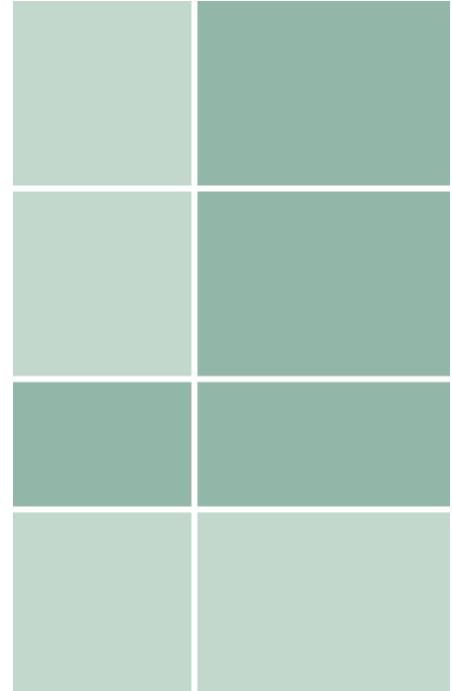# Subjecthood
and the on-line processing
of dyadic psych structures

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Outline

– Dyadic psych predicates in Icelandic and German:

(1)   *a.* *Mér   líkar   bók-in.*
             1.SG:DAT appeals book:NOM-DEF

     b. *Mir   gefällt   das   Buch.*
            1.SG:DAT appeals the:NOM book:NOM

(Þórhallur Eyþórsson 2000:185)

– What is the subject here?

– Icelandic: the DAT-argument
(see e.g. Andrews 1976, Höskuldur Þráinsson 1979:462-467, Helgi Bernódusson 1982:128-160, Zaenen et al. 1985:100-106, Halldór Ármann Sigurðsson 1989, Jóhanna Barðdal 1999:81-96 and many others)

– A "relentless accumulation of evidence"
(Andrews 2001:89)

– Indistinguishable from NOM-subjects with regard to many of the properties laid out by Keenan (1976)

– Obliques consistently analyzed to "behave like ordinary nominative subjects" (Fischer 2004:193)

(2)   a.   *Henni   leiðist bók-in.*
             3.SG.F:DAT bores   book:NOM-DEF

       b.   *Hún   vonast til   að ____ leiðast ekki bók-in.*
             3.SG.F:DAT hopes for to   bore   not book:NOM-DEF

                        (based on Halldór Ármann Sigurðsson 2004:141f.)

(3)   a.   *Kannski líkar   Hönn-u   nágrann-i-nn.*
             Maybe   appeals Hannah-DAT neighbor-NOM-DEF

       b.   **Kannski líkar   Hann-a   nágrann-a-num.*
             Maybe   appeals Hannah-NOM neighbor-DAT-DEF

                        (cf. also Jóhanna Barðdal 1999, Rott 2013)

1. Introduction

– An additional alternating subclass
(e.g. Jóhanna Barðdal 1999)

(4) a. *Henni   þóknast   nágrann-i-nn.*
          3.SG.F:DAT appeals   neighbor-NOM-DEF

      b. *Hún   vonast til   að ____ þóknast nágrann-i-nn.*
          3.SG.F:DAT hopes for to   appeal   neighbor-NOM-DEF

(5) a. *Kannski þóknast Hönn-u   nágrann-i-nn.*
          Maybe   appeals Hannah-DAT neighbor-NOM-DEF

      b. *Kannski þóknast Hann-a   nágrann-a-num.*
          Maybe   appeals Hannah-NOM neighbor-DAT-DEF

1. Introduction

– Now consider the German structures:

(6)
a. *Ihr   gefällt das   Buch.*
3.SG.F:DAT likes   the:NOM book:NOM

b. **Sie   hofft, ____ das   Buch   zu gefallen.*
3.SG.F:DAT hopes   the:NOM book:NOM to like

(7)
a. *Vielleicht gefällt (der)   Adam   dem   Nachbar-n.*
Maybe   appeals (the:NOM) Adam the:dat   neighbor-DAT

b. *Vielleicht gefällt (dem)   Adam   der   Nachbar.*
Maybe   appeals (the:DAT) Adam   the:nom neighbor:NOM

(cf. also Lenerz 1977:112-116, Kempen & Harbusch 2005, Verhoeven 2015)

– Status of the oblique is subject to extensive debate

1. Introduction

- – „The Icelandic-German dichotomy"
(Halldór Ármann Sigurðsson 2004:144)

- – Three decades of research
(see e.g. Cole et al. 1980, Seefranz-Montag 1983, Zaenen et al. 1985, Smith 1994, Andrews 2001, Jóhanna Barðdal 2002, 2006; Jóhanna Barðdal & Þórhallur Eyþórsson 2003, Wunderlich 2003, Halldór Ármann Sigurðsson 2004, Bayer 2004, Haider 2005 and many others)

- – Some recurring problems:

  a. One predominant type of evidence:
     Syntactic tests

  b. Limited comparative applicability
     (cf. Jóhanna Barðdal 2002:64-70)

  c. Mostly introspective

- – What other types of empirical data can be harnessed?

2. A sentence processing perspective

- Consensus on the basic principles of the *Human Sentence Processing Mechanism* (HSPM):

  a. Immediacy
     (e.g. Frazier & Fodor 1978, Just & Carpenter 1980, Townsend & Bever 2001)

  b. Incrementality
     (e.g. Marslen-Wilson 1973, Stabler 1994, Crocker 1999)

  c. Parsimony
     (e.g. King & Just 1991, Waters & Caplan 1996, Inoue & Fodor 1995, Gibson 1998)

- Initially largely based on data from English

- More recent developments addressing the cross-linguistic domain

- The eADM
  (Bornkessel & Schlesewsky 2006, Bornkessel-Schlesewsky & Schlesewsky 2009a, 2009b, Bornkessel-Schlesewsky et al. 2011)

2. A sentence processing perspective

– Prominence hierarchies:

(8)
a. **Morphological case marking:** NOM > ACC
b. **Argument order:** argument 1 > argument 2
c. **Animacy:** +animate **>** −animate
d. **Definiteness/Specificity:** +def/+spec > −def/−spec
e. **Person:** 1/2 > 3

(Bornkessel-Schlesewsky & Schlesewsky 2009b:28)

– Exceptional status of the DAT

– Cue strength is language specific

– Processing properties established for German:

a. Robust *Subject First* preference
(e.g. Hemforth 1993, Scheepers 1997)

b. One crucial exception:
Psych verbs with a DAT-Experiencer
(Bader, Meng & Bayer 2000, Schlesewsky & Bornkessel 2003,
De Schepper & Lamers 2010)

2. A sentence processing perspective

– Cue ranking for German:

(9)   Case marking > Animacy > Agreement > Argument order

(based on BORNKESSEL-SCHLESEWSKY et al. 2011:136)

– In contrast, Icelandic has barely figured in psycholinguistic research to date

– Two studies: Roehm, Schlesewsky & Bornkessel-Schlesewsky (2007) and Bornkessel-Schlesewsky et al. (2011)

– Tentative cue ranking for Icelandic:

(10) a. Morphologically unambiguous input:
       i. Non-alternating verbs: Case marking > Argument order
      ii. Alternating verbs: Argument order
    b. Morphologically ambiguous input: Argument order

3. Research questions

1. What is the general sentence processing profile of Icelandic vis-à-vis the German canon?

2. How does the more robust subjecthood of Icelandic obliques play out *in actu*?

3. How do the Icelandic subclasses differ and how do they relate to German?

4. Method

- Parallelized sentence processing studies carried out in Iceland and Germany

- *Self-Paced Reading* paradigm
(e.g. Just, Carpenter & Woolley 1982)

- Multifactorial design:
ORDER (NO/ON) ✖ VERBTYPE (EPROT/EPVAR/EPFIX)

- 6 conditions for Icelandic, 4 for German

- Three types of items:

  a. Target items with permutable grammatical relations (Garden Path)

  b. Check-filler items with main clause structures

  c. Distractor fillers ranging from simple to complex

– Items controlled for animacy, referentiality and constituent weight

– 90 Items for Icelandic, 60 for German

– 36 participants in Iceland
(21 female, 19-28, Ø=23.31, SD=2.48),
tested at Háskóli Íslands

– 36 participants in Germany
(21 female, 19-29, Ø=24.5, SD=2.82),
tested at Universität Bremen and in Hanover

– Baseline reading speed checked using simple filler sentences
(F(1,1114) = 0,153, p = 0,696)

4. Method

Table 1: Target sentence predicates

	Infinitive			Finite forms (2σ)	
	Icelandic	German	Translation	Icelandic	German
E P V A R	*þóknast*	*gefallen*	'appeal to'	*þóknast*	*gefällt*
	henta	*passen*	'suit'	*hentar*	*passte*
	duga	*reichen*	'find adequate'	*dugði*	*reichte*
	birtast	*erscheinen*	'appear to'	*birtist*	*erschien*
	nægja	*genügen*	'find sufficient'	*nægir*	*genügt*
E P R O T	*fíla*	*mögen*	'like'	*fílar*	*mochte*
	óttast	*fürchten*	'fear'	*óttast*	*fürchtet*
	þekkja	*kennen*	'know'	*þekkti*	*kannte*
	elska	*lieben*	'love'	*elskar*	*liebte*
	skilja	*verstehen*	'understand'	*skildi*	*verstand*
E P F I X	*líka*	-	'appeal to'	*líkar*	-
	leiðast	-	'bore'	*leiddist*	-
	gremjast	-	'anger'	*gramdist*	-
	blöskra	-	'appall, shock'	*blöskrar*	-
	ofbjóða	-	'be too much for'	*ofbauð*	-

4. Method

Table 2: Target item examples for WORD ORDER × VERBTYPE

	Adverb	Verb	Name	Dem.	Noun	Tail₁	Tail₂	Tail₃
	REGION OF INTERESTEST							
	3σ	2σ	2σ	2σ	3σ	2σ	-	-
NO	Auðvitað	þóknast	Þurý	þessum	starfsbróður	þar sem	þau sjá	um verkið
	Natürlich	gefällt	Kathi	diesem	Kollegen	seitdem	sie das Projekt	betreuen
ON	Sem stendur	þóknast	Lúðvík	þessi	kennari	vegna	reynslunnar	hans
	Momentan	gefällt	Ludwig	dieser	Kursleiter	wegen	seiner	Erfahrung
NO	Líklega	fílar	Davíð	þennan	farþega	eftir	að hann kom	með kaffi
	Vermutlich	mochte	David	diesen	Beifahrer	nachdem	er Kaffee	mitbrachte
ON	Af og til	fílar	Ottó	þessi	prófessor	síðan	hann sýndi	getu sína
	Ab und zu	mochte	Otto	dieser	Professor	seitdem	er sein Können	gezeigt hat
NO	Nú til dags	líkar	Axel	þessum	félaga	nema	ef það eru	átök
ON	Efalaust	líkar	Dagmar	þessi	málari	núna	þegar allar deilur	voru leystar

4. Method

Table 3: Check-filler examples for WORD ORDER × VERBTYPE

| REGION OF INTERESTEST								
	Def + Noun$_1$	Verb	Dem.	Noun$_2$	Tail$_1$	Tail$_2$	Tail$_3$	Tail$_4$
	4σ	2σ	2σ	3σ	4σ			
NO	Húsvörðurinn Der Hausmeister	þóknast gefällt	þessum diesem	leigjanda Nachmieter	í fyrsta sinn zum ersten Mal	í langan seit	tíma langer Zeit	
ON	Baðsgestinum Dem Badegast	þóknast gefällt	þessi dieser	gjaldkeri Kassierer	greinilega offensichtlich	þrátt fyrir trotz seiner	önuglyndið schlechten Laune	hans
NO	Skákmeistarinn Der Schachmeister	fílar mochte	þennan diesen	gestgjafa Gastgeber	sennilega höchstwahr- scheinlich	frá upphafi von Anfang an		
ON	Iðnrekandann Den Firmenchef	fílar mochte	þessi dieser	launþegi Arbeiter	hugsanlega eventuell	vegna wegen	kímnigáfunnar seines Humors	hans
NO	Könnuðurinn	líkar	þessum	kafara	sem betur fer	svo	það var	góð stemning
ON	Stjúpsyninum	líkar	þessi	ættingi	suma daga	en því miður	oftast	ekki

5. Results

1. A sentence processing profile for Icelandic

Table 4: Aggregated mean reading time for EPROT target sentences

Word Order	German	Icelandic
NO	3837,361 ms	3588,656 ms
ON	4497,922 ms	4376,439 ms
		N = 720

– Expected contrast descriptively visible

– For German, the slowdown is highly significant
(F(1,358) = 8,247, p = 0,004)

– The same holds true for Icelandic
(F(1,358) = 10,642, p = 0,001)

5. Results

Target sentences: EPROT
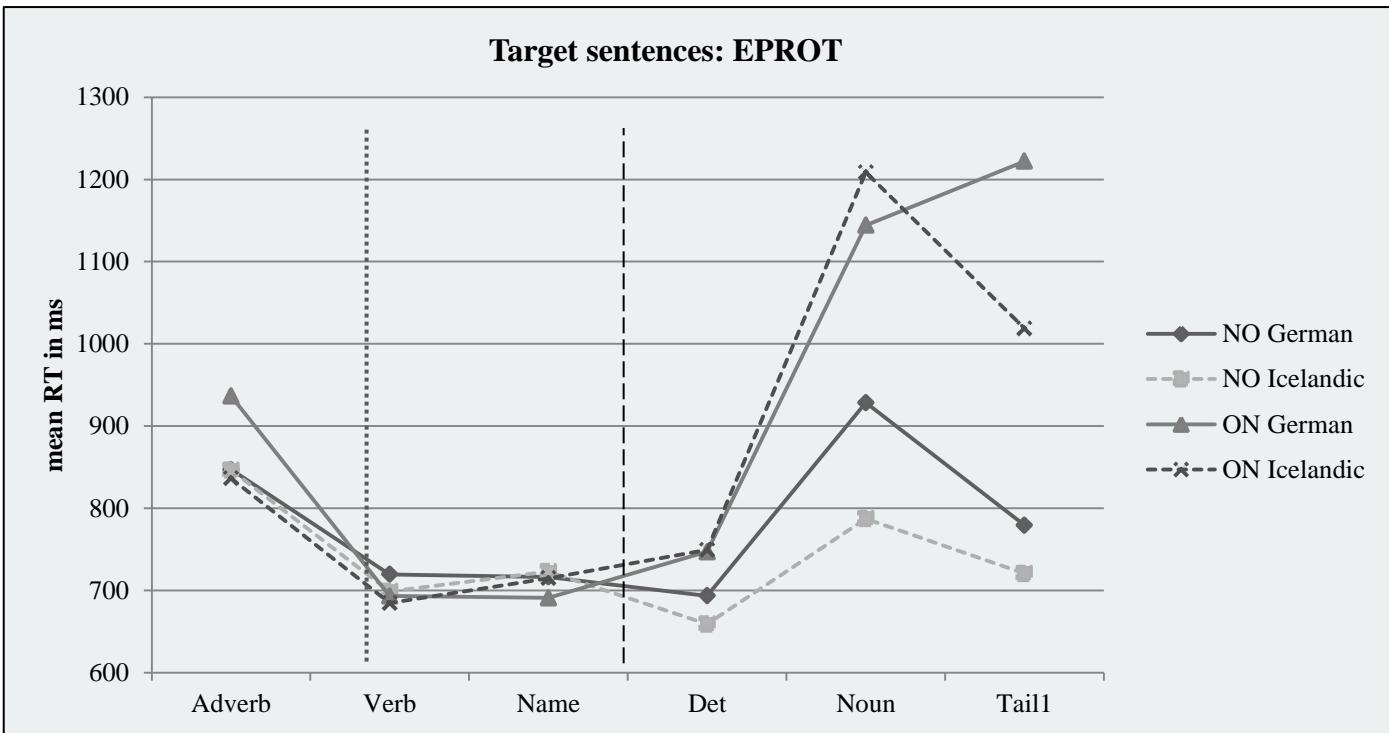
Note: Dotted line indicates onset of ROI, dashed line marks point of disambiguation
Figure 1: Mean target sentence RTs (Language × Word Order × EPROT)

– Strong garden path in both languages
– Close match of time course

5. Results

- ## Language comparison

Table 5: Model parameters for target sentences with EPROT

Fixed factor	Estimate	Std. Error	df	t	Sig.
Intercept	8,164616	,062102	76,620	131,470	,000
LANGUAGE (Icelandic)	-,086010	,087465	78,206	-,983	,328
WORD ORDER (ON)	,137165	,029847	27,637	4,596	,000
LANGUAGE*WORD ORDER	,045144	,040684	638,000	1,110	,268

– No significant impact of LANGUAGE

– Similar picture in contexts without reanalysis

Table 6: Aggregated mean reading time for EPROT check-filler sentences

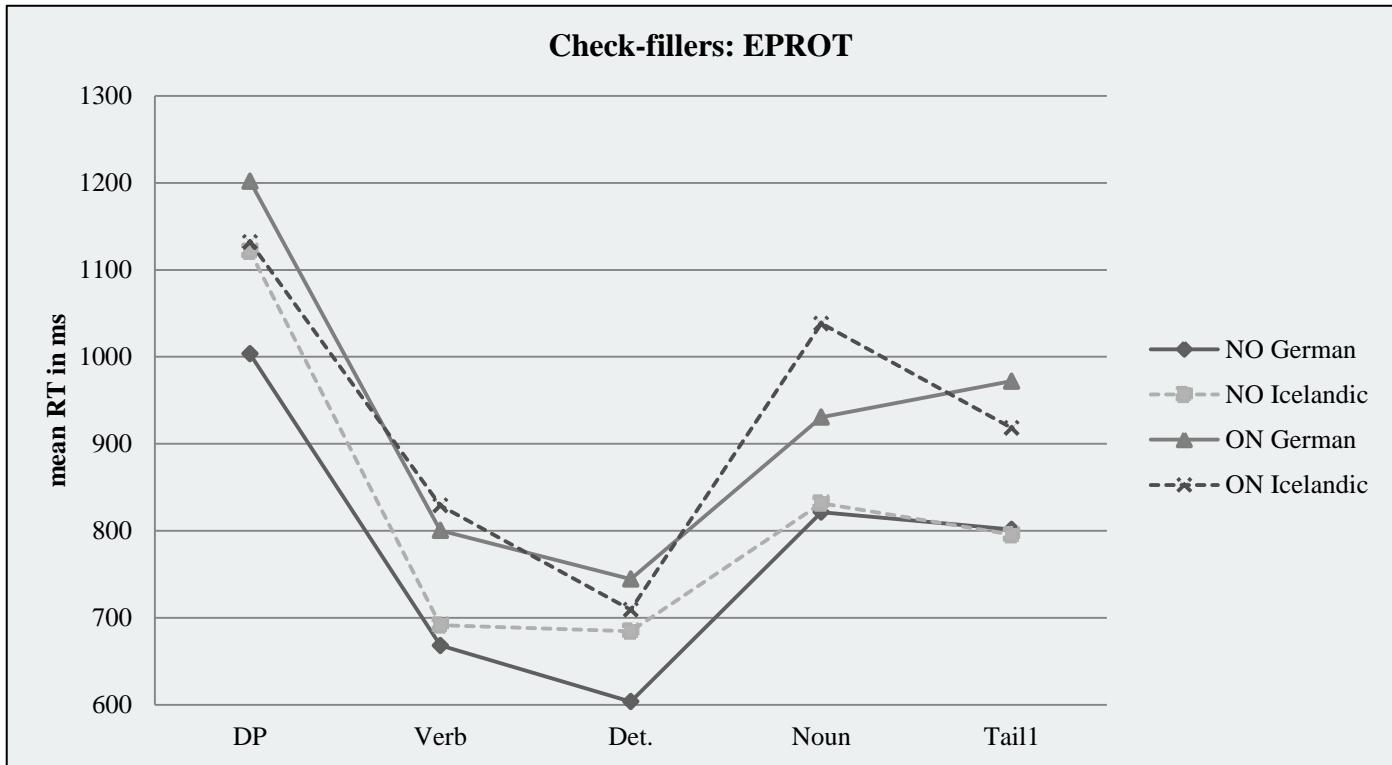| WORD ORDER	German	Icelandic
NO	3899,037 ms	4125,056 ms
ON	4650,019 ms	4627,463 ms
		N = 432

– Differing underlying data patterns:

Figure 2: Mean check-filler RTs (Language × Word Order × EPROT)

– A possible cue difference for case?

2. Reflexes of oblique subjecthood

Table 7: Mean target sentence RTs for Icelandic

WORD ORDER	EPROT	EPFIX	EPVAR
NO	3588,656 ms	4181,794 ms	3948,761 ms
ON	4376,439 ms	4037,122 ms	4057,339 ms
			N = 1080

– No significant difference between linearizations for DAT-psych predicates
(F(1,358) = 0,322, p = 0,571)

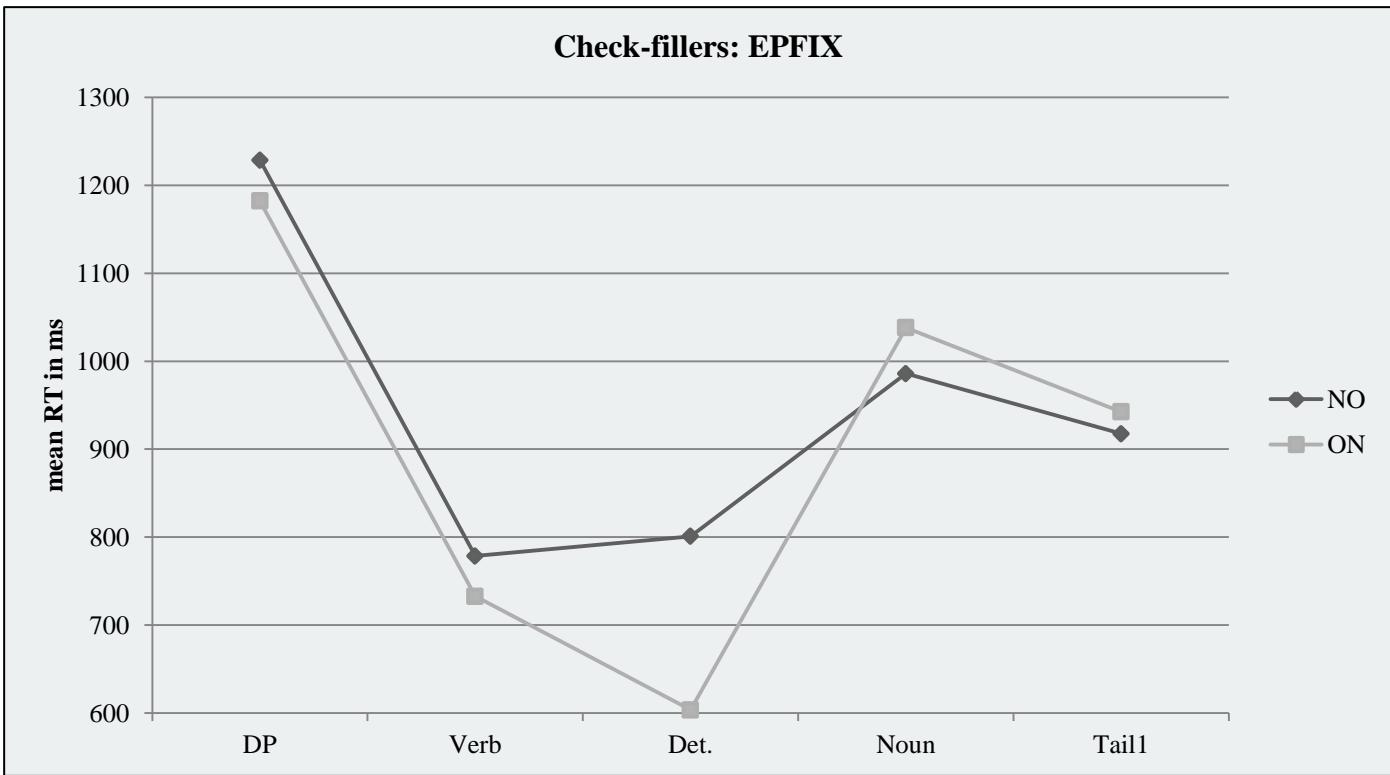– How does the most robust class (EPFIX) pattern in non-reanalysis contexts?

5. Results


Figure 3: Mean check-filler RTs (Word Order × EPFIX)

- The descriptive difference does not hold up to statistical scrutiny across the ROI
  ($F(1,214) = 0,176$, p = 0,676)

- Possibly due to animacy artifacts
  (Jóhannes Gísli Jónsson 2003:141-144)

3.   Class differences, language differences?

– There appears to be class-internal gradient of processing cost in the NO-linearization:

Target sentences: Icelandic (NO)
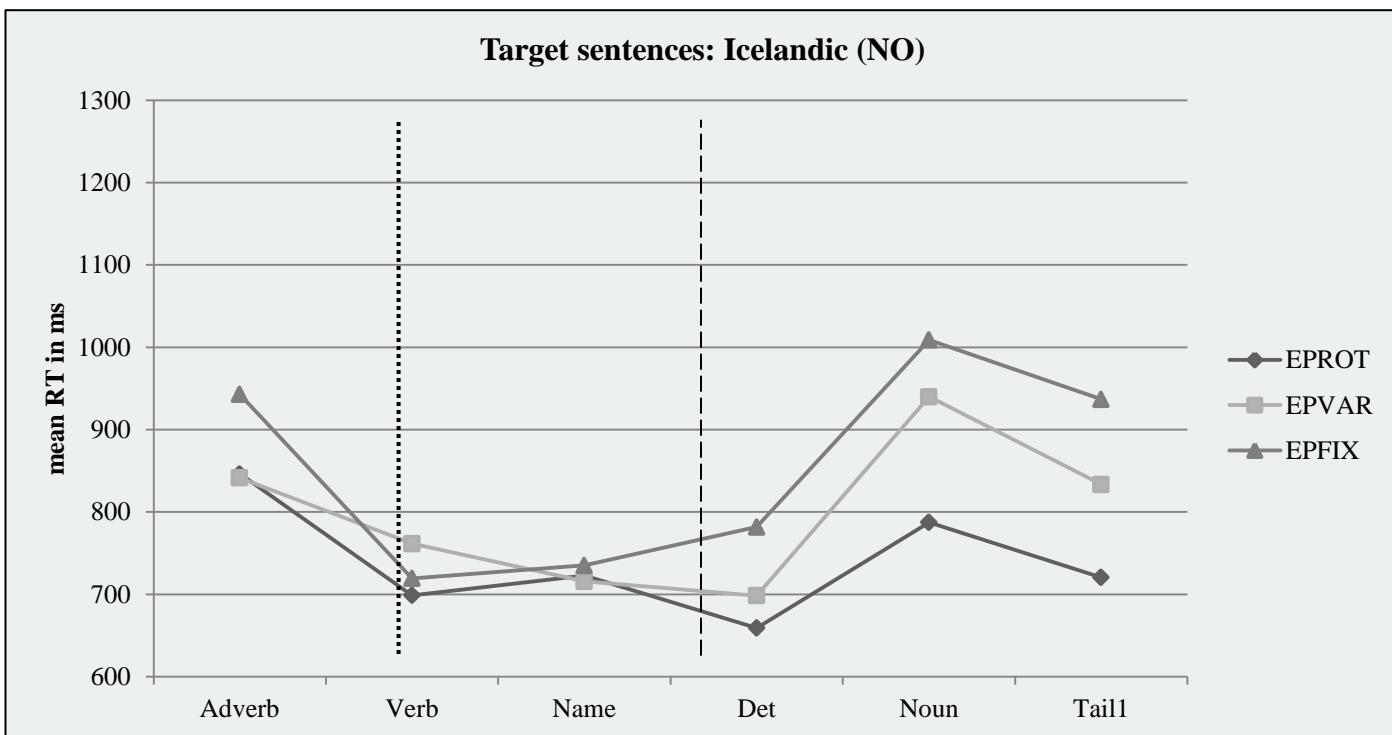
Note: Dotted line indicates onset of ROI, dashed line marks point of disamb.
Figure 4: Mean target sentence RTs (Icelandic × NO × Verb Type)

5. Results

Table 8: Model parameters for Icelandic target sentences with NO word order (EPFIX is reference group)

Fixed factor	Estimate	Std. Error	df	t	Sig.
Intercept	8,208327	,066255	40,403	123,890	,000
VERB TYPE (EPVAR)	-,058771	,030241	502,000	-1,943	,053
VERB TYPE (EPROT)	-,129722	,030241	502,000	-4,290	,000

- Alternating predicates show a significantly weaker increase

- Processing cost under reanalysis is a function of verb class

- Oblique subjecthood may possibly attenuate, but not override effects of argument linking
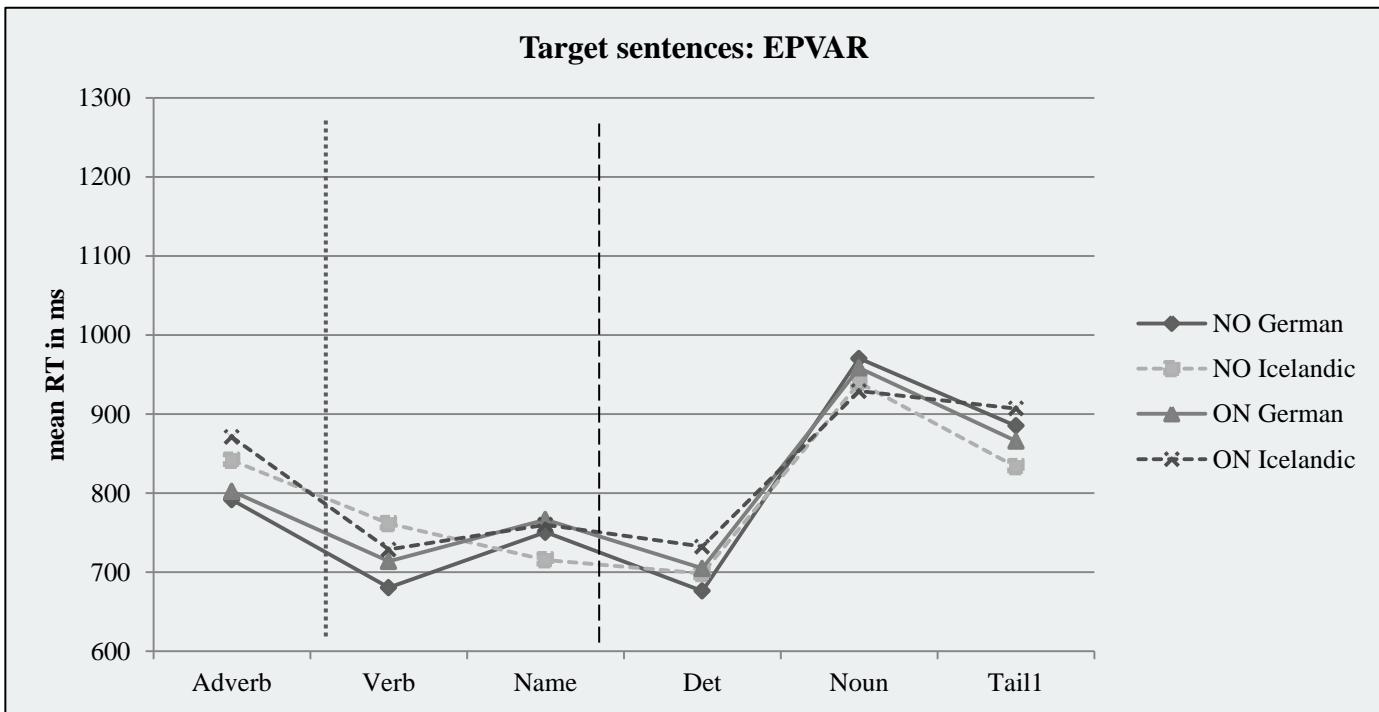
5. Results

- How do the languages compare with regard to alternating predicates?

Table 9: Aggregated total reading times for EPVAR target sentences

WORD ORDER	German	Icelandic
NO	3963,039 ms	3948,761 ms
ON	4009,444 ms	4057,339 ms
		N = 720

- No significant effect of WORD ORDER in German
  ($F(1,385) = 0,049$, p = 0,825)

- Previous findings replicated

- No effect in Icelandic, either
  ($F(1,385) = 0,195$, p = 0,659)

5. Results

Note: Dotted line indicates onset of ROI, dashed line marks point of disambiguation
Figure 5: Mean target sentence RTs (Language × Word Order × EPVAR)

5. Results

Table 10: Model parameters for target sentences with EPVAR predicates

Fixed factor	Estimate	Std. Error	df	t	Sig.
Intercept	8,189708	,066379	72,128	123,378	,000
LANGUAGE (Icelandic)	-,040151	,087001	78,512	-,462	,646
WORD ORDER (ON)	,007552	,045718	12,572	,165	,871
LANGUAGE*WORD ORDER	,043556	,041157	638,000	1,058	,290

- No significant effects
- Argument linking is the main determiner of processing cost
- No discernible attenuation via subjecthood for alternating psych predicates
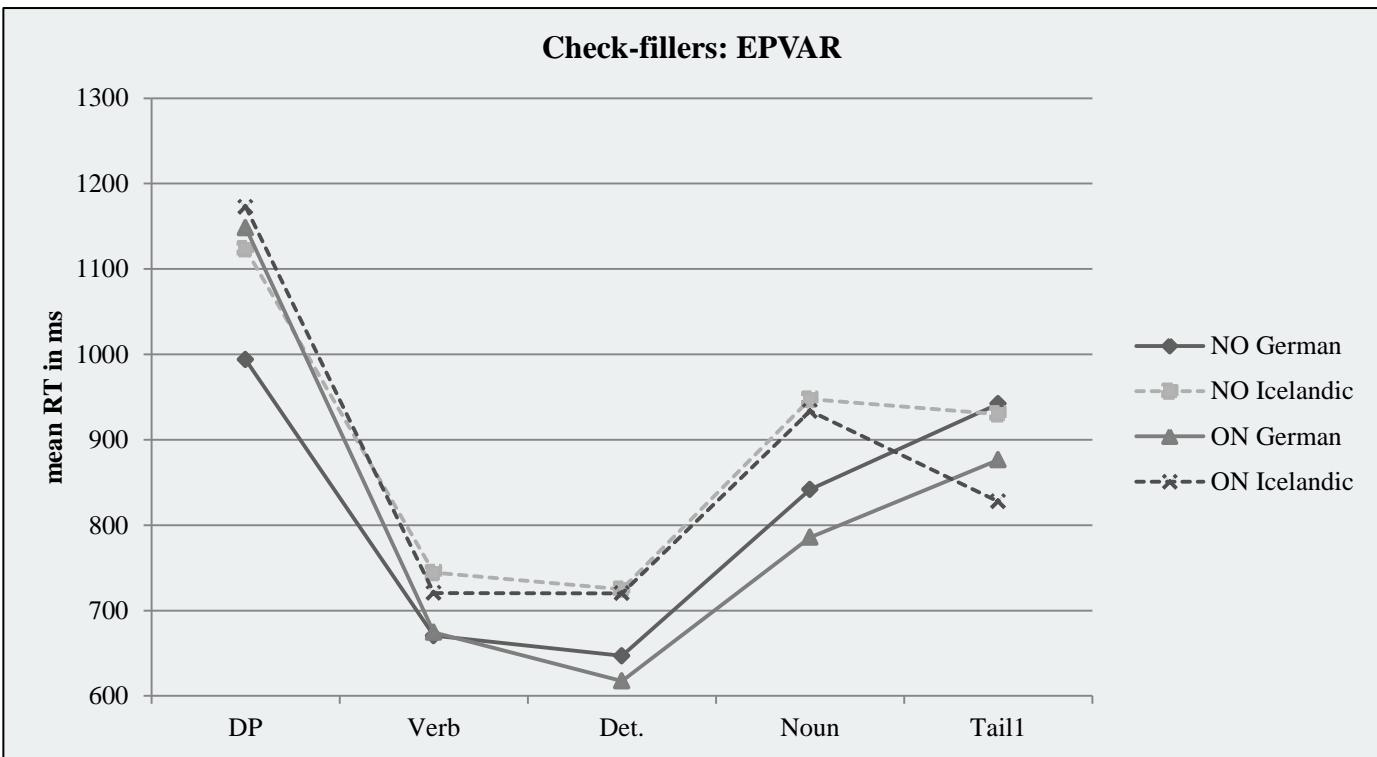
5. Results

Figure 6: Mean check-filler RTs (Language × Word Order × EPVAR)

- Likewise for non-reanalysis contexts
- Again: Evidence for cue differences

6. Summary and future research

- For verbs with canonical case marking, Icelandic parallels German in exhibiting reanalysis effects for dispreferred linearizations (i.e. *Subject First*)

- A possible difference: The role of case as a cue

- DAT-psych verbs have an altogether different different data pattern in both languages

- For psych structures with oblique Experiencers, subjecthood is not a primary determinant of processing

- Even non-alternating DAT-Experiencer verbs

- In terms of the eADM, subjecthood is clearly secondary to mechanisms underlying the selection of predicate case frames

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Thank you!
Takk fyrir!
Vielen Dank!