1 Short summary

By means of three forced choice experiments, the present study aims to test Endriss’ (2009) theory postulating that (singular) indefinites take wide scope when marked as aboutness topics. As experiment 1 and 2 could not serve the purpose of testing Endriss’ (2009) theory well due to not accounting for the potential contrastive reading and not controlling for the logical implication between the indefinite wide scope and indefinite narrow scope reading, experiment 3 was conducted with a different design to address these issues. The results of experiment 3 then showed highly significant effects of sentence structure and intonation as topic marking devices that make indefinite wide scope more available or even preferred in German sentences with scope ambiguity. With this study, I hence provide empirical evidence highlighting the pragmatic influence of information structure and prosody on scope interpretation in German.

2 Theoretical and empirical background

The phenomenon of scope ambiguity arises when two (or more) quantifiers interact and compete to take scope over each other in a single sentence. An example of this is given in (1):

(1) Everyone knows a song by ABBA.
   a. Indefinite narrow scope: ∀x[Person(x) → ∃y[song-by-ABBA(y) ∧ know(x,y)]]
   b. Indefinite wide scope: ∃y[song-by-ABBA(y) ∧ ∀x[Person(x) → know(x,y)]]

In (1a) the semantic interpretation is in agreement with the syntactic surface structure of the sentence, in which the universal subject quantifier c-commands the existential object quantifier. This order of semantic interpretation is inverted in (1b), contrasting with the syntactic surface structure of the sentence, as the object quantifier takes wide scope over the subject quantifier that c-commands it.

For German – a language with canonical S > O order that allows object fronting, it is unclear what the constraints on the availability of wide scope are. Frey (1993) takes a configurational approach and makes predictions about whether a sentence is scope ambiguous or not based solely on its syntactic structure – with the syntactic c-command of one quantifier over the other playing a crucial role. Pafel’s (2005) multifactorial theory takes into account both syntactic and non-syntactic factors, which are weighted differently and interact with each other in ways that result in different scope preferences. According to Krifka (1998) and Endriss (2009), the information structure of a sentence – that is, the way the information conveyed by the sentence is encoded by the speaker syntactically, semantically, or prosodically – also exerts an influence on scope interpretation. Krifka (1998) proposes focusing rules that ultimately lead to a so-called hat contour intonation consisting of a rising (/) and falling (\) accent on the two quantifiers, which in turn enables the wide scope reading. Endriss (2009) postulates that indefinites marked as aboutness
topics take wide scope (Endriss, 2009, p. 190, Claim 5.1). Two topic marking devices in German are left dislocation (Frey, 2000; Jacobs, 2001; Frey, 2004b – as cited in Endriss, 2009) and intonational marking (Gundel, 1985, 1988; Molnár, 1993; McNally, 1998 – as cited in Endriss, 2009) through a rising accent on the indefinite determiner. It should be noted that using the latter can also make a contrastive reading with indefinite narrow scope (more) available (Endriss, 2009, p. 7).

A number of empirical studies on scope ambiguity in German suggest that even though narrow scope readings are mostly preferred, wide scope readings are available in German in both SVO and OVS sentence constructions (e.g., Bott & Schlotterbeck, 2012; Radó & Bott, 2018; Philipp & Zimmermann, 2020; Fanselow et al., 2022). This common finding argues against Frey's (1993) theory that canonical SVO sentences are not scope ambiguous because the object structurally c-commanded by the subject cannot take wide scope. By investigating factors such as sentence configuration (Bott & Radó, 2009; Bott & Schlotterbeck, 2012), distributivity (Bott & Radó, 2009; Radó & Bott, 2018), discourse anaphoricity (Radó & Bott, 2018) and context plausibility (Philipp & Zimmermann, 2020), studies have shown that not only syntactic but also semantic and pragmatic factors can have an influence on the availability of wide scope. This speaks for the advantage of considering many different factors from the multifactorial approach in Pafel (2005). Going beyond studies concerning Frey's (1993) and Pafel's (2005) theory, there is only one pilot study in Radó & Bott (2018) that has investigated the possible effects of intonation on scope interpretation in German. This pilot study provides preliminary empirical evidence against the assumption in Krifka (1998) that the hat contour formed by a rising (/) and falling (\) accent on the two quantifiers can trigger a wide scope reading in SVO sentences. So far, to the best of my knowledge, there has been no study that explicitly tests Endriss' (2009) hypothesis on the wide scope of topical (singular) indefinites in both canonical and non-canonical sentence structures. This is what the present study attempts to do in order to investigate the pragmatic influence of information structure and prosody on scope interpretation.

3 Experiment 1 and 2 as pre-experiments for experiment 3

Experiment 1 and 2 have a 2x2 factorial design with the factors sentence structure (2 levels: SVO, OVS) and intonation (topic marking intonation with a rising accent on the singular indefinite determiner, 2 levels: with, without). The method used is the covered box paradigm (adapted from Fanselow et al., 2022). Participants first listened to the audio track of a sentence. They then had to choose between two images, one representing the indefinite narrow scope or indefinite wide scope reading and the other being covered. The instructions at the beginning of the experiment stated that both images depicted the sentence in the audio track, but the depiction of the sentence content on one image was more appropriate than on the other. Participants were asked to choose the visible image if they thought it was a good match for the sentence. If they doubted the appropriateness of the visible image, they should choose the covered one. In experiment 1, all visible images depicted the indefinite narrow scope reading of the target sentences, whereas in experiment 2, they all depicted the indefinite wide scope reading. The goal of using the covered box paradigm and presenting the visible images depicting the two possible readings in two separate experiments was to (i) make sure that the participants could not compare the two readings directly and (ii) test if the acceptance of one reading really corresponds to the rejection of the other. There were 20 target items (with ∀ quantifier jed- ‘every’ for subject, ∃ quantifier ein- ‘a/one’ for object) and 40 fillers for each experiment. An example of a target item is given in (2), the rising accent is marked with ↑. The English translations for the OVS conditions use passive voice.
for lack of equivalent structures, but the German sentences themselves are in active voice just like in the SVO conditions.

(2) a. Jeder Umzugshelfer musste gestern beim Umzug einen schweren Sessel tragen. 
   (SVO + without)
b. Jeder Umzugshelfer musste gestern beim Umzug ↑Eininen schweren Sessel tragen. 
   (SVO + with) ‘Every moving helper had to carry a heavy armchair during the move yesterday.’
c. Einen schweren Sessel musste jeder Umzugshelfer gestern beim Umzug tragen. 
   (OVS + without)
d. ↑Eininen schweren Sessel musste jeder Umzugshelfer gestern beim Umzug tragen. 
   (OVS + with) ‘A heavy armchair had to be carried by every moving helper during the move yesterday.’

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<th>Experiment 1</th>
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Table 1: Acceptance rates in Experiment 1 and 2 (in %)

20 participants took part in experiment 1 and another 20 in experiment 2. According to Endriss (2009), there should be a clear preference for the indefinite wide scope reading (i.e., acceptance rate of the visible images should be very low in experiment 1 and very high in experiment 2) in the SVO + with and OVS + with condition. In contrast, there should be a clear preference for the indefinite narrow scope reading (i.e., acceptance rate of the visible images should be very high in experiment 1 and very low in experiment 2) in the SVO + without and OVS + without condition. These predictions were clearly not met, as the results of both experiments showed no significant difference at all between the with and without condition in either sentence structure (see table 1).

Those results could not, however, serve the purpose of testing Endriss’ (2009) hypothesis well for two reasons. First, the experiments did not take into account the possible contrastive reading with indefinite narrow scope in the case of a rising accent on the singular indefinite determiner ein- ‘a/one’ (Endriss, 2009, p. 7), which might have ensured that the acceptance rates of visible images depicting the indefinite narrow scope reading were increased in the with conditions. Second, the target items did not control for the fact
that in sentences where the ∀ and ∃ quantifier interact with each other, the indefinite wide scope reading logically implies the indefinite narrow scope reading. This might have led to participants choosing the visible image depicting the indefinite wide scope reading, even though they interpreted the sentence with the indefinite narrow scope reading. In order to avoid these problems, experiment 3 was run with a different design.

4 Experiment 3

Instead of the ∀ quantifier jed- ‘every’, the quantifier fast jed- ‘almost every’ was used for the subject of target sentences in experiment 3, as it eliminates the logical implication between the indefinite wide scope and indefinite narrow scope reading. Instead of the covered box paradigm, experiment 3 employed a sentence continuation task with three options allowing for clear identification of which of the three possible readings was interpreted when participants chose a certain option to continue the target sentence. Furthermore, one more level – left dislocation (LD) – was added to the factor sentence structure, resulting in a 3x2 factorial design for experiment 3. An example of a target item is given in (3). The English translations for the OVS and LD conditions use passive voice for lack of equivalent structures, but the German sentences themselves are in active voice just like in the SVO conditions. The three options for continuing this target sentence are given in (4).

(3)  a. Fast jeder Umzugshelfer musste gestern beim Umzug einen Sessel tragen.
(SVO + without)

b. Fast jeder Umzugshelfer musste gestern beim Umzug ↑EINen Sessel tragen.
(SVO + with)
‘Almost every moving helper had to carry an armchair during the move yesterday.’

c. Einen Sessel musste fast jeder Umzugshelfer gestern beim Umzug tragen.
(OVS + without)

d. ↑EINen Sessel musste fast jeder Umzugshelfer gestern beim Umzug tragen.
(OVS + with)
‘An armchair had to be carried by almost every moving helper during the move yesterday.’

e. Einen Sessel, den musste fast jeder Umzugshelfer gestern beim Umzug tragen.
(LD + without)

f. ↑EINen Sessel, den musste fast jeder Umzugshelfer gestern beim Umzug tragen.
(LD + with)
‘An armchair, that had to be carried by almost every moving helper during the move yesterday.’

(4)  a. … Es gab viele Sessel im Haus.
‘… There were many armchairs in the house.’
(indefinite narrow scope)

b. … Manche mussten sogar zwei Sessel tragen.
‘… Some even had to carry two armchairs.’
(indefinite narrow scope, contrastive reading)

c. … Dieser Sessel war sehr schwer.
‘… This armchair was very heavy.’
(indefinite wide scope)
There were 24 target items, 48 fillers and 24 participants taking part in experiment 3. In accordance with Endriss’ (2009) theory, the choice of the option depicting the indefinite wide scope reading was predicted to significantly increase in the conditions where the indefinite object quantifier is marked as aboutness topic of the target sentence (SVO + *with, OVS + *with, LD + *without, and LD + *with – with the highest increase in the LD + *with condition due to simultaneous use of two topic marking devices). The participants’ responses were coded binarily as 0 (indefinite narrow scope options) and 1 (indefinite wide scope option) and then analyzed with a generalized linear mixed model fit by maximum likelihood. The factor *sentence structure* was analyzed using backward difference contrast coding, comparing the OVS to SVO condition, and the LD to the OVS condition. The factor *intonation* was analyzed using effect coding (0.5 vs. –0.5).

![Figure 1](image)

*Figure 1: Proportions of sentence continuation choices in Experiment 3*

The results (see figure 1) confirmed those predictions and also showed a significant increase in the choice of the indefinite wide scope option in the OVS + *without* condition. This implies that even the topicalization of the indefinite object quantifier alone (i.e., just its movement into the CP specifier) can make its wide scope over the subject quantifier c-commanding its trace more available. Overall, the results showed highly significant main effects of both factors *sentence structure* (OVS vs. SVO: $p = 3.8e-05$, LD vs. OVS: $p = 0.00087$) and *intonation* ($p = 4.3e-08$) on scope interpretation. There were no significant interaction effects observed (OVS/SVO & with/without: $p = 0.10671$, LD/OVS & with/without: $p = 0.60630$). The more left fronted the indefinite object quantifier was, the more available indefinite wide scope became, with or without topic marking intonation. A rising accent on the singular indefinite determiner *ein*- ‘a/one’ of the object quantifier marking it as aboutness topic increased the availability of indefinite wide scope in every sentence structure. Together, these findings indicate that *sentence structure* and *intonation* function independently from each other as topic marking devices that lead to topical singular indefinites taking wide scope, verifying Endriss’ (2009) claim and the pragmatic influence of information structure and prosody on scope interpretation. Moreover, the fact that indefinite wide scope became increasingly more available with further left-fronting of the object quantifier could also suggest that topicality may not be a binary feature and thus call for a gradient analysis of topicality.
References


