THE GERMAN LEARNER MIDDLE FIELD

HOW TO ACQUIRE HIDDEN FACTORS CORPUS STUDY ON THE FALKO ADVANCED LEARNER CORPUS

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Overview

- Acquiring linguistic variation
- The German middle field
- Variation in the German middle field
- Modeling
- Falko
- Annotation
- Analysis
- Results
- Outlook

Acquiring linguistic variation

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- Only few studies on acquisition of variation in syntactic patterns
- Research question:

  How do second language learners acquire the competence for using those competing structures?

German topological field model

- Topological field model for German (Drach 1937 ,Höhle 1986, Pasch et al. 2003)

prefield	lsb	MF	rsb	post field
Der Feminismus	hat	den Frauen schon immer	geschadet	durch seine Radikalität
The feminism-NOM	*has*	*the women-ACC*	*damaged*	*with its radicality*

lsb: left sentence bracket

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- Verb-Second Rule (V2)

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Variation in the German middle field

- **scrambling**:

Constituents in the middle field allow a variety of competing word orders (Haider/Rosengreen 2003)

dass	[***diese Ansicht***]**AKK** [***in Zukunft***] [***viel mehr Menschen***]**NOM**	*zu teilen lernen*
that	[*those opinions*]ACC [*in the future*] [*a lot more people*] NOM	*to share learn*

(dew07_2007_09_v2.1)

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- **grammatical function**
  subject., dir. object., ind. object
- **case**
  nominative, accusative, dativ
- **part-of-speech**
  personal pronoun, full noun, reflexive
- **weight**
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- **weight**
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- **phrase type**
  noun phrase, prepositional phrase, clause
- **semantic role**
  agent, patient, recipient
- **information status**
  given, new
- **agentivity**
  person, institution, animal, materia

Modeling competing factors

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- For modeling of simultaneous influence of competing factors
- Possibility I: **Hierarchies**
  - Optimality theory (Uzkoreit 1987)
- Possibility II: **Relative factor strength analysis**
  - Quantitative analysis (Hoberg 1981, Kurz 2000, Heylen et al. 2005, Bader/Häusler 2010)

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- Constituent-weight has no effect

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- Contrastive Interlanguage analysis CIA (Granger 2008)
  - Assumption
  - learner language is systematic
  - variation in the group
  - transfer & generell language acquisition processes

Data : Falko learner corpus of German

Lüdeling et al. 2008

- advanced learners of German B1+
- essays and summaries
- cross-sectional & longitudinal data
- ~260.000 tokens, growing
- automatically annotated POS, lemma (Treetagger, Schmid 1994)
- dependency parsed (NEW) (Bohnet 2010)

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sub set used

- 94 texts learners of German (25 L1s)
- 94 text German controll group

http://www.linguistik.hu-berlin.de/institut/professuren/korpuslinguistik/forschung/falko/standardseite/

Data : Target hypotheses

Non-canonical syntactic structures in learner texts (LT) make a description with standard grammars imposible.

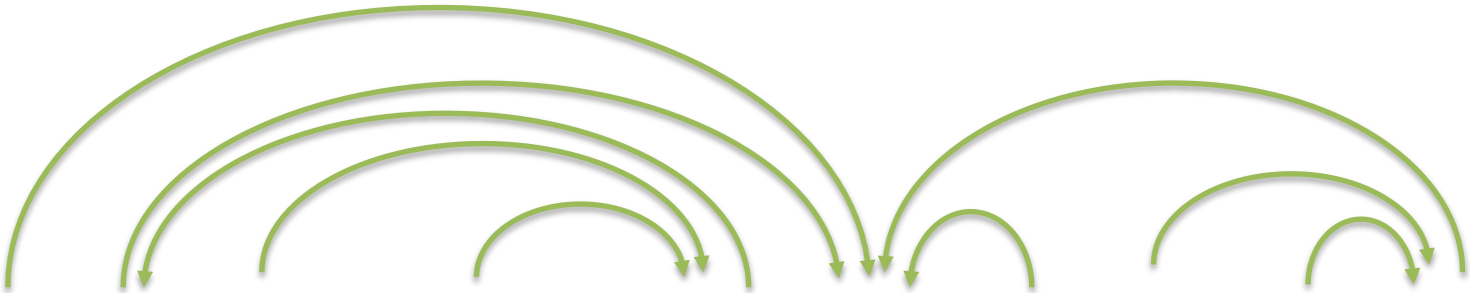
*LT: Aber in **die** meisten Fällen **das** **ist** nicht der Fall.*

(FalkoEssayL2v2.0:fk006_2006_08)

But unfortunately such percentages define the value of universities.

Data : Target hypotheses

Therefore a minimal gramatical correction (TH1) is explicitly included into the corpus (Reznicek et al. 2009)



TH1:*Aber in* ***den*** *meisten Fällen* ***ist*** ***das*** *nicht der Fall.*

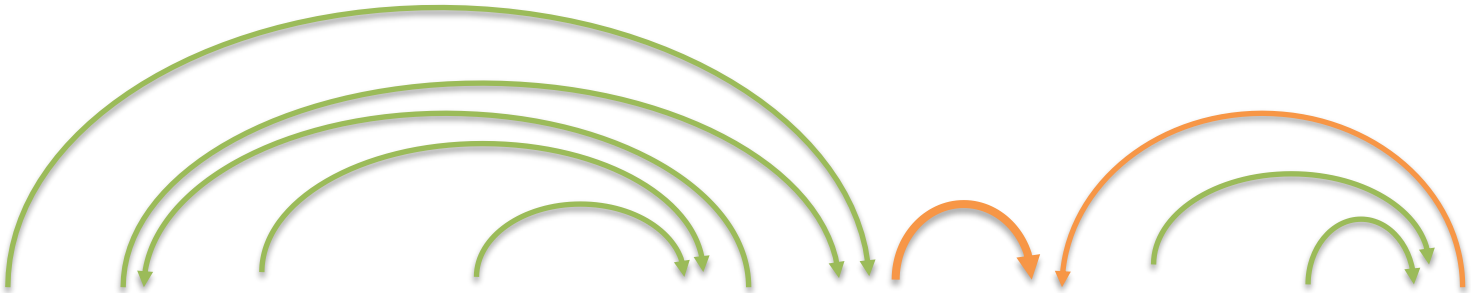
LT: Aber in ***die*** *meisten Fällen* ***das*** ***ist*** *nicht der Fall.*

(FalkoEssayL2v2.0:fk006_2006_08)

But in the-FEM most cases-MASC that is not the case.

Data : Target hypotheses

To conserve the original word order, dependencies are mapped back on original sites.



TH0: *Aber in **den** meisten Fällen **das** **ist** nicht der Fall.*

*TH1: Aber in **den** meisten Fällen **ist** **das** nicht der Fall.*

*LT: Aber in **die** meisten Fällen **das** **ist** nicht der Fall.*

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Data : Target hypotheses

TH0: *Aber in* ***den*** *meisten Fällen* ***das*** ***ist*** *nicht der Fall.*

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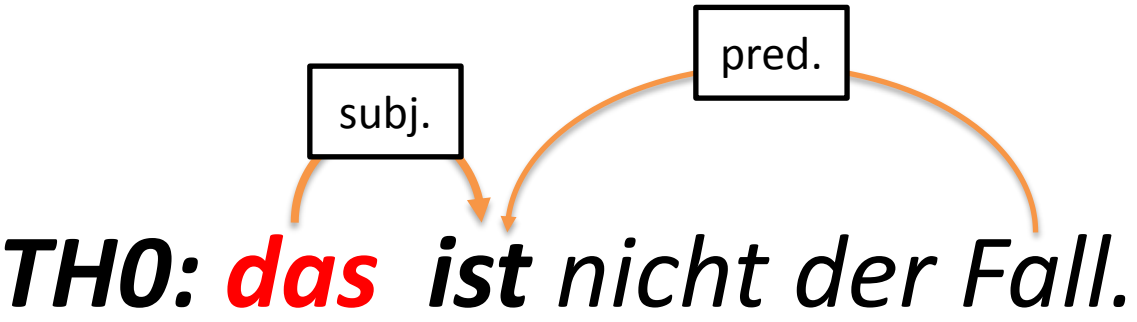
Data : Target hypotheses

Each dependency is automatically labeled with the sentence function.



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Annotation : middle fields

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- For each middle field following information has been extracted
- Only for verb arguments
  1) **clause type** (main clause, subordinate clause)
  2) **verb argument order** (obj-sub, sub-obj)
  3) **part-of-speech** (noun, pron, prf, prep)
  4) **case** (nom, acc, dat)
  5) **length of constituent in tokens**
  6) **length of constituents in sillables**

method: linear mixed effect model

linear mixed effect model to calculate the effect strength of different factors:

(Bates et al. 2011)

variable ↓ effect strength ↓

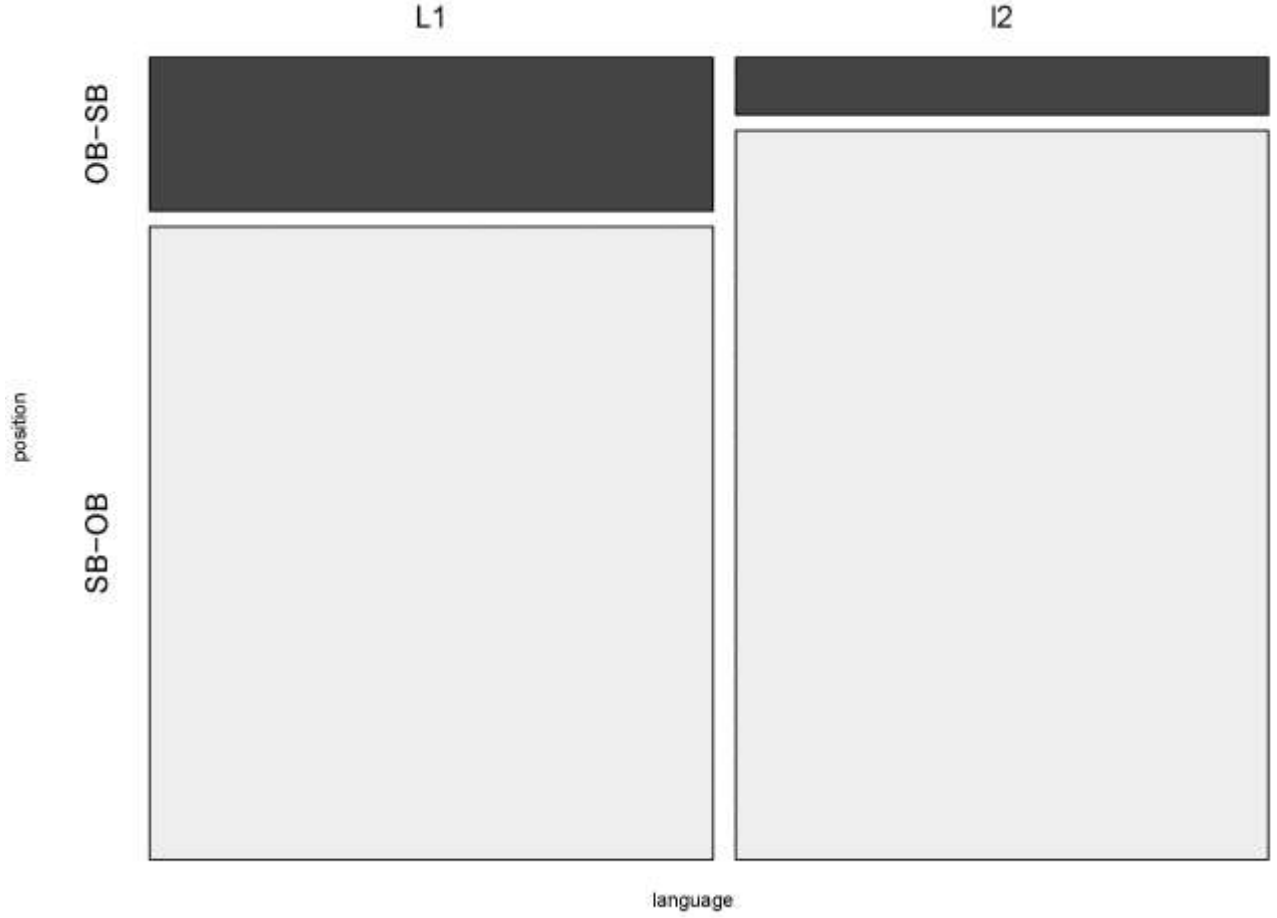
$$z = \beta_0 + \beta_1 \boldsymbol{x_1} + \beta_2 x_2 + \boldsymbol{\beta_3} x_3 + \ldots + \beta_k x_{k+1}$$

→ probabilities for OB-SB-order with subject as full noun

random effects: verb, text

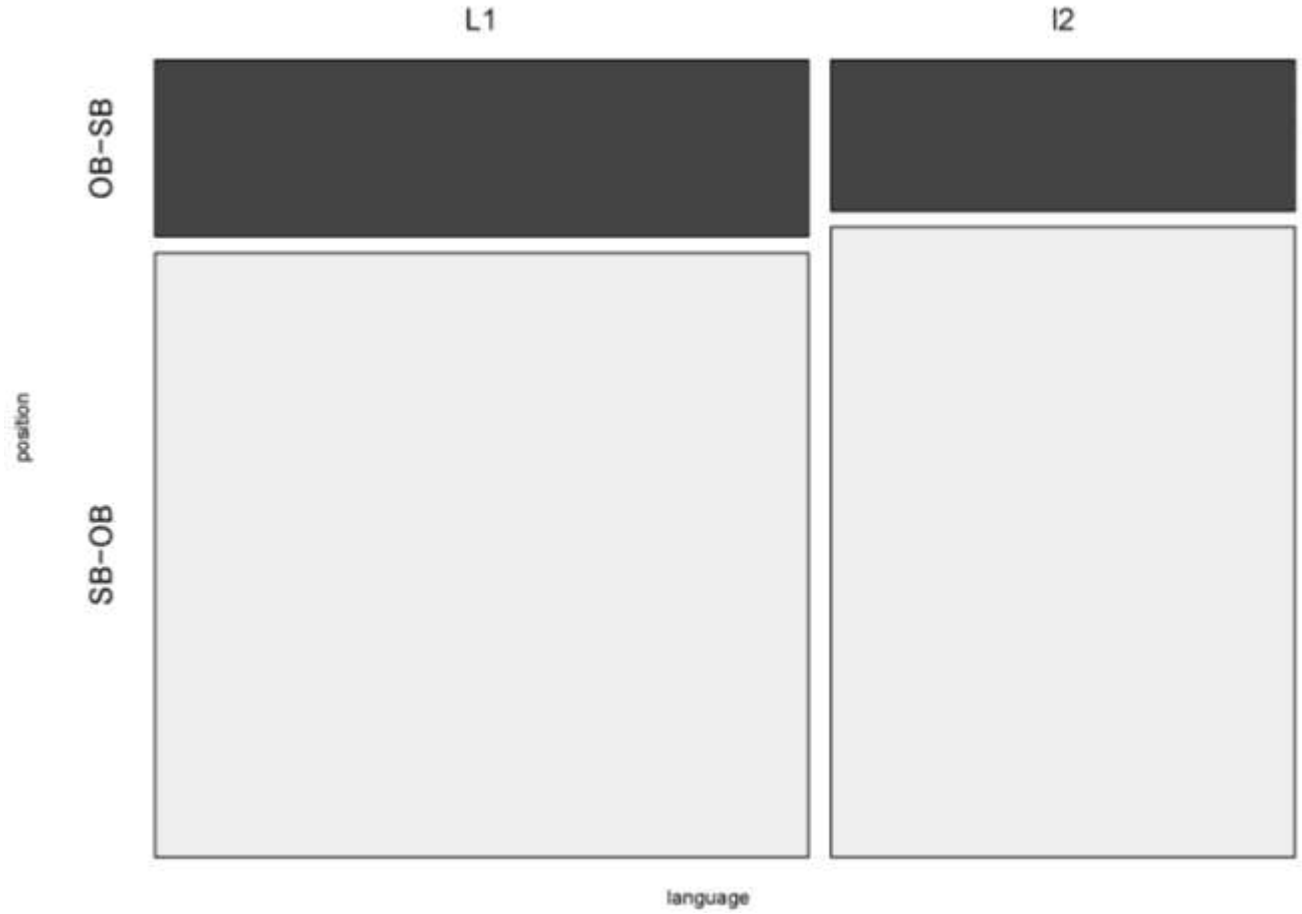
results I: χ^2

- Learners use significantly less object-subject middle fields in subordinate clauses



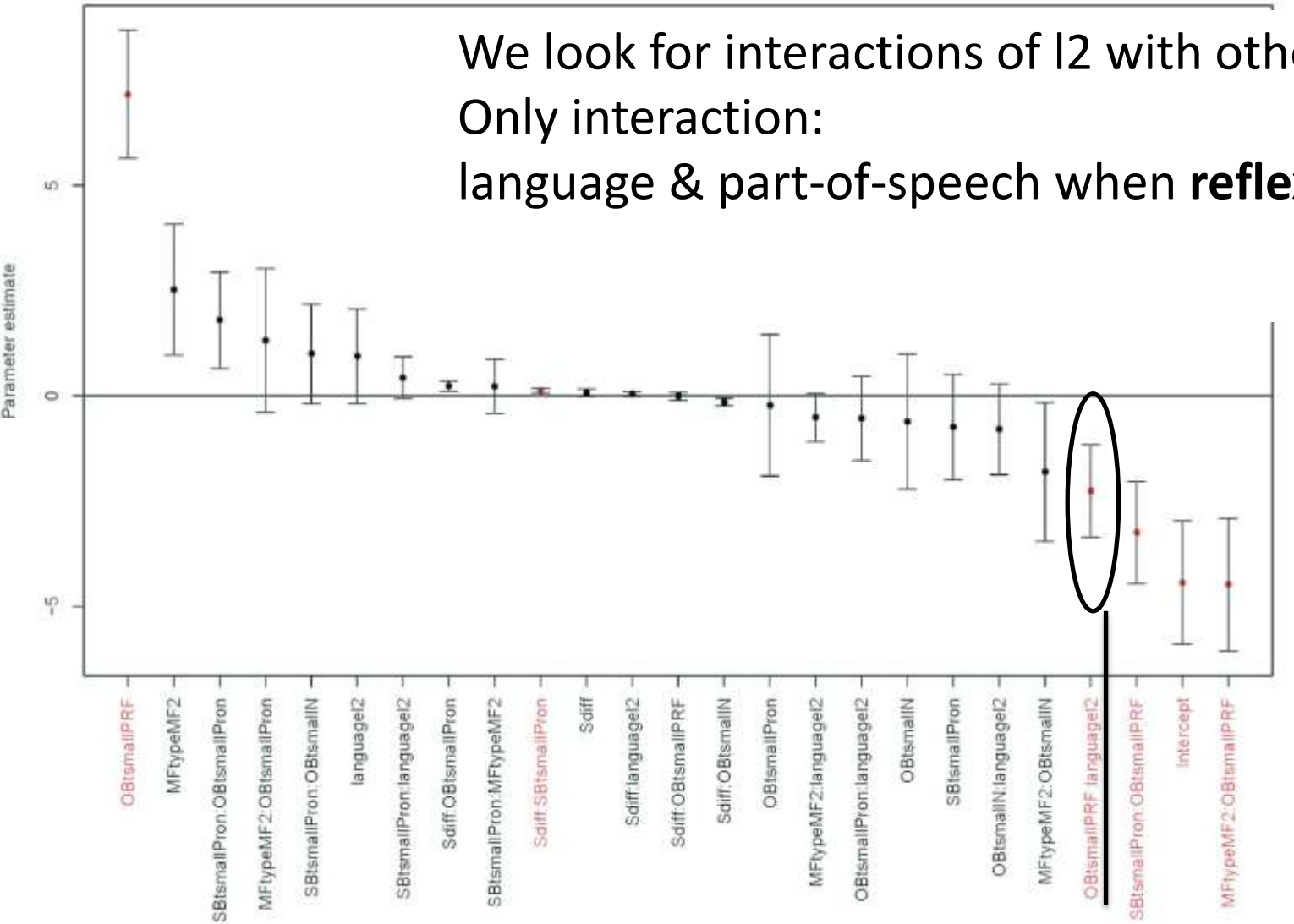
results I: χ^2

- Interestingly this is not the case in main clauses



results II: effects & interactions

We look for interactions of l2 with other factors
Only interaction:
language & part-of-speech when **reflexive pronoun**



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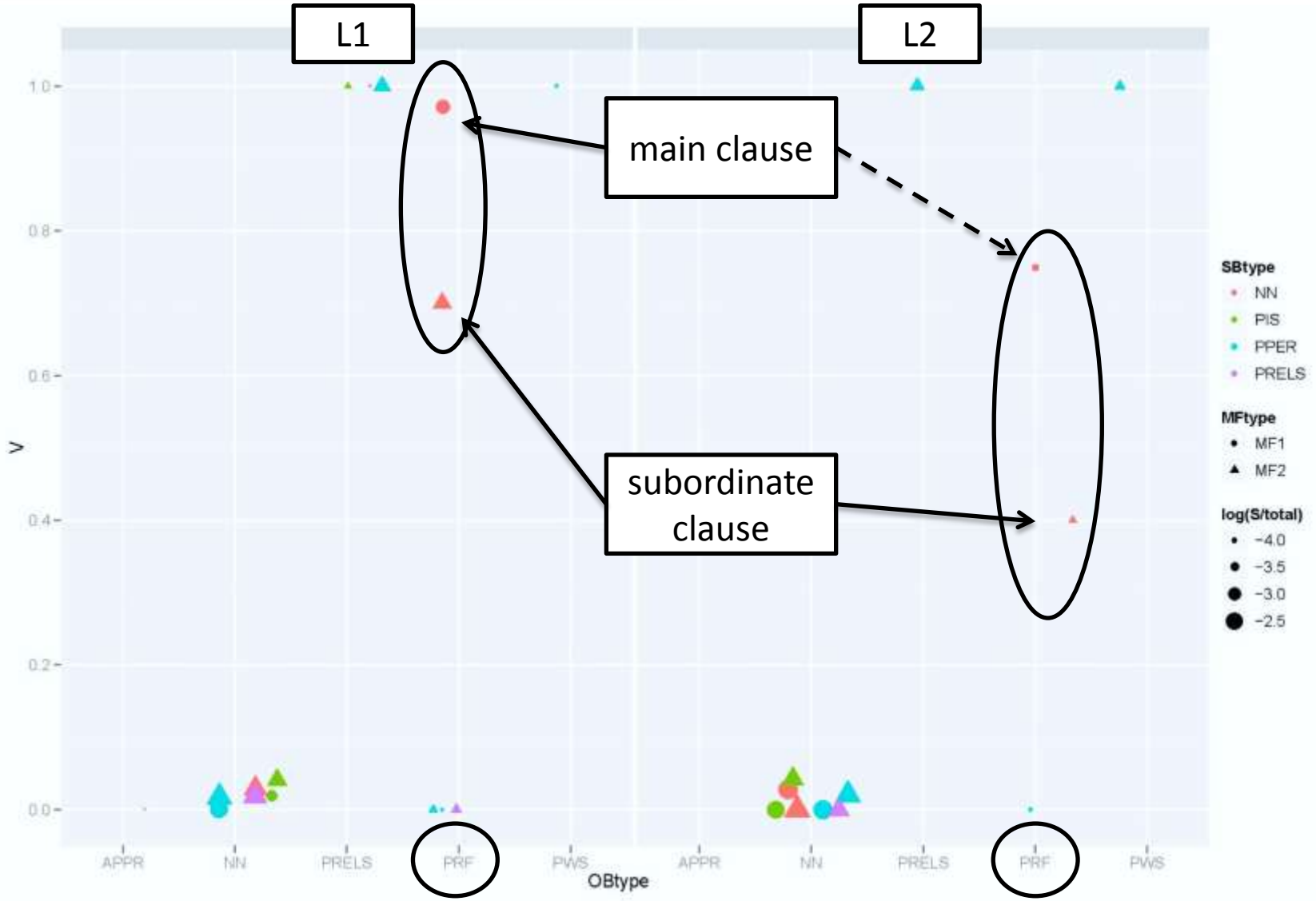

discussion

- The learners in this study have shown less variation in the use of SB-OB-type subordinate clauses.

➢ This seems to mainly come from a significant bias of SB-OB-type clauses for reflexive pronouns.

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➢ This seems to mainly come from a significant bias of SB-OB-type clauses for reflexive pronouns.

- **NO** effect found for case, weight.

➢ **case:** Too few datives in the data.

➢ **weight:** cognitive load →language independent

summary and outlook

- Advanced learners of German show different patterns of variation linked to the verb argument order in the German middle field
- This seems to be due to a non-native like weight of the factors 'sentence function' and 'part-of-speech' as influence of argument order

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Next step:

- more semantic and pragmatic factores

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Berlin corpus linguistics team

bibliography

- **Bader, Markus; Häussler, Jana (2010):** Word order in German. A corpus study. Exploring the Left Periphery. In: Lingua 120 (3), p.717–762.
- **Bates, Douglas; Maechler, Martin; Bolker, Ben (2011)**: lme4: Linear mixed-effects models using S4 classes. URL: http://CRAN.R-project.org/package=lme4
- **Bohnet, Berndt (2010):** Top Accuracy and Fast Dependency Parsing is not a Contradiction. In: *The 23rd International Conference on Computational Linguistics. (COLING 2010).*
- **Drach, Erich (1937)**: Grundgedanken der deutschen Satzlehre. Frankfurt am Main: Diesterweg.
- **Ellis, Rod (2009)**: The study of second language acquisition. Oxford [u.a.]: Oxford Univ. Press (= Oxford applied linguistics).
- **Haider, Hubert; Rosengren, Inger (2003):** Scrambling. Nontriggered Chain Formation in OV Languages. In: Journal of Germanic Linguistics 15 (03), p.203–267.
- **Heylen, Kris (2005):** A Quantitative Corpus Study of German Word Order Variation. In: Kepser, Stephan;Reis, Marga(eds.): *Linguistic Evidence. Empirical, Theoretical and Computational Perspectives.* Berlin, New York: Mouton de Gruyter (= Studies in generative grammar; 85), p.241–263.
- **Höhle, Tilman N. (1986):** Der Begriff 'Mittelfeld'. Anmerkungen über die Theorie der topologischen Felder. In: Schöne, Albrecht;Stephan, Inge(eds.): *Kontroversen, alte und neue. Akten des VII. Kongresses der Internationalen Vereinigung für germanische Sprach- und Literaturwissenschaft.* Tübingen: Niemeyer (= Kontroversen, alte und neue; 6), p.329–340.
- **Kurz, Daniela (2000)**: Wortstellungspräferenzen im Deutschen. Master Thesis. Computerlinguistik. Saarbrücken.
- **Lüdeling, Anke; Doolittle, Seanna; Hirschmann, Hagen; Schmidt, Karin; Walter, Maik (2008):** Das Lernerkorpus Falko. In: Deutsch als Fremdsprache 45 (2), p.67–73.

bibliography

- **Pienemann, Manfred (2005):** An introduction to Processability Theory. Parts of this chapter are based on an extended and revised version of my paper "Developmental dynamics in. In: Pienemann, Manfred(ed.): *Cross-linguistic aspects of processability theory.* Amsterdam: Benjamins (= Studies in bilingualism; 30), p.1–73.
- **Reznicek, Marc; Walter, Maik; Schmidt, Karin; Lüdeling, Anke; Hirschmann, Hagen; Krummes, Cedric; Andreas, Thorsten (2010)**: Das Falko-Handbuch. Korpusaufbau und Annotationen. Version 1.0. Berlin: Institut für deutsche Sprache und Linguistik, Humboldt-Universität zu Berlin. URL: http://www.linguistik.hu-berlin.de/institut/professuren/korpuslinguistik/forschung/falko [Stand: 12. Oktober 2010].
- **Schmid, Helmut (1994):** Probabilistic Part-of-Speech Tagging Using Decision Trees. In: *Proceedings of the International Conference on New Methods in Language Processing,* p.44–49.
- **Siewierska Anna (1993):** On the Interplay of Factors in the Determination of Word Order. In: Jacobs, Joachim et al.(eds.): *Syntax.* Berlin, New York: Mouton de Gruyter (= Handbücher zur Sprach- und Kommunikationswissenschaft / Handbooks of Linguistics and Communication Science; 9,1), p.826–846.
- **Uszkoreit, Hans (1987)**: Word Order and Constituent Structure in German. Stanford, Calif. (= Center for the Study of Language and Information <Stanford, Calif.>: CSLI lecture notes; 8).

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