

- The presence of a nominal layer on top of the adjunct makes extraction less natural, but only in the left condition.

Background
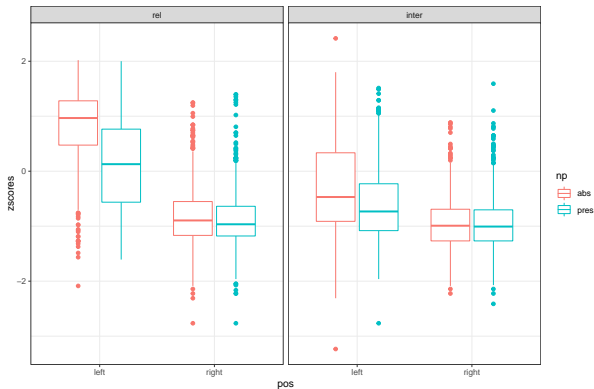00000000

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Results (ii)

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Results (iii)

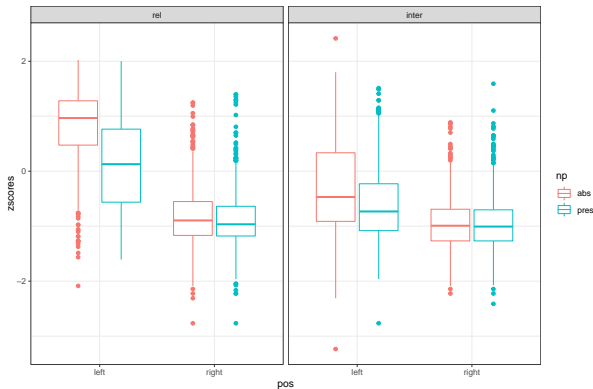Interaction between ADJUNCT POSITION and WH-PHRASE TYPE $[t = 12.129, p < 0.0001]$

- Extraction of relative pronouns is more natural than that of interrogative phrases, but only in the left condition; they are equally bad in the right condition.

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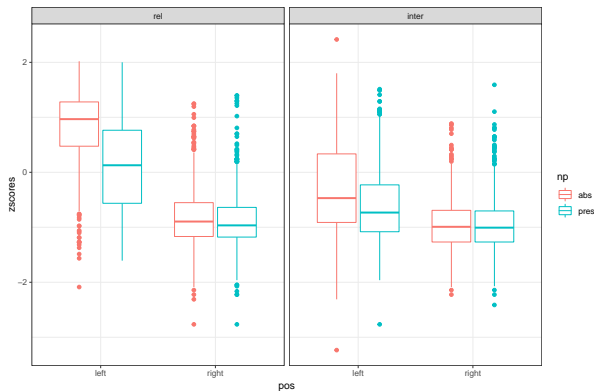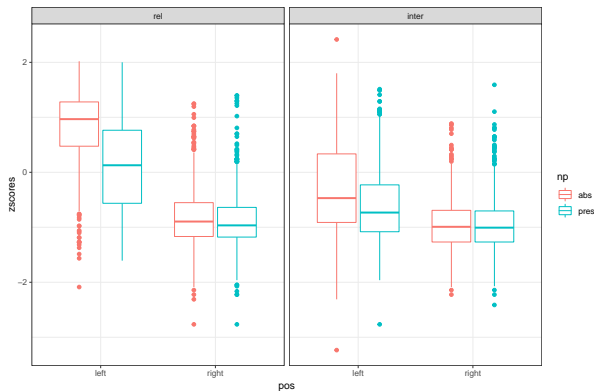
- SynSem ✓   InfoStr ✗

Results (iv)

Three-way interaction POSITION × WH-TYPE × NP LAYER $[t = 4.623, p < 0.0001]$

- Extraction from right adjuncts is unnatural across all sub-conditions.
- The naturalness of extraction from left adjuncts gradually decreases from the most natural rel+abs condition, through rel+pres, inter+abs, to the least natural inter+pres condition.

Results (iv)

Three-way interaction POSITION × WH-TYPE × NP LAYER $[t = 4.623, p < 0.0001]$

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- SynSem ✗   InfoStr ✗

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Results: Summary

Main effect of ADJUNCT POSITION $\qquad$ $[t = 9.214, p < 0.0001]$

- Extraction from left adjuncts more natural than from right adjuncts.

- | SynSem ✓   InfoStr ✗ |

Interaction between ADJUNCT POSITION and NOMINAL LAYER $\qquad$ $[t = 5.703, p < 0.0001]$

- The presence of a nominal layer on top of the adjunct makes extraction less natural, but only in the left condition.

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Interaction between ADJUNCT POSITION and WH-PHRASE TYPE $\qquad$ $[t = 12.129, p < 0.0001]$

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- | SynSem ✗   InfoStr ✗ |

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Model

Linear mixed model fit by REML. t-tests use Satterthwaite's method ['lmerModLmerTest']

Formula: zscores $\sim$ pron * pos * np + (1 | subject) + (1 | item)

REML criterion at convergence: 8963.7

Scaled residuals:

Min	1Q	Median	3Q	Max
-4.2418	-0.6339	-0.0773	0.5786	3.7626

Random effects:

Groups	Name	Variance	Std.Dev.
subject	(Intercept)	0.009982	0.09991
item	(Intercept)	0.042599	0.20640
Residual		0.389931	0.62444

Number of obs: 4608, groups: subject, 96; item, 48

Fixed effects:

	Estimate	Std. Error	df	t value	Pr(>|t|)	
(Intercept)	-9.354e-01	4.085e-02	1.356e+02	-22.896	< 2e-16	***
pron	6.996e-02	3.681e-02	4.459e+03	1.901	0.0574	.
pos	3.393e-01	3.682e-02	4.459e+03	9.214	< 2e-16	***
np	5.639e-03	3.681e-02	4.459e+03	0.153	0.8783	
pron×pos	6.314e-01	5.205e-02	4.459e+03	12.129	< 2e-16	***
pron×np	4.655e-02	5.206e-02	4.459e+03	0.894	0.3713	
pos×np	2.970e-01	5.208e-02	4.459e+03	5.703	1.25e-08	***
pron×pos×np	3.404e-01	7.363e-02	4.459e+03	4.623	3.89e-06	***

Coding: all factors treatment-coded; reference levels: left, rel, abs (following the baseline observation).

Summary

- Extraction from clausal adjuncts natural in Czech.
- Fully natural only extraction of relative pronouns from left adjuncts.
- Clear naturalness penalty on extracting interrogative wh-phrases.
- Floor unnaturalness of extraction from right adjuncts (whether of relative or interrogative phrases).

Discussion: left vs. right

- The **left–right asymmetry** expected by Biskup & Šimík's (2019) syntactic-semantic analysis of Czech adjuncts:
  - Left adjuncts are CPs/propositions and hence in principle transparent for extraction.
  - Right adjuncts are complex NPs (free relatives)/referential entities and hence opaque for extraction.
  - Unexpected: Extraction from overtly NP-headed adjuncts is much more natural than extraction from right adjuncts (NP-headed or not). This difference is not predicted by Biskup & Šimík (2019).
- The **left–right asymmetry** unexpected by Erteschik-Shir's (1973) or Abeillé et al.'s (2020) information structural theory of locality.
  - Left adjuncts are backgrounded and thus should be islands.

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Discussion: rel vs. inter

- The **relative–interrogative asymmetry**, where relative pronouns are more mobile than interrogative phrases, is expected by a syn-sem theory:
    - Relative pronouns are structurally more complex and hence more mobile.
    - The contrast is only attested in extraction from left adjuncts; right adjuncts are strong islands.
- The **relative–interrogative asymmetry** is also expected by the information structural theory.
    - Extraction of backgrounded from backgrounded.
    - Unexpected: Any extraction is unnatural from right adjuncts (expected to be natural by the information structural theory).

Conclusion

- The naturalness of long-dinstance extraction depends on various factors and their interactions (see also filler experiments).

- Theory of locality must be multi-factorial and the factors stem from various language domains.

- Syntactic and semantic factors have to be part of the mix.

- Not all kinds of A-bar extraction are alike.

- Our evidence goes against a strong version of the information structural theory of locality, which proves to be insufficient or even wrong for the case of extraction from adjuncts in Czech.

- What exactly is "backgrounded" in the InfoStr theory? Here: encoding by linear order (commonly assumed to encode information structure in Czech); cf. Abeillé et al. (2020), for whom background = grammatical subject (focus = grammatical object).

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<p style="text-align:center; color:red;">Thank you</p>

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Thank you

Thanks to all the coauthors – Petr Biskup, Kateřina Bartasová, Markéta Dančová, Eliška Dostálková, Kateřina Hrdinková, Gabriela Kosková, Jaromír Kozák, Klára Lupoměská, Albert Maršík, Edita Schejbalová, and Illia Yekimov – and the Charles University and its Faculty of Arts for support.

Filler experiments

1. **Extraction types** (4×2; 8 item sets; 96 obs/cond)
   - no extraction, short extraction, long extraction from complement clause, long extraction from complex NP
   - Extraction of relative vs. interrogative

2. **Linear distance** (2×2; 4 item sets; 96 obs/cond)
   - short vs. long
   - relative vs. interrogative

3. **Extraction of relative pronouns from adjuncts + long distance** (2×2 cond; 4 item sets; 96 obs/cond)
   - extraction from adjunct + from complement clause vs. from adjunct + across modal
   - left adjunct vs. right adjunct

4. **Nominal layer in adjuncts** (2×2; 4 item sets; 96 obs/cond)
   - NP absent vs. present
   - left adjunct vs. right adjunct

5. **Extraction from weak islands** (3×2; 6 item sets; 96 obs/cond)
   - declarative complement, polar interrogative complement, wh-interrogative complement
   - relative vs. interrogative

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Extraction types: Materials

stimulus (schematic)	WH-PHRASE TYPE	EXTRACTION TYPE
asked which soup think [that ate t]	inter	long
asked which soup think [it that ate t]	inter	island
asked which soup ate t	inter	short
asked whether ate soup	inter	no
soup which think [that ate t]	rel	long
soup which think [it that ate t]	rel	island
soup which ate t	rel	short
soup that ate it	rel	no/res.

Extraction types: Results

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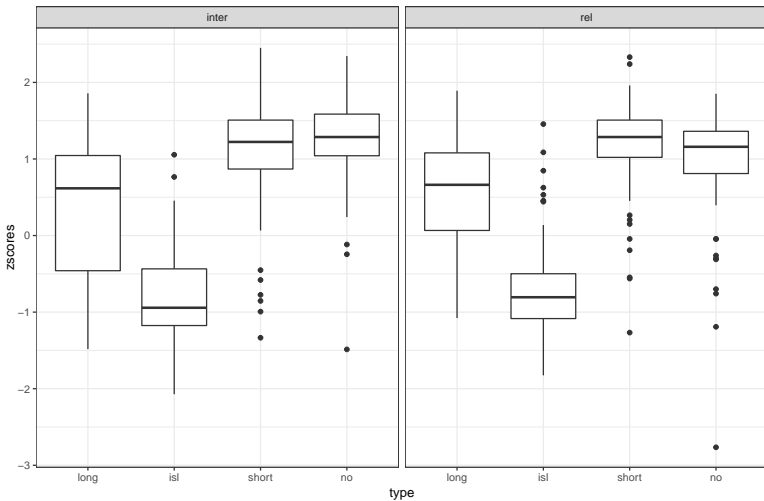
Extraction types: Discussion

Discussion:

- penalty for long extraction compared to short/no extraction (difference $\sim 0.5\sigma$)
- robust penalty for extraction out of islands compared to short/no extr. (difference $\sim 2\sigma$)
- no difference between extraction of relative and interrogative
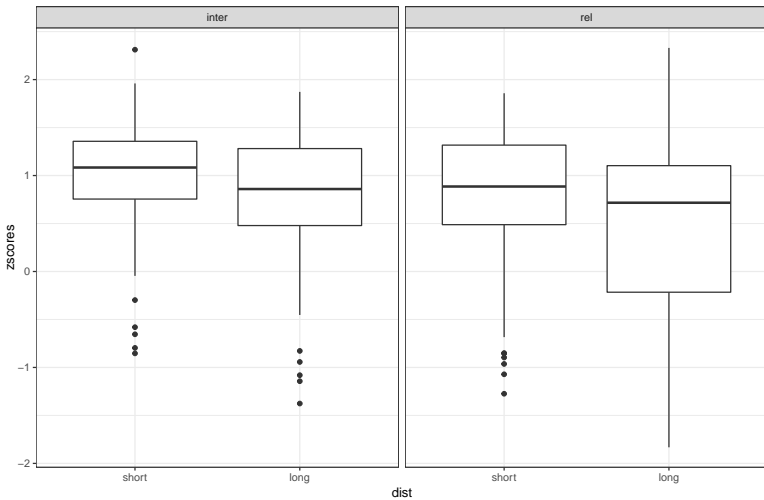
Relevance for main experiment:

- extraction of relative pron. from left adjuncts in **main** comparable to long extraction out of complements (difference $\sim 0.2\sigma$ in favor of extr. from adjuncts)
- extraction from right adjuncts in **main** comparable to extraction from islands (both $\sim 1\sigma$ below average)

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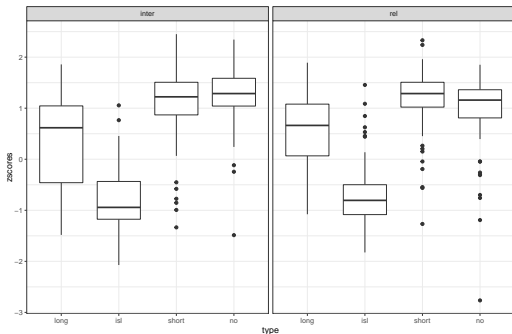
Linear distance: Materials

stimulus (schematic)	WH-PHRASE TYPE	DISTANCE
asked which soup ate t doctor [who…]	inter	short
asked which soup doctor [who…] ate t	inter	long
soup which ate t doctor [who…]	rel	short
soup which doctor [who…] ate t	rel	long

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Linear distance: Results

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Linear distance: Discussion

Discussion:

- linearly short distance extraction slightly better than linearly long distance extraction (difference: $\sim 0.2\sigma$)

- extraction of interrogative slightly better than extraction of relative (difference: $\sim 0.2\sigma$); attributable to two instances of relativization in the relative condition

Relevance for main experiment:

- the robust effect of POSITION in **main** cannot be attributed to linear distance

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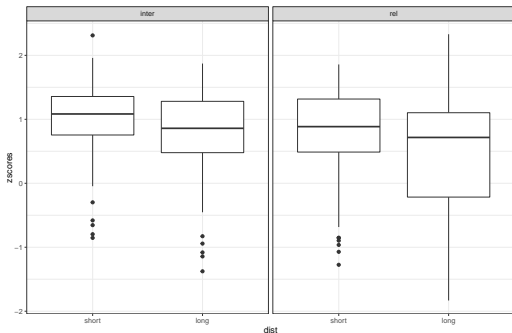
Adjuncts + long(er) distance: Materials

stimulus (schematic)	ADDED COMPLEXITY	ADJUNCT POSITION
soup which [think that [when ate t] slept]	compl. clause	left
soup which [think that slept [when ate t]]	compl. clause	right
soup which [probably [when ate t] slept]	epist. modal	left
soup which [probably slept [when ate t]]	epist. modal	right

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Adjuncts + long(er) distance: Results
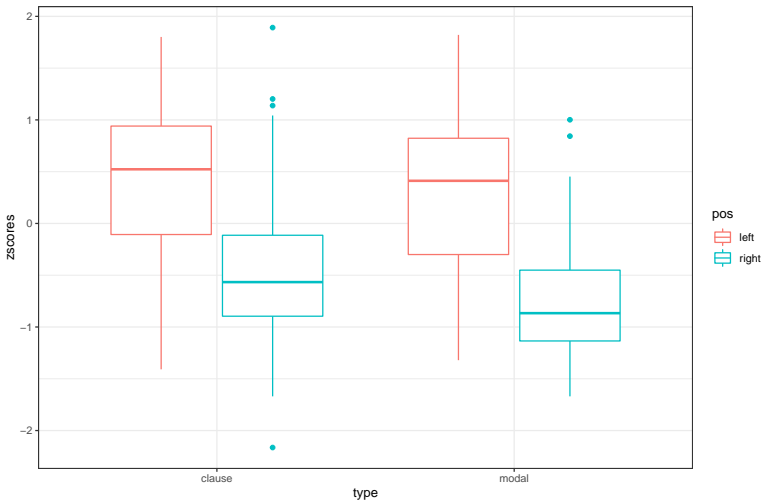
Adjuncts + long(er) distance: Discussion

Discussion:

- extraction from left adjuncts more natural than from right adjuncts
- extraction from a complement clause slightly better than extraction across a modal
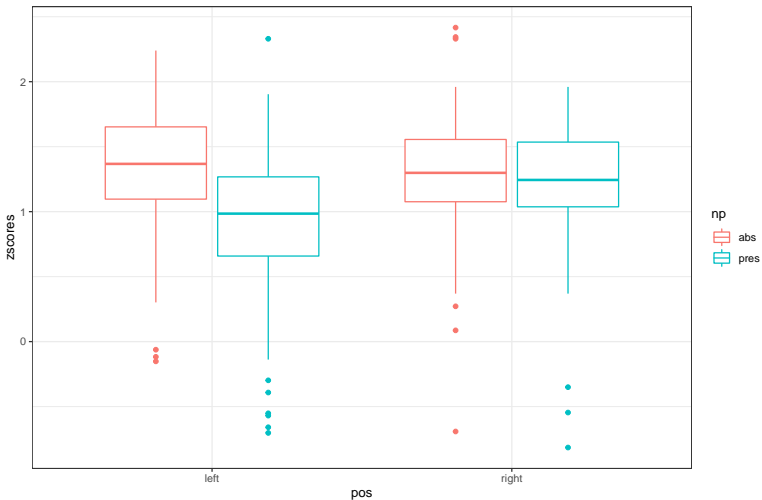
Relevance for main experiment:

- the effect of POSITION from **main** replicated, despite the added syntactic complexity
- the effect size is somewhat compressed, possibly due to the added complexity in parsing (difference in **main** $\sim 1.7\sigma$ vs. difference here $\sim 1.1\sigma$)
- evidence that the extraction from adjuncts under discussion is really extraction **out of** the adjunct, not just **to the edge of** the adjunct; cf. Heck 2008; Grewendorf 2015
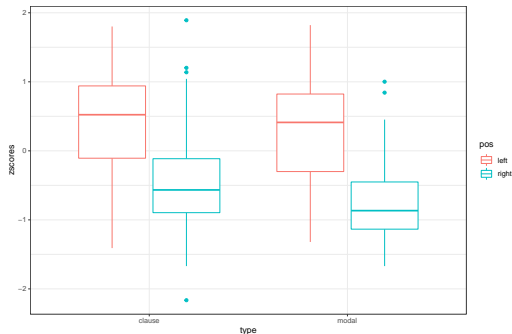
Nominal layer in adjuncts: Materials

stimulus (schematic)	ADJUNCT POSITION	NOMINAL LAYER
[when cook dinner] watch TV	left	absent
[at time when cook dinner] watch TV	left	present
watch TV [when cook dinner]	right	absent
watch TV [at time when cook dinner]	right	present

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Nominal layer in adjuncts: Results

Nominal layer in adjuncts: Discussion

Discussion:

- no penalty on right adjuncts (compared to left)
- penalty for left adjuncts with a nominal layer present (difference $\sim 0.3\sigma$)

Relevance for main experiment:

- the POSITION effect in **main** cannot be attributed to general adjunct position
- the NOMINAL LAYER effect size in **main** (in the left+rel condition) is larger than the one observed here (**main** $\sim 0.7\sigma$ vs. here $\sim 0.3\sigma$)
- the extraction-independent penalty of NOMINAL LAYER ($\sim 0.3\sigma$) should presumably be subtracted from the extraction-specific penalty ($\sim 0.7\sigma$)
- the extraction-specific penalty of NOMINAL LAYER is quite small (counter to SynSem expectations); also, it gets "evened out" across the WH-PHRASE TYPE levels
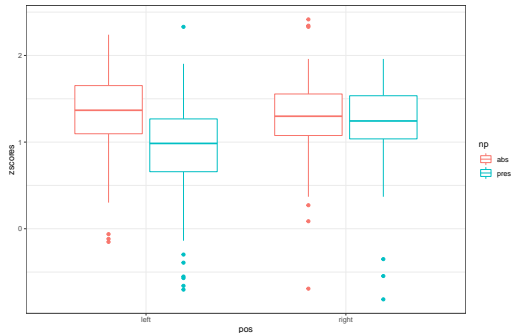
Extraction from weak islands: Materials

| stimulus (schematic)	WH-PHRASE TYPE	COMPLEMENT TYPE
asked which soup not know [that cooked t]	inter	decl
asked which soup not know [whether cooked t]	inter	polar
asked which soup not know [when cooked t]	inter	wh
soup which not know [that cooked t]	rel	decl
soup which not know [whether cooked t]	rel	polar
soup which not know [when cooked t]	rel	wh

Extraction from complement clauses: Results
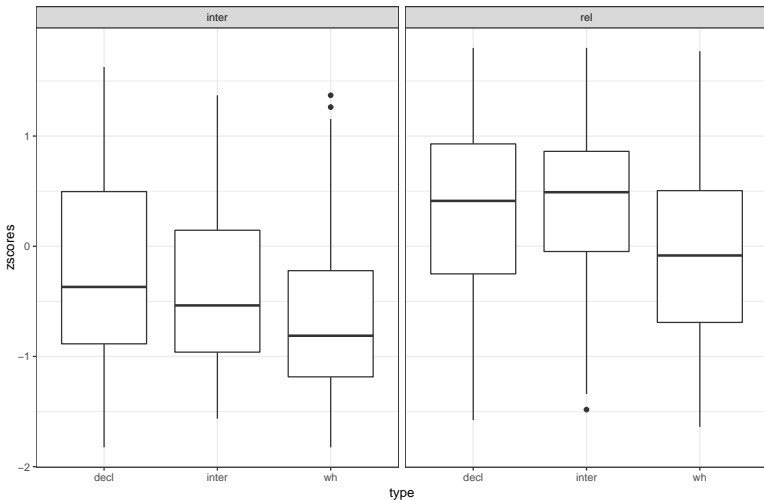
Extraction from complement clauses: Discussion

Discussion:

- extraction of relative more natural than extraction of interrogative (difference $\sim 0.7\sigma$)
- attributable to the weak island status of complements to the negative matrix verb; interrogative more sensitive to this than relative

Relevance for main experiment:

- overall less natural than extraction from complement clauses (filler exp. 1; difference for rel $\sim 0.3\sigma$, for inter $\sim 0.9\sigma$)
- no clear relation to extraction from left adjuncts; while the extraction of inter across negation is comparable to to the extraction of inter from left adjuncts in the **main** experiment, extraction of rel is more natural from left adjuncts than across negation (difference $\sim 0.5\sigma$)

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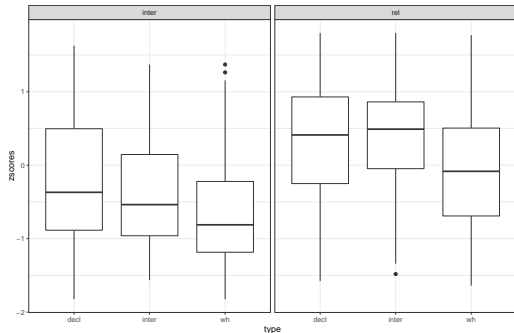
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