

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

1 Outline

- **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

2 Background: prosody, word order, information structure

Prosody-based approaches

In many languages, word order seems to interact with information structure in that e.g. the focus has to move to the right- or leftmost position. However, a famous type of approach to this phenomenon does not establish a direct connection between word order and information structure, but rather assumes that prosody plays a crucial role, mediating between the two other modules.

For example, Zubizarreta (1998) has proposed for Spanish that a clash between principles of prosody-IS-mapping and prosody-word-order-mapping causes word order variation:

- 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 include the following:

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:

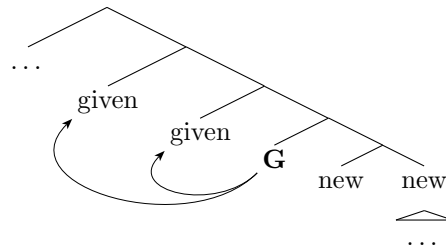
- Rule 1: Do not put sentence stress on given elements.
- Rule 2: Put sentence stress on the rightmost element.

→ Given elements are scrambled away from the rightmost position.

Approaches assuming a direct interaction between word order and IS

In the Czech linguistic (functionalist) tradition, it has been proposed that “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); Sgall et al. (1980); Hajičová et al. (1998).

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



Under this view, scrambling is a result of this partitioning requirement: If new elements end up in the scope of the G-operator, this leads to a presupposition failure, and given elements outside the scope of the G-operator lead to a violation of the Maximize-Presupposition constraint (in context C , use the most informative presupposition satisfied in C ; Heim 1991).

For a different formalization of an IS-related partition of Czech utterances within the minimalist framework, see Biskup (2006, 2011), who proposes that backgrounded specific elements are to be interpreted and spelled outside the vP; we will not discuss this approach in detail here.

A prosodic approach to scrambling in Slavic?

Potentially conflicting rules concerning prosody and information structure are found in the literature on Czech, suggesting that it could be worth trying to develop a prosodic approach to Slavic scrambling:

- 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.	

3 Experiments

General information:

- Participants: 40 students in Prague (native speakers of Czech), 40 students in Poznań (native speakers of Polish)
- 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

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?

3.1 Experiment 1: all new

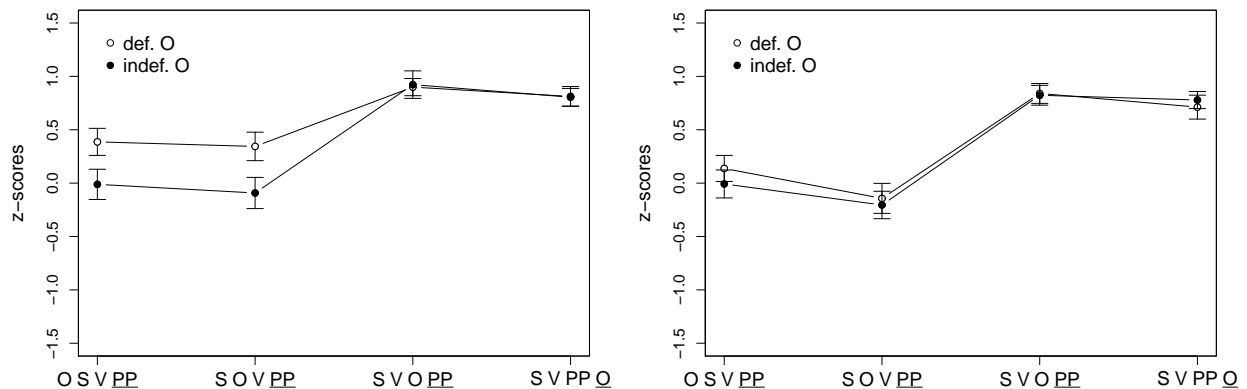
Design

- Question: What happens in an all-new context?
- 2x4 design:
 - factor 1: position of the object
 - factor 2: definiteness of the object
- 32 items
- sentence stress was always on the rightmost element

Example

- (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 allegedly director.ACC ING-bank masked men.NOM kidnapped to unknown place
‘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.

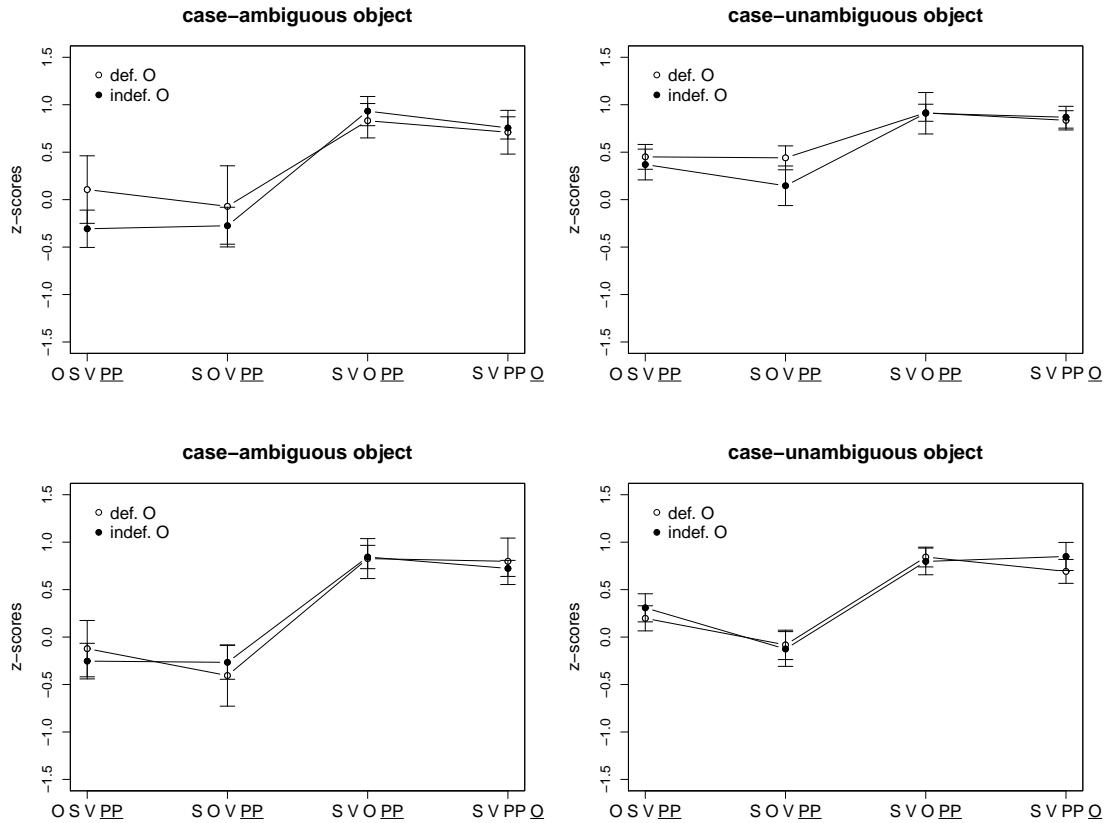
Results



exp 1 - mean z-scores for Czech (left) and Polish (right) with 95% confidence intervals

A linear mixed effects model with random intercepts for subjects and items showed a significant difference between the two preverbal positions and the two postverbal positions in both languages. In Polish, a significant difference was found also between presubject and postsubject position. There was a significant interaction between object position and definiteness in Czech, but not in Polish.

Confound ambiguity



3.2 Experiment 2: given object

Design

- Question: Which positions are acceptable for a given object?
- 2x4 design:
 - factor 1: position of the object
 - factor 2: givenness of the subject
- 32 items
- sentence stress was always on the rightmost element

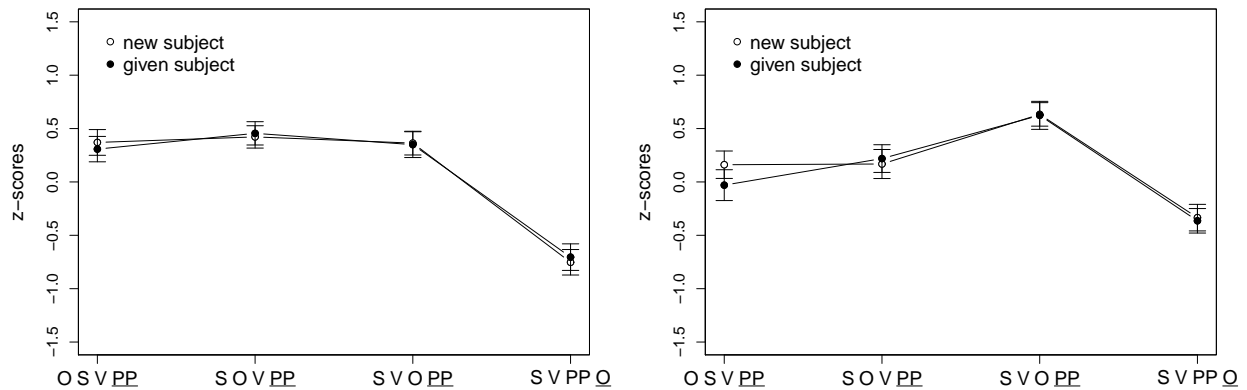
Example with new subject

- (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 allegedly secretary.ACC Karel.NOM sent to store
'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**.

Example with given subject

- (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.

Results



exp 2 - mean z-scores for Czech (left) and Polish (right)

In both languages, the object-final structure differ significantly from all others. In Czech, the three remaining structures do not differ significantly from each other, whereas in Polish all of them do; for the two preverbal positions, we see an interaction with the givenness of the subject.

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 Q when the object is given.
- Whether the subject is given or not does have any effect on acceptability (except for a slight difference in object-initial structures in Polish), 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.

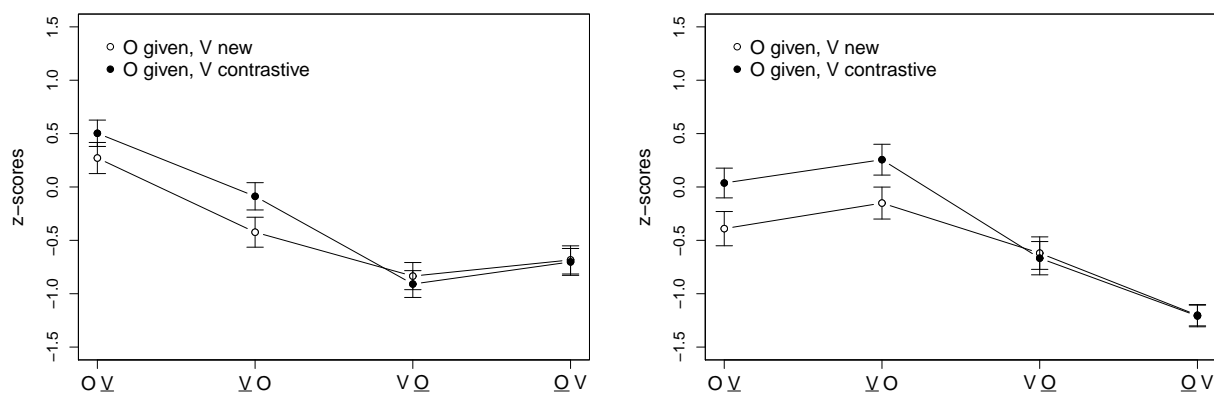
3.3 Experiment 3: stress shift, contrast and focus

- Questions:
 - (a) Is stress-shift an alternative to scrambling?
 - (b) How do focus and contrast influence the results?
- 2x2x3 design:
 - factor 1: word order (VO vs. OV)
 - factor 2: sentence stress (on V vs. on O)
 - factor 3: context (object given, verb new vs. object given, verb contrastive vs. object focused, verb given)
- 48 items

Example

- (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.
 I think that teacher closed this window
‘I think that the teacher closed this window.’ OV
- (b) Myslím, že učitelka zavřela to okno. VO
- (c) Myslím, že učitelka zavřela to okno. VO
- (d) Myslím, že učitelka to okno zavřela. OV

Results - first part (C₁ and C₂)

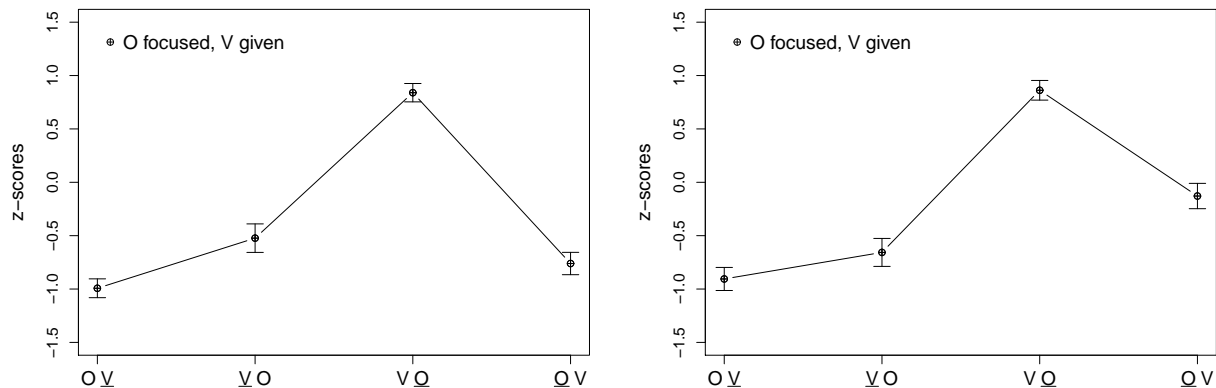


exp 3a - mean z-scores for Czech (left) and Polish (right)

Czech: All three factors (order, stress, context) had significant main effects. There were significant interactions between order and stress, and between context and stress. All pairwise comparisons showed significant differences, with the following exceptions: VO and OV did not differ significantly in any of the contexts, and there was not significant difference between OV with a new vs. contrastive verb.

Polish: All three factors (order, stress, context) had significant main effects. There were significant interactions between order and stress, and between context and stress. All pairwise comparisons were significant, with the following exceptions: VO new vs. contr., OV new vs. contr., OV (new) vs. VO (new), OV (new) vs. VO (new/contr.), OV (contr.) vs. VO (contr.), OV (contr.) vs. VO (new).

Results - second part (C₃)



exp 3b - mean z-scores for Czech (left) and Polish (right)

In both languages, the factors stress and order had main effects and there was a significant interaction. All pairwise comparisons within each language showed significant contrasts.

Experiment 3: interim summary of the results

Stress shift is 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.

4 Analysis

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

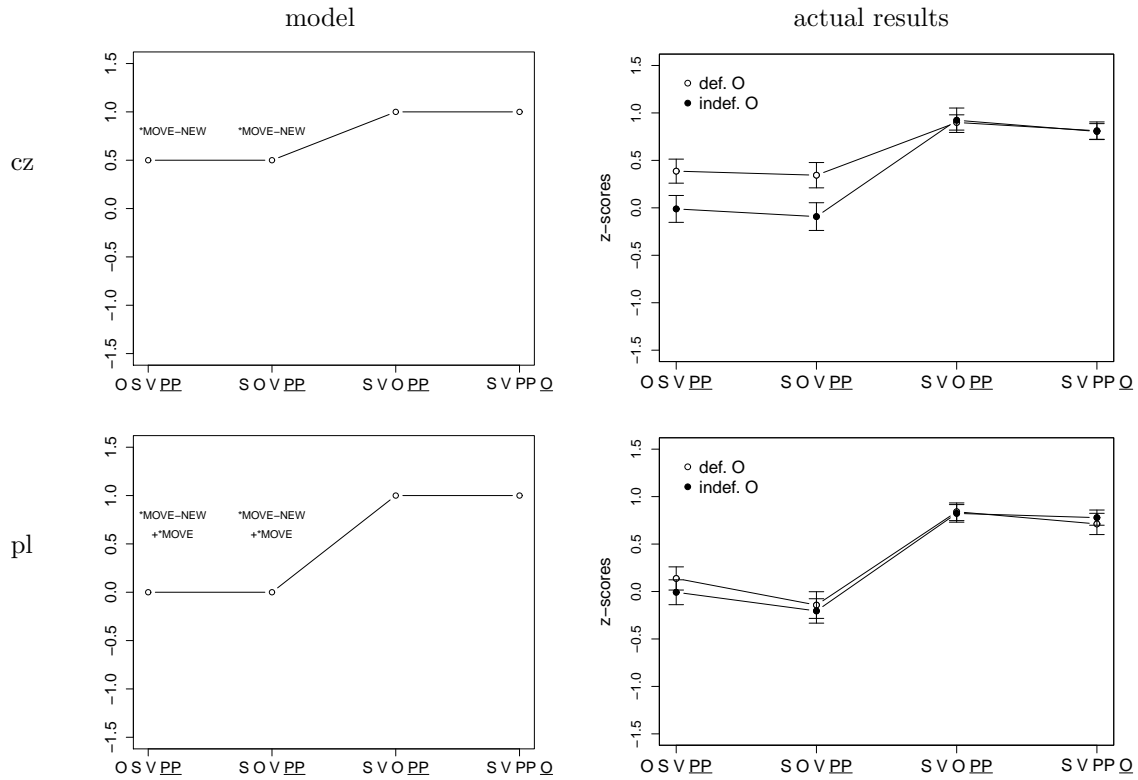
- “The ranking of linguistic constraints can be implemented by annotating each constraint with a **numeric weight** representing the reduction in acceptability caused by a violation of this constraint.” (Keller 2000:252)
- “The **cumulativity** of constraint violations can be implemented by assuming 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)

Constraints and weights¹

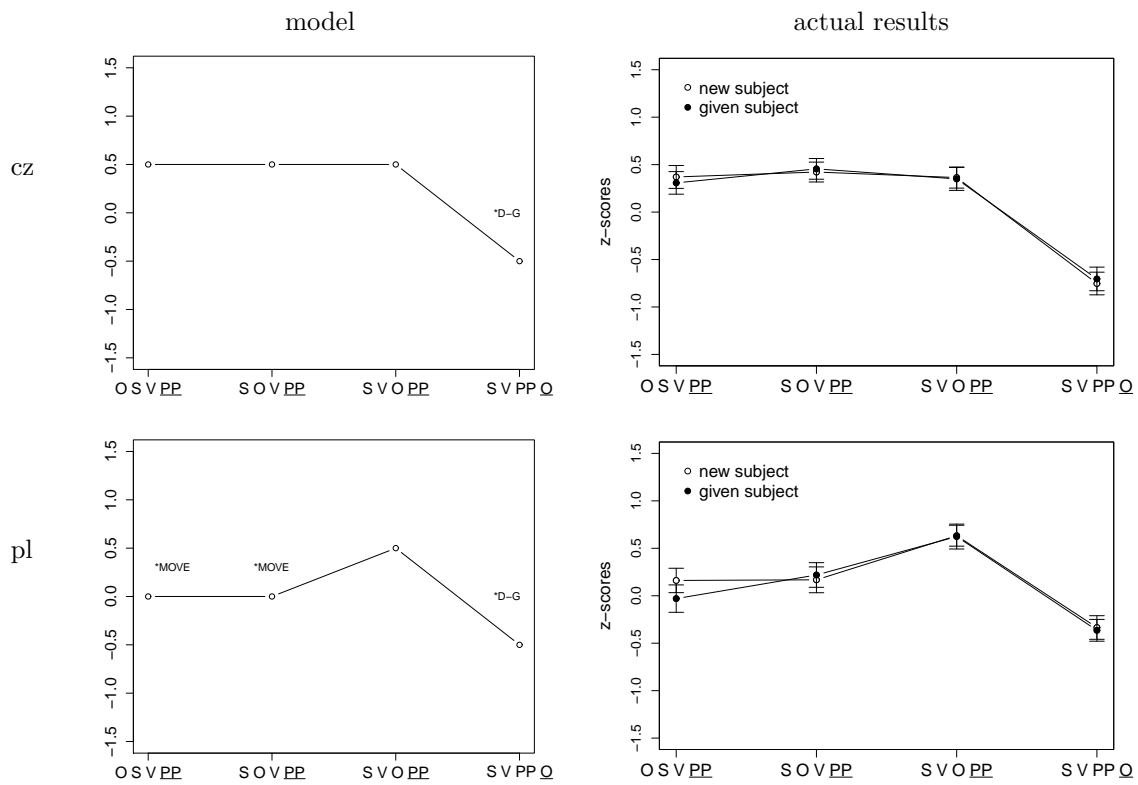
- Penalty for new objects in preverbal position:
***MOVE-NEW**, weight: 0.5 in both languages
- Penalty for preverbal objects even when the object is given:
***MOVE**, weight: 0.5 in Polish, 0.0 in Czech
- Penalty for sentence stress on a given element:
DESTRESS-GIVEN, weight: 1.0 in both languages
- 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

¹Two further assumptions were incorporated into the model: First, we know from previous research that repeating a previously mentioned DP instead of using a pronoun lowers acceptability; we implemented this by lowering all conditions in experiment 2 and 3a by 0.5. Second, we implemented an acceptability “floor”—in our model, acceptability is never lower than -1.

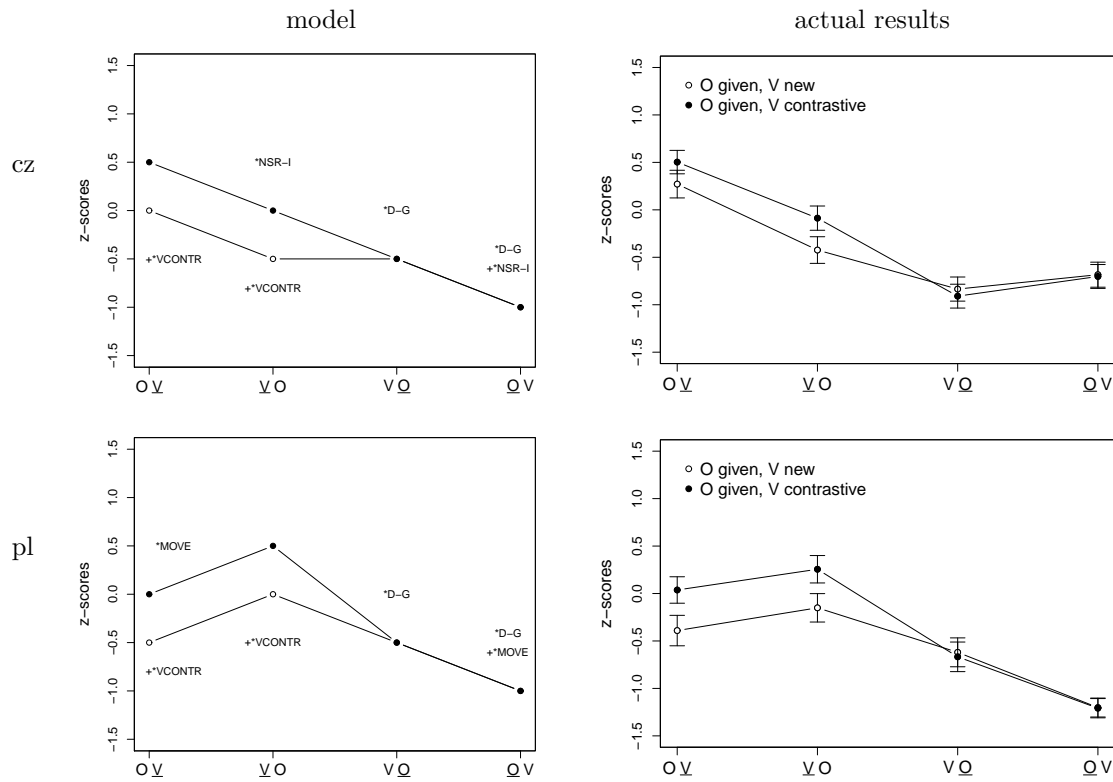
Predictions of the model for exp 1



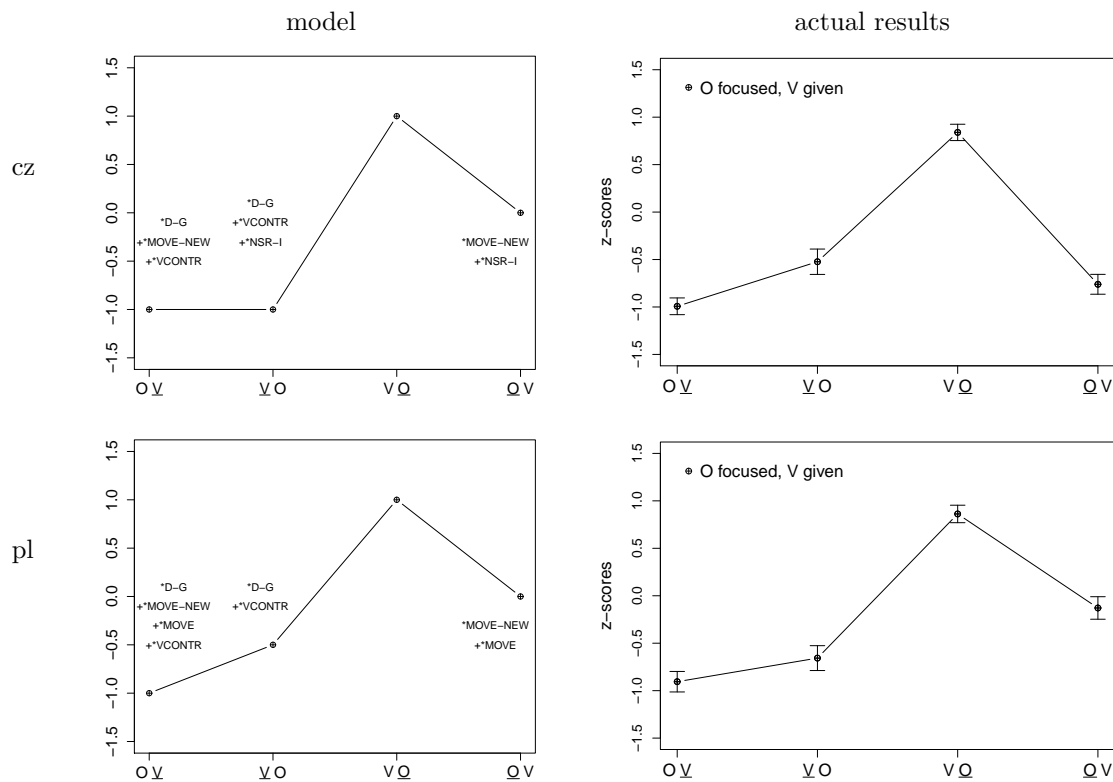
Predictions of the model for exp 2



Predictions of the model for exp 3, first part



Predictions of the model for exp 3, second part



Theoretical issues

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 OV structures in Polish, but it could work for Czech. These and other options need to be investigated further.

Empirical issues

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

- VQ 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.
- $\underline{\text{VO}}$ 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.

5 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.

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