Optionality in Verb-Cluster Formation

Markus Bader, Tanja Schmid & Jana Häussler

University of Konstanz

Tübingen, 01.02.08

In German, verbs normally select their dependent elements to the left. This is true for objects . . .

(1) . . . dass Peter [ein Buch ← schreibt].
that P. a book writes

. . . and also for verbs selected by another verb.

(2) a. . . . dass er [es ← geschrieben ← hat].
that he it written has

b. . . . dass er [es ← geschrieben ← haben ← könnte].
that he it written have could
'. . . that he might have written it.'

c. . . . dass [es ← geschrieben ← worden ← sein ← könnte].
that it written been be could
'. . . that it might have been written.'

The general pattern thus looks as in (3):

(3) a. $V_2 \leftarrow V_1$
b. $V_3 \leftarrow V_2 \leftarrow V_1$
c. $V_4 \leftarrow V_3 \leftarrow V_2 \leftarrow V_1$

There are certain well-known exceptions to (3):
For $V_1 = Aux_{perfective}$ and $V_2 = Modal$, the auxiliary must be fronted to the cluster initial position according to normative grammars of Standard German:

(4) $Aux_1 \rightarrow V_3 \leftarrow Mod_2$

dass er es [hat $\rightarrow$ [schreiben $\leftarrow$ wollen]].

However . . .

. . . we find a lot of variation across German dialects and varieties:

(5) a. Certain variants of Austrian and Bavarian:
dass er es [[schreiben ← wollen] ← hat]. *V-Mod-Aux*

b. Pattern typical for Austrian and Bavarian:
dass er es [schreiben ← [hat → wollen]]. *V-Aux-Mod*

c. Standard German:
dass er es [hat → [schreiben ← wollen]]. *Aux-V-Mod*

(6) Swiss German:
dass er es [hat → [wollen → schreiben]]. *Aux-Mod-V*

Furthermore, it is reported that dialects often allow for more than one order.

Questions Adressed in our Work

The large amount of variation found for verb clusters including modal verbs (and a couple of other 'semi-functional' verbs) raises the following question:

- Do speakers of German adhere to the strict Standard German pattern?

In a series of experimental investigations of verb cluster formation, we have found that they do not:

- Native speakers ('Colloquial German') are more liberal than prescriptive grammars ('Standard German') in a precisely defined way.

Questions Adressed in our Work

This in turn raises a bunch of new questions:

- What is the correct generalization about the linearization of German verb clusters?
- What is the best syntactic account of the observed grammaticality distribution?
- Is the observed optionality a matter of grammar or performance?

In this talk, we ...

- ... present new experimental findings confirming and extending our data obtained so far.
- ... summarize the syntactic analysis presented in Bader & Schmid (submitted).
- ... point out some general implications of our work.

Outline

Outline

Experiment 1: Introduction

Topics of Experiment 1:

- Order among verbs within 3-verb clusters
- Comparison of two different methods to assess the grammaticality of sentences

Experiment 1 replicates a prior experiment using two experimental procedures in a single session:

- **Speeded Grammaticality Judgments (SGJ)**:
  Participants judge sentences as either grammatical or ungrammatical under controlled and timed conditions.
- **Magnitude Estimation (ME)**:
  Participants evaluate sentences relative to a reference sentence on a continuous scale.

Experiment 1: Introduction

	Aux = *1*	*Aux* = *2*	*Aux* = *3*
V < *Mod*	Aux-V-Mod	V-Aux-Mod	V-Mod-Aux
Mod < *V*	Aux-Mod-V	Mod-Aux-V	Mod-V-Aux

(7) dass Peter ein Buch (HAT) *lesen* (HAT) **müssen** (HAT).
that P. a book has read has must has

(8) dass Peter ein Buch (HAT) **müssen** (HAT) *lesen* (HAT).
that P. a book has read has must has

Experiment 1: Expectation

	Aux = *1*	*Aux* = *2*	*Aux* = *3*
V < *Mod*	Aux-V-Mod	V-Aux-Mod	V-Mod-Aux
Mod < *V*	Aux-Mod-V	Mod-Aux-V	Mod-V-Aux

- **Expectation based on normative grammar**:
  If our experimental participants were adhering closely to Standard German, we should get high percentages of judgments 'grammatical' for order *Aux-V-Mod* and low percentages for the remaining five orders.

Experiment 1: Method

- **Participants**:
  48 students of the University of Konstanz
- **Materials**:
  - 30 sentences, each with 6 different versions according to the 6 permutations of 3 verbs (V, Mod, Aux)
  - 5 different modal verbs
- **Procedures**:
  - SGJ and ME procedure within a single experimental session
  - 24 participants: first ME then SGJ
  - 24 participants: first SGJ then ME

Experiment 1: Procedure SGJ

Speeded Grammaticality Judgments

- Word-by-word presentation in the middle of the screen
- Presentation time for each word: 225 ms plus an additional 25 ms per character
- End-of-sentence judgments with a deadline of 2000 ms
- Filler sentences (ratio of experimental to filler sentences of about 1:5)

Experiment 1: Procedure ME

Magnitude Estimation

- First, a reference item is presented to which the participant assigns an arbitrary numeric value (> 0).
- All further items are judged in proportion to the reference item on a continuous numerical scale.
- Each individual data point is divided by the reference value and the resulting ratio is log-transformed.

Experiment 1: Results

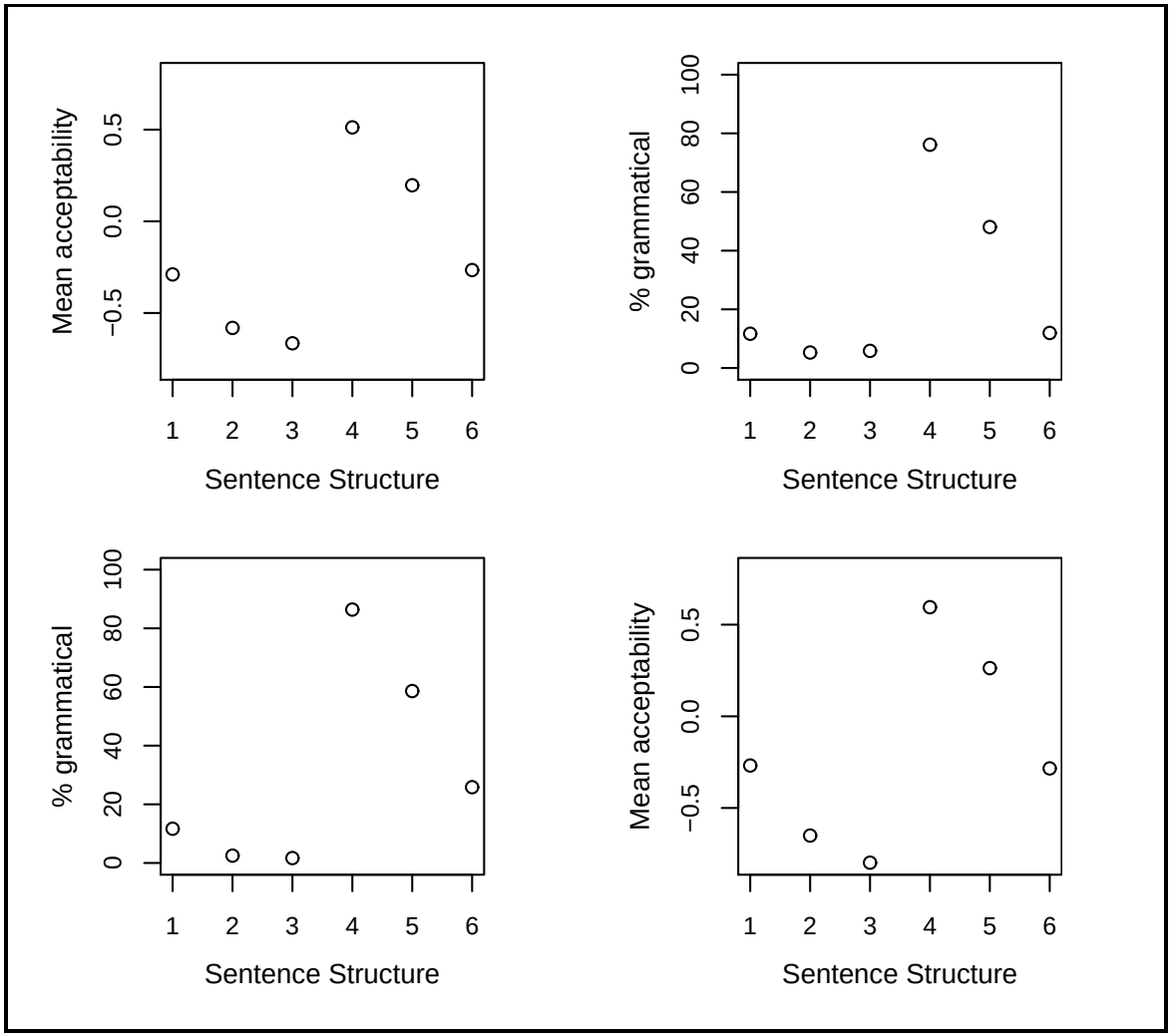
	V<Mod			Mod<V		
	Aux=1	Aux=2	Aux=3	Aux=1	Aux=2	Aux=3
SGJ (%)	86	57	26	12	3	2
ME (log)	0.51	0.20	-0.27	-0.29	-0.58	-0.66

Note: The results shown here are from sessions in which each method was administered first.

Experiment 1: Results

Upper row:
ME first, SGJ second

Lower row:
SGJ first, ME second



Experiment 1: Summary

- In all experiments, the Standard German order *Aux-V-Mod* received the best judgments.
- The partially inverted order *V-Aux-Mod* was judged better than expected by Standard Grammar, independently of regional background.
- Speeded grammaticality judgments and magnitude estimation revealed very similar results.

Outline

Is *V-Aux-Mod* focus-licensed?

- Influence of information structural properties and stress placement on verb order (for recent work, see Schmid & Vogel, 2004; Wurmbrand, 2004; Sapp, 2006).
- An effect of focus has in particular been proposed for the order *V-Aux-Mod*:

(9) 'I know that Peter has wanted to write a book.'

a. Ich weiß, dass Peter ein BUCH schreiben hat wollen.
   I know that Peter a book write has want

b. Ich weiß, dass Peter ein Buch SCHREIBEN hat wollen.
   I know that Peter a book write has want

c. Ich weiß, dass Peter ein Buch schreiben hat WOLLEN.
   I know that Peter a book write has want

Selected Results

Procedure: Speeded grammaticality judgments with auditory presentation of sentences

	Aux=1	Aux=2
Object Focus	91	82
Verb Focus	93	85

	Aux=1	Aux=2
Verb Focus	93	73
Modal Focus	93	69

Note: These are preliminary results from two different experiments which included also other conditions.

Experiment 2: Summary

- The results confirm the acceptance of the partially inverted order *V-Aux-Mod* by native speakers of German.
- Contrary to some assumptions in the literature, we found no effect of focus.

Outline

Data to Account for

	Aux = 1	*Aux* = 2	*Aux* = 3
V < *Mod*	**Aux-V-Mod**	**V-Aux-Mod**	**V-Mod-Aux**
Mod < *V*	**Aux-Mod-V**	**Mod-Aux-V**	**Mod-V-Aux**

- In addition to the Standard German order *Aux-V-Mod* . . .
- . . . the order *V-Aux-Mod* is also accepted by native speakers.
- We call the grammar allowing these two orders **Colloquial German**
- Disclaimer: We are not yet in a position to account for the gradience in our data.

General Properties

We present a syntactic analysis modifying and extending the analysis proposed in Williams (2003).

This analysis . . .

- . . . assumes that verb clusters are base generated and not derived by movement.
- . . . belongs to the family of analyses making use of FUNCTIONAL COMPOSITION (borrowed from Categorial Grammar).
  (e.g. Steedman, 1983; Johnson, 1986; Hinrichs & Nakazawa, 1994; Meurers, 2000)
- . . . places most of the information relevant for ordering in the lexicon.
- . . . attributes optionality to underspecified lexical entries.

The language CAT (Williams 2003)

Central to CAT is the Rule of Combination.

(10) Rule of Combination
X: Y + Y: Z $\rightarrow$ [X + Y]$_{\mathrm{X:Z}}$
(Williams, 2003: 205)

- 'X: Y' is a syntactic unit of category X which subcategorizes for a syntactic unit of category Y.
- 'Y: Z' is accordingly a syntactic unit of category Y which subcategorizes for a syntactic unit of category Z.'

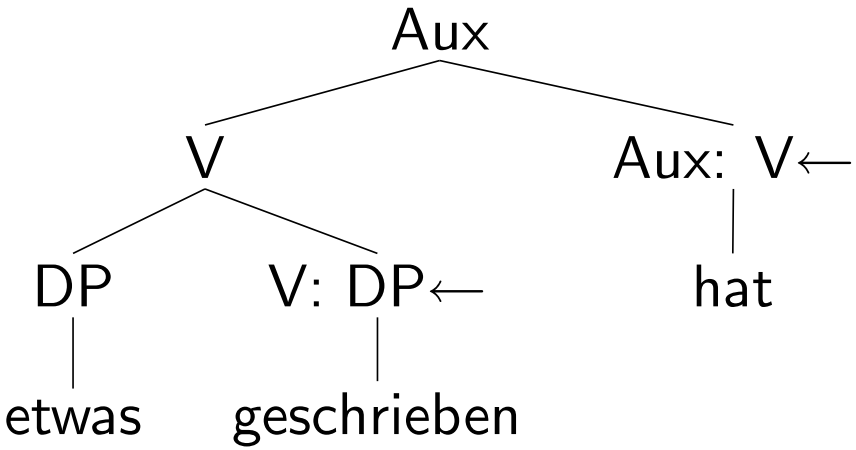
$\longrightarrow$

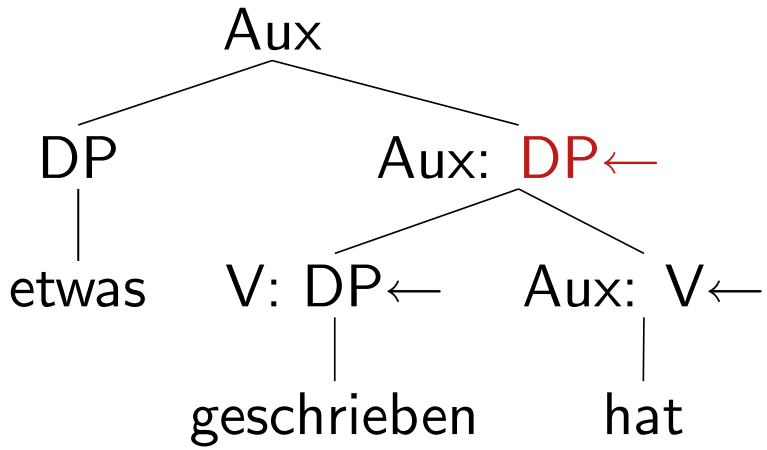
- If 'X: Y' and 'Y: Z' are combined by the Rule of Combination, the resulting unit is of category X and subcategorizes for Z.

CAT: First Example

(11) Lexical items:

a. *etwas* ('something') — DP
b. *geschrieben* ('written') — V: DP←
c. *hat* ('has') — Aux: V←





Subcategorization information in CAT

A particular grammar is obtained by specifying lexical entries for the following three types of information:

(12) Subcategorization specification

a. Type of complement: N vs. V vs. ...
b. Order of selection: left vs. right
c. Level of complement: X° vs. X^{N}

(13) Sample lexical entries for verbs in German

a. Main verbs — V_{Main}: DP$\leftarrow$
V_{Main}: PP$\leftarrow$
V_{Main}: DP PP$\leftarrow$
...
b. Modal and auxiliary verbs — $V_{Mod|Aux}$: V$\leftarrow$

Verb Cluster Complexity

There is yet another complication in verb cluster formation:

(14) Sensitivity of verb order to verb cluster complexity

a. … dass er ein Buch **gewollt** ← HAT.
   that he a book wanted has
   '…that he wanted a book.'

b. … dass er ein Buch HAT → *lesen* **wollen**.
   that he a book has read want
   '…that he wanted to read a book.'

CAT and Standard German

(15) Additional complexity feature for verb clusters (renaming Williams' 2003:184 'stem' versus 'non-stem')

a. Verb cluster: [VV]
b. Simple verb: [V]

(16) Subcategorization frames for Standard German tense auxiliaries selecting a modal verb:
Perfect tense: *haben* — Aux: $\rightarrow \text{Mod}_{[\text{VV}]}$

Complexity Variations

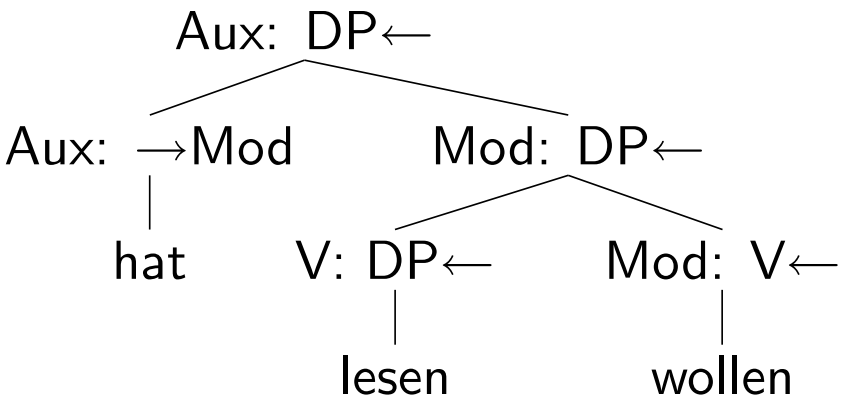
V-orders	System 1: $\rightarrow \text{Mod}_{[\text{VV}]}$	System 2: $\rightarrow \text{Mod}_{[\text{V}]}$	System 3: $\rightarrow$Mod
AUX V MOD	$\surd$	–	$\surd$
V AUX MOD	–	$\surd$	$\surd$

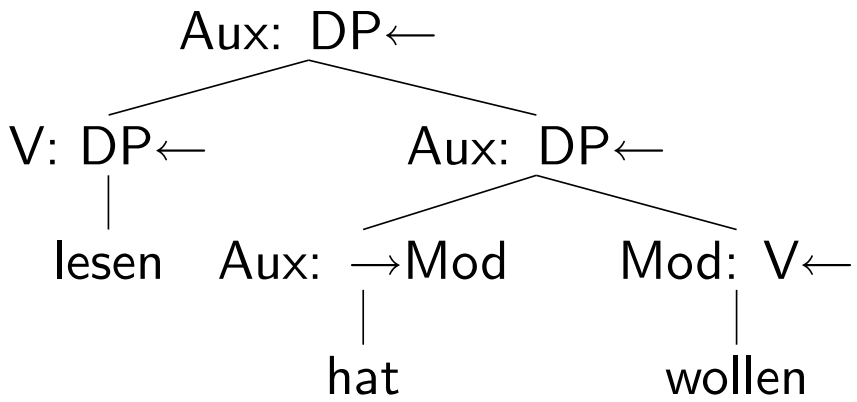
- System 1: Standard German: inversion only with complex verbal complement (cluster)
- System 2: inversion only with non-complex verbal complement (e.g., Pennsylvania German, see Louden, 1990)
- System 3: Colloquial German as suggested by our experimental results: inversion independent of complexity

Standard and Colloquial German in CAT

(17) Standard German perfect auxiliary selecting a modal verb:
Perfect tense: *haben* — Aux: $\rightarrow$Mod$_{[\mathrm{VV}]}$

(18) Colloquial German perfect auxiliary selecting a modal verb:
Perfect tense: *haben* — Aux: $\rightarrow$Mod





Outline

4 and 5-verb clusters

- Standard German: Auxiliary must always be in first position
- Colloquial German lacks idiosyncratic complexity feature
- Positional requirement only: auxiliary must precede modal complement

- Prediction: Perfective auxiliary occurs to the left of modal verb irrespective of its complexity
  - 4-verb clusters: three of four possible auxiliary positions should be accepted
  - 5-verb clusters: four of five possible auxiliary positions should be accepted

4 and 5-verb clusters

(19) 4-verb clusters: *. . . dass das Auto . . .* ('that the car . . . ')

Translation: '. . . that the car had to be repaired.'

a. *repariert* ← werden ← **müssen** ← HAT
   repaired be must has
b. *repariert* ← werden ← HAT → [**müssen**]
c. *repariert* ← HAT → [werden ← **müssen**]
d. HAT → [*repariert* ← werden ← **müssen**]

4 and 5-verb clusters

(20) 5-verb clusters *. . . dass das Auto . . .* ('that the car . . . ')

Translation: '. . . that the car should have been repaired.'

a. *repariert* ← worden ← sein ← **müssen** ← HÄTTE
   repaired been be must had
b. *repariert* ← worden ← sein ← HÄTTE → [**müssen**]
c. *repariert* ← worden ← HÄTTE → [sein ← **müssen**]
d. *repariert* ← HÄTTE → [worden ← sein ← **müssen**]
e. HÄTTE → [*repariert* ← worden ← sein ← **müssen**]

Results

	Aux=1	Aux=2	Aux=3	Aux=4	Aux=5
4-verb clusters (n = 32)	94	88	80	14	-
5-verb clusters (n = 13)	79	73	79	63	8

Note: The 4-verb cluster experiment contained a second factor 'position of modal verb'; here, only results for 'modal after V $\text{Aux}_{\text{passive}}$' are shown

Note: The 5-verb cluster experiment is still running and the results are therefore only preliminary

Summary

- High acceptance rate for sentences in which auxiliary preceded modal verb (in position one, two, three (or four))
- Rejection of sentence-final auxiliariy

Outline

Generalization

- What is the correct generalization about the linearization of German verb clusters?
  - Results are at odds with prescriptive grammar (only fully inverted auxiliary should be grammatical)
  - Native speakers require inversion, but the scope of inversion is underspecified and we therefore get optionality
  - Standard German and Colloquial German differ only minimally:
    - Standard German: complexity requirement on inversion
    - Colloquial German: no complexity requirement on inversion

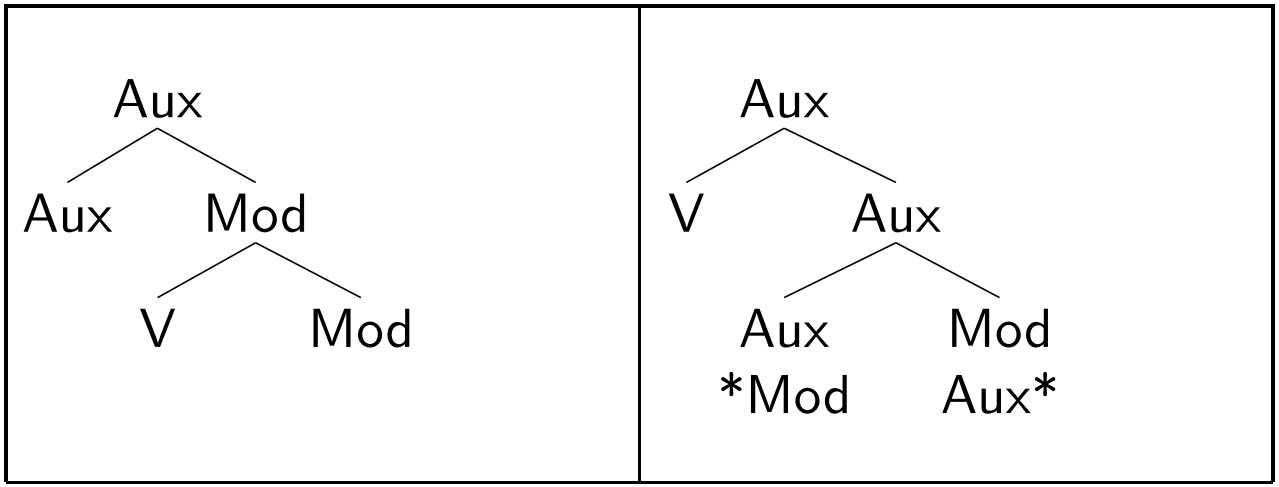
Syntactic Conclusion

- What is the best syntactic account of the observed grammaticality distribution?
  - The correct syntactic analysis must imply that a grammar with optionality (Colloquial German) is less complex than a grammar without optionality (Standard German)
  - Our analysis fullfills this requirement, but others may do as well.

Grammar vs. Performance

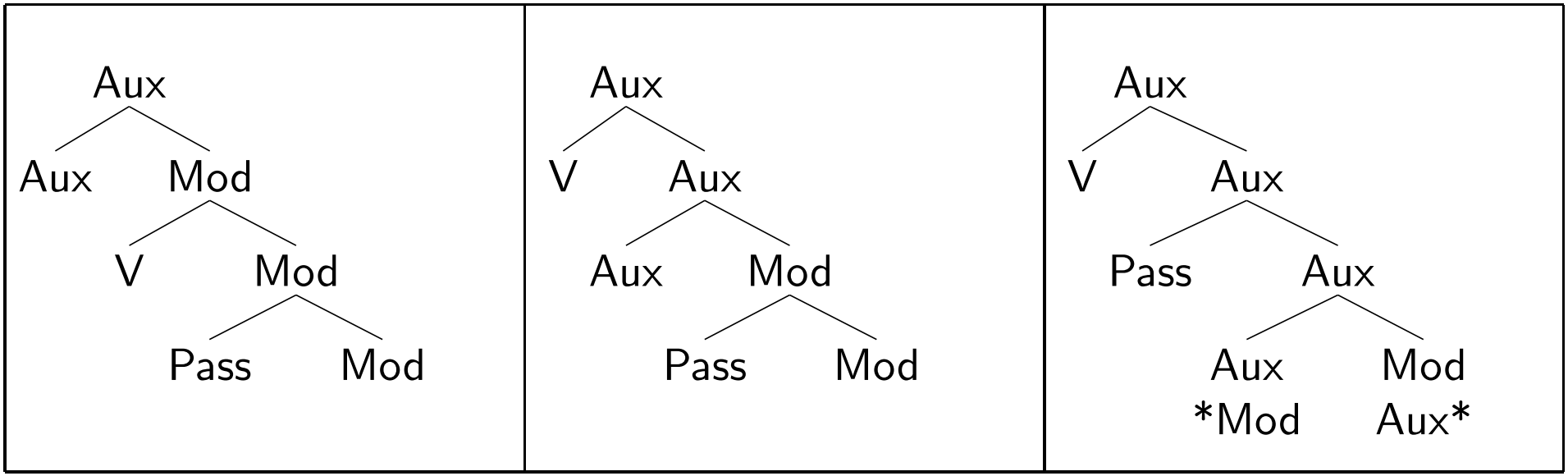
- Is the observed optionality a matter of grammar or performance?
  - Our grammar allows the generation of strictly right-branching verb-clusters for all auxiliary positions.

This is shown for 3-verb clusters below . . .



Verb Clusters and Branching

. . . and for 4-verb clusters here:



Conclusion:

- While verb cluster formation itself might well be a reaction to parsing pressure, . . .
- . . . the constraints on linearization still seem to be a matter of grammar.

References

Bader, M. & Schmid, T. (submitted). Verb clusters in Colloquial German. Manuscript submitted for publication.

Hinrichs, E. & Nakazawa, T. (1994). Linearizing AUXs in German verbal complexes. In J. Nerbonne, K. Netter & C. Pollard (Eds.), *German in Head-Driven Phrase Structure Grammar*, (pp. 11–37). Stanford: CLSI Publications.

Johnson, M. (1986). A GPSG account of VP structure in German. *Linguistics* 24, 871–882.

Meurers, D. (2000). Lexical generalizations in the syntax of German non-finite constructions. Arbeitspapiere des Sonderforschungsbereichs 340, University of Tübingen.

Sapp, C. D. (2006). *Verb order in subordinate clauses from Early New High German to Modern German*. Doctoral dissertation, Indiana University.

Schmid, T. & Vogel, R. (2004). Dialectal variation in German 3-verb clusters. *Journal of Comparative Germanic Linguistics* 7, 235–274.

Steedman, M. (1983). On the generality of the nested-depedency constraint and the reason for an exception in Dutch. *Linguistics* 21, 35–66.

Williams, E. (2003). *Representation Theory*. Cambridge, MA: MIT Press.

Wurmbrand, S. (2004). West Germanic verb clusters: The empirical domain. In K. . Kiss & H. van Riemsdijk (Eds.), *Verb Clusters: A study of Hungarian, German and Dutch*, (pp. 43–86). Amsterdam: John Benjamins.