

Animacy Effects on Crossing Wh-Movement in German*

Gisbert Fanselow, Potsdam
Matthias Schlesewsky, Marburg
Ralf Vogel, Bielefeld

This article presents several acceptability rating experiments concerned with crossing wh-movement in German multiple questions. Our results show that there is no general superiority effect in German, thus refuting claims to the contrary by Featherston (2005). However, acceptability is reduced when a wh-phrase crosses a wh-subject with which it agrees in animacy. We discuss two explanations for this result, a processing account (in terms of sorting keys and animacy distinctness) and a grammatical account in terms of linearization principles.

0. Introduction

Grammatical contrasts often yield only rather subtle differences in acceptability. This can lead to problems when such judgments figure crucially in arguments for specific syntactic assumptions. Schütze (1996) exemplifies this difficulty in various domains, and argues that it can, in principle, be coped with by controlled acceptability rating experiments. A recent example with far-reaching theoretical consequences involves the discussion of wh-island constraints for *in situ* wh-phases in Japanese (Kitagawa & Fodor 2006, Ishihara 2005), where it could be shown that the alleged subjacency effects on *in situ* wh-phrases do not exist. So-called “third-wh-effects” in English multiple questions also disappear under closer inspection (Clifton, Fanselow, & Frazier 2006).

In this paper, we will also be concerned with the proper interpretation of acceptability contrasts between different types of multiple questions. The superiority condition (Chomsky 1973) rules out crossing wh-movement in English, but apparently not in German, as the difference in the status of (1a) and (2a) illustrates. This contrast between English and German has served as the basis for important theoretical claims in a considerable number of papers (e.g., Chomsky 2005, Haider 1981, Müller 2004, Pesetsky 2000), and many more attempts of accounting for this difference at a lower level can be found (Fanselow 2004, Haider 2004, Noonan 1988, Wiltschko 1995).

(1) a. who t said what?

b. *what did who say t?

(2) a. wer sagte was? (=1a)

who said what

b. was sagte wer? (=1b)

In the light of the attention which the absence of superiority effects in German has received in the literature, it certainly comes as a surprise that Featherston (2005) denied the existence of a categorical difference in the acceptability of (1b) and (2b). Featherston justified his claim on the basis of the

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results of corpus research and internet based acceptability rating experiments in which he found only a gradient difference between English and German. The experiments reported in the present paper show, however, that Featherston's conclusions are not warranted. In contrast to English, there is no general ban against crossing movement in German. When the two clause-mate *wh*-phrases¹ differ in animacy (sect. 2,), crossing movement is as acceptable as non-crossing movement. However, when object and subject agree in animacy (sections 1 and 3), object before subject order reduces acceptability. This effect is composed of two factors (section 4), one affecting indefinite noun phrases in general, and one which is apparently confined to multiple questions. Such effects can be explained away (from the grammar perspective) as being due to processing difficulty, but we will also discuss a grammatical account (section 6). In general, we believe that our results shed an interesting light on the merits and limitations of controlled judgments experiments (section 5) as compared to reliance one's own intuitions.

1. Crossing *wh*-dependencies involving pairs of animate *wh*-pronouns

The COSMAS corpus of German texts (IdS, Mannheim, roughly one billion words) contains 1247 multiple questions involving a pronominal *wh*-subject (*wer*, 'who') and a pronominal *wh*-object (982 instances of accusative *wen*, 265 of dative *wem*) in which both *wh*-pronouns are animate². All 1247 multiple questions begin with the *wh*-subject. Not a single instance of an object initial question can be found in the corpus (Featherston 2005).

There are also 1007 multiple questions formed with the subject *wer* and the inanimate object *wh*-pronoun *was*, 'what'. Only 44 of these clauses (=4.6%) are object-initial (see Featherston 2005). The percentage of object initial structures in multiple questions is thus considerably lower than the overall frequency of OVS-structures³, which is 18,4% in the NEGRA Corpus (Weber & Müller 2004), and 20,4% in the Potsdamer Kommentar Korpus (Saueremann 2006).

Featherston (2005) argues that the zero/low frequency of object-initial multiple questions with a subject-*wh*-pronoun constitutes evidence for an English-like superiority effect in German. We agree that the complete absence of crossing *wh*-movement in sentences involving animate *wh*-pronouns in subject and object position in the COSMAS corpus is striking. Even in the much larger corpus of the German pages in the WWW, we could find⁴ only five relevant⁵ hits. This confirms that examples such as (3) are 'problematic'.

- (3) *Wen hat wer verraten?*
 Who.acc has who.nom betrayed
 "who betrayed who?"

¹ In the present paper, we focus on the interaction of subject and object *wh*-phrases. The results reported in Fanselow & Féry (2007) suggest that genuine superiority effects do not arise in the interaction of two object *wh*-phrases either.

² The quantificational domain of *wer* is in fact restricted to humans. The standard way of referring to non-humans is by the neuter pronoun *was* "what". In addition to *Was singt denn da?* "what <which species of bird> is singing here?" one can also hear *wer singt denn da?* "who is singing here", but there is a ironic or affectionate undertone here.

³ The percentage is related to the set of sentences in the NEGRA corpus which begin with a noun phrase and exclude certain occurrences of pronouns (see Weber & Müller 2004).

⁴ On Jan 3rd 2006 at 11pm CET).

⁵ This excludes numerous examples from linguistics papers posted in the web, but we have not controlled for echo *wh*-subjects that allow crossing movement in the English WWW.

Whether the status of (3) exemplifies a superiority effect in its standard sense cannot be answered independently of a consideration of questions such as (2) which combine an inanimate *wh*-object with a *wer*-subject. Recall that the latter type of multiple question can be found readily in corpora of German (though they still are rare), which shows that the crossing constellation is not ungrammatical as such. However, Featherston (2005) presupposes a gradient concept of grammaticality, so that the low frequency of (2) could be an indication of a reduction of grammaticality in structures involving crossing movement.

The “raw” frequency differences between subject and object initial multiple questions are influenced by various factors, and closer inspection reveals that the contribution of the superiority condition to the overall effect must be small (if it exists at all). After all, object initial multiple questions are a subtype of object-initial clauses, and the latter are generally less frequent than their subject-initial counterparts. One would not want to make the superiority condition responsible for the overall low frequency of object initial sentences⁶. Recall that roughly only 20% of the DP-initial transitive sentences begin with an object. Both in Stochastic OT and the model proposed by Featherston (2005), this reflects the impact of a general constraint against object-initial sentences, and this ban alone explains much of the reduction in frequency of (2). Furthermore, multiple questions are sentences that involve two *indefinite* noun phrases, and such sentences are underrepresented among OVS sentences (4.5% of the OVS sentences involve two indefinite NPs, while 10.4% of the SVO sentence have two indefinites in the NEGRA corpus, see Weber & Müller (2004)). Given the 81.6 : 18.4 ratio between SVO and OVS structures in NEGRA, this means that only 9% of all transitive sentences with an indefinite subject and indefinite object are object-initial. The superiority condition could thus at most be responsible for the difference between the 9% OVS structures that one expects for sentences with two indefinite arguments and the 4.6% one observes in the case of *who-what*-questions.

Acceptability rating studies are, of course, a more direct way of assessing the perception of the well-formedness of constructions types than corpus frequencies, and Featherston (2005) reports the result of an internet-based experiment with 38 subjects who saw 26 experimental items and 18 filler items and rated them with the Magnitude Estimation Method (see Cowart 1997, Keller 2000). He found that multiple questions with *in-situ wh*-subjects (such as (4b)) are significantly less acceptable than other types of multiple questions such as (4a).

- (4) a. *wer hat dem Patienten was empfohlen*
 who has the patient what recommended?
 b. *was hat wer dem Patienten empfohlen*
 what has who the patient recommended
 “who recommended what to the patient?”

There are several reasons for why one cannot be fully content with Featherston’s experiment. First, he used a very complex design for the experiment, with 26 conditions⁷, so that each participant saw only one experimental item per condition. The experimental items were constructed using 26 ditransitive sentence patters such as (5), by replacing one or two of the arguments with a corresponding *wh*-phrase

⁶ However, the superiority condition can probably be derived from more general constraints that affect DP-movement to the specifier position of CP independent of question formation. We cannot exclude that such a general constraint explains the low frequency of object-initiality in declaratives and multiple questions, but in the absence any well-established proposal for such a general constraint, the hypothesis cannot be tested.

⁷ The multiple questions were constructed on the basis of ditransitive sentences in which the two *wh*-phrases were drawn from the set {*wer* “who.nom”, *was* “what.acc”, *wem* “who.dat”, *welches N* “which.acc N”, *welchem N* “which.datN”, *wann* “when”}. All 13 grammatically possible combinations were used, in both orders, which accounts for 26 experimental conditions.

or by adding the question word *wann*. Given that there were only 38 participants, not more than 12 of the experimental items in each condition can have been rated by two or more participants.

- (5) *Der Zahnarzt hat dem Patienten die Zahnpasta empfohlen*
 the dentist has the patient the toothpaste recommended
 “the dentist recommended the toothpaste to the patient”

In addition to these non-standard aspects in the method of the experiment, the construction of the material also had suboptimal consequences in a potentially critical respect. Multiple questions were formed by replacing two [–wh] noun phrases in templates such as (5) by corresponding wh-phrases (and fronting either of the two wh-phrases). The questions involving a wh-subject and a wh-object therefore always had the form given in (4). Subject initial (4a) has the second wh-phrase *was* in the focus position of German clauses in front of the main verb at the end of the sentence. In the object initial questions such as (4b), the wh-subject was separated from the focus position preceding the main verb by the indirect object. In terms of accent placement (the *in situ* wh-phrase must be stressed), (4b) is thus suboptimal, and to our ears, sentences such as (6) with the definite indirect object preceding the indefinite wh-subjects sound better⁸. In other words, we do not know whether the reduced acceptability of (5b) as measured by Featherston is due to some residual superiority effect of German, or whether it merely reflects that the *in situ* wh-phrase did not appear in the optimal position for focal/accented XPs.

- (6) *was hat dem Patienten wer empfohlen?*

In order to find out whether the difference between animate and inanimate wh-objects found by Featherston (2005) in the COSMAS corpus is really linked to a difference in acceptability, and whether the possible reduction of acceptability of crossing constructions is due to a superiority effect, we conducted a series of acceptability rating experiments that we will report in the remainder of this article. First, we will focus on multiple questions involving pairs of animate subjects and objects.

Experiment 1

In our first experiment⁹ (**Exp. 1**), the participants rated the acceptability of multiple questions of the type exemplified in (7). The multiple questions could either be subject- or object initial (si/oi), and the wh-phrases could either be animate wh-pronouns (pr) or animate which-phrases (wp). The multiple questions thus appeared in 8 different versions¹⁰, of which 4 were presented to each participant (4 items/condition). The first group of 19 participants saw those experimental items in which the two wh-phrases either were both wh-pronouns or which-phrases (i.e.. (7a-d)). 20 participants rated the experimental conditions in which the two wh-phrases had different values for the pronoun vs. which-factor (7e-h)). In addition, the participants rated 72 distractor questions.

- (7) a. *wer besticht wen an der Grenze?* si; pr_pr
 who.nom bribes who.acc at the border
 b. *wen besticht wer an der Grenze?* oi; pr_pr
 “who bribes whom at the border?”

⁸ This intuition is not shared by all speakers of German.

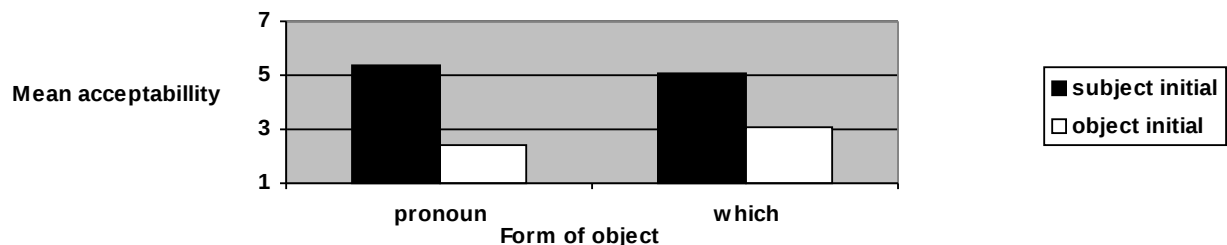
⁹ In the interest of readability, the technical details of our experiments are described in the appendix. The main body of the article reports their results only. Here, it may suffice to say that they all follow the standard design of psycholinguistic experiments (repeated measures both in terms of participants and items per experimental condition).

¹⁰ Locative PPs can follow direct objects in normal order in German (see Lenerz 1977). The distance between the *in situ* wh-phrase and the end of the clause (rightmost focus position) is thus identical both in subject-and object-initial conditions. Note that locative adjuncts do not necessarily need stress in the final position.

- | | |
|---|-----------|
| c. <i>welcher Ingenieur besticht welchen Forscher an der Grenze?</i>
which.nom engineer bribes which scientist at the border | si; wp_wp |
| d. <i>welchen Forscher besticht welcher Ingenieur an der Grenze?</i>
“which engineer bribes which scientist at the border?” | oi; wp_wp |
| e. <i>wer besticht welchen Forscher an der Grenze</i>
who.nom bribes which scientist at the border | si; pr_wp |
| f. <i>welchen Forscher besticht wer an der Grenze</i>
“who bribes which scientist at the border?” | oi; wp_pr |
| g. <i>welcher Ingenieur besticht wen an der Grenze</i>
which engineer bribes who.acc at the border | si; wp_pr |
| h. <i>wen besticht welcher Ingenieur an der Grenze</i>
“which engineer bribes who at the border“ | oi; pr_wp |

Let us consider first that part of the experiment that was concerned with (7a-d). As shown in the left part of Fig. 1, on the 7-point scale¹¹ used throughout this paper (1 being the worst, and 7 the best rating), subject initial multiple questions of the type (7a) got a mean rating of 5.39, while their object initial counterparts (7b) were judged as much worse (2.44). The difference was highly significant ($F_1(1,18)=62.44, p<.001, F_2(1,15)=92.14, p<.001$). Sentences with pairs of which-phrases also show an acceptability difference between subject-initial and object initial clauses (4.68 vs. 4.0). The difference was significant. $F_1(1,18)=4.35, p=.05, F_2(1,15)=9.31, p<.001$). There was a marginal main effect of the type of the wh-phrase ($F_1(1,18)=6.86, p<.05, F_2(1,15)=2.23, p=.16$), and a main effect of word order ($F_1(1,18)=42.39, p<.0001, F_2(1,15)=75.64, p<.0001$). The interaction between the two factors was significant ($F_1(1,18)=27.18, p<.0001, F_2(1,15)=36.63, p<.0001$): the loss of acceptability in crossing multiple questions is higher for pronominal wh-subjects than for which-subjects.

Figure 1: Results of Exp. 1 (conditions a,b,e,f)



The second half of the experiment working with structures such as (7e-h) had a comparable result. [(7e)=5.09, (7f)=3.09, (7g)=4.28, (7h)=4.11]. The contrast between (7e) and (7f) is shown in the right part of Fig. 1. There was a main effect of the type of the clause initial wh-phrase ($F_1(1,18)=18.12, p<.001, F_2(1,15)=13.49, p<.01$) and of word order ($F_1(1,18)=25.26, p<.0001, F_2(1,15)=20.23, p<.001$), but the two factors did not interact ($F_1<1, F_2<1$).

Figure 1 graphically expresses the observation that there is an effect of the crossing nature of wh-movement on the acceptability of multiple questions in German when both wh-phrases are animate. Object initial multiple questions are less acceptable than their subject initial counterparts when the wh-phrase left *in situ* is the subject wh-pronoun *wer*. Whether the object is a wh-pronoun or a discourse linked which-phrase does not really matter. Furthermore, even when the *in situ* subject is a “which phrase” (as in (7d)) it cannot be crossed over by a *which*-wh-object without a loss of acceptability, but the interaction observed for the first part of Exp. 1 shows that the effect of being crossed over is much smaller for “which-subjects” than it is for *wer* “who.nom”.

¹¹ In fact, an inverted six-point rating scale was used in our early experiments, including Exp. 1., that we later replaced by the 7-point scale. The values reported above are not the ‘raw’ ones from the six-point scale, but they are mapped from the ‘real’ ones to the seven point scale in order to increase the comparability with the other experiments reported in this paper. The statistical analysis was, however, conducted with the original values.

Acceptability judgments for multiple questions with a fronted animate wh-phrase and the *in situ* subject wh-pronoun are thus in line with the corpus results: such questions do not occur, and their acceptability is significantly lower than the one of their subject-initial counterparts.

Experiment 2

We replicated the result for pronominal wh-subjects in **Exp. 2**, which appeared among the distractor items of a large study investigating the grammar of German discontinuous noun phrases with several independent questionnaires. Exp. 2 focused on the contrast exemplified in (8): the participants had to rate multiple questions with two animate wh-pronouns. In contrast to Exp.1, the *in situ* wh-phrase always *followed* the discourse particle *denn*, which, at least according to Diesing (1992), marks the boundary of that verbal projection in which the subject is base-generated (vP). Haider (2004) and Müller (2004) explain the contrast between English and German concerning the superiority effects by the assumption that German subjects may remain in vP, while English subjects must move to Spec,TP. Their models predict that superiority effects are confined to subjects in Spec,TP. The placement of *denn* in (8) forces a structural analysis of the sentences in which the subject is not situated in that position.

The multiple questions could either be subject- (si) or object initial (oi), as exemplified in (8). Each participant saw 4 items in each of the two conditions. The eight experimental items appeared among the distractors on 37 different questionnaires (with 76 – 80 further items) which were rated by 8 participants each, i.e., there were 296 participants in the experiment.

- (8) a. *wer hat denn wen eingeladen* si
 who.nom has ptc. who.acc invited
 b. *wen hat denn wer eingeladen* oi
 "who invited who?"

Subject initial questions got a mean rating of 6.13, while the mean rating of their object initial counterparts was at 3.39 ($F_1(1, 295)=708.96, p<.001, F_2(1, 7)=4006.6, p<.001$). Exp. 2 does not only replicate Exp. 1 in showing a considerable difference in acceptability when an animate wh-object pronoun crosses the wh-pronoun *wer* "who" in subject position. The effect also arises when the wh-subject *follows* the discourse particle *denn*. If *denn* marks the left boundary of vP, the results of Exp. 2 suggest that the crossing effect arises even for wh-subjects that have stayed in vP. That subjects can occupy a position in German different from the one they have in English seems irrelevant for the acceptability of crossing constructions, in contrast to claims made in the literature.

Figure 2: Results of Exp. 2



Exp. 1 and 2, thus show that object initial questions have a lower acceptability than their subject initial counterparts, at least when both wh-phrases are animate. These experiments (and the ones of Featherston 2005) may, however, underestimate the acceptability of object initial questions. The experimental items were judged out of context, but object-initial sentences in German need contextual licensing, and multiple questions with OVS order are no exception to this. It has been observed for English that multiple (which-) questions with crossing wh-dependencies presuppose a special pragmatics: they relate to a special 'sorting key' (see Comorovski 1996) for the pair-list answers. It is

harder to use object > subject rather than subject > object order in a multiple question posed in a situation with no or little shared background knowledge of speaker and hearer (see, e.g., chapter IV.2 in Fanselow 1991 and Wiltschko 1998 for a discussion). Thus, (9b,d) were judged as somewhat inappropriate by syntacticians when informally presented in a context induced by the first sentence in (9). An object initial question such as (9d) improves if posed in a context in which speaker and hearer share some hypothesis concerning who was brought to the party (so that only the exact pairings are in question), i.e., if the *in situ* wh-subject can easily be in focus.

(9) *Erzähl mir doch was über die Party!* "Tell me something about the party"

- a. *wer hat wen getroffen*
who.nom has who.acc met
- b. *?wen hat wer getroffen*
- c. *wer hat wen mitgebracht*
who.nom has who.acc brought
- d. *?wen hat wer mitgebracht*

The absence of a contextual licensing affects the acceptability of OVS-structures in rating experiments as well. In isolation, German declarative OVS sentences often seem imperfect to the participants of experiments, but the acceptability difference between the unmarked and the marked word order disappears when the experimental items are presented in an appropriate context (see Weskott, Stolterfoth, Bornkessel, & Schlesewsky 2004, Fanselow, Lenertová & Weskott 2007, among others). OSV sentences generated by scrambling often, but not always (see Meng, Bader & Bayer 1999, Bornkessel & Schlesewsky 2006) retain their imperfect acceptability even when presented in context (Keller 2000, Weskott et al 2004). One cannot exclude, then, that the low acceptability of crossing wh-movement in the experiments discussed so far was due to absence of contextual licensing.

Experiment 3

It is therefore necessary to obtain judgments for sentences such as (8) in a licensing context. We designed two experiments¹² investigating possible context effects on the acceptability of the superiority-like violations found in the preceding two experiments. For **Exp. 3**, 16 sets of 4 sentence pairs of the type exemplified in (10) were constructed by combining each version of the context sentence with each version of the target sentence. Context sentences involving an object question motivate a focal interpretation of the wh-subject in the corresponding multiple question target sentences. The pragmatic condition for the crossing wh-dependency is thus met, which should be visible in an increase of acceptability of the object-initial question.

- (10) a) Context sentence with subject-question
Was die Morde in der Villa angeht, wissen wir zwar, wer jemanden in der Villa besucht hat, und wer nicht.
"As for the murders in the villa, we know very well who visited someone in the villa, and who did not"
- b) Context sentence with subject-question
Was die Morde in der Villa angeht, wissen wir zwar, wen man in der Villa besucht hat, und wen nicht.
"As for the murders in the villa, we know very well who one visited in the villa, and who, not"
- c) Subject initial target sentence
Wir müssen aber präzise wissen, wer wen in der Villa besucht hat
We must however precisely know who.nom who.acc in the villa visited has

¹² Experiments 3 and 4 were designed and carried out in collaboration with Andreas Haida.

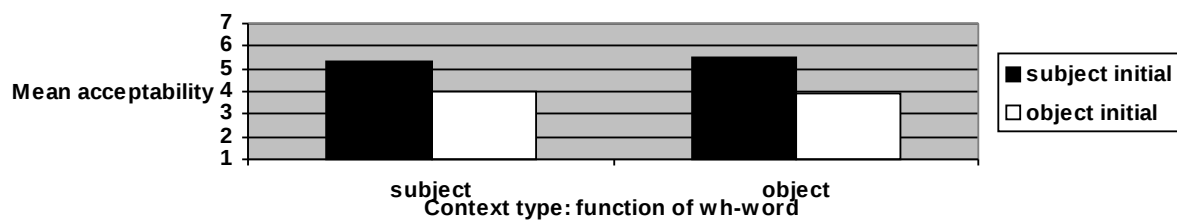
d) Object initial target sentence

Wir müssen aber präzise wissen, wen wer in der Villa besucht hat
 We must however precisely know who.acc who.nom in the
 villa visited has

“However, we need to know precisely who visited who in the villa”

There were, thus, four experimental conditions. Four items per condition were rated by the 48 participants of the experiment. In addition to the 16 experimental items, 56 distractors (sentence pairs belonging to unrelated experiments) appeared on the questionnaires. The mean rating for sentence pairs involving a subject initial multiple question was 5.39 (5.3 and 5.48 in subject and object question contexts, respectively), the mean rating for pairs with an object initial multiple question was 3.99 (4.03 and 3.95 in subject and object question contexts). The difference was significant ($F_{1(1,47)}=37.83$, $p<.0001$) $F_{2(1,15)}=196.0$, $p<.0001$). There was no main effect of the context sentence ($F_{1,2}<1$), and there was also no interaction between the context sentence and the effect of word order in the target sentence ($F_{1(1,47)}=1.29$) $F_{2(1,15)}=1.23$ $p>.1$).

Fig.3: Results of Exp.3



The type of context¹³ provided in Exp. 3 had no effect whatsoever on the acceptability of a multiple question with crossing dependencies. Object initial multiple questions still were less acceptable than their subject initial counterparts. The attempt to raise the acceptability of an object initial multiple question by presenting it in a proper context has failed in Exp. 3.

Experiment 4

A second attempt of finding a mitigating effect of context was carried out in **Exp. 4**. The experimental items again consisted of sentence pairs, but, in contrast to Exp. 3, the multiple question now was the first sentence of the mini-text. As always, it could begin with a wh-subject or a wh-object. The second sentence gave a short pair-list answer to the question, and it could also be object- or subject-initial. The first element would have to be considered the “sorting key” of the answer. We expected that the acceptability of the mini discourse should be a function of the degree of harmony between the sorting key defined by the question and the sorting key used in the answer. 16 sets of contexts such as exemplified in (11) were constructed. Each of the 48 participants saw all four conditions with 4 items each. The 40 unrelated distractor items were sentence pairs as well.

- (11) a. *Wer hat denn wen verraten? Der Schüler hat den Klaus*
 Who.nom has ptc who.acc betrayed? The pupil has the.acc Klaus
verraten, und ein Student den Emil.
 betrayed, and a student the.acc Emil
 “who betrayed who?” “The pupil betrayed Klaus, and a student, Emil”

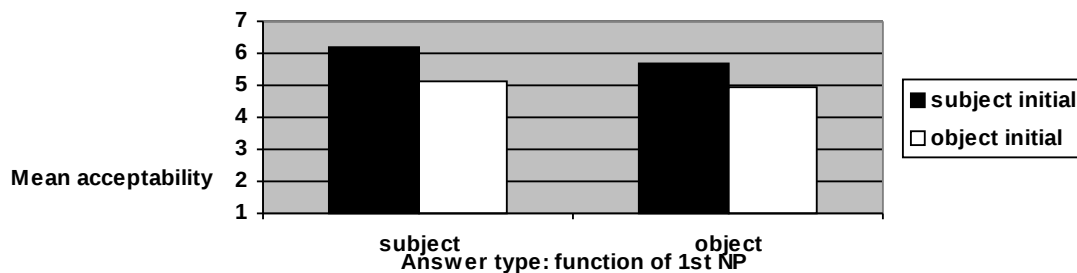
- b. *Wer hat denn wen verraten? Den Klaus hat der Schüler verraten, und den Emil ein Student.*

¹³ Although such comparisons are not warranted in a strict sense, the mean acceptability value of object-initial questions looks higher in Exp. 3 than in Exp.1 and 2. Presentation within some context, even in an inappropriate one, appears to raise acceptability, then. In experiments we have carried out in other domains, we also observed such an increase in the mean ratings when two rather than one sentence were presented. Perhaps, participants average over the degree of acceptability of the two sentences when they give their rating.

- c. *Wen hat denn wer verraten? Den Klaus hat der Schüler verraten, und den Emil ein Student.*
- d. *Wen hat denn wer verraten? Der Schüler hat den Klaus verraten, und ein Student den Emil.*

From the perspective that wh-object fronting across a pronominal wh-subject might be acceptable in the appropriate context, the results of Exp. 4 were as disappointing as those of Exp. 3. There was a main effect of the structure of the multiple question: texts with subject initial questions were rated as more acceptable (5.93) (6.18 and 5.69 for subject and object initial continuations, respectively) than their object initial counterpart (5.03) (5.14 and 4.94 for subject and object initial continuations, respectively) ($F_1(1,47)=26.8, p<.0001$) $F_2(1,15)=61.36, p<.0001$). Texts with a subject initial answer were more acceptable than texts with an object initial one (5.66 vs. 5.31). The parallelism between question and answer had no main effect on acceptability ($F_1(1,47)=2.33, p>.05, F_2(1,15)=3.62, p=.08$). However, there was a significant interaction between the structure of the first sentence and the parallelism factor ($F_1(1,47)=24.98, p<.0001$) $F_2(1,15)=6.35, p<.05$). For subject initial questions, congruent answers yielded better results, for object initial questions, the subject-initial answer was the better one.

Fig. 4: Results of Exp. 4



The fact that the object initial answer to an object initial question yielded the lowest rating of all conditions (4.94) shows how little context helps in licensing object-initiality in multiple questions with two animate wh-pronouns. The major finding of Exp. 4 thus corroborates that claim that such constructions are judged significantly less acceptable..

One might object that the Exps. 3 and 4 failed to find a context effect for the simple reason that the contexts used were inappropriate. This may be the case, but the corpus frequencies mentioned above make it quite unlikely that such licensing contexts can be found. If they existed, crossing wh-dependencies with animate wh-pronouns should occur in large corpora such¹⁴.

¹⁴ One last but important issue for the interpretation of the results presented in this section concerns the grammatical function of the *in situ* wh-phrase. In the examples considered so far, an animate wh-subject was crossed by an animate wh-object, and this reduced acceptability. Do such crossing effects show up with two wh-objects as well? The results of Featherston (2004) would suggest that they do not, but his data involve pairs of animate indirect and inanimate direct objects. Furthermore, the laws of normal word order among clause-mate objects are very complex, and most verbs readily tolerate both the order *io > do* and *do > io*. Under such circumstances, it is difficult to tell crossing movement apart from non-crossing movement. Fanselow & Féry (2007) therefore considered the interaction of animate wh-objects originating in different clauses, as in (i):

- (i) a. wen hat er gebeten wem zu helfen
 who has he asked who to help
- b. wem hat er wen gebeten zu helfen
 „who did he asked to help who?“
- c. wem hat er ihn gebeten zu helfen
 who has he him asked to help
 „who did he asked him to help?“

The experiments reported in Fanselow & Féry (2007) show no negative impact of crossing movement on acceptability. Apart from an influence stemming from the fact that the lower wh-phrase comes from an island,

2. Effects of inanimate wh-objects crossing animate wh-subjects

The experimental evidence presented so far seems to support the view that the superiority condition has an impact on German multiple questions, too, but our data base is too small for drawing any conclusions. One of the invaluable merits of Haider (2004) lies in disentangling various factors that contribute to the ban on crossing movement. Based on observations going back to Bresnan (1972), he argues that there is specific constraint against *in situ* wh-subjects in English independent of whatever additionally affects crossing movement. The evidence presented so far might be interpreted in terms of such a subject-particular constraint. Billings & Rudin (1996) identify a special ban against the crossing over of animate wh-subjects in Bulgarian, and this also falls in line with what we have observed.

As remarked above, the conclusions to be drawn depend on whether what we saw for the interaction of animate wh-phrases also holds for pairs of inanimate wh-objects and animate wh-subjects. The corpus search of Featherston (2005) already revealed a difference: accusative wh-objects precede *wer* “who.nom” only if they are inanimate (*was* ‘what’).

Meyer (2004) made an important observation concerning animacy and superiority. In his experiments focusing on Slavic multiple questions, he found a stable reduction of acceptability when an animate wh-object is placed in front of an animate wh-subject. In some Slavic languages (Czech, Polish), no crossing effect could be detected when an inanimate wh-object was moved across an animate wh-subject pronoun. There was no such animacy related modulation of the crossing effect in Russian (Meyer 2004:243).

Experiment 5

In order to find out whether German patterns with Czech and Polish rather than Russian in this respect, we constructed a rating experiment (**Exp. 5**) that compared the acceptability of sentences such as (12). Exp 5. was embedded in a larger written questionnaire study (viz., Experiment 1 of Fanselow & Frisch 2006), and was presented to 20 of the 43 subjects completing the large questionnaire. In addition to the 8 experimental items (4 per condition), there were 8 related filler items¹⁵ and 90 unrelated filler items. The 106 sentences were presented in a pseudo-randomised order.

- (12) a. *Wer hat was für das heutige Treffen lesen sollen?* (subject-initial)
who has what for the today meeting read should
“who was supposed to read what for today’s meeting?”
b. *Was hat wer für das heutige Treffen lesen sollen?* (object-initial)

Mean acceptability was 4.42 for the subject-initial condition, and 4.38 for the object-initial one¹⁶, i.e., the participants of the experiment found *was*-initial multiple questions (14b) as acceptable as *wer*-

there is no crossing effect visible. In particular, (ib) is as good as (ic), in spite of the fact that object fronting crosses an additional wh-phrase in (ib) but not in (ic). This shows that the effect uncovered in Exps. 1 – 4 is confined to subject wh-phrases.

We note in passing that the absence of a crossing effect in long movement in German stands in strong contrast to English, where (iib) is much worse than (iia). This difference militates against the view that English and German differ only gradually in the context of superiority.

- (ii) a. who did he persuade to buy what
b. *what did he persuade who to buy

¹⁵ The related filler items were multiple questions with two which-phrases.

initial ones (14a) ($F_{1,2} < 1$). In other words, there was no superiority effect visible at all for multiple questions with an inanimate object. Together with the corpus facts, the results of Exp. 5 show that German is like Czech and Polish: there is a clear difference in the acceptability of multiple questions with pronominal *in situ* wh-subjects as a function of the animacy of the preposed wh-pronoun: if the crossing wh-pronoun is animate, the sentence becomes unacceptable, if it is inanimate, it does not. Featherston's (2005) conclusion that German and English are, basically, identical in terms of superiority is thus premature. There is no crossing effect when *wer* is crossed by *was*. This shows that the pertinent crossing movement is well-formed as such, in contrast to what holds for English (Clifton et al 2006, Sag et al 2005) and Russian (Meyer 2004).

Experiment 6

Exp. 6¹⁷ differs from the other experiments reported here in a number of dimensions. First, the material was presented auditorily rather than in written form. The obvious advantage of this presentation mode is that a potentially disturbing factor can be controlled: like most German wh-pronouns, the forms *wer*, *was*, and *wen* are ambiguous between a question and an indefinite pronoun interpretation. (13) allows the two readings indicated in the translation. If *wer* is interpreted as a second question phrase, (13) involves a crossing constellation. With an indefinite interpretation of *wer*, (13) is just a single question, so that issues of crossing and superiority do not arise at all. Disambiguation follows a simple pattern: wh-pronouns in Spec,CP¹⁸ and accented wh-pronouns can be interpreted as question words, the other occurrences of wh-pronouns are indefinites.

- (13) *wann hat wer angerufen*
 when has who called
 “who called when?”
 “when did someone call?”

This ambiguity makes the interpretation of the results of written questionnaire studies somewhat difficult, although the indefinite interpretation of the wh-word is dispreferred. When subjects are asked to read out sentence material involving two wh-pronouns, they nearly always stress both wh-pronouns, i.e., the phonological realization shows they have analysed the *in situ* wh-pronoun as a question operator (Fanselow & Féry 2007).

In Exp. 6, the *in situ* wh-phrase was always pronounced with an accent, so that it did not allow an indefinite interpretation. The 24 participants heard 8 items for each of the four conditions exemplified in (14). All experimental items were multiple questions formed with two wh-pronouns that figured as subjects and objects, respectively. The items could be subject- or object initial. The subject was *wer*, while the object could be animate *wen* “who.acc” or inanimate *was* “what.acc”

- (14) a. *wer hat wen im Garten besucht*
 who.nom has who.acc in-the garden visited
 b. *wen hat wer im Garten besucht*
 c. *wer hat was im Keller gesucht*
 who has what in-the basement searched
 “who looked for what in the basement”

¹⁶ As was noted for Exp. 1, the values reported here have been transformed from the values on the six-point scale actually used in the experiment.

¹⁷ We are obliged to Frank Kügler for his help.

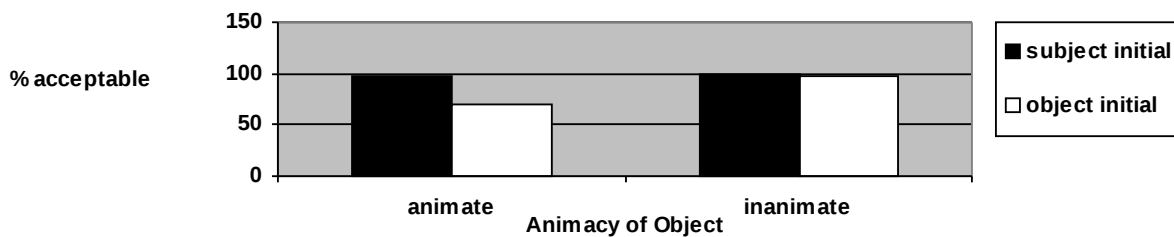
¹⁸ This is true only if the wh-pronoun is not modified. When it is, as in *wer aus Hamburg würde das nicht machen* „anyone from Hamburg would that not do“, the indefinite interpretation is possible: “nobody from Hamburg would do that.”

d. *was hat wer im Keller gesucht*

In addition, participants heard 16 related filler items (multiple questions constructed with an inanimate subject, see below), 24 multiple questions with agreement violations, and 152 unrelated filler items. By pressing a button after being visually prompted for doing so, participants indicated whether they found the sentence acceptable or not. Reaction time (=the time between the visual solicitation of the reaction and the pressing of the button) was recorded as well. Trials with a reaction time longer than 3 seconds have been discarded from the analysis (27 out of 960 trials for the full experiment, 2.8%)¹⁹.

The results of Exp. 6 are shown in Fig. 5. The statistical analysis for the mean rejections revealed a main effect of word order ($F_1(1,19)=15.659$, $p<.001$; $F_2(1,7)=71.818$, $p<.001$; due to more rejections in the OS conditions (16.25%) than in the SO conditions (1.98%), as well as a main effect of the animacy of the object ($F_1(1,19)=17.299$, $p<.001$; $F_2(1,7)=85.049$, $p<.001$; due to more rejections in the object > subject conditions in general, and particularly in the animate object > subject condition (30.0%). More interestingly, there was an interaction between both factors ($F_1(1,19) = 20.974$, $p<.001$; $F_2(1,7)=37.151$, $p<.001$). Resolving this interaction revealed that the sentences of the OS conditions were significantly more often rejected than sentences of the SO conditions for the pattern with two animate wh-pronouns, ($F_1(1,19)=19.319$, $p<.001$; $F_2(1,7)=77.412$, $p<.001$). But there was no significant contrast in the conditions with inanimate objects ($F_1<1$; $F_2<1$).

Fig. 5: Results of Exp. 6



Subject initial sentences were accepted by the participants to a very high degree, and it plays no role whether the wh-object left *in situ* is animate or not. This is what one would expect. Results are different when the wh-object is fronted and the animate subject wh-pronoun stays *in situ*. In line with what we observed in Exp. 1 and 2, acceptance went down from 97.5 to 70.0 percent for fronted animate wh-objects. For fronted inanimate wh-objects, acceptability was not decreased in a statistically relevant way (98.5% vs. 97.5%)²⁰.

Exp. 6 thus confirms the findings of the previous experiments. There is a large difference in acceptability between crossing and non-crossing wh-questions if the crossing wh-pronoun is animate, but this effect cannot be due to a general superiority condition, since the use of an inanimate object wh-pronoun eliminates the difference between subject- and object-initial sentences: both orders are accepted more than 97% of the time, they are both well-formed structures of German. The crossing effects in multiple questions in German and English are qualitatively different.

¹⁹ The data from 4 participants did not enter the analysis because of the too large number of timeouts (2 participants) and because they had a rejection rate of 100 percent for one or more of the conditions.

²⁰ Mean response latencies for accepted sentences were 548 ms (subject initial, animate object), 580 ms (subject initial, inanimate object), 661 ms (inanimate object in 1st position), and 884ms (animate object in 1st position). The statistical analysis revealed a main effect of word order ($F_1(1,19)=12.155$, $p<.01$; $F_2(1,7)=15.175$, $p<.01$) due to higher latencies in the OS sentences. There was a main effect of the animacy if the object in the item analysis only ($F_1(1,19)=4.5902$, $p<.05$; $F_2(1,7)=5.7368$, $p<.05$). We also found an interaction between both factors ($F_1(1,19)=21.104$, $p<.001$; $F_2(1,7)=7.5089$, $p<.05$). Resolving it revealed higher latencies in object > subject sentences compared to subject > object for animate objects ($F_1(1,19)=16.978$, $p<.001$; $F_2(1,7)=16.581$, $p<.01$), but only marginally for the AI pattern ($F_1(1,19)=3.1981$, $p=.09$; $F_2(1,7)=3.4201$, $p=.1069$). The reaction time results thus parallel the findings for the rejections.

3. Wh-Objects crossing inanimate wh-subjects

The experiments reported so far suggest that crossing wh-movement comes with no decrease in acceptability when an inanimate object is moved to the left of an animate subject, while acceptability goes down when the animate subject is crossed by an animate object. The idea suggests itself that one will find the same dissimilarity effect when the subject is inanimate. We investigated this issue in two further experiments.

Experiment 7

Inanimate wh-subjects were combined with animate wh-objects in **Exp.7**. In the experimental items, the object always was the wh-pronoun *wen* ‘who.acc’. The subject could be *was* ‘what’ in the pron(ominal) condition, and was composed of *welcher* ‘which’ and an inanimate noun in the wp condition. Sentences could be subject- or object-initial. In the construction of the material, we avoided psychological predicates because these often come with an object > subject normal order (see Haider & Rosengren 2003) that would make it hard to decide if a given multiple question involves a crossing constellation or not. The experimental conditions are exemplified in (15).

- (15) a. *welcher Anruf erreichte wen* si; wp
which call reached who.acc
b. *wen erreichte welcher Anruf* oi, wp
„which call reached who?
c. *was erreichte wen?* si; pron
what reached who
d. *wen erreichte was?* oi; pron
„what reached who?“

48 students of the University of Potsdam rated 4 items per condition (and further 96 distractor items) on our 7-point scale. The mean acceptability for sentences such as (15a) was 5.62, for sentences such as (15b) it was 5.65. When the subject was the inanimate wh-pronoun *was*, subject > object order (15c) yielded a mean acceptability of 5.65, and the mean acceptability of the inverse order was 5.70. Neither the factor subject/object initiality nor the factor \pm pronoun yielded a significant contrast ($F_{1,2} < 1$) and there was no significant interaction between the two factors either ($F_{1,2} < 1$).

Exp. 7 thus shows that crossing movement does not imply a reduction of acceptability when the two wh-phrases do not agree in animacy. This result is independent of whether the animate wh-pronoun is the subject or the object in the sentence.

Experiment 8

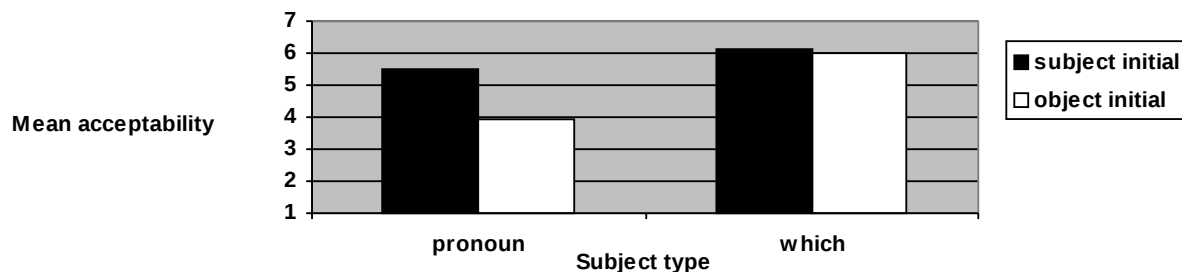
This leaves us with the issue of whether there is a crossing effect in the case of two inanimate wh-phrases, too. In the pertinent **Exp.8**, we could not use pairs of inanimate wh-pronouns, since *was* does not distinguish nominative and accusative case, and has no dative form. (16) is thus globally ambiguous, and cannot be used in experiments that try to distinguish the acceptability of subject- and object initial forms. Instead of (16), we used multiple questions in which one argument slot was filled by *was*, while the other argument was a ‘which’-phrase with an inanimate nominal head. In the experimental items, the pronoun could either be the subject or the object (pron_sub vs. pron_obj), and the question could be subject- or object initial (si vs. oi). These conditions are exemplified in (17).

- (16) *was erforderte was?*
What required what
“what required what?”

- (17) a. Was erforderte welchen Abschluss? Pron_sub si
 What required which.acc degree
 b. Welchen Abschluss erforderte was? Pron_sub oi
 c. Welcher Abschluss erforderte was? Pron_obj si
 Which.nomdegree required what
 d. Was erforderte welcher Abschluss? Pron_obj oi

Together with 34 distractor items, 4 items per conditions were presented to 24 students of the University of Potsdam. The results of the experiment are represented in Figure 6. In multiple questions with an inanimate ‘which’-phrase in subject position, the subject-initial version has a slightly higher (6.1 vs. 5.88) mean acceptability score than the version in which the subject is crossed-over by *was*. For sentences in which *was* is the subject, we found a large difference in the acceptability of subject vs. object initial questions (5.48 vs. 3.96).

Fig. 6: Results of Exp. 8



Both the contrasts of the factor \pm pronominal subject ($F_1(1,23)=33.07, p<.001$; $F_2(1,15)=43.91, p<.001$) and of the factor subject/object initiality ($F_1(1,23)=20.34, p<.001$; $F_2(1,15)=17.05, p<0.001$) were statistically significant, as was the interaction between them ($F_1(1,23)=13.28, p<0.01$ / $F_2(1,15)=9.15, p<0.01$). A one-factor ANOVA showed that the contrast between (17a) and (17b) was significant, ($F_1(1,23)=21.64, p<0.001$; $F_2(1,15)=17.23, p<0.001$) but not the one between (17c) and (17d) ($F_1(1,23)=1.6, p=0.21$; $F_2(1,15)=1.1, p<0.31$).

Exp. 8 thus supports the hypothesis that acceptability is decreased by crossing movement in those multiple questions only in which the crossing *wh*-object and the *wh*-subject agree in animacy²¹. The effect shows up very clearly for the *wh*-pronouns *wer* and *was*²².

²¹ We want to note that the absence of a contrast in Exp. 6 between the two word orders in sentences with an inanimate subject and an animate object is mirrored by a further result gained in the context of Exp. 6. The participants of the experiment saw 8 items each for each of the two structures exemplified in (i), viz. multiple questions with an inanimate nominative DP and an animate object.

- (i) a. was hat wen beim Vortrag gelangweilt?
 what has who.acc at-the talk bored
 b. wen hat was beim Vortrag gelangweilt?
 “who was bored by what during the talk?”

Nominative-initial sentences of the type (20a) were accepted in 92.9% of the cases, for accusative-initial sentences of the type (24b), acceptance was at 93.6%. There was thus no difference between these two conditions ($F_1<1, F_2<1$). The absence of a difference suggests once more that no (strong) crossing effects arise when the two *wh*-phrases involved come from different semantic domains but the results are somewhat blurred because we used both causative and psychological predicates.

²² Unlike what we found in Exp. 1, the animacy agreement effect was insignificant for *which*-subjects in the inanimate case. This is in line with the general observation that crossing effects are weaker for *which*-phrases (see Pesetsky 1987, Pesetsky 2000, among many others), but we have no explanation for the additional effect of animacy visible here. Likewise, multiple questions with *which*-subjects were generally rated as more acceptable than sentences with *was*-subjects. An explanation for this effect is also beyond the scope of the present paper.

4. Scrambling

The picture emerging from the results discussed so far is that there is no general ban against crossing *wh*-movement in German, but acceptability is reduced when the crossing occurs in a constellation in which the two *wh*-phrases agree in animacy. On the one hand, this effect is reminiscent of what Haider (1997, 2000) discovered for Case (acceptability goes down in crossing structures when the two *wh*-phrases bear the same Case), on the other hand, one may wonder whether such an effect of animacy is visible in other constellations, too. Whether the effect is confined to multiple questions or not is crucial for its interpretation. The principled ambiguity of the *wh*-pronouns opens us a particularly promising hold on the factor triggering the animacy effect.

Recall that German *wh*-pronouns *wer* ‘who’, *was* ‘what’, etc. can be interpreted as question operators and as indefinite pronouns. The choice between the two readings is linked to accentuation. Haider (1993) had already pointed out that one should always control whether the restrictions one observes for *wh*-question-pronouns also hold in the case of *wh*-indefinites. If they do, they cannot be attributed to constraints on *wh*-movement.

For the proper interpretation of the results observed so far, it is thus necessary to control animacy effects with the indefinite interpretation of *wh*-phrases. This can be done quite easily by comparing multiple questions with corresponding sentences involving scrambling. One needs to keep in mind, however, that ‘normal’ scrambling in German affects definite, thematic, given material rather than indefinite phrases that are in focus (because they are *wh*-words), so that one need not necessarily expect that scrambled structures and crossing multiple questions behave alike.

We tested the acceptability of subject- and object initial questions and sentences with two indefinite *wh*-pronouns in two experiments. In order to minimize the differences between the conditions, the indefinite *wh*-pronouns appeared in a question clause as well, i.e., they were embedded in a decision question. We used complement questions for both versions of the *wh*-pronouns in order to maximize the similarity of the items, but that decision increased the structural difference between the two new experiments and some of those reported so far.

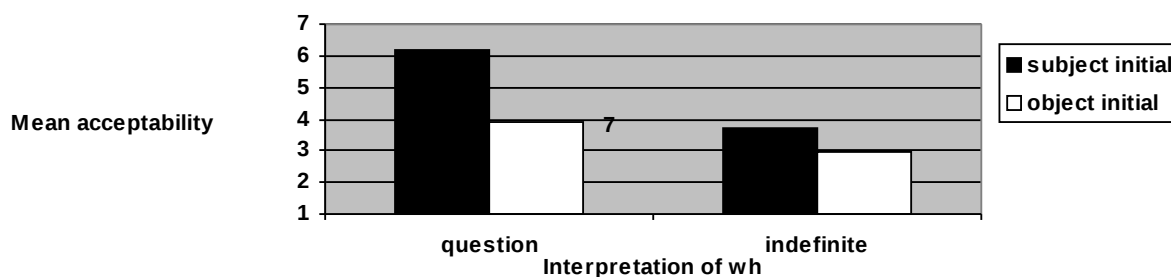
Experiment 9

(18) illustrates the four conditions used in **Exp. 9**: the first factor was subject/object initiality, the second question (*qu*-) vs. indefinite (*in*-) interpretation of the *wh*-pronouns. 32 participants rated 16 experimental items (4 per condition) plus 88 distractor items (among which there were 16 simple questions potentially involving a weak crossover violation).

(18) *es ist egal* ‘it does not matter’

- | | | | | | | | | |
|----|--|---------------|------------|----------------|------------------|------------------|--------------|--------|
| a. | <i>wer</i> | <i>damals</i> | <i>wen</i> | <i>ständig</i> | <i>angerufen</i> | <i>hatte</i> | si; qu | |
| | who.nom | then | who.acc | permanently | called | had | | |
| b. | <i>wen</i> | <i>damals</i> | <i>wer</i> | <i>ständig</i> | <i>angerufen</i> | <i>hatte</i> | oi; qu | |
| | ‘who had permanently called whom then’ | | | | | | | |
| c. | <i>ob</i> | <i>damals</i> | <i>wer</i> | <i>wen</i> | <i>ständig</i> | <i>angerufen</i> | <i>hatte</i> | si; in |
| | whether | then | who.nom | who.acc | permanently | called | had | |
| d. | <i>ob</i> | <i>damals</i> | <i>wen</i> | <i>wer</i> | <i>ständig</i> | <i>angerufen</i> | <i>hatte</i> | oi; in |
| | ‘whether anybody had permanently called anybody else then’ | | | | | | | |

Fig. 7: Experiment 9



As shown in Figure 7, there was a main effect of the interpretation type of the wh-phrases ($F_1(1,31) = 61.27$; $p < .001$; $F_2(1,15) = 69.43$, $p < .001$), with multiple questions being more acceptable than sentences with an indefinite interpretation of the wh-pronouns (5.04 vs. 3.34). There was also a main effect of word order, with non-crossing sentences being better than crossing ones ($F_1(1,31) = 60.91$; $p < .001$; $F_2(1,15) = 50.28$, $p < .001$). Subject initial sentences were more acceptable than object initial ones (4.93 vs. 3.44). Furthermore, there was a significant interaction between the two factors of the experiment ($F_1(1,31) = 27.65$; $p < .001$; $F_2(1,15) = 16.09$, $p = .001$).

Exp. 9 replicates the findings of Exp. 1, 2 and 6 in that a huge acceptability difference between subject and object initial multiple questions with two animate wh-pronouns appeared again in a very clear way (6.2 vs. 3.7). Subject and object initial sentences also differed significantly ($t_1(1,31) = 3.35$, $p < .01$; $t_2(1,15) = 3.35$, $p < .01$) in sentences with the wh-pronouns interpreted as indefinites (3.9 vs. 3.0).

There is a significant ($F(1,31) = 5.68$, $p < .05$) correlation between the word order effects (=difference between the means of the subject and object initial condition) in the multiple question and the indefinite condition ($R = .399$, $R^2 = .16$)²³, which corroborates the view that the ‘soft’ superiority-like effect observed in multiple question is partially related to the factor that influences the acceptability of scrambled structures. While ‘raw’ acceptability facts for sentences such as *who did who see* may be similar in English and German, the source of the inacceptability seems to be quite different.

However, the significant interaction between the word order factor and the wh-interpretation factor also shows that the difference between object- and subject-initial multiple questions with two animate wh-pronouns cannot exclusively be accounted for by the “scrambling factor” that is responsible for the object initiality effect in the indefinite condition. The crossing effect is stronger in multiple questions.

This strength difference allows several interpretations among which to choose is not very easy. There might be some factor reducing the acceptability of subject-initial indefinite clause, or a factor raising the acceptability of object initial indefinite clauses, or a factor reducing the acceptability of object-initial wh-questions. The results of Exp.9 are compatible with each of these options, but we believe that Exp. 10 clearly favors an account in terms of object initial wh-questions.

We cannot fully reduce the crossing effect in multiple questions to the low acceptability of the scrambling of indefinite accusative noun phrases.

Experiment 10

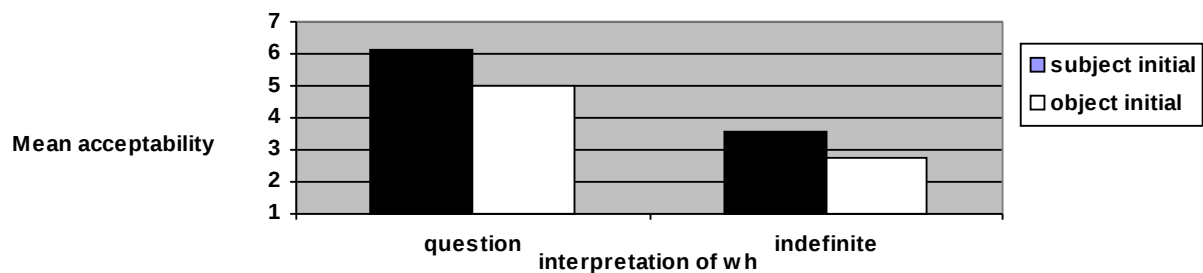
The idea suggests itself to apply the design of Exp. 9 to *wer-was*-pairs of wh-pronouns, too. The makeup of the conditions of **Exp. 10** differs only minimally from the one used in Exp. 9, and is illustrated in (19).

²³ This correlation is not simply due to some participant-specific degree of “liberality” that would correlate all judgment of a participant. E.g., the word order effect in multiple questions turned out to not correlate with the similar factor (subject- or object question) in a weak crossover experiment appearing on the same questionnaire.

- (19) a. *Ich frage mich schon lange wer damals was gesagt hat* si; qu
 I ask me already long who then what said has
 “I have been wondering for quite some time who said what then”
- b. *Ich frage mich schon lange was damals wer gesagt hat.* oi; qu
- c. *Ich frage mich schon lange ob damals wer was gesagt hat.* si; in
 I ask me already long if then who what said has
 “I have been wondering for quite some time if anyone said anything then”
- d. *Ich frage mich schon lange ob damals was wer gesagt hat.* oi; in

The 36 participants of Exp. 10 rated the 16 experimental items (4 per condition) and 72 distractors. The results are shown in Fig. 8.

Fig 8: Results of Exp. 10



As in Exp. 9, sentences in which the wh-pronouns had to be interpreted as indefinites were less acceptable than the multiple questions ($F_1(1,35)=119.84$, $p<.001$, $F_2(1,15)=232.23$, $p<.001$). Furthermore, the word order manipulation yielded a significant effect: subject initial sentences were better (6.13 for multiple questions and 3.58 for indefinites) than object initial sentences (4.98 and 2.76, respectively) ($F_1(1,35) = 51.536$, $p<.001$, $F_2(1,15)=37.304$, $p<.001$). Judgments for the two object initial conditions of the experiment ($R^2=0.163$, $p<.05$) were correlated, just as the judgments for the subject initial sentences ($R^2=0.158$, $p<.05$) (but correlations within interpretation types were higher: $R^2=0.547$, $p<.001$ in the case of multiple questions, and $R^2=0.436$, $p<.001$ for indefinites). The subject advantage in multiple *wer-was*-questions thus seems to be driven by the factor that is also responsible for the similar effect in scrambled structures.

The two factors of the experiment did not interact ($F_1(1,35)=2.04$, $p>0.1$, $F_2(1,15)=1.5297$, $p>0.2$). Unlike what we found for *wer-wen* pairs, the acceptability differences between subject and object-initial multiple questions is not larger in multiple questions than in sentences with an indefinite interpretation of the wh-words.

Object initial clauses are less acceptable than their subject initial counterparts in sentences involving two indefinite wh-pronouns. This result is hardly surprising, given that the object initial order arises by scrambling, which always reduces acceptability when the scrambled order is presented without a context.

The absence of an interaction between word order and interpretation type for the two wh-pronouns is in line with our expectations, and allows us to further interpret Exp. 9. The increase in the word order effect we observed there cannot be due to a factor reducing the acceptability of subject-initial indefinite clauses, since that factor should have affected Exp. 10 as well. This leaves us with the possibility that object-initial indefinite clauses were *improved* in Exp. 9, or the possibility that object-initial multiple questions are made worse by a further factor. If both options are confined to animate wh-objects, they are inoperative in Exp.10, as required. The idea that there is a factor further reducing the acceptability of object initial multiple questions with two animate wh-pronouns can be made sense

of easily in terms of current ideas in processing and syntax models (see section 6), while this is not the case for the alternative raising of the grammaticality of object initial indefinite clauses with pairs of animate wh-pronouns. Therefore, we believe that the former account is the most plausible one²⁴.

The composition of the questionnaire on which Exp. 10 appeared allows us to compute a set of further correlations. A different experiment on the questionnaire compared the acceptability of sentences with scrambled and topicalized objects with the judgments for their subject initial counterparts. Both arguments were definite noun phrases in this experiment, in which topicalization and scrambling indeed turned out to reduce acceptability. We compared the participants' behaviour in the superiority and the scrambling/topicalization experiment, and found that the acceptance of object-initial multiple questions is correlated with definite object scrambling ($R^2=0.223, p<.01$), and less so with topicalization ($R^2=0.132, p<.05$).

The correlation between crossing multiple questions and scrambling can also be seen in the context of Exp. 2. As mentioned above, Exp. 2 was among the distractor items of a larger study concerned with the acceptability of discontinuous noun phrases. An experiment investigating the acceptability of scrambled sentences such as (20) was also included among the distractor items of the discontinuous noun phrase study.

(20) *Neulich hat den Sohn die Mutter getadelt*
Recently has the.acc son the mother scolded
“Recently, the mother has scolded the son”

We found a highly significant correlation ($R^2=0.28, p<.001$) between the acceptability of scrambled sentences and multiple questions with a crossing wh-dependency in the judgments of the 296 participants.

Summing up the results of our experiments, we have found that

- Crossing movement causes no inacceptability when the two wh-phrases differ in animacy
- Crossing movement decreases acceptability in multiple questions (and the scrambling of indefinites) when the wh-phrases agree with respect to animacy
- The size of the crossing effect is larger in multiple questions than it is in clauses with pairs of indefinites.

5. Judgments of linguists vs. judgments of linguistically naïve participants

Our results call for further discussion in at least two respects. First, the source of the reduced acceptability of multiple questions with crossing movement of wh-phrases with identical animacy specification must be identified. Before we turn to this issue, we want to discuss whether our results are compatible with the grammatical properties of German as reported in the theoretical literature.

The major finding of the present paper lies in the identification of an animacy effect on crossing movement in German. Apart from that effect, crossing movement turns out to be as acceptable as its

²⁴ That structures such as (19b) were judged as less well-formed than structures such as (19a) is somewhat surprising in the light of the results of section 2. The only relevant structural difference between the three studies reported above and Exp. 10 lies in the fact that the latter involved embedded questions while the experiments in section 2 used matrix questions. Whether this difference or some design fact (e.g., the presentation of scrambled wh-indefinites and object initial multiple questions in the same experiment) accounts for the reduced acceptability of (19b) is a question that cannot be resolved on the basis of the available evidence. It is important to keep in mind, though, that the size of the object initiality disadvantage visible for (19b) is comparable to the one visible for (19d), so that no additional superiority effect is present.

non-crossing counterpart (though the general difficulties of object initial sentences may (sometimes) influence acceptability). The syntactic literature on German (with the exception of Featherston 2005, of course) nearly unanimously presupposes that there is no general ban on crossing movement in German, and is thus in harmony with the findings reported in sections 2 and 3. Our experiments have confirmed the general position concerning superiority effects taken by syntacticians.

The loss of acceptability that results when a (pronominal) *wh*-subject is crossed by a (pronominal) *wh*-object with which it agrees in animacy was not noted in the syntactic literature. This does not imply that there was a misrepresentation of acceptability facts in the syntax articles. Rather, nearly all illustrations of the absence of a superiority effect in German involve *was-wer*-pairs. The acceptability of corresponding sentences with two animate *wh*-phrases is practically never discussed at all in these publications.

- (21) a. *Weißt du noch was wer bestellt hat* (Haider 1986:292)
 Know you still what who ordered has?
 “Do you still know who has ordered what?”
- b. *Was hat wer gekauft* (Noonan 1988:17)
 What has who bought
 “Who bought what?”
- c. *Was hat wer behauptet?* (Grewendorf 1988:312, Müller 1995:276)
 what has who claimed
 „who claimed what“

The animacy effect has thus been indirectly ‘acknowledged’ in the linguistic literature, by confining illustrations of the absence of a superiority condition effect to sentences with *wh*-phrases differing in animacy. There are rare instances of hints at the animacy contrast, as in Fanselow (1991: 329), who discusses prosodic and pragmatic constraints on the acceptability of (22a) and observes that (22b) is not subject to such restrictions, but he fails to explicitly link the contrast to animacy.

- (22) a. *ich habe vergessen, wen wer umbringen wollte*
 I have forgotten who.acc who.nom kill wanted
 “I have forgotten who wanted to kill who”
- b. *er wollte wissen, was jeweils wer vorgetragen hatte*
 he wanted know what resp. who presented had
 “he wanted to know who had presented what”

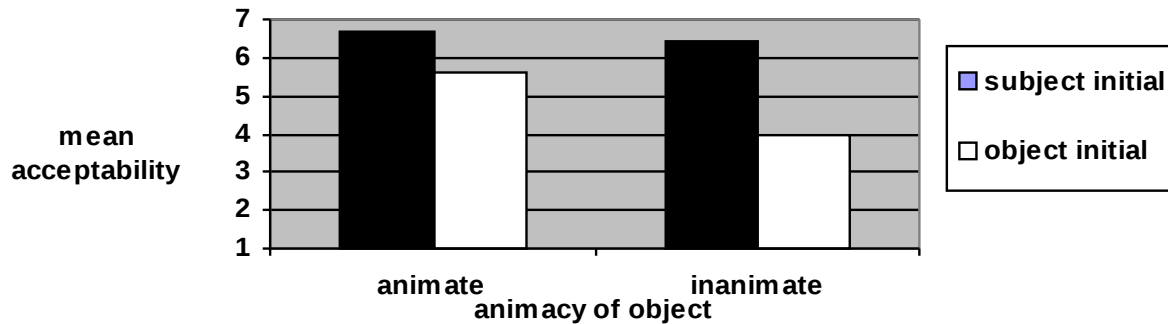
Acceptability facts for German multiple questions were thus rarely misrepresented in the theoretical literature (if at all).

It may be interesting to find out systematically how syntacticians rate the two examples in (22), but judgments may be influenced by the theoretical predictions of nearly all current accounts for German. However, crossing movement with inanimate subjects as in Exp. 8 has never been considered in the literature, so that professional judgments are not likely to be based on previous assessments of these sentences in the literature. As a pilot for Exp. 8, we had interviewed syntacticians with respect to such structures, by sending out 20 multiple questions electronically to a number of linguists, of which 18 responded by rating them on our 7 point scale. The four conditions exemplified in (23) appeared with 4 items each. The subject was the inanimate *wh*-pronoun *was*, the object could be an inanimate (23a,b) or animate (23c,d) which-phrase. Different verbs were used for the different object types, to increase plausibility. The other factor was, as always, subject- or object initiality. The remaining four sentences were multiple questions formed with *warum* “why”. The results of this study are depicted in Fig. 9.

- (23) a. *was erklärte welchen Befund*

- | | | | | |
|----|--------------------------------|---------------|----------------|------------------|
| | what | explained | which.acc | result |
| b. | <i>welchen Befund erklärte</i> | <i>was?</i> | | |
| c. | <i>was</i> | <i>störte</i> | <i>welchen</i> | <i>Professor</i> |
| | what | annoyed | which.acc | professor |
| d. | <i>welchen Professor</i> | <i>störte</i> | <i>was</i> | |

Fig. 9



The subject initial conditions got a very high rating (6.7 and 6.4 for animate and inanimate objects, respectively). With animate objects, acceptability decreased in the crossing condition (5.6); but the magnitude of the decrease is relatively small. In contrast, the acceptability of inanimate objects fronted across inanimate subjects was low (4.0), the size of the difference is reminiscent of what we saw the comparable cases of two animate *wh*-phrases²⁵. By and large, we can conclude that syntacticians showed the behavior that we observed in Exp. 8: They even saw a small contrast in the case of *wh*-pairs not agreeing in animacy²⁶.

There is little reason to believe, then, that syntacticians or linguists in general judge multiple questions in a way much different from the rest of the linguistic community, and the literature also does not contain false statements concerning the acceptability of crossing movement. The only potential problem of the previous presentation of facts lies in the failure to explicitly discuss the animacy effect: it was ‘filtered out’ for the purposes of model formation. The (implicit) background assumption may have been that this effect is due to some noise factor. This assumption can be correct, but if it is not made explicit, not all information necessary to judge the merits of a syntactic explanation is presented. If the animacy effect has a syntactic source, the filtering out of certain crossing movement constructions would even have been harmful for syntactic theory formation.

Our results also illustrate the (obvious) point that acceptability rating experiments do not always eliminate the problem of conflicting evidence/judgments. Experiment 10 differed from the experiments reported in section 3 by finding a decrease in acceptability in embedded multiple questions in which *was* ‘what’ crossed *wer* ‘who’. Experiment 10 and the two studies reported in

²⁵ Since this study is not a standard rating experiment, we refrained from subjecting the data to a statistical analysis of variance.

²⁶ In a further informal study, we asked linguists (by an ad in LinguistList) to rate a set of 32 multiple questions posted in the internet (www.ling.uni-potsdam.de/fogra3/neu), of which 4 were simple transitive sentences with *wer-wen-* and *wer-was-*pairs, in both orders. 24 native German linguists responded. 5 of them accepted all 4 items, 14 considered the two object-initial items as worse than their subject-initial counterparts, 4 showed the animacy effect (*was-wer* was judged as better than *wen-wer*) and 1 participant rated *wen-wer* as better than *was-wer*. Given the differences in methods, these figures cannot be compared easily with our judgment experiments, but if anything they suggest that linguists are more restrictive in their judgments than “normal” speakers of the language.

Featherston (2005) therefore show that controlled acceptability rating experiments do not automatically solve the problem of ambiguous evidence.

However, at least some of the factors that may be responsible for such variation can in principle be clearly identified in judgment experiments (e.g., the nature of sentence structures that have to be judged in parallel can have an influence on judgments). In addition, such experiments allow quantifiable statements on correlations between judgment types. In our case, the object initiality effect in Exp. 10 correlated with the disadvantage found in scrambled structures. The absence of an interaction with the sentence type factor also suggests that no further source is involved. In other words, the statistical properties of the results gained in Exp. 10 suggest that the lower acceptability of crossing movement resulted here as a consequence of the general problems of object-initiality. To the extent that one is willing to attribute these to context (mismatch) effects, the statistical properties of the crossing effect in Exp. 10 allow us to maintain the view that the crossing of *wer* by *was* yields no superiority effect.

Systematic judgment studies have two obvious advantages here. They make the factors that contribute to a judgment pattern explicit, and the quantitative methods allow to justify claims that a certain effect (such as the low acceptability of *wen-wer*-sequences) cannot be explained on the basis of one factor only (the reduced acceptability of object initial sentences) but must have a further source (see section 4). The latter cannot be achieved on the basis of ‘impressionistic’ data collected by consulting colleagues in neighboring offices.

6. Explaining the Animacy Effect

Our experiments support the view that there is no general superiority effect in German multiple questions. In this respect, German differs from English. German multiple questions thus cannot serve an example for the claim (see Featherston 2005) that hard constraints of one language (English, in this case) are mirrored by soft constraints in another (German).

Several proposals for an account of the English-German difference concerning superiority can be found in the literature, and obviously, our results do not allow us to decide between them. We also saw that the acceptability of object initial sentences is often reduced as compared to their subject initial counterparts, and this holds of declaratives, the scrambling of indefinites, and multiple questions. In general, the lack of sufficient contextual motivation for the choice of a grammatically marked word order can be made responsible for this.

In addition, we found a specific animacy effect for multiple questions: the crossing penalty turned out to be larger for multiple questions than for, e.g., the scrambling of indefinites, and we found no contextual licensing for crossing movement when the two *wh*-phrase agree in animacy. How can we explain this additional animacy effect?

The most conservative solution (in terms of syntactic theory) lies in a processing account of the animacy effect. Haider (1996, 2000) observed that the acceptability of crossing movement is reduced when the *wh*-phrases bear the same case (as they do in (24)), while no superiority-related effect can be observed in (25) (see Fanselow & Féry 2007). Haider proposes that the lower acceptability of (24) is due to a processing problem, and we may envisage such type of an account for the animacy effect, too.

(24) *wem hat er wem geholfen dies zu erklären*
who.dat has he who.dat helped this to explain
“who has he helped to explain this to who?”

(25) *wen hat er wem geholfen davon zu informieren*

who.acc has he who.dat helped thereof to inform
 “who has he helped to inform who about that”

In Haider’s case, the idea of a processing cause for low acceptability can be easily linked to other results in that domain. The initial segment of (24) contains two occurrences of a dative DP, but only one such phrase fits into the Case frame of a matrix verb. The initial segment of (24) thus involves a “case clash” (Kasusaufprall, Kvam 1981), and it has been shown by Kvam (1981) and Fanselow & Frisch (2006) that local processing problems of this type lead to a global reduction of acceptability. In other words, the reduced wellformedness of (24) is predicted on the basis of what we know about processing effects on acceptability, so that there is little reason to seek for a further cause of the difference between (24) and (25).

The animacy effect can then be interpreted in terms of recent insights into the concept of ‘unmarked transitivity’ and the processing costs related to violations thereof. The unmarked transitive pattern involves an animate subject and an inanimate object (Comrie 1989), and its unmarkedness goes hand in hand with the processing principle Distinctness proposed by Schlesewsky & Bornkessel (2004). Distinctness requires that each argument be maximally distinct from every other argument in terms of thematic status. The principle explains, e.g., the additional processing costs that can be observed in marked word order sentences when the arguments of a predicate agree in animacy (see Schlesewsky & Bornkessel 2004). An increase in processing difficulty often reduces the acceptability of sentences (Fanselow & Frisch 2006), so that Distinctness might be invoked in an account of the animacy effect.

We must acknowledge, however, that there is no general reduction in the acceptability of object movement to Spec,CP in sentences with two arguments not differing in animacy. Fanselow, Lenertova & Weskott (2007) compared the (focus-induced) fronting of animate and inanimate objects across an animate subject, and found no effect whatsoever on acceptability.

- (26) a. *Den serbischen Studenten mag der Professor besonders.*
 the.acc Serbian student likes the professor particularly
 ‘The professor particularly likes the student from Serbia.’
 b. *Den serbischen Bohneneintopf mag der Professor besonders*
 the.acc Serbian beans pot likes the professor particularly
 ‘The professor particularly likes the Serbian beans pot.’

(Dis-)agreement of animacy between the subject and the object has an influence on the frequency of object fronting to Spec,CP in the TIGER corpus (Boethke, Fanselow, & Weskott 2007): 81% of the object initial transitive sentences have an animacy difference between the two arguments, while such a difference can be observed for 44% of the SVO sentences only. For scrambling (a subcorpus of 207 OSV sentences and a corresponding number of SOV sentences from the COSMAS corpus), Boethke et al. found that the percentage of sentences with an animate object and an inanimate subject was much larger among OSV (38%) than among SOV sentences (1%), while the percentage of structures with animate subjects and inanimate object is larger in unscrambled (64%) than in scrambled (38%) sentences. Therefore, there is no general effect of animacy disagreement in scrambled structures, rather, the animacy effect here seems to be due to the influence of the (violable) word order constraint [+animate] > [-animate] (Lenerz 1977, Uszkoreit 1987, Müller 1999).

The processing difficulty of sentences with OS-order that arises when Distinctness is not respected therefore does not always have an impact on corpus frequency and acceptability. If we want to make the processing difficulty caused by Distinctness violations responsible for the animacy effect in multiple questions, we must assume that processing difficulty does not as such reduce acceptability. One possibility is that the processing difficulty must surpass a certain threshold for affecting

acceptability. The information structure of sentences implies processing demands of its own, and these can reduce processing costs differences between marked and unmarked structures. To the extent that information structure effects are stronger in the case of declaratives with definite NPs than in the case of non-discourse linked wh-words, the effects of Distinctness might have a chance of being visible in multiple questions but not in sentences such as (28).

One surprising finding of a quick internet survey that is related to this idea concerns the fronting of wh-objects across the universal quantifier *jeder* “every”. Google found²⁷ 11 instances of *wen* ‘who’ moved across *jeder* and an additional 5 of *wen* moved across *jede* “every(one).fem”. These 16 hits include both cases where *jeder* is used as a determiner combined with a noun, and examples with a pronominal use of *jeder*.

(27) *wen hat jeder gesehen*
who.acc has every.masc seen
“who has everybody seen”

The most remarkable property of these 16 hits is that they ALL come from syntax papers (all of them were considered grammatical by the respective authors). On other words, there is *not a single* real life example in the internet exemplifying the structure (27).

Things are quite different with (28). Google found 215 examples of (28) (on the basis of the search string “*was hat jeder*”). Among the first 100 hits²⁸, there was only a single example from a linguistics papers. Even when one carefully eliminates all examples in which *was* is not the direct object (and not a question pronoun), in which *hat* is not an auxiliary, and in which *jeder* is not the pronominal ‘everybody’ but the determiner ‘every’, there remain 36 hits exactly mirroring (28). Even if the fit of the rest of the hits is less good than among the first 100, we are left with at least 50 – 70 structures exemplifying (28), but none exemplifying (27)²⁹.

(28) *was hat jeder erwartet?*
What has every.masc expected
“what has everybody expected”

The difference between (27) and (28) suggests that congruent animacy specification has an effect on wh-quantifier interaction in domains other than syntactically explicit multiple questions. Congruent animacy specification seems to make object initial questions very infrequent, independent of whether the subject is a wh-phrase or a universal quantifier. The complete absence of structures exemplifying (27) makes it difficult to tell whether relative scope relations play a role in this context. Recall that with a wide-scope interpretation of the quantifier, the sentences in (27) and (28) are semantically equivalent to multiple questions, so that the frequency facts would suggest a semantic aspect in the account of the animacy effect. Unfortunately, we are aware of only very few studies linking scope taking and animacy (see, e.g., Karnowski & Meyer 2000) that would help one in specifying such a semantic account in detail.

Both multiple questions and the wh-quantifier-structures in (27) – (28) can be related to the concept of sorting keys for answers (Comorovski 1996), so that the idea suggests itself that, in the absence of

²⁷ The search string “*wen hat jeder*” was entered on Feb 22nd 2007 at 12:20pm MEZ.

²⁸ The exact number of items Google finds differs even among searches that are temporarily very close to each other, and Yahoo reports more hits than Google. Hit counts do not seem to go beyond the 249 of Yahoo, and do not go below 200. It thus makes little sense to try to identify an exact figure of structures matching (31).

²⁹ In the TIGER corpus, only 22 of 358 transitive structures with an animate subject selected for a related purpose also had an animate object. We therefore expect an animate wh-object in less than 10% of the questions with a *jeder*-subject. So one should have found 10 –20 exemplars of (29).

discourse linking, sorting keys can be easily distinguished only when they are sortally different. If the choice of a marked word order in a multiple question must be motivated by a specific choice of a sorting key, marked order could be pragmatically licensed only in sentences in which the arguments are distinct with respect to animacy. This would complete the account of the animacy effect: for non d-linked wh-pronouns, sortal differences only motivate the selection of non-standard sorting keys for answers. The choice of a marked order thus can have a facilitating effect at the pragmatic level only for predicates with arguments differing in animacy. Therefore, there is no way of pragmatically mitigating the processing difficulty of multiple questions violating Distinctness with a marked order. This processing difficulty translates itself into a reduction of acceptability.

In an alternative account, one could try to explain the animacy effect in terms of grammar itself. Recent suggestions involving a syntactic version of the OCP (Richards 2006) may allow us to capture the animacy effect directly in syntactic terms. Consider the following contrast from Russian. Normally, all wh-phrases undergo some fronting operation in a multiple question in Russian, but this is not possible when the two wh-phrases are phonologically non-distinct.

- (29) a. *kto čto kazal*
 who what said
 b. **kto kazal čto*
 c. **Čto čto obuslovivo?*
 What what caused
 d. *Čto obuslovivo čto?*

Under the assumption that one wh-phrase goes to Spec,CP in Russian while the other(s) are adjoined to IP (see Rudin 1988), (29a,c) involve the constellation (30) while (29b,d) have the abstract representation (30b). Phonologically identical wh-phrases must not be too close to each other in Russian, and Richards (2006) suggests the relevant domains are phases/spellout domains in the sense of Chomsky (2005). For our present purposes it suffices to point out that vP and CP, but not TP are phases. The two wh-phrases are thus separated by a phase boundary in (30b) but not in (30a). If (31) holds (as is implied by the proposal of Richards 2006), we understand why (29c) is ungrammatical.

- (30) a. [_{CP} WH-1 C [_{IP} WH-2 [_{IP} ...]]]
 b. [_{CP} WH-1 C [_{IP} ... [_{vP} ... WH-2 ...]]]]

(31) Two identical elements cannot appear in the same phase (spellout domain).

Richards (2006) proposes that the notion of identity in (31) is subject to variation. In some languages (English), it may be quite a broad concept, involving a comparison of category labels only, so that the blocking effect of (31) will arise easily, while others languages such as Russian or German impose more refined criteria for identity, so that (31) will filter out fewer structures. This basic idea can in principle be applied in an account of the animacy effect.

Suppose that “±wh” is the relevant distinction of DPs that English is sensitive to in the context of (33). Then the constellation (32a) is blocked for English, ruling out *in situ* wh-subjects in general. As Richards suggests, there is room for intermediate specifications of the features relevant for identity. If animacy is relevant for identity, too, then (32b) but not (32a) will be ruled out, and this may come close to what we found for German.

- (32) a. [_{CP} WH-1 C [_{IP} WH-2 [_{vP} ...]]]
 b. [_{CP} WH-1(α anim) C [_{IP} WH-2(α anim) [_{vP} ...]]]
 c. [_{IP} WH-1(α anim) [_{IP} WH-2(α anim) [_{vP} ...]]]

Such an account of the animacy contrast raises several questions, however. First, Case distinctions seem relevant for identity relations in German, as Richards (2006) demonstrates, and this makes it somewhat doubtful that Case should be irrelevant for the assessment of structures such as (32a-b). Nominative *in situ* wh-subjects should thus not be blocked at all, only in the rare instances of nominative objects moved across them. Second, one may wonder why the additional animacy effect does not show up in the scrambling constellation (32c) (as we saw in Exp. 10). Without further complications that may render the whole system inelegant, it seems that we cannot integrate the animacy effect into a model working with (31).

The two alternative accounts presented here for the animacy effects all come with a problem. The syntactic model has the advantage of placing the animacy effect into a general theory of the quite pervasive similarity effects in syntax (see Richards 2006), but the resulting grammatical model may be quite complex, and it may not do full justice to the gradient nature of the phenomenon.

The processing/context fit account has the advantage that it relates the animacy effect to a widespread view of the decrease of acceptability in object initial structures. Under this view, it should be particularly difficult to accommodate contexts licensing crossing movement in multiple questions (as compared to simple reordering), but animacy differences would reduce this difficulty. With a proper context, the acceptability difference should thus disappear. As remarked above, one still does not really understand under this assumption why crossing movement is not attested in corpora for pairs of animate wh-pronouns.

Appendix

Unless indicated otherwise, all experiments reported in this paper were carried out in exactly the same way.

Participants

The participants of the experiments were students of the University of Potsdam, with the exception of Exp.2, in which also students of the Humboldt University at Berlin and Potsdam high school students (recruited on the campus of the University of Potsdam during its annual public relations event) participated. They were paid for participation, or participated in the experiment in order to fulfil curricular requirements.

Method

The participants rated the acceptability of the experimental items embedded in a set of distractor items (appearing in pseudorandomized order) on a printed questionnaire or on a computer screen (Exp. 2). Most experiments used a 7-point rating scale (1 worst, 7 best). A 6-point rating scale (1 best, 6 worst) had been used in Exp. 1 and 5. The scale appeared below each item on the printed questionnaire or the screen, and subjects responded by ticking the appropriate number or by pressing the corresponding key.

The scale was explained and exemplified in the instruction part of the experiment. The two items exemplifying the scale consisted of one fully grammatical and one fully ungrammatical sentence. In Exp. 4 and 5, the participants were asked to rate the grammaticality of the full (two-sentence) texts figuring as experimental items.

Material

With the exception of Exp. 6, participants always saw 4 items per condition. For each experiment with n conditions, we constructed $4n$ blocks of n sentences not sharing any lexical material, such that each experimental condition was realized in each of these blocks. The questionnaires were constructed in n versions, such that each participant saw exactly one sentence from each block only. The sentences of each block were rated by exactly the same number of conditions

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