

An OT-analysis of *do*-support in Modern German

Markus Bader & Tanja Schmid

June 8, 2006

Abstract: Grimshaw (1997) gives an optimality theoretic analysis of English *do*-support. She also claims that due to a different constraint ranking, a language like German does not have the equivalent to English semantically empty *do*. In this article we present a counterexample to this claim: semantically empty *do* is obligatorily inserted with VP topicalization in Standard German. In support of these data, experimental studies (speeded grammaticality judgments) of Standard German are presented and contrasted with Colloquial German. Although the Standard German data contradict Grimshaw's typological prediction, we conclude that they actually support her analysis of *do*-insertion as a last resort strategy.

Key words: Optimality Theory, *do*-support, experimental evidence (speeded grammaticality judgments), Standard and Colloquial German

Address for correspondence: Department of Linguistics, University of Konstanz, Fach D191, Universitätsstraße 10, 78457 Konstanz

email markus.bader@uni-konstanz.de, tanja.schmid@uni-konstanz.de

In her 1997 article on projection, heads, and optimality, Jane Grimshaw claims that the occurrence of semantically empty *do* depends on the ranking of constraints and not on the availability of such an item in the lexicon of a language. She further claims that *do*-support appears as a last resort strategy in a language with the constraint ranking of English but not in a language with the constraint ranking of Standard German. In this article we present a counterexample to this claim. Although the constraint ranking of Standard German is such as Grimshaw claims for languages without *do*-support there is nevertheless one case of systematic insertion of semantically empty *do*. In cases of VP-topicalisation the German equivalent of *do* is inserted obligatorily to fill the otherwise empty second position in main clauses. As in English, this insertion is possible only when it is necessary and thus displays a typical case of last resort. In the end we will conclude that *do*-support in Standard German contradicts the exact words of Grimshaw 1997 but actually supports her analysis of *do*.

1 Grimshaw's analysis of English *do*-support

Following earlier work (e.g., Chomsky 1957), Grimshaw (1997) analyzes *do*-support as a last resort strategy: The insertion of semantically empty *do* is only possible when it is necessary. In English declarative sentences *do*-support is not necessary and therefore not possible, as shown in (1).¹

- (1) a. She said that.
b. *She did say that.

However, *do*-support is necessary—and therefore possible—in the context of object questions and sentence negation when no other auxiliary is present. An example for *do*-support in object questions is given in (2).

- (2) a. What *(did) she say?
b. *What said she?

Although the generalisation about *do*-support is quite straightforward, an adequate account for this generalisation is not. In order to derive it, Grimshaw (1997) makes use of the basic principles of Optimality Theory that constraints are ranked and violable. The leading question is why *do*-support is not allowed in declaratives but necessary in questions and negated sentences. In the following section, we will review the main ideas behind Grimshaw's analysis of *do*-support as a last resort. For illustration, we will concentrate on *do*-support in object questions.

1.1 The Analysis

The relevant constraints for Grimshaw's analysis of *do*-support in object questions are listed in (3) to (7):

- (3) OP-SPEC (OPERATOR IN SPECIFIER): Syntactic operators must be in specifier position.
(4) OB-HD (OBLIGATORY HEADS): A projection has a head.
(5) NO-LEX-MVT (NO LEXICAL HEAD MOVEMENT): A lexical head cannot move.

- (6) FULL-INT (FULL INTERPRETATION): Lexical conceptual structure is parsed.
- (7) STAY (ECONOMY OF MOVEMENT): Trace is not allowed.

The constraint ranking that Grimshaw proposes for English is given in (8):

- (8) OP-SPEC \gg NO-LEX-MVT \gg OB-HD \gg FULL-INT \gg STAY

Grimshaw’s analysis of *do*-support rests on two main assumptions. First, any occurrence of semantically empty *do* is costly (i.e., violates a constraint) and is therefore avoided if possible. Second, English has no special expletive *do* in addition to main verb *do*; there is only one *do* which is stripped of its lexical conceptual content when used as an expletive. As a semantically and functionally empty verb, *do* violates FULL-INT, the constraint that requires lexical conceptual structure to be parsed. *Do* is inserted, however, when its presence helps to fulfill a higher ranked constraint. In the case at hand, *do* provides a head for a projection, thus allowing the construction to satisfy OB-HD that outranks FULL-INT in English. Consequently, *do* is impossible in (positive) matrix declaratives but required in matrix interrogatives. The presence of semantically empty *do* in declarative sentences violates FULL-INT but does not gain anything compared to a candidate without *do* as shown in Tableau 1:

Tableau 1 No *do* in matrix declaratives: *She said that*

	OP- SPEC	NO-LEX- MVT	OB-HD	FULL INT	STAY
☞ a. [_{VP} She said that]]					
b. [_{IP} She _i did [_{VP} t _i say that]]				*!	*

In matrix interrogatives, in contrast, the candidate with insertion of semantically empty *do* is optimal. Although it violates FULL-INT, it is still better than its competitors. The *wh*-operator must be in a specifier position due to the highly ranked OP-SPEC. The new projection results in an empty head position that must be filled due to OB-HD.² The alternative to *do*-insertion, namely that the lexical verb moves in order to fulfill OB-HD (candidate (d) in tableau 2) is excluded by the constraint NO-LEX-MVT that outranks FULL-INT in English. Thus, the generalisation is derived that *do*-insertion is necessary in matrix interrogatives and therefore possible. The competition is shown in Tableau 2:

Tableau 2 *Do*-support in matrix interrogatives

	OP- SPEC	NO- LEX-MVT	OB- HD	FULL INT	STAY
☞ a. [_{CP} What _k did [_{VP} she say t _k]]				*	*
b. [_{VP} she said what]	*!				
c. [_{CP} What _k —[_{VP} she said t _k]]			*!		
d. [_{CP} What _k said _i [_{VP} she t _i t _k]]		*!			**

1.2 Typological prediction

An attractive feature of Grimshaw’s analysis is that the existence of *do*-support in a language does not depend on the existence of an expletive verb in the lexicon but purely on the grammar as encoded in the constraint hierarchy. This follows from her

assumption that expletives are lexical elements whose meaning—in the sense of a lexical-conceptual structure—is not parsed, thereby violating FULL-INT. The lexeme that violates FULL-INT least is one that had least lexical-conceptual meaning in the first place. Consequently, the semantically simplest verb in a language will be used as an expletive if the constraint ranking of the language demands the insertion of an expletive at all.

Grimshaw makes the following prediction concerning the constraint ranking (i.e. the grammar) of a language in connection with the existence of semantically empty verbs:

- (9) “A grammar in which NO-LEX-MVT is dominated by both FULL-INT and OB-HD will be inconsistent with the use of a semantically empty verb like English *do* in inversion. In fact, it will be inconsistent with the existence of such a verb, which can never appear.” (Grimshaw 1997:386)

2 (Counter) Evidence from Standard German

In the remainder of this paper we will first show that German is a language with the constraint ranking as described in the above citation from Grimshaw (1997), and second, that nevertheless there is a context in Standard German in which *do*-support is obligatory.

2.1 The Standard German Constraint Ranking

German is a verb-second language which allows lexical verbs to move to C° in order to obey the verb-second requirement. With respect to the possibility of *do*-support, a distinction has to be made between Standard German and Colloquial German. In Standard German, semantically empty *do* (*tun* in German) is normally not inserted—neither in positive matrix declaratives (cf. (10)) nor in object questions (cf. (11)).

- (10) a. **Sie tut gerade schreiben.*
She does just write
- b. *Sie schreibt gerade.*
She writes just
'She is writing at the moment'

- (11) a. **Was tut sie sagen?*
What did she say
- b. *Was sagt sie?*
What said she

In contrast to Standard German, *do* insertion is a well known option in Colloquial German and a variety of German dialects. All (a)-examples above would be grammatical in these variants. *Do* may optionally be inserted without contextual restrictions.³

The distinction between Standard and Colloquial German is neatly captured in the following citation from a prescriptive grammar of German.

- (12) “The connection of *do* and a bare infinitive in sentences like *Sie tut gerade*

schreiben (‘she does just write’) or *Er tut das schon erledigen* (‘he does that already handle’) is a dispensable colloquial extension of the predicate. It is not considered correct in the standard language.” (Duden–Richtiges und gutes Deutsch, 1997:726, translation by the authors; the complete citation in German will be given in footnote 4)

For Standard German, we propose the following constraint hierarchy using Grimshaw’s (1997) constraints as given above. This hierarchy differs from the one for English only in that FULL-INT outranks NO-LEX-MVT.

$$(13) \quad \text{OP-SPEC} \gg \text{OB-HD} \gg \text{FULL-INT} \gg \text{NO-LEX-MVT} \gg \text{STAY}$$

The effects of this ranking are demonstrated for object questions in Tableau 3.

Tableau 3 No *do*-support in matrix interrogatives

	OP-SPEC	OB-HD	FULL-INT	NO-LEX-MVT	STAY
a. [$_{CP}$ Was _k tut [$_{VP}$ sie t _k sagen]]			*!		*
b. [$_{VP}$ Sie sagt was]	*!				
c. [$_{CP}$ Was _k —[$_{VP}$ sie t _k sagt]]		*!			*
☞ d. [$_{CP}$ Was _k sagt _i [$_{VP}$ sie t _k t _i]]				*	**

The optimal candidate in Standard German is candidate (d) in which the lexical verb moves to C° in order to fulfill OB-HD. Although this candidate violates NO-LEX-MVT, it still outranks all competitors. Candidate (a), for example, showing *do*-insertion which has been optimal in English, is ungrammatical in Standard German

as it fatally violates highly ranked FULL-INT.

Note that NO-LEX-MVT is dominated by both FULL-INT and OB-HD. According to Grimshaw’s typological prediction, Standard German therefore should be inconsistent with the existence of a semantically empty verb like English *do*. As we will show in the next section, this prediction is not borne out.

2.2 Obligatory *do*-support

Although *do*-insertion is normally not allowed in Standard German, there is one context in which it is in fact obligatory: Whenever the lexical verb is topicalized and no other verb—like an auxiliary or a modal verb—is present to fill the empty C° position, a semantically empty *tun* must be inserted into C° . Two examples illustrating this are shown in (14).

- (14) a. Tanzen tut Katja immer noch häufig.
Dance does Katja still often
- b. Gesehen habe ich sie schon, aber kennen tue ich sie nicht
Seen have I her already but know do I her not
- (Duden - Richtiges und gutes Deutsch 1997:726)

This occurrence of *do*-support is explicitly allowed by German prescriptive grammar. We give the second half of the citation on *tun* in ‘Duden - Richtiges und gutes Deutsch (1997:726)’ in (15):

- (15) “ (...) Only with a topicalized infinitive, when the verb has to be particularly

stressed, is the extension with *do* acceptable because then *do* must take over the syntactic function of the verb: *Singen tut sie gern* ('sing does she like').
(...) ” 4

This instance of obligatory *do*-support in Standard German poses a counterexample to Grimshaw's typological prediction: Although Standard German is a language in which both OB-HD and FULL-INT outrank NO-LEX-MVT there nevertheless exists a semantically empty verb *tun* that obligatorily appears in a certain context.

3 Experiment

As we said above, general *do*-support is not allowed in Standard German but is a feature of Colloquial German. To further inquire into the status of this phenomenon, we ran an experiment using the method of speeded grammaticality judgments. This is a method where participants have to judge the grammaticality of sentences as fast as possible.

Two contrasts were the focus of this experiment. The first contrast concerns the status of *do*-support in sentences with and without VP-topicalization. Sentence (16a) is a control condition with no *do*-support and the object topicalized to SpecCP. Its counterpart with *do*-support is sentence (16b). Sentence (16c), finally, is a sentence with VP-topicalization and *do*-support.

- (16) a. Den teuren Schmuck versteckt Monika sicherlich.
the expensive jewelry hides M. surely

- b. Den teuren Schmuck tut Monika sicherlich verstecken.
the expensive jewelry does M. surely hide
- c. Verstecken tut Monika den teuren Schmuck sicherlich.
hide does M. the expensive jewelry surely

In addition to comparing the three structures in (16), a further aim of our experiment was to investigate what happens when the main verb in (16) is embedded below a modal verb. The three sentences resulting from this manipulation are shown in (17).

- (17)
- a. Den teuren Schmuck muss Monika sicherlich verstecken.
the expensive jewelry must M. surely hide
 - b. Den teuren Schmuck tut Monika sicherlich verstecken müssen.
the expensive jewelry does M. surely hide must
 - c. Verstecken müssen tut Monika den teuren Schmuck sicherlich.
hide must does M. the expensive jewelry surely

Contrasting sentences with and without modal verbs allows us to investigate the status of the constraint NO-LEX-MVT in German. As discussed above, in contrast to English all verbs can move to C° in German. This was captured by ranking FULL-INT above NO-LEX-MVT in the constraint hierarchy for Standard German (cf. (13)). This ranking masks any effect of NO-LEX-MVT under most circumstances. However, in sentences like (17) NO-LEX-MVT should become visible if it is part of the German constraint hierarchy, which it should be according to the OT-assumption that

constraints are universal. As we will discuss in more detail below, even a speaker of Colloquial German who accepts *do*-support in simple main clauses should reject sentences like (17b). The modal verb which is not a lexical verb and therefore not affected by NO-LEX-MVT should move to C° instead.

3.1 Method

Thirty sentence sets were constructed, with each set containing six sentences according to the crossing of the two factors STRUCTURE and MODAL VERB, as illustrated by the six sentences in (16) and (17). The factor STRUCTURE jointly manipulated the constituent in SpecCP and the presence vs. absence of a finite form of *tun* in C^0 . Sentences in the condition ‘simple object fronting’ had the object fronted to SpecCP and no form of *tun* ((16a) and (17a)). Sentences in the condition ‘object fronting with *tun*’ also had the object in SpecCP but in addition contained a finite form of *tun* ((16b) and (17b)). In the third and final condition ‘verb fronting with *tun*’, the main verb was fronted to SpecCP and a form of *tun* was inserted into C^0 ((16c) and (17c)).

The second factor MODAL VERB varied whether sentences contained an additional modal verb or not. In the condition without modal verb, sentences contained either a finite main verb only, or an infinitival main verb together with a finite form of *tun*. In the condition with modal verb, a modal verb selecting the main verb was added to all three sentence structures. Three different modal verbs were used: *können* (‘can’),

wollen ('want'), and *müssen* ('must'). Each modal verb occurred in 10 sentence sets.

Sentences were presented visually on a computer screen using the DMDX software developed by K. Forster and J. Forster at the University of Arizona. Participants initiated each trial by pressing the space-bar which triggered three fixation points to appear in the center of the screen for 1,050msec. Thereafter, each word of the sentence appeared at the same mid-screen position. Each word was presented for 221msec plus additional 26msec for each character to compensate for length effects. There was no interval between words. Immediately after the last word of a sentence, three question marks appeared on the screen, signaling to participants that they now were to make their judgment. Participants indicated their judgment by pressing one of two keys on a computer keyboard. If no response was given within 2,000msec, the trial was finished and a red warning line "Zu langsam" ('too slow') appeared on the screen. Prior to the experimental session, participants received practice trials to ensure that they had understood the task. During the practice trials but not during the experimental session participants received feedback as to the correctness of their judgments.

36 students of the University of Konstanz were paid to participate in the experiment. All participants were native speakers of German and were naive with respect to the purpose of the experiment.

Table 1: Percentages of judgment ‘grammatical’. Reaction times are shown in parentheses; the number before the slash is for judgments ‘grammatical’; the number after the slash is for judgments ‘ungrammatical’; reaction times are not shown for conditions with too few observations.

	Without Modal			With Modal		
	Obj	Obj+tun	VP+tun	Obj	Obj+tun	VP+tun
All subjects	95	48	70	93	22	51
(n = 36)	(549/)	(606/540)	(540/666)	(570/)	(836/662)	(616/591)
Group 1	92	15	50	92	2	23
(n = 20)	(550/)	(634/500)	(559/601)	(594/)	(/516)	(656/428)
Group 2	99	89	95	94	46	86
(n = 16)	(548/)	(588/)	(516/)	(541/)	(902/857)	(593/)

3.2 Results

The results of the current experiment are shown in table 1. Two-way ANOVAs with either participants or items as random effects revealed a significant main effect of the factor Structure ($F(2,70)=75.12$, $p<.001$; $F(2,58)= 171.61$, $p<.001$), a significant main effect of the factor Modal Verb ($F(1,35)=53.09$, $p<.001$; $F(1,29)=41.04$, $p<.001$), and a significant interaction between Structure and Modal verb ($F(2,70)=8.84$, $p<.001$; $F(2,58)= 4.49$, $p<.05$).

Closer inspection of the results revealed that participants fall into two separate

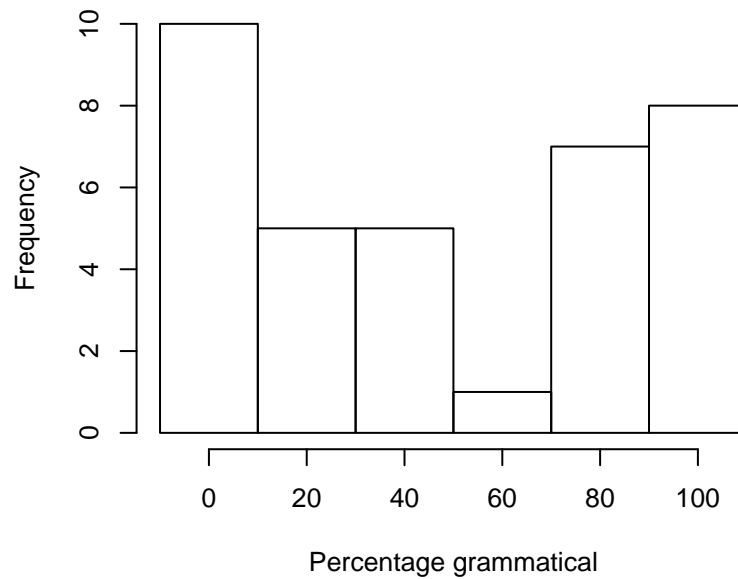


Figure 1: Histogram of mean judgments by subjects in the condition “Obj+tun without Modal”

groups with regard to their judgments of simple sentences with *tun*. A histogram showing the distribution of the percentages of answers ‘grammatical’ (ranging from 0–100% based on 5 judgments per participant) is shown in Figure 1. Figure 1 shows a clearly bimodal distribution: The distribution has two peaks, which lie at the extreme points, and a valley in between.

Based on their judgments in the condition object/*tun* without modal verb, we divided subjects into two groups: Subjects in Group 1 ($n = 20$) judged less than half of the sentences in this condition as grammatical; subjects in Group 2 ($n = 16$) judged more than half as grammatical. The results for these two groups are also shown in Table 1.

Despite their opposite behavior with respect to simple sentences with *do*-support, the two groups show similar contrasts among the four conditions with *do*-support. First, in sentences without modal verb, *do*-support is judged better for sentences with VP-topicalization than for sentences with topicalization of the object. Second, for sentences with an object in SpecCP, *do*-support is accepted at a considerably higher rate when the sentence contains only a lexical verb than when it also contains a modal verb. Third, for sentences with modal verbs, we again see an increase in acceptability for sentences with VP-topicalization in comparison to sentences with object topicalization.

3.3 Discussion

The results of our experiment confirm the existence of two groups of speakers with regard to *do*-support in German. The first group closely adheres to the grammar of Standard German by rejecting *do*-support in sentences with object topicalization. The second group, in contrast, allows *do*-support even when only an object is topicalized. Given that both groups almost unanimously accepted sentences with no *do*-support at all, a first conclusion of our experiment is that *do*-support in simple sentences is either not tolerated at all by the grammar, or is an optional variant to sentences without *do*-support. What is not observed is any kind of obligatoriness of *do*-support in simple sentences.

In addition, both groups showed the expected contrasts. *Do*-support is accepted

to a higher degree in sentences with VP-topicalization than in sentences with object-topicalization. Second, the acceptance of *do*-support is strongly reduced by the presence of an additional modal verb.

While the contrasts are as expected, the absolute levels of grammaticality judgments need some comments. Consider first the standard group. This group accepted VP-topicalization sentences only about 50% of the time without modal and 23% with modal, despite the fact that prescriptive grammar allows *do*-support in combination with VP-topicalization, as shown by the citation in (15). Simple VP-topicalization sentences are clearly judged better than *do*-support sentences with object-topicalization (50% vs. 15%). We suggest that the reduced judgment rates for sentences with VP-topicalization for speakers of Standard German result from overgeneralizing the prescriptive ban on *tun* to all contexts. For the standard group, we will thus assume the distribution of grammaticality as shown in Table 2. Somewhat unexpected is the low value of 23% for VP-topicalization sentences with modal verb, which we have marked with a question mark in Table 2. We tentatively propose that such sentences are grammatical for speakers of Standard German, but that judgments are degraded due to an interaction of two factors. First, subjects overgeneralized the ban on *do*-support. Second, topicalizing a verb together with a modal is a complex operation in itself, as witnessed by a decrease in judgments ‘grammatical’ even for the colloquial group. This question clearly deserves more research.

While the standard group seems to overgeneralize the ban on *do*-support, the

Table 2: Assumed distribution of grammaticality for group 1 (standard) and group 2 (colloquial)

	Without Modal			With Modal		
	Obj	Obj+tun	VP+tun	Obj	Obj+tun	VP+tun
Standard	✓	*	✓	✓	*	✓ (?)
Colloquial	✓	✓	✓	✓	*	✓

colloquial group seems to overgeneralize its use. Speakers who optionally allow *do*-support sometimes tend to accept *do*-support in sentences where the grammar does not allow it. For this reason, *do*-support in sentences with object-topicalization and modals is still judged as grammatical about 46% of the time, which is nevertheless a strong decrease in comparison to 89% for sentences with *do*-support but without a modal. This interpretation is supported by the finding of strongly increased reaction times in the condition object-topicalization with *do*-support and modal verb (cf. Table 1). In this condition, participants needed 902ms on average to give the judgment ‘grammatical’. This contrasts with all other conditions for which reaction times for grammatical judgments range from 516-593msec. The strongly prolonged judgment times for *do*-support in the presence of a modal verb show that participants were unsure about the judgment in this condition.

In summary, we will assume that the numerical results in Table 1 can be translated into binary grammaticality judgments as shown in Table 2. We will discuss in the final

section whether this reduction of experimental data to binary grammaticality values is justified.

4 The Analysis

In contrast to English, German is a generalized verb-second language: The finite verb occupies C° in all kinds of main clauses, and exactly one constituent has to precede it in both declarative and *wh*-clauses. As it is not our main objective to derive the verb-second property of German here (but see Vikner 2001 for an OT-approach) one constraint in addition to the ones introduced before should suffice to analyze the occurrence of *do*-insertion in German.

To derive the verb-second property of German we propose a constraint that demands that constituents that are marked with a topic feature in the input appear in the specifier position of CP. The constraint is given in (18):⁵

(18) TOPIC: Topics are sentence initial.

First, we will give an analysis for the first group of speakers. This is the Standard German group that closely adheres to the pressure of prescriptive grammar by banning *do*-insertion except for cases of VP-topicalisation. A constraint hierarchy for Standard German including the newly introduced constraint TOPIC is given in (19).

(19) Standard German constraint hierarchy:⁶

TOPIC \gg OB-HD \gg FULL-INT \gg NO-LEX-MVT \gg STAY

The competition that shows that *do*-insertion is obligatory with VP-topicalisation in

Standard German is given in tableau 4. The relevant data are repeated in (20):

(20) Question: What about eating?

- a. Essen tue ich gerne
eat do I willingly
'I like to eat'
- b. *Essen ich gerne
- c. *Ich gerne essen

Tableau 4 Standard German: Obligatory *do*-insertion.

Input: [Essen] _[+top]	TO-	OB-	FULL	NO-	STAY
	PIC	HD	INT	LEX-MVT	
☞ a. [_{CP} Essen _i tue [_{VP} ich gerne t _i]]			*		*
b. [_{CP} Tue [_{VP} ich gerne essen]]	*!		*		
c. [_{CP} ich _j esse _i [_{VP} gerne t _j t _i]]	*!			*	**
d. [_{CP} Essen _i —[_{VP} ich gerne t _i]]		*!			*

Although candidate (a) with *tun*-insertion violates FULL-INT it is nevertheless optimal. All competitors violate higher ranked constraints like TOPIC or OB-HD. The same result is predicted when the topicalized VP contains a modal verb in addition (*Lernen müssen *(tut) der Hans immer noch*, 'study must does the Hans always still'): Here, too, the candidate with *tun*-insertion in second position will be optimal.

Note that the proposed ranking for Standard German also rightly excludes the

ungrammatical sentence with *do*-support in a clause that already contains a modal verb (cf. **Die Suppe tut der Hans noch essen müssen* ‘The soup does the Hans still eat must’). Since the same reasoning applies to Colloquial German, the respective OT-tableau will be shown there.

We now turn to the group of speakers that has the option of *do*-insertion not only in clauses with VP-topicalisation but more generally. For these speakers, only a single change has to be made to the constraint hierarchy of Standard German. Whereas FULL-INT outranks NO-LEX-MVT for the standard group, a tie between these two constraints must be assumed for the colloquial group. This tie is a ‘global’ tie, i.e., the one grammar splits into two grammars at the tied constraint (cf. Müller 1999 for an overview of ties in OT). In one of these, FULL-INT outranks NO-LEX-MVT while the other grammar shows the opposite ranking. The grammar of Colloquial German is thus given in (21). The outcome of such a grammar is shown in (22).

(21) Colloquial German constraint hierarchy:

TOPIC \gg OB-HD \gg FULL-INT $\langle \rangle$ NO-LEX-MVT \gg STAY

(22) a. Das tut er gerne lesen.

b. Das liest er gerne

Tableau 5 Colloquial German: Optional *do*-insertion

Input: [das] _[+top]	TO-	OB-	FULL-	NO-	STAY
	PIC	HD	INT	LEX-MVT	
☞ a. _{[CP Das_k tut [VP er t_k gerne lesen]]}			*		*
☞ b. _{[CP Das_k liest_i [VP er t_k gerne t_i]]}				*	**

Due to the tie between FULL-INT and NO-LEX-MVT both candidate (a) and (b) are optimal in the competition: Neither violates the highly ranked constraints TOPIC and OB-HD, and both violate one part of the tied constraint: candidate (a) with *do*-support violates FULL-INT whereas candidate (b) with movement of the lexical verb violates NO-LEX-MVT. As the decision is made at the tied constraint it does not play a role that the constraint profile of the two optimal candidates differs below.

While the constraint hierarchy for Colloquial German makes *do*-support optional in sentences which contain only a lexical verb, it nevertheless excludes *do*-support when a modal verb is available to fill C°. The relevant data are repeated in (23):

(23) a. *Die Suppe tut der Hans noch essen müssen.

The soup does the Hans still eat must

b. Die Suppe muss der Hans noch essen.

The soup must the Hans still eat.

Tableau 6 Colloquial German: No *do*-insertion.

Input: [Die Suppe] _[+top]	TO- PIC	OB- HD	FULL- INT	NO- LEX-MVT	STAY
a. [_{CP} Suppe _i tut [_{VP} H. t _i essen müssen]]			*!		*
☞ b. [_{CP} Suppe _j muss _i [_{VP} H. t _j essen t _i]]					**

The tie between FULL-INT and NO-LEX-MVT does not lead to optionality here. Candidate (a) with *do*-support still violates FULL-INT. Candidate (b) in which the modal verb is moved in order to fulfill OB-HD does not violate NO-LEX-MVT as it is not a lexical verb that is moved. Compared to its competitors, candidate (b) has the best constraint profile although it violates STAY twice, and is thus optimal.

5 Conclusion

Based on the optimality-theoretic analysis of English developed in Grimshaw (1997), this article has analyzed *do*-support in Standard and Colloquial German. In contrast to English, German is a language in which all verbs—including lexical verbs—can move in order to fill an empty C° position, i.e., in German FULL-INT is not outranked by NO-LEX-MVT as it is in English. With respect to *do*-support, a distinction between Standard and Colloquial German has been reported in the literature. This distinction was confirmed by an experiment making use of speeded grammaticality judgments.

In Standard German, *do*-support is normally not allowed, which can be accounted

for by ranking FULL-INT above NO-LEX-MVT. Despite this ranking, *do*-support is not completely impossible in Standard German as predicted by Grimshaw (1997). In the restricted context of VP-topicalization, it is even obligatory. Although the Standard German data thereby provide a counterexample to Grimshaw's typological prediction, they nevertheless support her analysis of *do* as a last resort: As in English, *do* is only possible when it is necessary. It is inserted in order to fill an otherwise empty head position in Standard German that cannot be filled by movement of the lexical verb whenever the lexical verb is topicalized. Although the triggers for the existence of an empty head position are partly different in English and in German, the reasoning behind the analysis of *do*-support is the same in both languages: *do* is inserted as a last resort whenever all other possibilities are even worse.

In contrast to Standard German, *do*-support is optional in Colloquial German. We accounted for this by postulating a global tie between FULL-INT and NO-LEX-MVT. While this means that *do*-support is possible in Colloquial German in a much wider range of contexts, it still seems to be restricted in that it is only allowed when a sentence does not contain a modal verb which would compete with *do* for filling an empty C^o position. As we have shown above, Colloquial German thus provides clear evidence that the constraint NO-LEX-MVT is active in German.

A final point concerns our reduction of the experimental data to binary grammaticality values. Two assumptions underlie this reduction. First, the grammar as encoded in the constraint hierarchy strictly classifies sentences as either grammatical

or ungrammatical. Second, the classification provided by the grammar interacts with extra-grammatical factors in an experiment using speeded grammaticality judgments in such a way that sentences classified as grammatical by the grammar do not always result in the judgment ‘grammatical’, and vice versa. As already discussed above, prescriptive grammar might have influenced the behavior of the participants in our experiment. While some subjects seem to have overgeneralized the ban on *do*-support, other subjects seem to have overgeneralized the use of it.

There are several alternatives to these assumptions about the relationship between grammar and making grammaticality judgments (cf. Schütze 1996). For example, stochastic OT (e.g., Boersma and Hayes 2001) is an extension of standard OT which encodes probabilities directly in the grammar. We must leave it as an question for future research what information should be included in the grammar, and what should be left to grammar-external factors, in order to appropriately model the kind of data presented here.

Notes

¹Grimshaw does not analyse so-called *emphatic do* which allows *do*-support under special focus conditions in declarative main clauses (cf. Grimshaw 1997:footnote 8).

²For reasons of illustration we simplify the tableau by omitting the IP whenever it is not needed, as in the optimal candidate in tableau 1. Whether *do* is inserted in I^0 and moves to C^0 or whether it is inserted directly in C^0 as assumed here is not relevant for our reconstruction of the analysis.

³There are some lexical restrictions on the cooccurrence of *do* with other verbs (see Erb 2001 and

Schwarz 2001 and references therein). As this is not central to our analysis we will not go into detail here. We will also refrain from genuine dialect data and concentrate on Colloquial and Standard German here (for various German dialects, see Eroms, 1984; Erb, 1995; Schwarz, 2004). We will also abstain from *tun*-insertion in embedded clauses. *Do*-support is clearly rejected in embedded clauses in Standard German. For Colloquial German and German dialects, we get conflicting information (see Eroms 1984:132 and Schwarz 2004:48).

⁴The complete original citation is the following: “Die Verbindung von *tun* mit einem reinen Infinitiv in Sätzen wie *Sie tut gerade schreiben* oder *Er tut das schon erledigen* ist eine umgangssprachliche überflüssige Erweiterung des Prädikats. Sie gilt in der Standardsprache nicht als korrekt. Nur bei vorangestelltem Infinitiv, also wenn das Verb besonders nachdrücklich hervorgehoben werden soll, ist die Erweiterung mit *tun* zulässig, weil dann das *tun* die syntaktische Funktion des Verbs übernehmen muss: *Singen tut sie gern*.”

⁵The constraint is formulated in a slightly different way as TOPICFIRST in Costa (2001:176). In contrast to the formulation given here, TOPICFIRST is also violated by topicalized nontopics.

In German, topics may not only be realized in first position but optionally in situ. Also, ‘topic’ is certainly not the only discourse function that may be realized in first position. We will refrain from these complications as they are not relevant for the illustration of obligatory *do*-insertion in German.

⁶Note that we leave out OP-SPEC in the following. That does not mean that it is not present in the grammar of German but only that it is not active in the examples we give.

References

- Boersma, Paul, and Bruce Hayes. 2001. Empirical tests of the gradual learning algorithm. *Linguistic Inquiry* 32:45–86.
- Chomsky, Noam. 1957. *Syntactic Structures*. The Hague: Mouton.
- Costa, Joao. 2001. The emergence of unmarked word order. In *Optimality-theoretic syntax*, eds. Géraldine Legendre, Jane Grimshaw, and Sten Vikner, 171–203. Cambridge, MA: MIT Press.
- Duden. 1997. *Richtiges und gutes Deutsch: Wörterbuch der sprachlichen Zweifelsfälle (Duden Bd.9)*. Mannheim: Dudenverlag.
- Erb, Marie Christine. 1995. *Eine Theorie expletiver Verben: Die tun-Periphrase im Deutschen*. M.A. thesis, Universität Frankfurt.
- Erb, Marie Christine. 2001. *Finite auxiliaries in German*. Doctoral dissertation, Katholieke Universiteit Brabant.
- Eroms, Hans Werner. 1984. Indikativische periphrastische Formen mit ‘doa’ im Bairischen als Beispiel für latente und virulente syntaktische Regeln. In *Beiträge zur bairischen und ostfränkischen Dialektologie (Göppinger Arbeiten zur Germanistik, 409)*, ed. P. Wiesinger, 123–136. Göppingen: Kümmerle.
- Grimshaw, Jane. 1997. Projections, heads, and optimality. *Linguistic Inquiry* 28:373–422.

- Müller, Gereon. 1999. Optionality in optimality-theoretic syntax. *GLOT International* 4:3–8.
- Schütze, Carson T. 1996. *The empirical base of linguistics*. Chicago: Chicago University Press.
- Schwarz, Christian. 2004. *Die tun-Periphrase im Deutschen*. M.A. thesis, Universität München.
- Vikner, Sten. 2001. *Verb Movement Variation in Germanic and Optimality Theory*. Habilitationsschrift, Universität Tübingen.