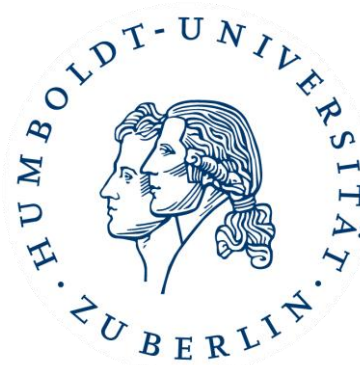


Routes of investigation on deeply annotated learner data Falko – German learner corpus

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Anke Lüdeling
Ines Rehbein
Amir Zeldes



research question

- How do heavily annotated second language learner corpora help in understanding interlanguage/acquisition processes?
 - error annotation with target hypotheses
 - overuse/underuse of multilevel items
 - syntactical parsing of learner data

background: interlanguage

assumption:

- learners of a second/foreign language have a systematic internal grammar (interlanguage)
- different from the internal grammar of L1 speakers of the target language

interlanguage is influenced by

- the learners' L1 (transfer, interference)
- the structure of the L2
- general learning principles
- mode of acquisition / teaching method / learning strategies

Selinker (1972), Nickel (1998) and many others

interlanguage & data

further assumption:

- interlanguage can be researched through the analysis of (naturally occurring) learner data
- one type of data: **learner corpora**

- analyses:
 - **error analysis (EA)**
→ analysis of learner data with a 'correct' form
 - **contrastive interlanguage analysis (CIA)**
→ analysis of the learner data wrt to another corpus

plan

- learner corpora / Falko
- annotation of learner corpora
- overuse and underuse statistics
- analysis of parsed learner data

plan

- learner corpora / Falko
- annotation of learner corpora
- overuse and underuse statistics
- analysis of parsed learner data

learner corpora

- principled and well-documented collections of learner language
- the design depends on the research question
 - written vs. oral data / text type / type of exercise
 - grade of advancedness
 - L1s of the learners
 - ...
- many learner corpora for English,
more and more learner corpora for other languages

Granger/Hung/Petch-Tyson (2002), Cobb (2003), Tono (2003), Myles/Mitchell (2004), Nesselhauf (2004), Tenfjord/Meurer/Hofland (2004), Granger (2008), Lüdeling/Walter (2009) etc.

German error-annotated learner corpus

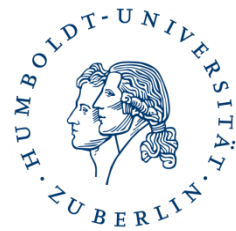


- freely available
- advanced learners ~B1-C1 (CEFR)
- written language / controlled, unaided writing
- several text types (sub-corpora)
 - essays (122.791 tokens) + WHIG (~120.000 tokens) soon
 - summaries (40787 tokens)
- comparable native speaker corpora
 - essays (68.480 tokens)
 - summaries (21184 tokens)
- meta-data for each learner
(bibliographic data, linguistic history, c-test score)
Lüdeling et al. (2008), Reznicek et al. (2010)

plan

- learner corpora / Falko
- **annotation of learner corpora**
- overuse and underuse statistics
- analysis of parsed learner data

annotation of learner data: conceptual issues



- annotation of learner data is highly problematic
 - data is **unsystematic** (especially if there are different L1s) – difficult for automatic tools
 - for **error analysis** and **contrastive interlanguage analysis**:
 - data has to be **interpreted**
(long discussion in acquisition research)

Corder (1981), Izumi/Uchimoto/Isahara (2005),
Tenfjord/Hagen/Johansen (2004), Diaz-Negrillo et al. (2010) etc.

annotation of learner data: target hypothesis

consider:

*An der anderen Seite, wenn da kein
Feminismus wäre, stünden wir noch nur in
der Küche und köchten wir.* (fkb034_2008_07)

~ "On the other hand, if there were no
feminism, we would still only stand in the
kitchen and cook."

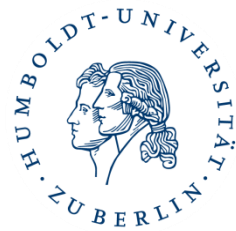
annotation of learner data: target hypothesis

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annotation of learner data: target hypothesis

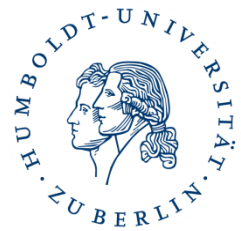


- all error tags depend on an (at least implicit) correct version of a learner utterance
→ **target hypothesis**
- Falko: **explicit target hypotheses**
often there are several ways of correcting an utterance

th1: *Auf der anderen Seite, wenn da kein Feminismus wäre, stünden wir **nur noch** in der Küche und **kochten**.*

th2: ***Andererseits**, stünden wir **wenn es keinen Feminismus gäbe**, **nur noch** in der Küche und **kochten**.*

annotation of learner data: target hypothesis in Falko



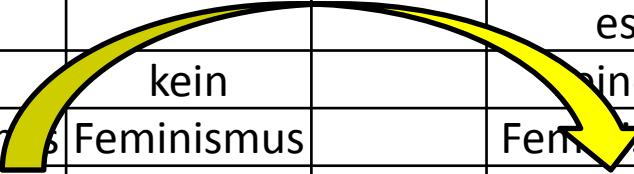
th1: sentence-based, very close to original text,
mainly clear grammatical errors

th2: text-based, also stylistic errors

- the differences between a target hypothesis and the original data is automatically annotated with **edit tags** (change, insert, replace etc.)
- all layers are automatically annotated with POS tags & lemma (TreeTagger, Schmid 1994)
- additionally – **manual error tags** for some phenomena

Automatic error annotation: edit tags

LT	TH1	TH1Diff	TH2	TH2Diff
An	Auf	CHA		
der	der		Andererseits	MERGE
anderen	anderen			
Seite	Seite			
,	,			
			stunden	MOVT
			wir	MOVT
			,	INS
wenn	wenn		wenn	
da	da			DEL
			es	INS
kein	kein		inen	CHA
Feminismus	Feminismus		Feminismus	
wäre	wäre		gäbe	CHA
,	,		,	
stunden	stunden			MOVS
wir	wir			MOVS
	nur	MOVT	nur	MOVT
noch	noch		noch	
nur		MOVS		MOVS
in	in		in	



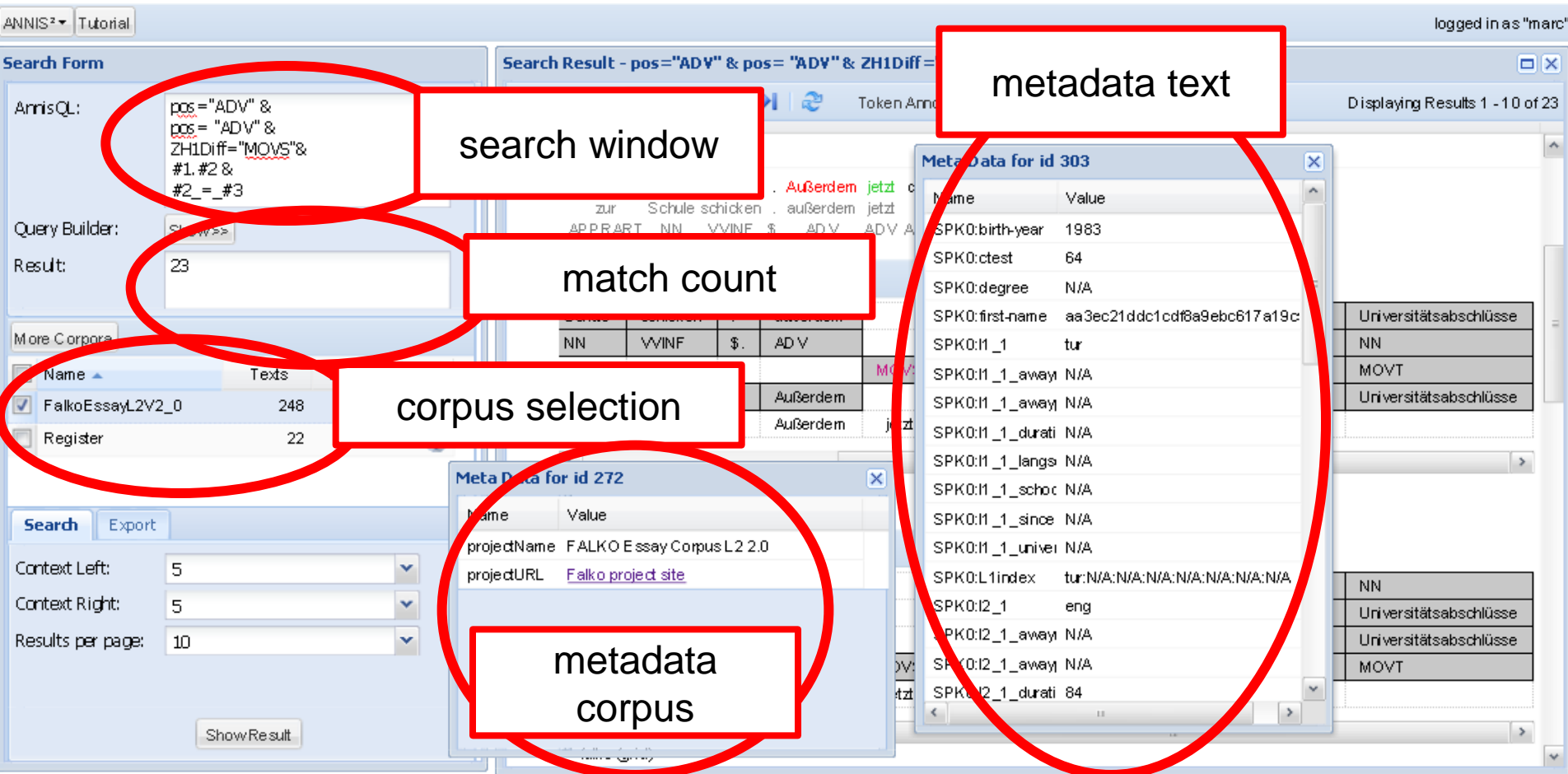
Automatic error annotation: edit tags

LT	pos	lemma	TH1	TH1Diff	TH1pos	TH1posDiff
An	APPR	an	Auf	CHA	APPR	
der	ART	d			ART	
anderen	ADJA	andere	anderen		ADJA	
Seite	NN	Seite	Seite		NN	
,	\$,	,	,		\$,	
wenn	KOUS	wenn	wenn		KOUS	
da	PAV	da	da		PAV	
kein	PIAT	kein	kein		PIAT	
Feminismus	NN	Feminismus	Feminismus		NN	
wäre	VAFIN	sein	wäre		VAFIN	
,	\$,	,	,		\$,	
stunden	VVFIN	stehen	stunden		VVFIN	
wir	PPER	wir	wir		PPER	
			nur	MOVT	ADV	MOVT
noch	ADV	noch	noch		ADV	
nur	ADV	nur		MOVS		MOVS
in	APPR	in	in		APPR	

Automatic error annotation: edit tags

LT	pos	lemma	TH1	TH1Diff	TH1pos	TH1posDiff
An	APPR	an	Auf	CHA	APPR	
der	ART	d	der		ART	
anderen	ADJA	andere	anderen		ADJA	
Seite	NN	Seite	Seite		NN	
,	\$,	,	,		\$,	
wenn	KOUS	wenn	wenn		KOUS	
da	PAV	da	da		PAV	
kein	PIAT	kein	kein		PIAT	
Feminismus	NN	Feminismus	Feminismus		NN	
wäre	VAFIN	sein	wäre		VAFIN	
,	\$,	,	,		\$,	
stunden	VVFIN	stehen	stunden		VVFIN	
wir	PPER	wir	wir		PPER	
			nur	MOVT	ADV	MOVT
noch	ADV	noch	noch		ADV	
nur	ADV	nur		MOVS		MOVS
in	APPR	in	in		APPR	

Search in Annis



The screenshot shows the Annis search interface with several components highlighted by red circles and labels:

- search window**: The search query input field containing the query: `pos="ADV" & pos="ADV" & ZH1Diff="MOVS"& #1.#2 & #2=_#3`
- match count**: The result count field showing the number 23.
- corpus selection**: The list of corpora with checkboxes, showing 'FalkoEssayL2V2_0' selected and 'Register' unselected.
- metadata corpus**: A pop-up window for 'Meta Data for id 272' showing project details like 'projectName FALKO Essay Corpus L2 2.0' and 'projectURL Falko project site'.
- metadata text**: A pop-up window for 'Meta Data for id 303' showing a list of metadata fields and values, such as 'SPK0:birth-year 1983' and 'SPK0:i2_1_eng'.

<http://korpling.german.hu-berlin.de/falko-suche/>

Search in Annis

Search Form
 AnnisQL: `pos="ADV" & pos="ADV" & ZH1Diff="MOVS"& #1.#2 & #2=_#3`
 Query Builder:
 Result:

Name	Texts	Tokens
FalkoEssayL2V2_0	248	131599
Register	22	19342

ContextLeft:
 ContextRight:
 Results per page:

Search Result - pos="ADV" & pos="ADV" & ZH1Diff="MOVS"& #1.#2 & #2=_#3 (5, 5)
 Page 2 of 3

wäre , stunden wir noch nur in der Küche und köchten
 sein , stehen wir noch nur in d Küche und
 VAFIN \$, VAFIN PPER ADV ADV APPR ART NN KON VAFIN
 ZHverb (grid)
 ZH2 (grid)

Original text and token based annotations

ZH2pos	ZH2	ZH2lem	ZH2Diff	tok
APPR	in	in		wäre
ART	der	d		,
NN	Küche	Küche	MOVS	stunden
KON	und	und	MOVS	wir
VAFIN	köchten	kochen	MOVT	noch
			MOVS	in
				der
				Küche
				und
				köchten

falko (grid)
 ZH1 (grid)

partitur with spans Target hypothesis 2 error annotations

partitur with spans Target hypothesis 1 error annotations

. Außerdem so viele Le
 . außerdem so viel Le

Search in Annis

väre , stünden wir noch nur
 sein , stehen wir noch nur
 VAFIN \$, VAFIN PPE ADV ADV
 + ZHverb (grid)
 + ZH2 (grid)
 + falko (grid)
 - ZH1 (grid)

nur noch
only still
just

Select Displayed Annotation Levels ▾

ZH1lemma	sein	,	stehen	wir	nur	noch
ZH1diff					MOV	
ZH1pos	VAFIN	\$,	VAFIN	PPE	ADV	ADV
ZH1	väre	,	stünden	wir	nur	noch
tok	väre	,	stünden	wir		noch

MOVT = MOVEDtarget
 token should appear here

source
 dered

+ text (grid)
 - Volltext

Der Feminismus hat den Interessen der Frauen mehr geschadet als genützt. Was heißt eigentlich Feminismus? Ich meine, es gibt unterschiedliche Stufen von diesem Fennomen. An einer Seite muss ich mit der Anzeile zustimmen. Der Feminismus hat uns - den Frauen - um einige Rechte geraubert. Oder Vorteile besser zu sagen. Wir können, sogar müssen, die männliche Arbeiten beherrschen, wir müssen schwere Sachen tragen und selbst die immer bereit sind, uns mit den Kofern und mit den Türen zu helfen. Die Frage ist eine gleichgerechte Gesellschaft schaffen? An der anderen Seite, wenn da ke und köchten wir. Kein Studium, kein Selbstbewusstsein und die einzigen Gipfel, die den wir aber sogar selbst nicht gewählt könnten) und die Kinder zu gebären. Mein Frauen. Die Männer haben sich auch "feminisiert". So dass heutige Generation der männer mit den Frauen in der Haushalt sicher mehr als die ältere. Mein Vater war anderer Meinung. Ich weiß, dass er selbst die Haushalt beherrschen konnte, z. B. wenn er unterwegs ohne Mutti war.

tokens in
 complete text

noch nur in der Küche

plan

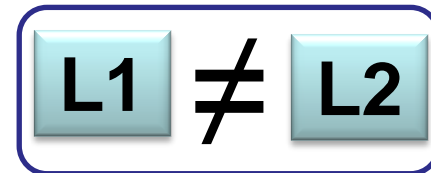
- learner corpora / Falko
- annotation of learner corpora
- **overuse and underuse statistics**
- analysis of parsed learner data

research question

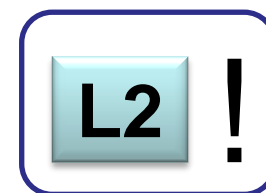
- We want to find **structural problems** in German L2 interlanguage
- structural problems are those problems that
 - occur **independent of the learners' L1**
 - and are therefore **attributed to the structure of the target grammar**

how can we detect acquisition problems?

- structures that are unique for the L2 or different from the learners' L1s (transfer)



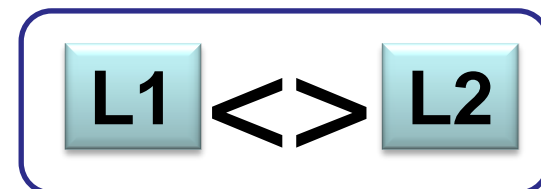
- structures that are judged to be difficult by the learners



- structures that contain many errors



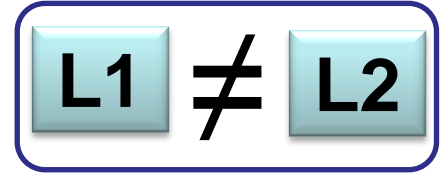
- underused structures



how can we detect acquisition problems?

➤ **grammatical analysis**

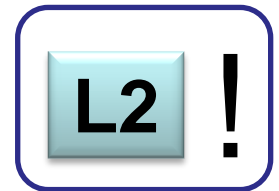
- proved to be extremely problematic no straightforward transfer



➤ **intuition of the learners**

(unsystematic, dependent on teaching)

➤ **experiments**



➤ **intuition of the teachers** (unsystematic)

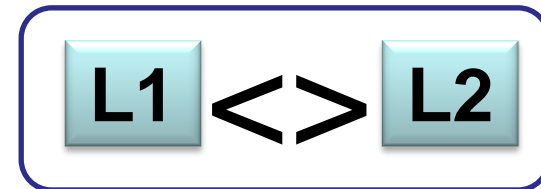
➤ **corpus analysis, error analysis**

(Corder 1991, Diehl/Albrecht/Zoch 1991, Granger 2008, Lüdeling 2008 etc.)



➤ **corpus analysis, Contrastive Interlanguage Analysis**

(Corder 1991, Ringbom 1998, Cobb 2003, Nesselhauf 2003 etc.)



how can we detect acquisition problems?

➤ grammatical analysis

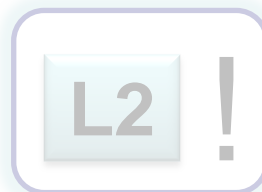
➤ proved to be extremely problematic no straightforward transfer



➤ intuition of the learners

(unsystematic, dependent on teaching)

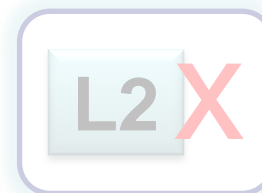
➤ experiments



➤ intuition of the teachers (unsystematic)

➤ corpus analysis, error analysis

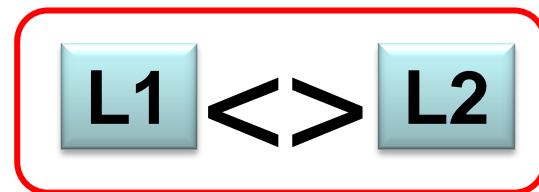
(Corder 1991, Diehl/Albrecht/Zoch 1991, Granger 2008, Lüdeling 2008 etc.)



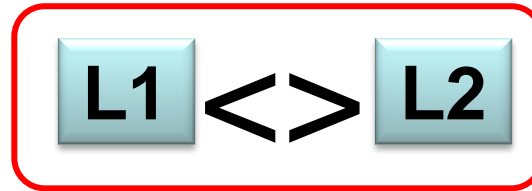
underused structures

➤ corpus analysis, **Contrastive Interlanguage Analysis**

(Corder 1991, Ringbom 1998, Cobb 2003, Nesselhauf 2003 etc.)



underuse



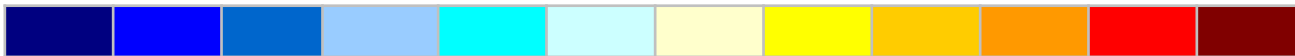
- L2 distributions are compared to L1 distributions
 - Overuse & underuse are defined as (statistically significant) differences between the varieties
 - a category can be underused in L2 because
 - the learners do not know it
 - the learners do know it but (unconsciously) avoid it
- diagnostics for detecting structural acquisition problems

visualization of overuse and underuse

- underuse: **cold colours**
- overuse: **warm colours**
- intensity of colour signals strength of overuse/underuse

Underuse

Overuse



- Excel add in by Amir Zeldes available at <http://korpling.german.hu-berlin.de/~amir/uoadin.htm>

visualization of overuse and underuse: lexical categories

lemma	tot_norm	deu	dan	eng	fra	pln	rus
in	0.013188	0.012261	0.014041	0.014247	0.015272	0.012135	0.009534
es	0.010897	0.011945	0.010900	0.011379	0.013347	0.008163	0.012385
sie	0.010618	0.008193	0.010643	0.008835	0.010909	0.006067	0.005613
man	0.010164	0.007900	0.012438	0.008742	0.009754	0.006950	0.007306
dass	0.009522	0.007404	0.012823	0.008789	0.009625	0.008880	0.009890
von	0.007982	0.007122	0.007309	0.006846	0.007315	0.010259	0.007930
auch	0.007028	0.008362	0.008527	0.005828	0.005775	0.005461	0.004455
für	0.006683	0.007201	0.006091	0.007216	0.006802	0.005736	0.004188
sind	0.006465	0.004271	0.008976	0.007308	0.006930	0.004964	0.005346
sich	0.006309	0.011697	0.006283	0.006291	0.006930	0.007170	0.005435
ich	0.006262	0.003877	0.013272	0.005366	0.003465	0.001434	0.001426
aber	0.006048	0.003347	0.007309	0.006245	0.007315	0.003365	0.003831

sich (reflexive pronoun) is underused in all L1 groups

visualization of overuse and underuse: bigrams of pos-categories

bigram	tot_norm	de	da	en	fr	pl	ru
\$.-PPER	0.042384	0.005297	0.009748	0.007963	0.006166	0.005801	0.007409
VVFIN-\$,	0.042131	0.006457	0.00776	0.006343	0.006937	0.006243	0.008391
PPOSAT-NN	0.041739	0.008058	0.007247	0.007269	0.007066	0.006298	0.005802
ADV-ADV	0.041604	0.012858	0.010518	0.006111	0.006166	0.003094	0.002856
ADV-APPR	0.039742	0.009117	0.008016	0.005324	0.007837	0.004807	0.004642
PDAT-NN	0.03956	0.005409	0.004233	0.005509	0.007837	0.007735	0.008837
ADV-ART	0.037125	0.007629	0.006349	0.006898	0.005653	0.006133	0.004463

adverb chains are underused in all L1 groups

form vs. function
example study on
modification

modification

- corpus-based studies of adverbs in GFL
 - typically based on lexical items and (rarely) word classes (form-based)
 - typically for one language pair
(Möllering 2004, Vyatkina 2007 etc.)
- ADV underuse points to a more general phenomenon: **modification**

modification

- **effects form-based or function-based?**
 - are **all adverbs** underused?
 - are **certain adverbs** (forms) underused?
 - are **certain adverbs** (forms) underused **in certain functions?**
 - are **certain adverbial functions** underused?
 - is **modification generally** underused?
(or do learners make up for the underuse of adverbs by other means of modification?)

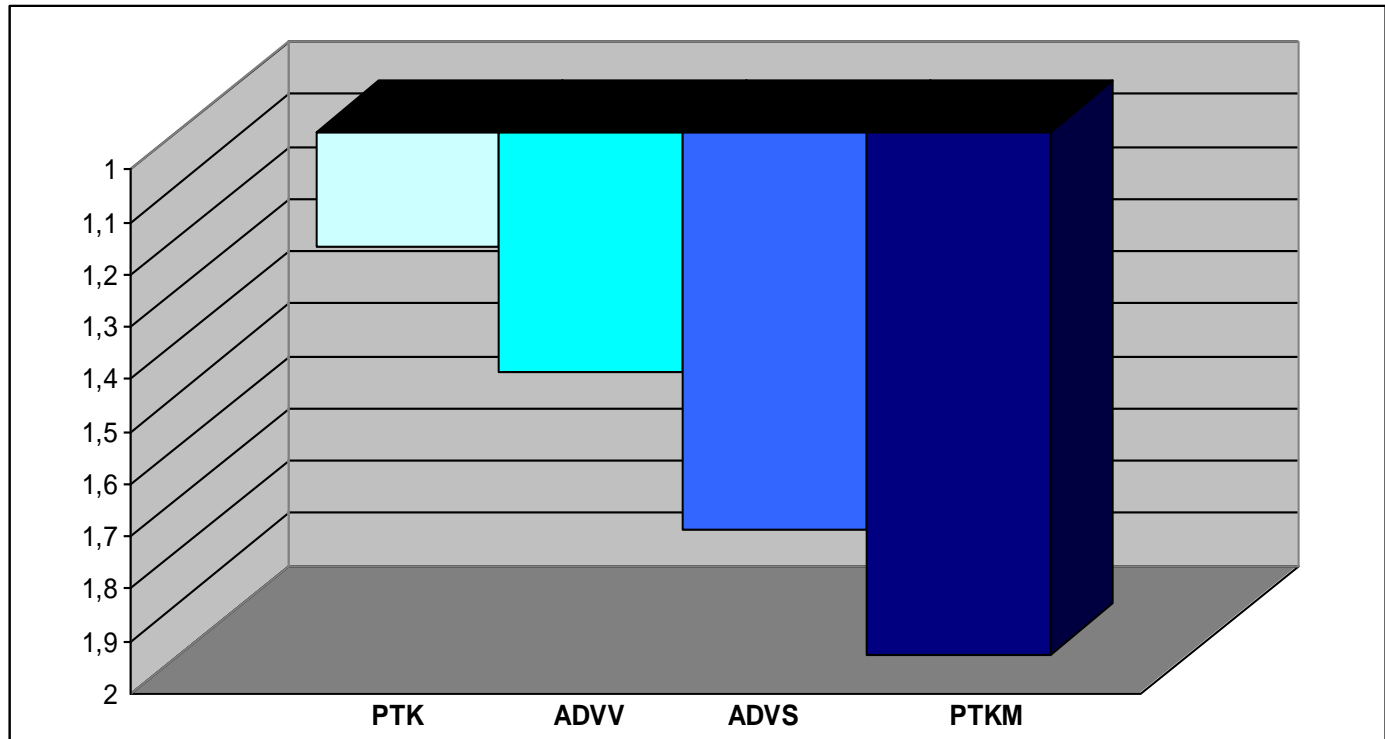
underuse of adverbs: function



- pos tag ADV is not fine-grained enough
- better classification and different functions
 - classes show different distributions
 - only some of these classes are underused by the learners

Hirschmann (2011, in preparation)

strength of underuse of different syntactic ADV classes



PTK: particles **sehr** gut

–

very good

ADVV: modal adv **Bald** schneit es

–

Soon it will snow

ADVS: sentence adv. **Bestimmt** regnet es bald – **Certainly**, it will snow soon

PTKM: modal part. Er mag sie **eben**

–

He **just** likes her.

modification

- **effects form-based or function-based?**
 - are **all adverbs** underused?
 - → **No: auch, noch etc. over**
 - are **certain adverbs** (forms) underused?
 - → **Yes**
 - are **certain adverbs** (forms) underused **in certain functions?**
 - are **certain adverbial functions** underused?
 - is **modification generally** underused?
(or do learners make up for the underuse of adverbs by other means of modification?)

underuse of adverbs: function

- underuse shows differences between different adverbial functions
 - but classification is still word based
- necessity to code syntactic functions independent of filler category

Falko – syntactic preprocessing

- Parses should be built on
 - grammatical sentences
 - learner near utterances→TH1
- for CIA Falko L1 & L2 corpus
- manually corrected pos tags
- semi-automatic sentence segmentation

Falko – syntactic annotation



- dependency parser (Bernd Bohnet 2010; Syntactic Analyser)
- training data: TiGer dependency bank
 - (derived from ~50000 trees of the TiGer treebank)
- result: very accurate dependency parses
 - with syntactic functions

ANNIS² Tutorial

Search Form

AnnisQL: POS="VVFIN" & POS="APPR" & POS="ADV" & #1 ->dep #2 & #2 ->dep #3

Query Builder: Show >>

Result: 110

History: Query History

More Corpora

<input type="checkbox"/>	Name	Texts	Tokens	
<input type="checkbox"/>	I1_0509_2	94	68940	i
<input checked="" type="checkbox"/>	I2_0609	248	124524	i

Search Result - POS="VVFIN" & POS="APPR" & POS="ADV" & #

Page 1 of 11 | Token Annotations

Dies gilt besonders für Kinder
dieser gelten besonders für Kind
Nom|Sg|Neut 3|Sg|Pres|Ind Acc|Pl|Masc
PDS VVFIN ADV APPR NN

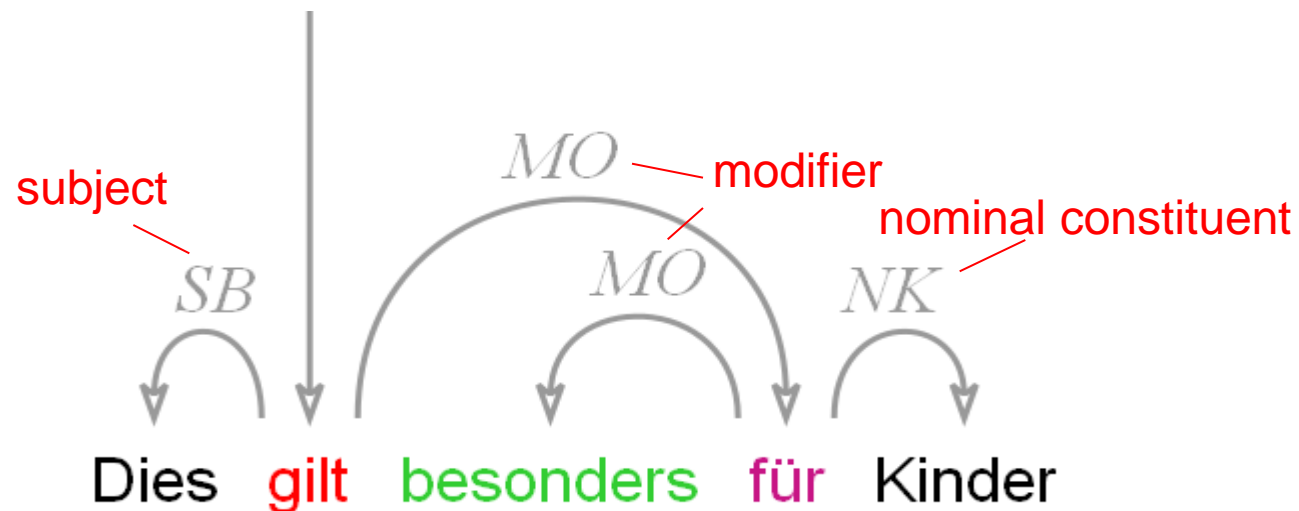
default_ns (grid)
 dependency

Dies gilt besonders für Kinder

syntax schema (very briefly)

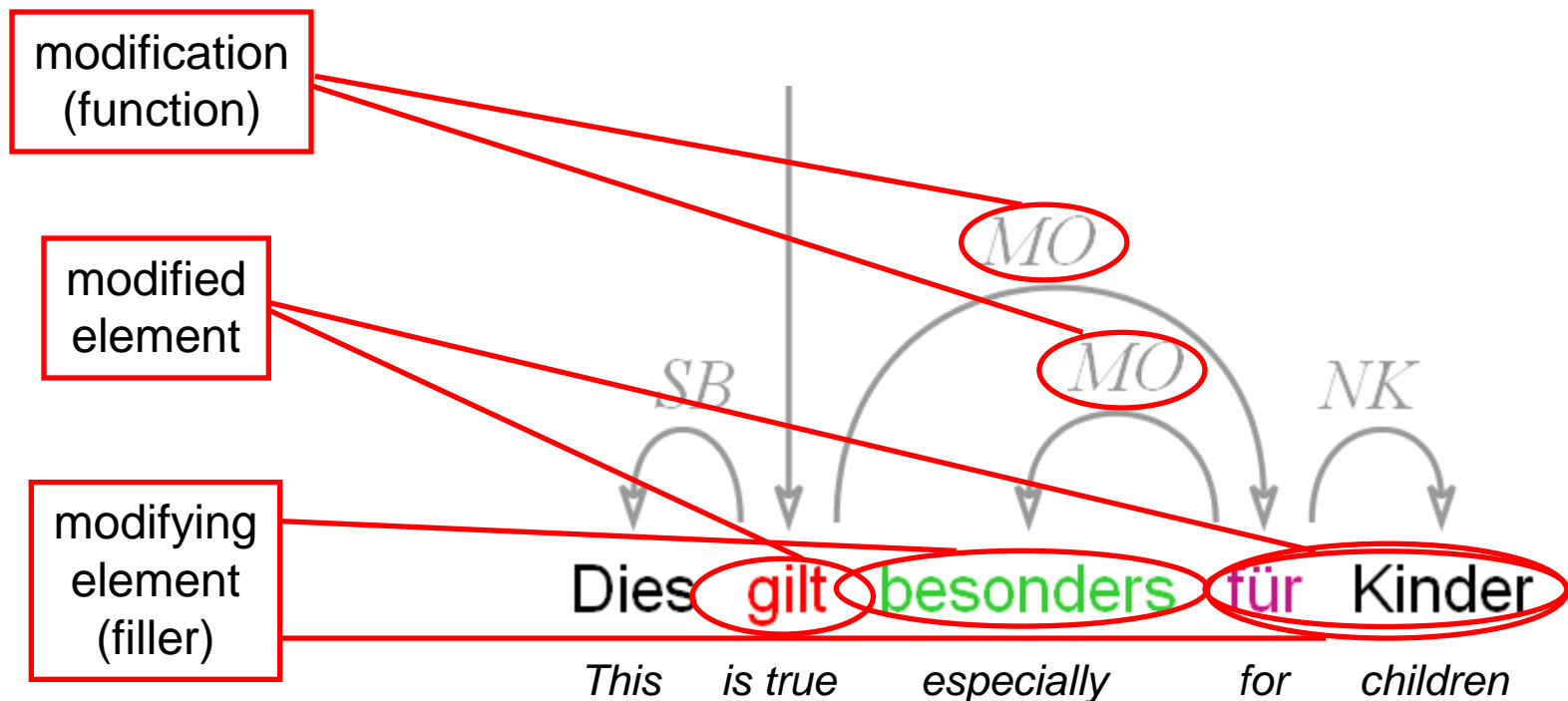


- every word is connected with its dependent(s)
- arrows point to hierarchically lower dependent
- each arrow (dependency) has a function label

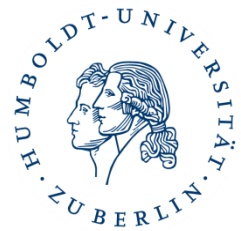


searching for modification in Falko

- different aspects of the problem
 - is the syntactic function ‚modification‘ underused?
 - what is the target of the modification?
 - what are the categories used for modification?



overuse / underuse of syntactic functions



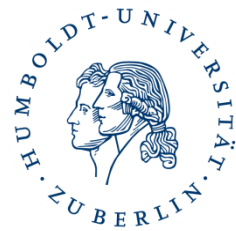
label	de	da	en	fr	ru	usb
NK	0,264067	0,278546	0,284881	0,303271	0,29552	0,295136
HD	0,156192	0,155622	0,157178	0,154275	0,15809	0,156483
MO	0,141968	0,12789	0,113704	0,110112	0,112513	0,108707
SB	0,07398	0,078506	0,077099	0,075093	0,078852	0,085512
CJ	0,059604	0,053397	0,056411	0,050632	0,059274	0,072183
AC	0,057051	0,059317	0,057215	0,054796	0,054012	0,04916
OC	0,050335	0,053039	0,050008	0,049888	0,047125	0,040679
OA	0,044213	0,042352	0,044097	0,043643	0,046119	0,046218
CD	0,026549	0,024632	0,025639	0,022156	0,024917	0,030466
CP	0,017653	0,021732	0,020325	0,018141	0,017256	0,014887
PD	0,014435	0,014462	0,015943	0,015019	0,016947	0,018002
NG	0,011065	0,011561	0,010914	0,00974	0,00975	0,011252
MNR	0,010995	0,013707	0,013429	0,013383	0,010679	0,009521
RC	0,010051	0,008979	0,009385	0,011375	0,006268	0,005366

overuse / underuse of syntactic functions – significant results

label	de	da	en	fr	ru	usb
NK	0,264067	0,278546	0,284881	0,303271	0,29552	0,295136
HD	0,156192					
MO	0,141968	0,12789	0,113704	0,110112	0,112513	0,108707
SB	0,07398	0,078506			0,078852	0,085512
CJ	0,059604	0,053397	0,056411	0,050632		0,072183
AC	0,057051					0,04916
OC	0,050335					0,040679
OA	0,044213					
CD	0,026549			0,022156		
CP	0,017653	0,021732	0,020325			
PD	0,014435		0,015943		0,016947	0,018002
NG	0,011065					
MNR	0,010995	0,013707	0,013429	0,013383		
RC	0,010051				0,006268	0,005366

MO (modification) is significantly underused independent of L1

modification



- **effects form-based or function-based?**
 - are **all adverbs** underused?
 - **No: auch, noch etc. over**
 - are **certain adverbs** (forms) underused?
 - **Yes**
 - are **certain adverbs** (forms) underused **in certain functions**?
 - **Yes**
 - are **certain adverbial functions** underused?
 - is **modification generally** underused?

modified element

func	L2 (norm)	L1 (norm)
V	117,635562	139,407446
ADJ	11,8629809	14,5772595
PREP	4,24891865	6,05986598
PROADV	0,08497837	0,15264146
NEG	1,22368857	2,57964068
ADV	2,85527333	5,08296063

In my opinion this statement **holds** .

the often very **theoretical** approach

especially **in** Denmark where ...

...and **exactly** for this reason ...

Perhaps **not** when

Only **then** do they develop...

frequencies normalized per 1000 edges

modified element – results

- all categories are frequently modified in both L1 and L2
- but **all syntactic relations** possible for modification are underused
- modifiers of adverbs show the strongest underuse

modifiers

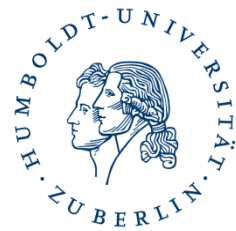
func	L2 (norm)	L1 (norm)	
V	14,6162802	12,8218827	If she makes her career, ...
PROADV	7,41011413	6,73148841	Some have success [with this] ...
COMPARE	0,26343296	0,27475463	One can, as mentioned above ...
PREP	44,8600831	48,5857769	To make money on a criminal basis
ADJ	12,7722495	17,5842962	... criminality increases steadily ...
ADV	61,8302642	87,7230473	which still exists ...

frequencies normalized per 1000 edges

modifier – results

- categories of different complexity (lexemes to sentences) are used for modification; modification is frequent in L2 and L1
- some categories are underused by the learners, two categories are slightly overused
- adverbs and (adverbially used) adjectives show the strongest underuse

modification



- **effects form-based or function-based?**
 - are **all adverbs** underused?
 - **No: auch, noch etc. overused**
 - are **certain adverbs** (forms) underused?
 - **Yes**
 - are **certain adverbs** (forms) underused **in certain functions**?
 - **Yes**
 - are **certain adverbial functions** underused?
 - **Yes**
 - is **modification generally** underused?
 - **Yes**

summary:

modification in Falko

- modification is a difficult category for learners of GFL
 - previous evidence: form-based
 - previous hypotheses: ‚transfer‘, polyfunctionality
- additional syntactic evidence shows the syntactic function ‚**modification**‘ is underused
 - **independent of form**
 - **independent of the learners L1**

Summary: learner corpora

- Learner corpora like Falko can help:
 - find abstract error patterns and relate them to meta-data
 - contrast frequencies in learner language structures on very different levels of abstraction to
 - to native speakers
 - between different learner groups

Parsed data empowers investigators to study differences in the use of specific **functions** rather than simply of **forms or form classes**.



謝謝

Thank you!

Danke!

Falko:

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

contact: marc.reznicek@staff.hu-berlin.de

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