

The relation between information structure,
prosody, and word order in Slavic
— a crosslinguistic experimental study

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- **Background:** previous research on the relation of information structure, prosody, and word order across languages
- **Experiments on Polish and Czech:**
 1. Scrambling in an all-new context
 2. Scrambling a given object
 3. Interaction of givenness, focus, contrast
- **Analysis** in terms of weighted constraints

Background: prosody, word order, information structure

Our research question: how are the components prosody, word order and information structure connected with each other?

Prosodic approach

A clash between principles of **prosody-IS-mapping** and **prosody-word-order-mapping** causes word order variation, e. g.:

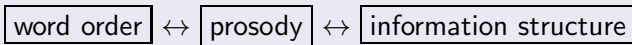
- **Zubizarreta (1998) for Spanish:**

Rule 1: Put sentence stress on the focus.

Rule 2: Put sentence stress on the rightmost element.

→ Results in a conflict if the focus is not rightmost.

→ Solution: Move the focused element to the right periphery.



Further examples of prosodic approaches

- **Szendrői (2001, 2003) for Hungarian**

Rule 1: Put sentence stress on the focus.

Rule 2: Put sentence stress on the leftmost element.

→ Foci move to the left periphery.

- **Neeleman and Reinhart (1998) for Dutch:**

Rule 1: Do not put sentence stress on given elements.

Rule 2: Put sentence stress on the rightmost element.

→ Given elements are scrambled away from the rightmost position.

Background: prosody, word order, information structure

For Czech, there is a research tradition that assumes a direct connection between word order and information structure:

Czech linguistic (functionalist) tradition

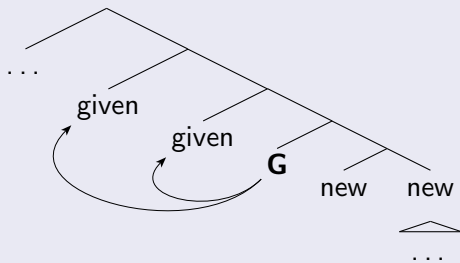
Communicative dynamism (Firbas 1957, 1992) governs word order, in that **less dynamic** (familiar, discourse old, functional) expressions tend to **precede more dynamic** (new, contrastive, lexically rich) expressions, see also e.g. Mathesius (1939).

word order ↔ information structure

Background: prosody, word order, information structure

Recent formalization

Kučerová (2007, 2012) formalized the idea of a given-new-partition in Czech within a generative framework. She argued for a **“G-operator”** that marks elements in its scope as given and thus divides the structure into a **given and a new part**.



→ Is scrambling a result of this partitioning requirement?

Prosodic approach: conflicting rules in Czech

We think that it is worth trying to apply this approach to Czech:

Given elements are deaccented in Czech

“Constituents which are **known, repeated, self-evident, or functional**, are typically **unaccented**, whereas constituents which are important, new (i.e. not repeated) have accent, in which they can be told apart from known constituents.” (Petřík 1938:132–33)

Sentence stress is rightward-oriented in Czech

On the level of the phonological phrase and the intonational phrase, **stress** is assigned to the **right** (see Daneš 1957:63):

(*)	IP
(*)	(*)	pP
Naštvaní	učitelé	stávkovali	před	budovou	parlamentu.						

→ Is scrambling a result of this conflict?

Experiments: general information

- **Participants:** 40 students in Prague (native speakers of Czech), 40 students in Poznań (native speakers of Polish); in progress: Slovak
- **Materials:** auditive stimuli consisting of a context utterance and a target sentence; participants were instructed to rate the target sentence in the given context
- **Task/procedure:** acceptability ratings on a 1–9 scale via computer keyboard. We report normalized z-score values.

Experiments: overview

Experiment 1

What happens in an all-new context?

Experiment 2

Which positions are acceptable for a given object?

Experiment 3

- (a) Is stress-shift an alternative to scrambling?
- (b) How do focus and contrast influence the results?

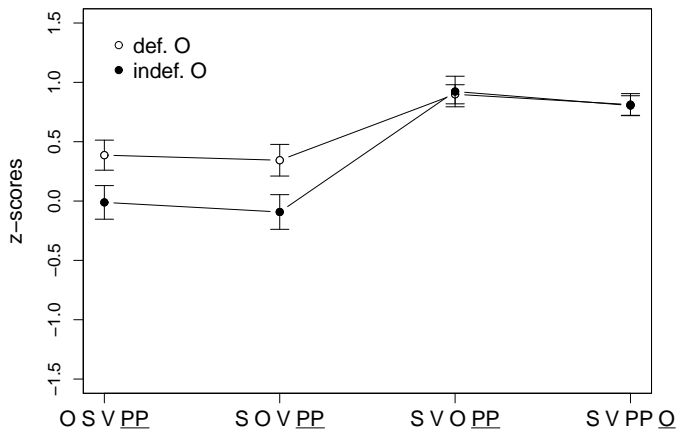
Experiment 1: design and example

2x4 design; factor 1: position of the object; factor 2: definiteness of the object; 32 items; sentence stress was always on the rightmost element

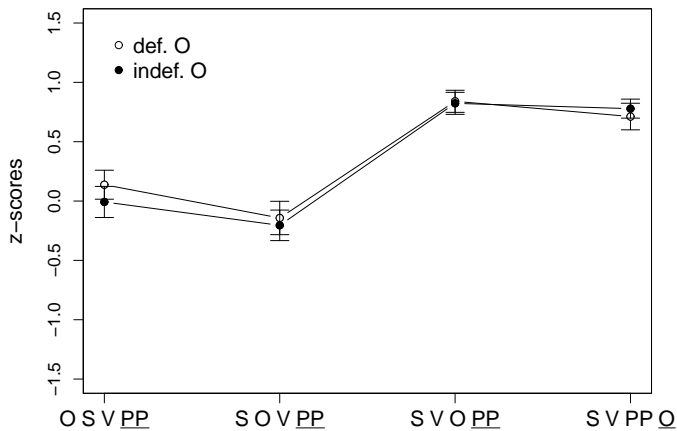
Scrambling the object in an all-new context

- (1) (C) Dávali něco zajímavého ve zprávách?
'Was there anything interesting in the news?'
- (a) Dnes prý ředitele ING-banky maskovaní muži unesli na neznámé místo.
'Today some masked men have allegedly kidnapped the ING-bank director to an unknown place.'
- (b) Dnes prý maskovaní muži ředitele ING-banky unesli na neznámé místo.
- (c) Dnes prý maskovaní muži unesli ředitele ING-banky na neznámé místo.
- (d) Dnes prý maskovaní muži unesli na neznámé místo ředitele ING-banky.

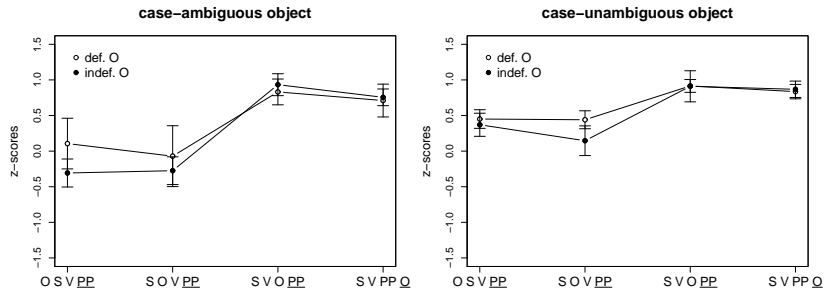
Experiment 1: results for Czech



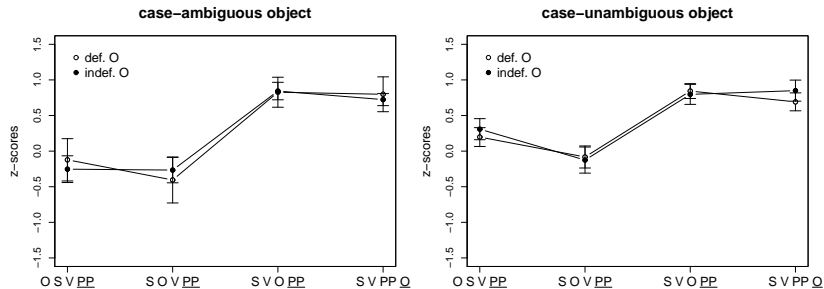
Experiment 1: results for Polish



Experiment 1: confound ambiguity in Czech



Experiment 1: confound ambiguity in Polish



Experiment 2: design and example

2x4 design; factor 1: position of the object; factor 2: givenness of the subject; 32 items; sentence stress was always on the rightmost element

Scrambling a given object (subject is new)

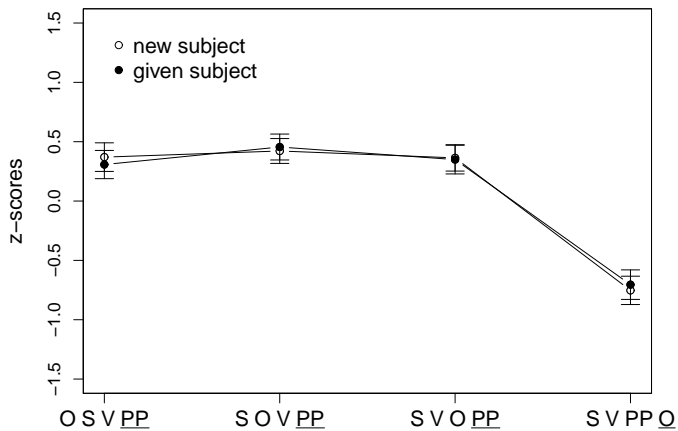
- (2) (C) Zjistil jsi, proč dnes sekretářka tak nadávala?
'Did you find out why our secretary was so angry today?'
- (a) Protože prý **sekretářku** Karel poslal do obchodu.
'Because Karel allegedly sent the secretary to the store.'
- (b) Protože prý Karel **sekretářku** poslal do obchodu.
- (c) Protože prý Karel poslal **sekretářku** do obchodu.
- (d) Protože prý Karel poslal do obchodu sekretářku.

Experiment 2: example

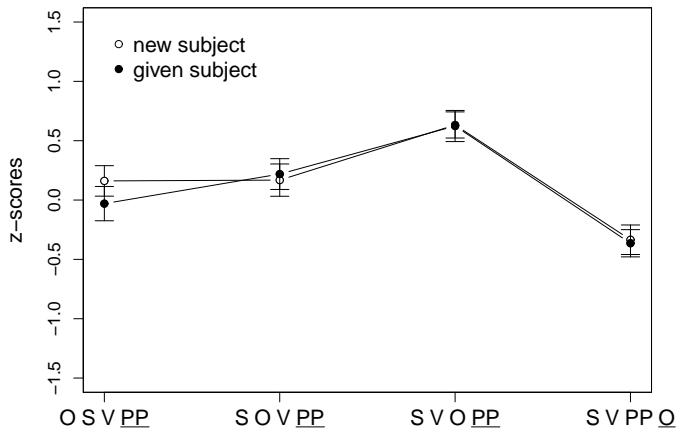
Scrambling a given object (subject is given)

- (3) (C) Zjistil jsi, proč dnes sekretářka nadávala na Karla?
'Did you find out why our secretary was so angry with Karel today?'
- (a) Protože prý **sekretářku Karel** poslal do obchodu.
'Because Karel allegedly sent the secretary to the store.'
- (b) Protože prý **Karel sekretářku** poslal do obchodu.
- (c) Protože prý **Karel** poslal **sekretářku** do obchodu.
- (d) Protože prý **Karel** poslal do obchodu sekretářku.

Experiment 2: example



Experiment 2: results for Polish



Experiment 1 + 2: interim summary of the results

- We see a slight penalty for objects in preverbal position in experiment 1 (where everything is new), which is absent or weaker in experiment 2 (where the object is given).
- In Polish, we see a slight penalty for preverbal objects even when the object is given.
- In both languages, we see a large penalty for S V PP O when the object is given.
- Whether the subject is given or not does have any effect on acceptability, suggesting that a partition between given and new elements is not obligatory.
- It is possible that the definiteness effect observed in Czech is due to the confounding factor ambiguity.

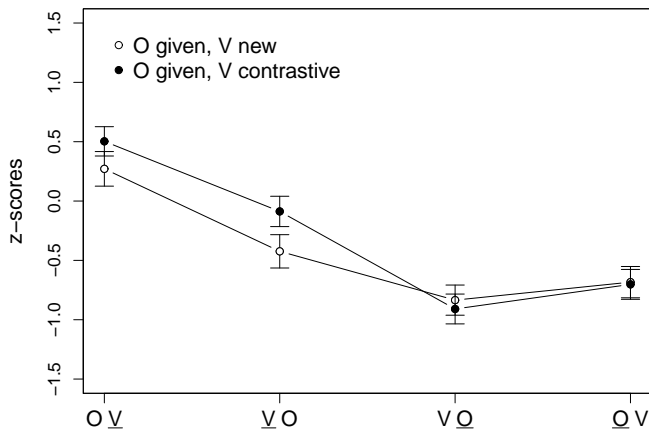
Experiment 3: example

2x2x3 design; factor 1: word order (VO vs. OV); factor 2: sentence stress (on V vs. on O); factor 3: type of context; 32 items; sentence stress was always on the rightmost element

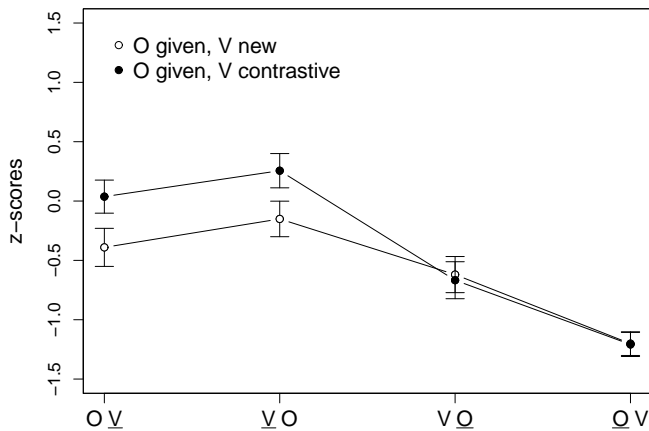
Stress shift in different contexts

- (4) (C₁) Doufám, že ta bouřka nerozbije to okno. **(object given, verb new)**
'I hope that the storm will not break this window.'
- (C₂) Bojím se, že to okno zůstalo otevřené. **(object given, verb contr.)**
'I am afraid that this window has been opened.'
- (C₃) Nevíš, co učitelka zavřela? **(object focused, verb given)**
'Do you know what the teacher closed?'
- (a) Myslím, že učitelka to okno zavřela. OV
'I think that the teacher closed this window.'
- (b) Myslím, že učitelka zavřela to okno. VO
- (c) Myslím, že učitelka zavřela to okno. VO
- (d) Myslím, že učitelka to okno zavřela. OV

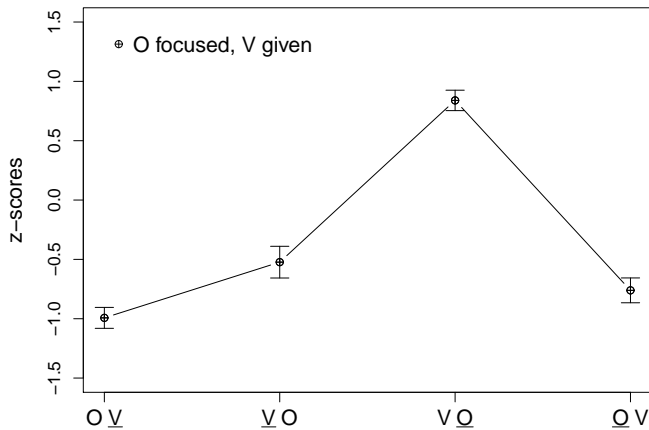
Experiment 3: results for Czech, first part



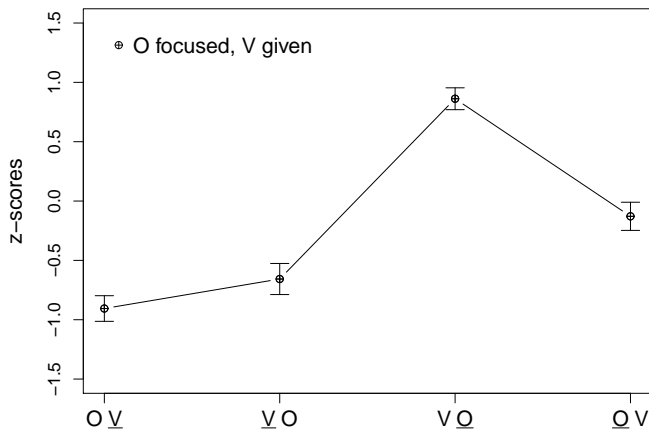
Experiment 3: results for Polish, first part



Experiment 3: results for Czech, second part



Experiment 3: results for Polish, second part



Experiment 3: interim summary of the results

- Stress shift worse than scrambling in Czech, but not in Polish.
- Contrast on a stressed verb raises acceptability.
- Focused objects are best in situ; scrambling them is better in Polish than in Czech.

To capture the gradient acceptability contrasts within and between the languages, we propose to use Linear Optimality Theory:

- “The ranking of linguistic constraints can be implemented by annotating each constraint with a **numeric weight** representing the reduction in acceptability caused by a violation of this constraint.” (Keller 2000:252)
- “The **cumulativity** of constraint violations can be implemented by assuming that the grammaticality of a structure is proportional to the weighted sum of the constraint violations it incurs, where the weights correspond to constraint ranks.” (Keller 2000:252)

Analysis: weighted constraints

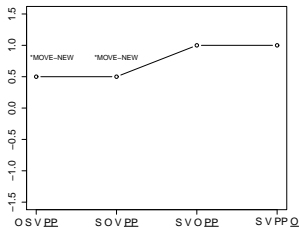
We formulate the result descriptions as weighted constraints:

- Penalty for new objects in preverbal position:
*MOVE-NEW, weight: 0.5 in both languages
- Penalty for preverbal objects even when the object is given:
*MOVE, weight: 0.5 in Polish, 0.0 in Czech
- Penalty for sentence stress on a given element:
DESTRESS-GIVEN, weight: 1.0 in both languages
- Stress shift worse than scrambling in Czech, but not in Polish:
NSR-I, weight: 0.5 in Czech, 0.0 in Polish
- A stressed verb is better if it is contrastive:
V→CONTR, weight: 0.5 in both languages

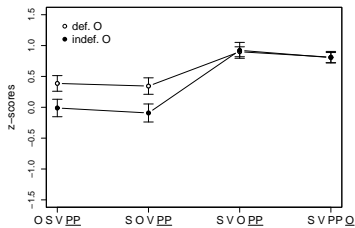
Analysis: predictions of the model for exp 1

CZ

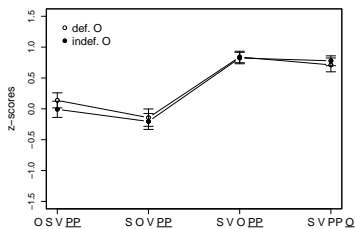
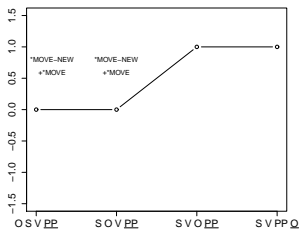
model



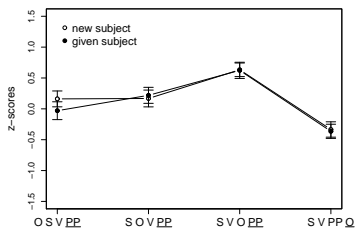
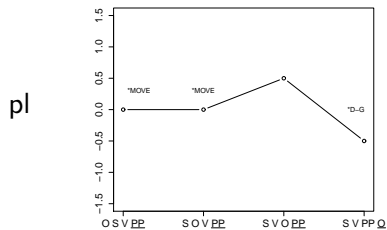
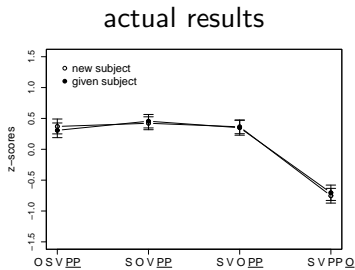
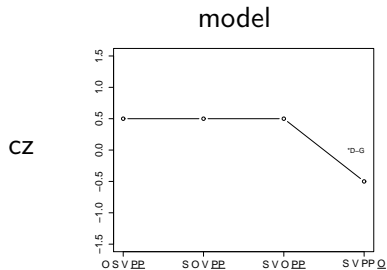
actual results



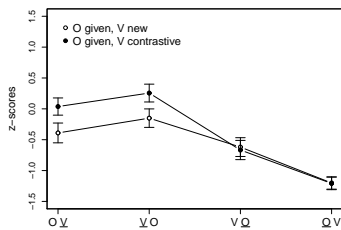
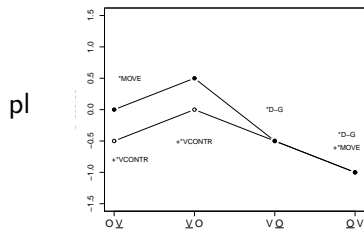
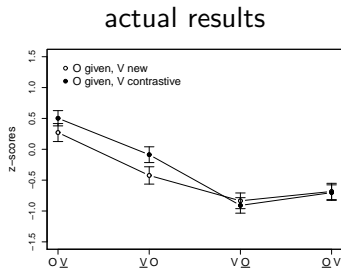
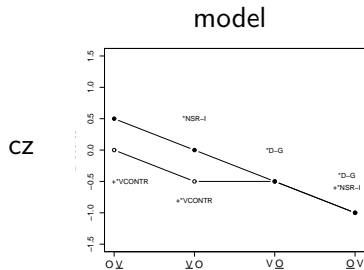
pl



Analysis: predictions of the model for exp 2



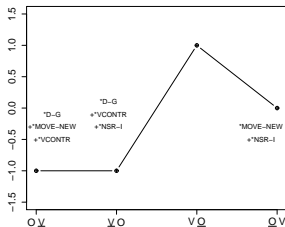
Analysis: predictions of the model for exp 3a



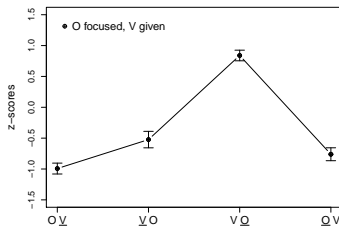
Analysis: predictions of the model for exp 3b

CZ

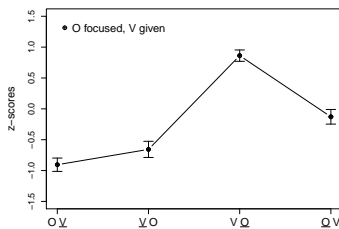
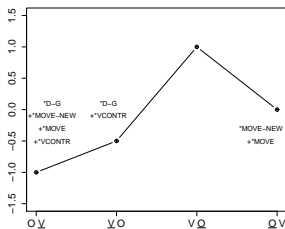
model



actual results



pl



Issues concerning **DESTRESS-GIVEN** and **NSR-I**:

- If we assume that given elements do not receive phrasal stress (a particular interpretation of Féry and Samek-Lodovici's (2005) "DESTRESS-GIVEN: a given phrase is prosodically nonprominent"), and NSR-I strengthens the rightmost phrasal stress (cf. Truckenbrodt 2012), NSR-I would not be violated in structures like VO.
- We thus assume that given elements are capable of bearing phrasal stress, and DESTRESS-GIVEN is violated if a given element's phrasal stress is strengthened so that it is most prominent at sentence level.

Issues concerning *MOVE and *MOVE-NEW:

- *MOVE corresponds to Grimshaw's (1997) STAY constraint. In other frameworks, it is conceptualized as a universal economy condition banning operations that do not result in an otherwise unavailable operation (Reinhart 2006). In our data, it seems that Czech grammar does not involve such an economy condition, and Polish involves only a weak one.
- *MOVE-NEW: This constraint introduces a movement restriction that is dependent on the information structural status of elements—given elements have more freedom to move than new ones. Usually, approaches that assume prosodically motivated syntactic movement do not establish a direct relation between information structure and syntax, but rather an indirect one.

Issues concerning $\underline{V} \rightarrow \text{CONTR}$:

- $\underline{V} \rightarrow \text{CONTR}$ was introduced ad-hoc to explain the differences in experiment 3a. It could be related to more well-established constraints like STRESS-FOCUS, although it seems that a reverse constraint is needed here that penalizes stress on non-focused elements.
- The version “if X bears sentence stress, X is focused” seems to be too strong in view of experiments 1 and 2; the version “if sentence stress is shifted to X, X is focused” would not capture the difference between new and contrastive verb in \underline{OV} structures in Polish, but it could work for Czech. These and other options need to be investigated further.

Results that are not accounted for by the model so far:

- VO with a given object is less acceptable in Czech than predicted by the model (where only DESTRESS-GIVEN is violated). This could be due to an ordering preference concerning definite vs. indefinite elements that we found in previous experiments.
- VO with a given verb and a focused object is more acceptable in Czech than predicted.
- Scrambling a focused object is predicted to be equally acceptable in Czech and Polish, but we see a significant acceptability contrast in the results—is a specific focus scrambling constraint required?
- We have ignored slight differences between pre- and postsubject position in Polish in experiment 1 and 2 so far.

Summary

- In both Polish and Czech, the requirement to **destress given elements** plays an important role.
- In both languages, we see that **movement of given elements is less restricted** than movement of new elements. In Czech, movement of given elements appears to be completely free, whereas we see a slight penalty for unnecessary movement in Polish.
- **Contrast** influences the results in both languages, but to determine the impact of contrast and focus in more detail, more research is necessary.
- **Weighted constraints** seem to be a suitable device to capture the graded acceptability data.

Thank you for your attention!