

# Variation in the structure of subordinate clauses and the instability of V-to-T in Scandinavian

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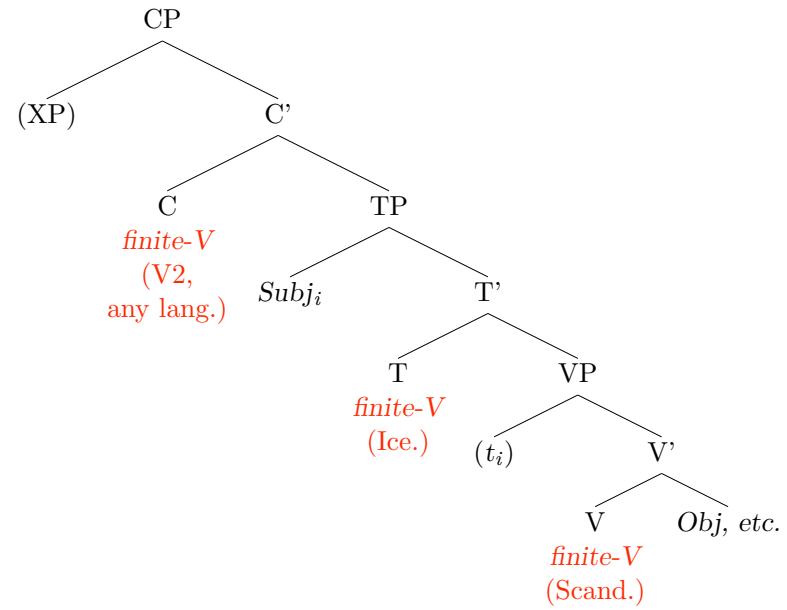
Formal Ways of Analyzing Variation  
25th Scandinavian Conference of Linguistics  
May, 2013  
Háskóli Íslands, Reykjavík

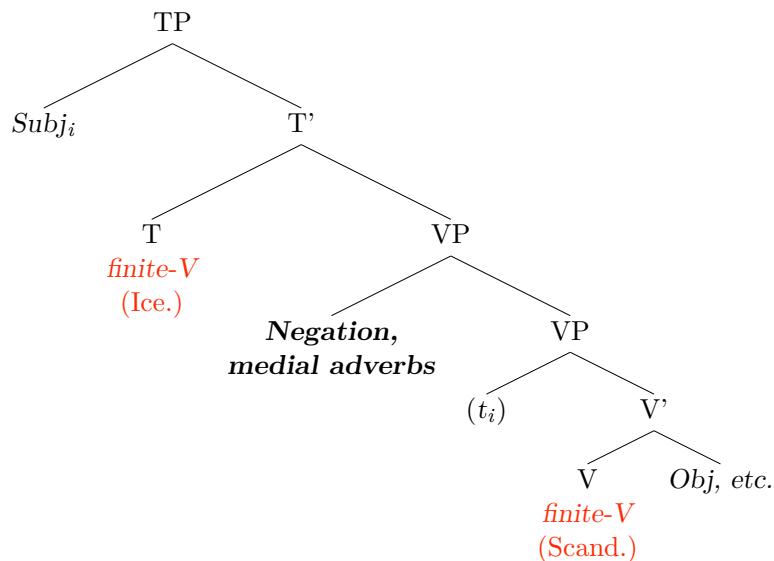
## Outline

- ① V2 and V-to-T
- ② Loss of V-to-T
  - A repeated diachronic pattern; proposed explanation
- ③ Model of Learning
  - A very simple model of acquisition
- ④ Experiment
  - Predictions for Sample Corpora
  - Some Remaining Issues
- ⑤ Conclusions

## Big Questions

- What mechanisms link L1 acquisition and diachronic change?
- What predictions do hypotheses about acquisition make for language change, and how precise can the predictions be?
- How can we test these predictions empirically?





## Embedded V2 (EV2)

- In all these languages, a subset of subordinate clauses are optionally V2 (= exhibit Embedded V2 (EV2)).
- The presence/absence of EV2 is not diagnosed by the absence/presence of an complementizer.

(1) Vi ved ...  
we know

at børnene (altid/ikke) havde (altid/ikke) lært  
that children-def always/not had always/not learned  
historie i skolen  
history in school

at i skolen havde børnene altid/ikke lært  
that in school had children-def always/not learned  
historie  
history

## V-to-T in Scandinavian: important background assumptions

- 1 Vfin–Neg order of Icelandic is historically prior. That is, we know that the MS languages all changed from Vfin–Neg to Neg–Vfin order in subordinate clauses over time (=V-to-T was lost)
- 2 When V2 applies in Scandinavian, it obliterates the evidence for V-to-T vs V-in-situ, placing the finite verb in C regardless of whether the language shows V-to-T movement.
- 3 V2 has been a constant property of all of these languages during the relevant time period (including now).

## Loss of V-to-T and the Rich Agreement Hypothesis

- A diachronic pattern has repeated itself in a number of Scandinavian languages: verb-agreement morphology is lost, then V-to-T movement is lost.
  - Danish (by sometime in 18th c.), Swedish (by 18th c. in most varieties), Norwegian (Sundquist 2002)
  - Faroese (Jonas 1996; Heycock et al. 2011).
  - English followed a similar pattern.
- Even if contact between these varieties is involved in a cascade of changes, why are they so susceptible to the change?
- **Tempting Conclusion:** strong version of the “Rich Agreement Hypothesis” (Rohrbacher 1999; Koenenman and Zeijlstra 2010).
  - Rich agreement morphology ↔ V-to-T movement (or equivalent)

## Problems with the Strong RAH

- See overview in Bobaljik (2002).
- In Mainland Scandinavian, the loss of V-to-T lags behind the loss of “rich” morphology by many generations.
- While the loss of V-to-T is ongoing, individuals show evidence of both systems in their production (intraspeaker variation), without morphological differences.
- It is possible for individual speakers to acquire and generate V-to-T in the absence of verb morphology.
- If there is a pressure against this situation, it is a gradual one, and shows up over generations.

## Problems with the Weak RAH

- If word order evidence alone is enough to acquire the V-to-T grammar, then it is not clear why any change would happen; without further assumptions, stasis is predicted even after agreement is lost.
- Even if V-to-T were lost on occasion (e.g. due to drift), there is still no explanation for the repetition of this change across the Scandinavian varieties.

## Weak RAH

- Bobaljik (2002): rich (i.e. distinct) Tense and Agr morphology entails verb movement into the T-domain (and the presence of relevant functional projections), **but not vice-versa**.
- Bobaljik and Thráinsson (1998), Bobaljik (2002), *inter alia*: disappearance of verb morphology removes an important cue for the learner about the syntax, which may precipitate the loss of V-to-T.
- This theory allows V-to-T to be acquired based solely on word order evidence.

## Proposed solution: evidence for V-to-T is masked by EV2

- The model of the relationship between acquisition and change in Yang (2000) predicts that **the variant which signals its presence most often to the learner** will win out over time.
- Many sentences produced by a syntactic parameter setting will be ambiguous, i.e. compatible with other settings, but some will unambiguously signal one setting over another.
- When two syntactic variants are being acquired in variation, the one which generates a higher percentage of unambiguous sentences (signaling it) will win.

$$\frac{UnambiguousClauses_G}{AllClauses_G} \tag{1}$$

Proposed solution: evidence for V-to-T is masked by EV2

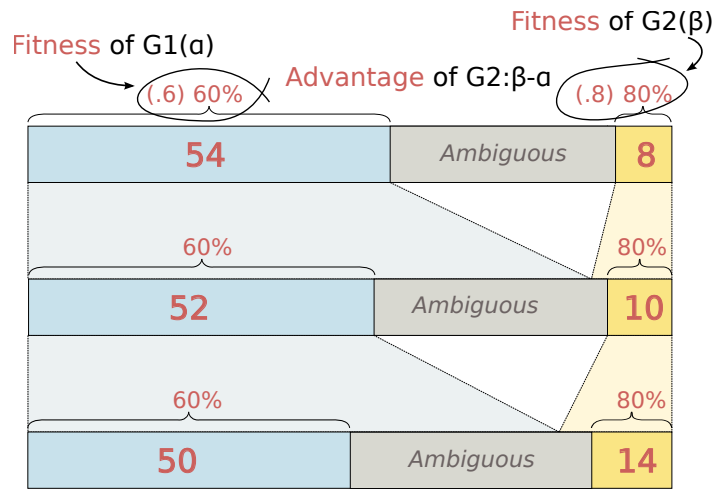
- In our case, all matrix clauses in V2 languages are ambiguous between V-in-situ and V-to-T, because they all have V-to-C.
- In subordinate clauses, we show that a V-in-situ grammar produces more unambiguous clauses signaling itself than a V-to-T grammar, giving it an advantage ... **if it allows some Embedded V2.**
- Once the V-in-situ and V-to-T grammars are in contact, the course of the change is deterministic in favour of the V-in-situ grammar, based on the evidence to the learner from **word order alone.**

Yang's (2000) Model of Grammars in Variation

- If an **ambiguous** input is encountered, i.e. either  $G_1$  or  $G_2$  can analyze it, then the child will reward whichever grammar he/she happened to be using at the time.
- If an **unambiguous** input is encountered, e.g. only  $G_2$  could have produced the sentence, then either  $G_2$  will be rewarded, or  $G_1$  will be punished. Either way,  $G_2$  ends up with an augmented weight.
- Therefore, the grammar which generates more unambiguous sentences of its own type will have its weight augmented more often.
  - And over generations as well.

Yang's (2000) Model of Grammars in Variation

- Given a mixture of 2 grammars in the input,  $G_1$  and  $G_2$ , a child is expected to learn both, assign some probability (weight) to each (p,q), and then update these weights throughout the learning process.
- Selectional advantage of a grammar is based on the ability of children to acquire it (i.e. reproductive advantage, in the sense of Darwinian selection).
  - Adapts a classic computational model of learning from Bush and Mosteller (1951), Bush and Mosteller (1958) to syntactic acquisition in a state of grammar variation/change.



G<sub>1</sub>: V-to-T with V2 vs. G<sub>2</sub>: V-in-situ with V2

	V-to-T output	V-in-situ output
<b>Root</b>	<b>V-Neg</b> Hún borðar ekki fisk she eats not fish She doesn't eat fish	<b>V-Neg</b> Hon áter inte fisk she eats not fish She doesn't eat fish
<b>Embedded Non-EV2 contexts</b>	<b>V-Neg</b> ... ef hún borðar ekki fisk ... if she eats not fish ... if she doesn't eat fish	<b>Neg-V</b> ... om hon inte áter fisk ... if she not eats fish ... if she doesn't eat fish

$\alpha$	Fitness of V-to-T grammar
$\beta$	Fitness of V-in-situ grammar

G<sub>1</sub>: V-to-T with V2 vs. G<sub>2</sub>: V-in-situ with V2

Returning now to our case: the competition between two V2 grammars, one with V-to-T (G<sub>1</sub>) and one with V-in-situ (G<sub>2</sub>)

- What type of examples constitute unambiguous evidence for G<sub>1</sub> and for G<sub>2</sub>?
- What is the ratio of such unambiguous examples to all examples, for each grammar? That is, what are  $\alpha$  and  $\beta$ , the measures of **fitness** for G<sub>1</sub> and G<sub>2</sub>?

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<b>Embedded Possible EV2 contexts</b>	<b>V-Neg</b> ... að hún borðar ekki fisk ... that she eats not fish ... that she doesn't eat fish	<b>Neg-V</b> ... att hon inte áter fisk ... that she not eats fish ... that she doesn't eat fish	<b>V-Neg</b> ... att hon áter inte fisk ... that she eats not fish ... that she doesn't eat fish

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Calculating  $\alpha$  and  $\beta$

- Icelandic: all subordinate clauses with diagnostic elements from narrative texts, excluding texts from the years 1600-1850 (IcePaHC).
  - Texts from 1600-1850, show significant syntactic influence from Danish and, to a lesser extent, German.
- Total Icelandic subordinate clauses in sample: 1199
- For Swedish: all of Waldmann's caregiver data, 300 relevant clauses from *Bonnier's* novels, 300 clauses from blogs.
- Total Swedish clauses in samples:
  - 1 Waldmann's (2008) caregiver data: 211
  - 2 Bonnier novels: 285
  - 3 Blogs: 290

An Observational Experiment

- To get an estimate of  $\alpha$ , fitness of V-to-T, Icelandic Parsed Historical Corpus (IcePaHC) (Wallenberg, A. K. Ingason, E. F. Sigurðsson, and E. Rögnvaldsson, 2011).
- For Mainland Scandinavian, no comparable corpus exists.
- We use three sources to estimate  $\beta$ , fitness of V-in-situ, based on modern Swedish:
  - 1 Waldmann's (2008) data from the speech of Swedish caregivers to children.
  - 2 Novels published by Bonnier (1976/1977).
  - 3 Blogs (recent)
 (the latter two from *Korp*, (unparsed) corpus of modern Swedish, part of *Språkbanken*, Borin et al. 2012)
- **Hypothesis:**  $\beta_{sample} > \alpha_{sample}$ , based on Swedish and Icelandic subordinate clause samples.

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## What about a bias against acquiring V-to-T?

- **Possible alternative solution:** an acquisitional bias against V-to-T acts as a partial filter on the input to the child (Kirby 1999; Clark et al. 2008)
- **But** there is no evidence for such a bias. Acquisitional work on Swedish (Håkansson and Dooley-Collberg 1994; Waldmann 2008), Norwegian (Westergaard and Bentzen 2007a), Faroese (Heycock et al. 2012) shows that children initially **overproduce** V-to-T.

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Root	V-Neg Hún borðar ekki fisk she eats not fish She doesn't eat fish	V-Neg Hon áter inte fisk she eats not fish She doesn't eat fish	
Embedded Non-EV2 contexts	<b>.55</b> V-Neg (overt S) ... ef hún borðar ekki fisk ... if she eats not fish ... if she doesn't eat fish	<b>.50</b> Neg-V (null S) ... sem ekki borðar fisk ... C-rel not eats fish ... who doesn't eat fish	Neg-V (overt S) ... om hon inte áter fisk ... if she not eats fish ... if she doesn't eat fish
Embedded Possible EV2 contexts	V-Neg ... að hún borðar ekki fisk ... that she eats not fish ... that she doesn't eat fish	Neg-V (null S) ... sem borðar ekki fisk ... C-rel eats not fish ... who doesn't eat fish	Neg-V (null S) ... som inte áter fisk ... C-rel not eats fish ... who doesn't eat fish

Data from caregivers

$\alpha$	Fitness of V-to-T grammar
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## How much evidence is there for the V-to-T parameter?

- 793 utterances in 1 hour of caregiver speech, 114 sub. clauses (Westergaard and Bentzen 2007b)  
**Pr(hearing sub.cl. in a given utterance) = 0.114**
- IcePaHC: 49,576 sub. clauses (filled C); only 2316 are *potentially* relevant to the parameter.  
**Pr(hearing relevant in a given sub. cl.) = 0.0467**
- **Pr(relevant sub.cl. in a given utterance) = Pr(sub.cl. in utt.)Pr(relevant) = 0.00672**
- $\alpha = 0.35$  for Icelandic; **Pr(hearing unambig. clause) = Pr(relevant sub.cl. in utt.) $\alpha = 0.00235$**
- Assume 6 hours of input per day, then a child could expect to hear a relevant utterance  $0.00235 \times 793 \times 6 = 11.2$  times.
- What is the probability of a child mishearing an utterance completely?





## Conclusions

- A V-to-T system can be acquired with or without rich verb morphology (cf. strong RAH).
- If a V-in-situ system were never introduced (through innovation or contact), V-to-T without agreement could persist indefinitely (cf. weak RAH).
- However, V-to-T is susceptible to invasion by a V-in-situ grammar, which has a selectional advantage iff it also permits embedded V2.

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