Superiority Effects in Russian, Polish, and Czech: Judgments and Grammar*

Roland Meyer
University of Leipzig & University of Regensburg

Abstract: Constraints on the surface linear order of *wh* phrases (superiority effects) are certainly important for the syntactic analysis of *wh* movement in Slavic, but also very controversial empirically. This paper reports the results of a series Magnitude Estimation studies (cf. Bard et al. 1996) concerning the linguistic acceptability of various *wh* orders in Russian, Polish, and Czech. In order to determine the linguistic status of the fine-grained differences elicited in the experimental studies, they are evaluated against evidence from large text corpora. Some of the effects turn out to be stable and language-specific, which makes them bad candidates for performance phenomena or functional preferences. The outcome of the discussion is a scalar view of the strength of superiority effects, with different potential cut-off points between grammaticality and ungrammaticality among the Slavic languages.

1. Introduction

Slavic multiple *wh*-questions have attracted much attention in generative syntax, mainly because they involve the obligatory fronting of all their *wh*-phrases to the left clausal periphery in the standard case (on special discourse-linked and echo readings, see Pesetsky 1987 and references therein). Rudin (1988) establishes a typological subdivision among the multiple *wh* structures found in Slavic, according to which in Bulgarian (as in Romanian), all *wh*-phrases move to CP-Spec, while in the other Slavic languages, only one moves to CP-Spec and the others adjoin to IP. This analysis draws on a number of empirical criteria, one of them being the surface linear order of *wh*-phrases, which is strictly *wh*-subject > *wh*-object in Bulgarian, but relatively free in Serbo-Croatian, Polish and Czech, according to Rudin (1988, 1996):

* This research was supported by the SFB 441, University of Tübingen (project C1, Marga Reis). I wish to thank Aria Adli, Sam Featherston and Janina Rado for invaluable advice and discussion, and Helen Goodluck, Danijela Stojanovi , an anonymous reviewer, and the FASL-12 audience for many helpful remarks. All errors are my own.

Cahiers linguistiques d'Ottawa, June/juin 2004, Vol. 32: 44-65
ISSN 0315-3167.

(1) a. *Koj kakvo (/ * kakvo koj) pravi?* ((BG), Rudin 1996)
who $what_{acc}$ $what_{acc}$ who does

b. Kdo co (/ co kdo) vlastn d lá?
who $what_{acc}$ $what_{acc}$ who MP does (CZ)

It seems that Bulgarian *wh* questions, but not Polish or Czech ones, are subject to the *Superiority Condition* (Chomsky 1973). In a minimalist syntactic view, this condition is a paradigm case for derivational economy (*Attract Closest*): If Z is closer to X than Y, then Z, rather than Y, has to be attracted. In a series of papers, Boškovi (1997, 1998) has developed a theory of multiple *wh*-questions based on a detailed analysis of superiority effects in Slavic, refuting all the other criteria given by Rudin; the analysis was further extended to Russian (Stepanov 1998) and Polish (Citko and Grohmann 2000). Besides its theoretical merits, this line of research adds two major empirical refinements: (i) The languages of Rudin's non-Bulgarian group have to be further divided into those showing superiority effects only in *embedded* multiple wh-interrogatives (Serbo-Croatian) and those showing no superiority effects at all (Russian, Polish). (ii) Even in Bulgarian, only the *first* instance of *wh* fronting is subject to the Superiority Condition, whereas the further *wh*-phrases can occur in any order.

Although the theoretical importance of superiority effects for syntactic theory is obvious, their empirical status seems regrettably unclear, and opposing views can be found throughout the literature (see section 1). The goal of this paper is to provide evidence from a series of controlled acceptability studies, as well as from large text corpora, which may serve to clarify some empirical aspects. The results are compatible with a gradual view of grammaticality, according to which languages can choose different cut-off points on a scale, at which the constraint violation cost of a given construction is high enough to deem it ungrammatical.

The paper is organized as follows: Section 1 gives a short overview of superiority in the three languages, as reported in the literature and derives hypotheses for empirical research. Section 2 presents a series of studies of

linguistic acceptability using the method of Magnitude Estimation. In section 3, I compare the outcome of the studies to corpus frequencies and discuss to what extent it may reveal differences in grammaticality, and language-specific vs. cross-linguistic patterns. Section 4 concludes.

2. Superiority (non-)effects reported in the literature

Czech [CZ] is probably the least controversial (and least studied) among the three languages with respect to superiority effects. Toman (1981) detects no *wh* word order preference in either main or embedded clauses, Rudin (1988) mentions that preferred and dispreferred orders exist, without providing further details.

Polish [PL], according to the majority of authors, shows no superiority effects (Toman 1981, Przepiórkowski 1994, Citko 1997, Citko and Grohmann 2000). Dornisch (1995) argues for a correlation between *wh* word order and D(iscourse)-linking, with the lower *wh*-phrase (not the higher one, as is often claimed for Bulgarian) being obligatorily D-linked. Rudin notes individual preferences of varying strength, Cheng (1991/1997) and Dornisch (1998) find strict ordering preferences with some individual variation, and encode superiority in the grammar of Polish.

For *Russian* [R], Stepanov (1998) notes no superiority effects apart from the fact that the sequence *to kto* '$what_{acc}$ who_{nom}' is exceptionally ungrammatical (which he tentatively attributes to a phonetic constraint). On Strahov's (2000) and Kazenin's (2001) view, a D-linked *wh* phrase has to precede a non-D-linked one. Krejdlin (1980) identifies preference patterns according to grammatical function and animacy, varying in strength both stylistically and idiolectally. According to Comrie (1984) and Rudin (1996), there are strong preferences reminiscent of superiority effects.[1] Since, according to other criteria, R should fall into the same typological group as CZ and PL, this state of affairs even leads Rudin (1996) to reject superiority effects altogether as evidence for the structure of multiple *wh*

[1] Rudin (1996) states that the preferences are stronger in main than in embedded clauses.

questions in Slavic.

Boškovi (1997) shows that superiority effects in Serbo-Croatian surface not only in complement interrogatives, but also in a number of comparable, embedded-like structures.[2] If we find no preferences in run-of-the-mill subordinate multiple *wh* questions, then this might be due to the fact that they are mistakenly analyzed as main clauses. Unfortunately, the critical constructions are not fully available in the languages discussed here. R seems to be the clearest case: According to Stepanov (1998), it allows both *wh* orders in double correlatives, in double long *wh* extractions and in structures involving CP-adjunction. In PL, the latter two environments are also free of superiority effects, following Citko & Grohmann (2000). However, it seems that (i) double long *wh* extractions are ungrammatical for many speakers of PL (Rudin 1988), and (ii) there is no independent evidence for the existence of CP-adjunction in PL (other than in colloquial R, see Müller and Sternefeld 1993). In CZ *and* PL, double correlatives are not productive, if acceptable at all. In CZ, furthermore, CP-adjunctions are ungrammatical, and the *wh* phrases in double long extractions obligatorily occur in a fixed order, preceding the clitic cluster (which is attributed to the phenomenon of *wh* clustering in Meyer 2002b). Thus, these constructions do not suggest themselves as materials for an empirical study, because (i) none of them is unproblematic in all three languages, (ii) they are hard to test with naive subjects due to very low acceptability and heavy context-dependence, and (iii) the problem of complex clauses being reanalyzed as an adsentential plus a main clause can be controlled by introducing further markers of subordination (e.g., matrix verbs which allow no complement ellipsis, or main clause negation).

Despite the general disagreement in the literature even about basic data, a main initial hypothesis may be derived (with different stances taken towards it by different authors): There is (/ is not) a difference in grammaticality between the *wh* orders *subject* > *object* and *object* > *subject*. This effect (if it exists) is

[2] In fact, these are often more reliable contexts, because embedded *wh* interrogatives mostly do not differ superficially from main clause *wh* questions in Slavic languages.

furthermore influenced by (i) the *who/what*-difference (be it "animacy" or phonology), (ii) the main clause / subordinate clause distinction, and (iii) D-linking of the *wh* phrases.

3. Experimental studies of superiority in R, PL, and CZ

3.1 Methodology

The relatively recent experimental paradigm of Magnitude Estimation is based on the idea that linguistic judgments are similar to psychophysic responses: Participants can assess the acceptability of stimuli naturally and reliably by giving comparative ratio measures like "half as good", "one third as good", i.e., responses located on a proportional scale (Bard et al. 1996). The method has been applied successfully in linguistic research (see Keller 2000, Keller and Sorace *to appear* for an overview), mainly for studies of acceptability, and notably in research on superiority effects (Featherston *to appear*). In the studies reported here, participants were first presented with a reference clause of intermediate acceptability, to which they assigned a numerical acceptability rating. Then they saw a series of fillers and test items, each of which they had to assess in proportion to the reference clause (which remained visible throughout). This method allows subjects flexibility to express their intuition without forcing them into difficult linguistic categorizations. The judgments can be as fine-grained as needed (any positive rational numbers allowed), and the absolute rating of the reference item is not decisive. The values obtained were divided by that of the reference clause and log-transformed for comparability.

Given that we conducted several sub-studies in different languages – 2 for Russian, 3 for Polish, 3 for Czech –, the use of a broadly accessible medium like the internet suggested itself. The majority of tests made use of the WebExp software package (Keller et al. 1998). This tool has the advantage of offering a number of built-in control features, such as keeping records of the exact response times, tracking personal data and connection data, and re-checking the email-addresses entered into the answer form (Keller 2000). Data from unclear or doubtful sources as well as data entered very quickly or slowly are automatically

excluded from evaluation. Subjects for the internet-based tests were recruited via postings to news groups and web catalogues and announcements in universities. Every participant who sensibly filled in the questionnaire took part in a prize draw. For the PL part, I also undertook in-class questionnaire studies at the Institute of Political Science, University of Bydgoszcz.[3] The first PL study reported here, presented over the internet, could therfore be compared to a more traditional mode of presentation. The internet-based and the questionnaire-based variant, which included exactly the same items, had identical significant effects and interactions. In order to avoid effects of normativity, participants were explicitly instructed that they should imagine to have overheard the given sentence as it was uttered by someone else in casual conversation, and they had to judge its naturalness and grammatical correctness.

3.2 Results

3.2.1 Study 1: Relative order of wh subject and wh object

The first set of studies concerned the acceptability of the two surface orders of *wh* subject and *wh* object. Besides relative linear order, two further factors could be important: (i) the *who/what* (*alias* animacy or object type) distinction, and (ii) the difference between matrix and embedded clauses. Based on the most recent analyses (see section 1), I generally predict (i) no clear preferences for a specific *wh*-word order in any of the languages, except for the ban on * *to>kto* in Russian, and (ii) no clear influence of the factor EMBEDDING. I chose to manipulate animacy only for the *wh* object, arriving at three two-level factors, as illustrated for the Russian sub-study in (2): *WH*-ORDER ((2a); (2b)), OBJECT-TYPE ((2a) vs. (2b)), and EMBEDDING (e.g., (2a,b) vs. (2c)).

(2) a. Kto kogo / kogo kto porekomendoval komissii?
who$_{nom}$ who$_{acc}$ who$_{acc}$ who$_{nom}$ recommended commission$_{dat}$
'Who recommended who to the commission?'

[3] Many thanks are due to Dana Karnowska, University of Bydgoszcz, for giving me access to her students and making the questionnaire study possible.

b. Kto to / to kto porekomendoval komissii?
who$_{nom}$ what what who$_{nom}$ recommended commission$_{dat}$

c. *Vsë ravno,* [(2a,b)]
all the-same ...

This leaves us with 8 test conditions. All three sub-studies were conducted as a Magnitude Estimation task over the internet, using the WebExp tool (Keller et al. 1998), as described in section 2.1.

3.2.1.i Russian

Materials, Participants, Predictions: 8 different lexicalizations were constructed and distributed systematically over the above conditions in a latin square design, yielding four versions of the questionnaire, each of which contained every condition twice and every lexicalization twice. Each participant saw the 16 test items, along with 4 different, unrelated superiority examples, 16 examples of long extraction from a different study and 10 unrelated fillers, i.e., 46 sentences, in pseudorandom order. 18 speakers took part in the study, of which 1 had to be excluded for giving unallowed ratings. The predictions, relying on Stepanov (1998), were (i) a clear preference for *wh* subject > *wh* object only with a *to*-object, (ii) no influence of embedding on other effects.

Results: The questionnaire variant was included as a between-subject factor and showed no significant effects or interactions. An analysis of variance revealed a significant main effect of the factor WH-ORDER ($F_1(1,16)=26.582$, $p_1<.001$; $F_2(1,7)=56.361$, $p_2<.001$), but no interactions between WH-ORDER and OBJECT-TYPE or between WH-ORDER and EMBEDDING. Separate ANOVAs for the two levels of OBJECT-TYPE, i.e., *kto/kogo* ('*who* who$_{acc}$') and *kto/ to* ('*who* what$_{acc}$'), showed significant main effects of WH-ORDER in both conditions (*kto/kogo*: $F_1(1,16)=10.715$, $p_1<.006$; $F_2(1,7)=17.217$, $p_2<.005$; *kto/ to*: $F_1(1,16)=27.418$, $p_1<.001$; $F_2(1,7)=69.221$, $p_2<.001$).

Interpretation: The results indicate a general preference for the *wh* subject to precede the *wh* object, which could be interpreted as a superiority effect. This effect seemed somewhat stronger with an animate object (*kogo*) than with an

inanimate one (*to*), but the difference in strength was not significant and does not support a fundamental distinction between the types of object with respect to superiority. The matrix/embedded clause distinction was irrelevant. These findings support the claim by Comrie (1984) and Rudin (1996) that R has clear *wh* order preferences (*contra* Stepanov 1998), but they also support the view that R and Serbo-Croatian differ with respect to the influence of embedding on superiority-like effects (Stepanov 1998).

3.2.1.ii Polish

Materials, Participants, Predictions: The Polish sub-study used the same method and design as the Russian one (see above). Again, 16 superiority items were tested, this time along with 18 long extractions and 11 unrelated fillers, in randomized order. Data from 24 participants could be included in the evaluation. The prediction, based on Citko (1997), Citko & Grohmann (2000), was a lack of clear *wh* order preferences in any of the conditions.

Results: An analysis of variance showed not only a significant main effect of the factor WH-ORDER ($F_1(1,23)=10.501$, $p_1<.005$; $F_2(1,7)=35.549$, $p_2<.002$), but also a significant interaction between WH-ORDER and OBJECT-TYPE ($F_1(1,23)=13.703$, $p_1<.002$; $F_2(1,7)=18.327$, $p_2<.005$). I found no interaction between WH-ORDER and EMBEDDING and no other effects. In separate ANOVAs for the two object-types, there was a significant main effect of WH-ORDER *only* for the pair *kto kogo* 'who_{nom} who_{acc}' ($F_1(1,23)=13.9$, $p_1<.002$; $F_2(1,7)=37.874$, $p_2<.001$), but not for the pair *kto co* 'who_{nom} $what_{acc}$', in accordance with the interaction effect found in the overall analysis.

Interpretation: The results indicate a *selective* preference for *wh*-subject > *wh*-object orders over the reverse ones in PL: The superiority-like effect holds only if both *wh*-phrases refer to animates, but seems to be alleviated if the object *wh*-pronoun is restricted to inanimates. The pattern of this alleviation, however, comes as a surprise: Broadly accepted ideas about the degrees of markedness of different word orders in scrambling languages include rules of thumb like "subject precedes object" and "animate precedes inanimate". If these descriptive

generalizations are modelled as weak constraints in an optimality-theoretic ranking (see, e.g., Müller 1999), then *co kto* '$what_{acc}$ who_{nom}' loses the competition with *kto co* 'who_{nom} $what_{acc}$' by a violation of *both* of these rules of thumb. The sequence *kogo kto* 'who_{acc} who_{nom}' – would violate only *one* constraint, compared to *kto kogo* 'who_{nom} who_{acc}' . Nevertheless, we found a clear acceptability difference within the latter pair, but no contrast at all within the former one. I conclude that this strange "reverse animacy effect", which actually seems to *improve* a superiority violation if the inanimate *wh*-phrase precedes the animate one, has to be due to an independent factor. Typologically, Polish multiple *wh*-questions clearly differ from Bulgarian ones, for which superiority effects between *wh* subject and *wh* object of transitive verbs seem to hold irrespectively of animacy distinctions (Billings and Rudin 1996, Błaszczak and Fischer 2001). Embedding had no influence on the superiority-like effect, which shows that Polish *wh*-questions are typologically distinct from Serbo-Croatian ones, as analyzed in Boškovi (1998).

3.2.1.iii Czech

Materials, Participants, Predictions: As in the Russian and the Polish sub-study, 8 relevant superiority conditions (16 items) were tested, this time along with 2 more *wh* order conditions in double long extraction contexts. These 20 items were presented together with 16 long extractions of various kinds and 12 unrelated fillers, making an overall 48 sentences, in random order. 25 subjects participated in the study.

Results: An overall ANOVA revealed a significant main effect of WH-ORDER only by subjects ($F_1(1,24)=11.755$, $p_1<.003$; $F_2(1,9)=2.430$, $p_2<.154$), but a strongly significant interaction between WH-ORDER and OBJECT-TYPE ($F_1(1,24)=14.871$, $p_1<.002$; $F_2(1,9)=38.654$, $p_2<.001$). In separate analyses for the two levels of OBJECT-TYPE, i.e., for the *wh* object *koho* 'who_{acc}', and *co* '$what_{acc}$', respectively, I found a significant preference for *wh* subject > *wh* object only with the *animate* object *koho* ($F_1(1,24)= 24.145$, $p_1<.001$; $F_2(1,9)=10.612$, $p_2<.011$), but no such effect with the inanimate object pronoun *co*. There were no

interactions of the factor EMBEDDING with any other factor.

Interpretation: In CZ, multiple *wh* questions showed the same superiority-like preference for *wh* subject > *wh* object, as well as the exception to it caused by the "reverse animacy effect", as we found in the Polish sub-study. Although *wh* constructions in the two languages differ in many important details (see Meyer 2002a), they pattern alike with respect to superiority. As in R and PL, embedding played no role in the results of the first Czech study.

3.2.2 Study 2: Relative order of wh arguments and wh adjuncts

A second series of Magnitude Estimation studies was designed to test for superiority effects with *wh* subject/*wh* adjunct and *wh* object/*wh* adjunct sequences. Since adverbs may in principle occupy a range of surface positions in Slavic (cf. Szcusich 2002 for details), it is not obvious where they are merged into the tree, and whether they should be expected to induce superiority effects with *wh* arguments in the first place. However, at least the *wh* manner adverb tested here (r. *kak*, pl./ . *jak* 'how') has a clear base position at the left edge of VP, which it occupies in examples with wide focus. (3)-(4) show a set of items from the Russian sub-study:

(3) a. *Kto kak / kak kto otreagiroval na novosti iz Kieva?*
who$_{nom}$ how how who$_{nom}$ reacted to news from Kiev
b. *Uže ne pomnju,* [(3a)]
already not remember$_{1sg}$ ...

(4) a. *Kak kogo / kogo kak ocenili arbitry na sorevnovanijach?*
how who$_{acc}$ who$_{acc}$ how estimated referees at competition
b. *Nas ne interesuet,* [(4b)]
us not interests ...

As before, claims made in the literature are inconsistent (see section 1); I start from the most recent predictions, that there are no strong effects of *WH*-ORDER in any of the three languages.

3.2.2.i Russian

Materials, Participants, Predictions: The materials for Study 2 covered four conditions for the subject/adjunct part, and four conditions for the object/adjunct part (both times 2 levels of *WH*-ORDER and 2 levels of the factor EMBEDDING). Additionally, I tested for superiority effects in the so-called *wh*-scope marking construction, a subexperiment not reported here. Altogether, each participant had to judge 22 superiority items, 16 extraction items from a different study, and 11 unrelated fillers and controls in randomized order. 24 subjects took part and could be included in the evaluation. The prediction was a lack of clear superiority-like preferences (Stepanov 1998), although Krejdlin (1980) claims that *wh* arguments preferably *precede wh* adjuncts.

Results: An ANOVA revealed a general preference for *kto 'who'* > *kak 'how'* over *kak* > *kto* (i.e., *wh*-subject > *wh*-adjunct), which was almost significant by subjects and significant by items ($F_1(1,23)=3.466$, $p_1<.076$; $F_2(1,7)=12.647$, $p_2<.010$). I found no interaction between this *WH*-ORDER pattern and the factor EMBEDDING. As far as *wh* adjunct/*wh* object sequences are concerned, no preferred linear order could be shown.

Interpretation: The results add some support to the hypothesis that there is a weak, albeit not fully significant preference for *wh* subjects to precede *wh* adjuncts in R. Apart from that, we have no evidence of a fixed linear order for *wh* arguments and *wh* adjuncts. Embedding played no role in the judgement data. This picture looks like a weakened version of the *wh* ordering preferences in Bulgarian, following Billings and Rudin (1996).

3.2.2.ii Polish and Czech

Closely parallel studies were designed for PL and CZ. Since there were no significant effects or interactions of *WH*-ORDER, no reliable superiority-like preference for the relative linear order of *wh* arguments and *wh* adjuncts could be demonstrated. This is in line with the bulk of the literature on PL and CZ, but it contradicts claims about PL by Cheng (1991/1997) and Dornisch (1998). However, before jumping to the conclusion that PL and CZ are thus "superiority-

free", one should note that even Bulgarian, showing the clearest superiority effects among the Slavic languages, has been claimed to lack a preference for *wh* argument > *wh* adjunct with inanimate nominative *wh* arguments (Billings and Rudin 1996, but see Boškovi 1998 for different judgments).

3.2.3 Study 3: Alleviation of wh order effects via Discourse-linking

A number of researchers have claimed that D-linking is an important factor for the acceptability of *wh*-sequences in Slavic (e.g., Dornisch 1995). In most analyses, any *wh*-phrase which ranges over a previously established set of referents counts as contextually D-linked; *which*-phrases are the paradigm case of *obligatorily* D-linked *wh*-phrases (in any context). For a language with strict superiority effects such as English, Pesetsky (1987) found the generalization that a D-linked *wh*-phrase does not have to move and may be unselectively bound *in situ*, voiding superiority. The rationale of the following two sub-studies on PL and CZ is to check whether the superiority-like effect found in study 1 can be influenced by the D-linking status of the *wh*-phrases. A remark about the two designs is in order: Although it would be desirable to test for the full array of combinations between D-LINKING(SUBJECT), D-LINKING(OBJECT) and *WH*-ORDER, I decided not to include *all* of the resulting 8 conditions. Since all *wh*-phrases had to range over animates, this would have made an extremely tiresome questionnaire. Instead, only the four most telling conditions were included.

3.2.3.i Polish

Materials, Participants, Predictions: In the Polish sub-study, simple pronominal *wh* subjects and subject *which*-phrases, respectively, were combined with object *which*-phrases in either order. Examples with pronominal subject and object *wh*-phrases in either order were included as control conditions. For obvious reasons (see section 2.2.1), all *wh*-phrases tested had to range over animates. For each of the four conditions, a set of 8 lexicalizations was devised and distributed across four questionnaire types in a latin square design. The study was conducted on paper in a seminar group of the University of Bydgoszcz using a Magnitude Estimation task. 28 students of political science participated and could be

included in the evaluation. The prediction, based on Pesetsky (1987) and study 1, was a clear preference for a *wh* subject to *precede* the *wh* object in conditions with a pronominal subject, but no such preference for subject *which*-phrases.

Results: (i) A partial ANOVA for the four conditions with a *non-D-linked wh* subject showed a significant main effect of the factor WH-ORDER ($F_1(1,27)=45.766$, $p_1<.001$; $F_2(1,7)=41.704$, $p_2<.001$) and of D-LINKING of the *wh* object, but no interaction between the two. (ii) A partial ANOVA of the four conditions with *D-linked wh* objects revealed a significant main effect of WH-ORDER ($F_1(1,27)=11.727$, $p_1<.003$; $F_2(1,7)=7.483$, $p_2<.030$) and a detectable interaction with the D-LINKING status of the *wh*-subject ($F_1(1,27)=4.395$, $p_1<.047$; $F_2(1,7)=1.683$, $p_2<.237$), which reached significance only in the by-subjects analysis.

Interpretation: The result (i) suggests that the D-linking status of only the *wh* object is irrelevant for superiority, as long as the *wh* subject is *non*-D-linked. On the other hand, if the object *is* D-linked, then it is important whether the *wh* subject is *also* D-linked or not (result (ii)): The *wh* order effect remains stable with *non*-D-linked *wh* subjects, but it is alleviated when both *wh* phrases being D-linked. These results are compatible with Pesetsky's finding that a D-linked wh subject can remain in situ and allow being crossed by a (D-linked or *non*-D-linked) *wh* object.

3.2.3.ii Czech

Materials, Participants, Predictions: In the Czech sub-study, both surface orders of a non-D-linked *wh* object were combined with a non-D-linked and a D-linked *wh* subject, respectively. 16 superiority items from the resulting four conditions were presented along with 16 examples of long extraction and 11 fillers, in randomized order. Since I tested for a potential alleviation of the *wh* order effect established in study 1, only *wh* phrases ranging over animates (*kdo 'who'*- and *který 'which'*-phrases) were included. The study was conducted over the internet as a Magnitude Estimation task, using the WebExp software package. Data from 36 participants could be included in the evaluation. As in the Polish sub-study, the

prediction was a *wh* ordering preference only in conditions with a pronominal *wh* subject, but no such preference for subject *which*-phrases.

Results: A separate ANOVA for the conditions with two non-D-linked *wh*-phrases replicated the result from study 1, showing a significant preference for *kdo* 'who_{nom}' to precede *koho* 'who_{acc}' ($F_1(1,35)=8.507$, $p_1<.007$; $F_2(1,7)=7.243$, $p_2<.032$). When the *wh* subject was D-linked, the WH-ORDER preference for *wh* subject before *wh* object was much reduced ($F_1(1,35)=5.405$, $p_1<.027$; $F_2(1,7)=1.272$, $p_2<0.298$), reaching significance only in the by-subjects analysis. Comparing all conditions with a *D-linked wh* object (i.e., across all conditions), there was a significant interaction between WH-ORDER and D-LINKING of the *subject wh*-phrase ($F_1(1,35)=16.011$, $p_1<.001$; $F_2(1,7)=14.354$, $p_2<.008$).

Interpretation: The results support the same conclusion as in the Polish sub-study, namely, that a D-linked *wh* subject may be crossed over by a *wh* object more easily than a non-D-linked *wh* subject. This means that the *wh* order effect with animate *wh*-phrases can be alleviated via D-linking along the lines discovered for English superiority effects in Pesetsky (1987).

4. Functional preference and/or grammatical competence?

What may we conclude from the results laid out in Section 2? Do they reveal anything about the *grammar* of *wh* questions in R, PL, and CZ (in the sense of the internal competence of a native speaker)? Or are they merely a matter of extra-grammatical preferences not to be represented in grammar proper? In the present section, I will discuss the status of the results reported above. Throughout, I assume that the effects described are real, i.e., that they are not an artifact of uncontrolled variables (which is, as always, open to experimental falsification).

4.1 Extra-grammatical influences on acceptability

Potential extra-grammatical sources for differences in acceptability include, e.g., normativity of the speaker, context-dependence, preference of "the unmarked", processing difficulty, and the (possibly language-specific) performance system, to name just a few. I tried to reduce the influence of *normativity* by giving explicit

instructions (see section 2.1). *Contexts* were not provided, mainly because the initial hypotheses about their influence on *wh* orders were too unexplicit. If normativity and/or context dependence had distorted our data, then we would expect to find at least *some* examples of the dispreferred variants in actual language use. In each of the three languages, large text corpora have recently been made available for linguistic research. In section 3.2, I compare the results of the acceptability studies to the distribution of the relevant types in corpora.

There is solid evidence that structures involving syntactic movement differ from unmoved structures with respect to *processing* effort (see Sekerina 1997, *to appear* for R). It is not immediately obvious how these findings could carry over to superiority effects in Slavic, because multiple *wh* questions involve multiple movement in both surface *wh* orders. What is quite clear, however, is that processing effects should be of a *universal* nature. The same goes for *markedness* patterns, which may be expressed as hierachically ordered constraints (see, e.g., Müller 1999 for an Optimality-based and Keller 2000 for a weighted model).Thus, in evaluating the above effects, it is instrumental to distinguish cross-linguistically constant patterns which are only observed more strictly in one language or the other (see section 4.3) from language-specific effects (see section 4.4).

4.2 Positive (counter)evidence from corpora[4]

Regarding *wh* subject / *wh* object sequences, the above acceptability patterns are largely in line with the distribution of *wh* sequences in text corpora: Our Russian corpus contains no instances of oblique case forms preceding a nominative of *kto 'who'*, whereas the opposite *wh* order is well attested (71 examples). The same goes for the Polish corpus (0 vs. 36 instances). Also in the Czech National Corpus (SYN2000), oblique > nominative interrogative *kdo 'who'* had an extremely

[4] The Russian corpus used is based on the Tübingen Russian Corpora (12.4 Mio word forms). The Polish corpus, 19.5 Mio word forms, contains Adam Przepiórkowski's "Toy Corpus" and a corpus of texts from *Gazeta Wyborcza*. The Czech corpus is the *SYN2000* part of the Czech National Corpus, comprising 100 Mio forms. I thank Tilman Berger, Adam Przepiórkowski, and the Czech National Corpus for access to their collections.

marginal status (4 doubtful examples vs. 207 instances of the nominative > oblique *wh* order). The difference between the three languages with respect to the "reverse animacy effect" is exactly replicated in the corpora: I found 14 instances of R kto_{nom} > to_{acc}, but none with the reverse order; in PL (10 *kto* > *co*, 18 *co* > *kto*) and CZ (125 *kdo* > *co*, 17 *co* > *kdo*), on the other hand, both orders exist.

The preference for *wh* subject > *wh* adjunct in R found in study 2 is not quite reflected in the corpus: 37 cases of kto_{nom} preceding a *wh* adjunct (*kogda 'when'*, *gde 'where'*, *kak 'how'*, *kuda 'where-to'*, *po emu 'why'*) are complemented by 12 instances of the reverse order. Thus, the preference seems too weak to be a matter of Russian grammar proper. In the Polish (12/6) and the Czech (33/23) corpus, we found a similar state of affairs, with both the *wh* subject > *wh* adjunct order and the reverse order well established. For PL, both judgment and corpus data therefore contradict the claim made by Cheng (1991/1997) and Dornisch (1998) that a superiority violation occurs if a *wh* adjunct precedes a *wh* subject.

As for study 3, corpus frequencies are regrettably uninformative – multiple *wh* interrogatives with *which*-phrases simply occur too rarely in 'real life'. With regard to *contextual* D-linking of pronominal *wh*-phrases, however, corpus data point to an interesting *interpretational* effect: The grammatically possible *reverse* orders (*wh* object > *wh* subject in PL and CZ; *wh* adjunct > *wh* subject in all three languages) are used only if the *wh* subject ranges over referents present in the discourse (Meyer 2002a). A reversely ordered multiple *wh* question in the three languages can be understood as a function whose domain exhausts the entire, established set of referents for the linearly second *wh* phrase.[5] By contrast, there is no contextual restriction on "normal" *wh* orders, which reflect the base hierarchy before movement. A typical interpretation for a question of the latter type is shown in (5a,b):

(5) a. *[... Razgovory sredi èmigrantov velis' isklju itel'no o prošlom v Rossii. –*

[5] The sets of potential referents of the *wh*-phrases are necessarily disjoint in this case (see also section 3.4).

'Conversations between the emigrants only centered around the past in Russia.']

Kto to skazal, [...] kto kak postupil, [...]

who what said who how behaved

'[...] who said what, [...] who behaved how [...]' (TRC)

b. For those x, x a person *and x said something (special)*, what did x say ... for those x, x a person *and x behaved in some (special) way*, how did x behave

No such interpretation seems to be available in any of the *reverse wh* orders present in our corpora.

To sum up, corpus data support two candidates for stable, grammatical restrictions: the nominative > accusative asymmetry and the exception to it with co_{acc}-phrases in PL and CZ. The data contradict a grammatical rule which would allow only the order *wh* subject > *wh* adjunct in R. Contextual evidence from corpora strongly suggests that the second *wh* phrase in a reversely ordered multiple *wh* question has to be interpreted as D-linked, i.e., the function asked for ranges over the whole set of potential referents of the second *wh* phrase. This interpretational constraint seems to hold for all grammatical reverse orders.

4.3 Cross-linguistic patterns

Some of the superiority-like effects in R, CZ and PL are telling in cross-linguistic comparisons. A first notable fact is the complete lack of interaction with the factor EMBEDDING in all of the judgment studies. Multiple *wh*-questions in all three languages are thus *distinct* from multiple *wh*-questions in Serbo-Croatian, as described in Boškovi (1998). R, PL and CZ clearly belong to a typological group of languages in which superiority affects matrix and embedded *wh* questions in the same way. The question remains how exactly these languages relate to the Bulgarian pattern (which also involves no matrix/embedded distinction).

A point of *conformity* with a well-known cross-linguistic pattern is the alleviation of superiority effects by D-linking. Polish and Czech judgments on

obligatorily D-linked *which*-phrases resemble what would count as strict grammaticality differences in other languages (cf. Featherston *to appear* for German vs. English). If grammaticality is partly a matter of degree (Featherston *to appear*, Keller 2000), then the effects found in study 3 lend support to the general idea that movement across a D-linked *wh*-phrase does not violate superiority (Pesetsky 1987).

4.4 Language-specific differences

Regarding differences among superiority effects in the three languages, we saw (i) that *kto 'who'* preceding *wh* adjuncts is more acceptable than the reverse order in R, but not in PL and CZ, and (ii) that the nominative > accusative pattern can be circumvented by co_{acc}-phrases in PL and CZ, but not in R. The Russian acceptability pattern conforms to the Bulgarian one as given in Billings and Rudin (1996) and Błaszczak and Fischer (2001). But while Bulgarian grammar presumably rules out *wh* adjunct > *kto* sequences in general, this is not the case in R.[6]

The "reverse animacy effect" in (ii) is puzzling when compared to typical word order preferences, which involve constraints favoring *nom* > *acc* and *animate* > *inanimate* (see Müller 1999). Needless to say, detailed studies on the acceptability of scrambled structures, including animacy effects, would be called for, but it seems quite unlikely that their outcome would favor inanimate > animate XPs selectively in PL and CZ, as opposed to R. We should think of an independent reason why *kogo/koho* > *kto/kdo*, but not co_{acc} > *kto/kdo* would be dispreferred.

It has been observed for R (Kazenin 2001), German (Wiltschko 1997) and CZ (Meyer 2002a) that so-called "constrastive single pair" *wh* questions as (6) show a very strict superiority effect, although multiple *wh* questions in these languages are usually claimed *not* to be sensitive to superiority.

---

[6] Billings & Rudin (1996) point out that the Bulgarian case does not extend to all *wh* subject / *wh* adjunct-combinations either. E.g., according to their informants, *inanimate* nominative *kakvo 'what'* can precede *wh* adjuncts like *koga 'when'*, *kade 'where'*.

(6) Kto u kogo vyigral? / *U kogo kto vyigral?
who at who_{gen} won at who_{gen} who won
'Who (of the two) won against the other?' (Kazenin 2001)

Any explanation of (6) has to face the fact that the set of potential referents of the *wh*-phrases is clearly present in the context, i.e., they should both count as D-linked and thus be immune towards superiority (cf. Pesetsky 1987).[7] Interpretational properties of (6) include that (i) it is a matching question, (ii) it maps one quantifier onto a second quantifier with the same restriction, (iii) there are only two entities in the set of possible referents. (i) cannot be critical, because we can easily find e.g. matching questions with co_{acc} > kdo_{nom} in CZ. (iii) cannot be relevant either, since conjoined questions, which allow only for a single pair answer, do not induce strict superiority in R (Kazenin 2001). (ii) is a good candidate for a useful generalization: It also holds for the strong *nom* > *acc* preference which we found with animate *wh* phrases in R, PL and CZ. By contrast, when the restrictions of the two *wh* phrases are *disjoint* – as is necessarily so with (inanimate) *co* and (animate) *kto/kdo* – both orders are possible in PL and CZ. The generalization in (7) covers both cases.

(7) *Wh*-phrases ranging over identical sets of referents do not surface in reverse order in a multiple *wh* question.

Acording to (7), co_{acc} > kdo_{nom} has a chance of ending up equally acceptable as kdo_{nom} > co_{acc}, while $koho_{acc}$ > kdo_{nom} is still worse than kdo_{nom} > $koho_{acc}$. Under this view, Polish and Czech superiority effects present in the judgment data could be ultimately reduced to *interpretational* superiority (see section 3.3) and (7).

Obviously, nothing like (7) applies in R, where the *wh*-order to_{acc} > *kto* is as much degraded as $kogo_{acc}$ > *kto*. The conclusion suggests itself: R shows a

[7] Wiltschko (1997), however, tries to show that they are necessarily *non*-D-linked, and revises the definition

grammatical superiority effect.

5. Conclusion

In a series of Magnitude Estimation studies of linguistic acceptability, the following superiority-like preferences could be established:

(8) a. *wh*-subject > *wh*-adjunct (R)
b. *wh*-subject > *wh*-object, where the two *wh*-phrases have different restrictions (R)
c. *wh*-subject > *wh*-object, where both *wh*-phrases have the same restriction (R, PL, CZ)

Furthermore, we saw an exception to (8c), when the *wh*-subject was D-linked (PL, CZ)[8]. This was also supported by contextual D-linking effects in corpus data. (8a) could be shown not to belong to Russian grammar proper: given the appropriate context, *wh*-adjunct > *wh*-subject orders do occur in corpus texts. An important finding was that embedding plays no role for superiority effects in all three languages. This leaves us with one core difference in superiority effects between R on the one hand and PL and CZ on the other: the behavior of to_{acc}/co_{acc} *'what'* > *kto/kdo 'who'*. Although there is some individual variation, it seems clear that for the majority of speakers, the cut-off point between degraded grammaticality and absolute ungrammaticality is to be found somewhere between (8a) in (8b) in R. For CZ and PL, it would lie between (8b) and (8c). For Bulgarian, it would be above (8a), all three constraints in (8) being observed strictly.

Further research into acceptability judgments on superiority effects has to clarify their status mainly in Bulgarian and Serbo-Croatian. Furthermore, it would seem promising to compare the superiority effects reported here to acceptability

---

of D-linking accordingly.

[8] Russian has not yet been tested in this respect.

patterns of scrambled constructions (cf. Featherston *to appear* for German).

References

Bard, E. et al. (1996) Magnitude Estimation of Linguistic Acceptability. *Language* 72(1): 32-68.

Billings, L. and C. Rudin (1996) Optimality and Superiority. In *FASL 3*, in J. Toman (ed), 35-60.

Błaszczak, J. and S. Fischer (2001) *Multiple Wh-Konstruktionen im Slavischen*. University of Potsdam.

Boškovi , Ž. (1997) Superiority Effects with Multiple Wh-Fronting in Serbo-Croatian. *Lingua* 102: 1-20.

Boškovi , Ž. (1998) *Wh-Phrases and Wh-Movement in Slavic*. Position Paper, Indiana Workshop on Comparative Slavic Morphosyntax. Ms., University of Connecticut.

Cheng, L. (1991/1997) *On the Typology of Wh-Questions*. New York: Garland.

Chomsky, N. (1973) Conditions on Transformations. In *A Festschrift for Morris Halle*, in Anderson, S. and P. Kiparsky (eds), New York: Holt, Rinehart and Winston, 232-286.

Citko, B. (1997) On Multiple WH Movement in Slavic. *FASL 6*, In Ž. Boškovi et al. (eds), 97-113.

Citko, B. and K. Grohmann (2000) The (Non-)Uniqueness of Multiple WH-Fronting. German = Bulgarian. *FASL 9*, In S. Franks et al. (eds)

Comrie, B. (1984) Russian. In *Interrogativity*, ed. W. S. Chisholm, 7–46. Amsterdam/Philadelphia: Benjamins.

Dornisch, E. (1995) Discourse-linking and Multiple Wh-Movement in PL. In *Licensing in Syntax and Phonology*, ed. E. Gussmann, Lublin: PASE Studies and Monographs.

Dornisch, E. (1998) Clitics and Multiple Wh-Movement in PL. PhD thesis, Cornell University.

Featherston, S. (to appear) Universals and the Counter-Example Model: Evidence from wh-constraints in German. *Linguistics*.

Kazenin, K. (2001) On Coordination of Wh-Phrases in Russian. Ms, University of Tübingen.

Keller, F. (2000) Gradience in Grammar: Experimental and Computational Aspects of Degrees of Grammaticality. PhD thesis, University of Edinburgh.

Keller, F. et al. (1998) WebExp: A Java Toolbox for Web-Based Psychological *Experiments*. Technical Report HCRC/TR-99, University of Edinburgh.

Keller, F. and A. Sorace (to appear) Gradience in Linguistic Data. In *Lingua*.

Krejdlin, G. (1980) O porjadke slov v voprositel'nyx predloženijax s neskol'kimi voprositel'nymi slovami. In *Problemy strukturnoj lingvistiki* 1980, 92-98.

Meyer, R. (2002a) Zur Syntax der Ergänzungsfrage in einigen slavischen *Sprachen*. Dissertation, University of Tübingen.
Meyer, R. (2002b) On Multiple Wh-Fronting and Wh-Clustering in CZ. *FASL 11*, B. Partee et al. (eds)
Müller, G. (1999) Optimality, Markedness, and Word Order in German. In *Linguistics* 37/5: 777-818.
Müller, G. and W. Sternefeld. Improper Movement and Unambiguous Binding. *Linguistic Inquiry* 24 (3): 461-507.
Pesetsky, D. (1987) Wh-in-situ: Movement and Unselective Binding. In *The Representation of (In-)Definiteness*, ed. E. Reuland and A. ter Meulen, Cambridge: MIT Press, 98-129.
Przepiórkowski, A. (1994) Critical Review of Approaches to Multiple Wh-*Movement.* Centre for Cognitive Science, University of Edinburgh.
Rudin, C. (1988) On Multiple Questions and Multiple Fronting. *NLLT 6*, 445-501.
Rudin, C. (1996) Multiple Wh-Questions South, West, and East. *International Journal of Slavic Linguistics and Poetics* 39/40:103-122.
Sekerina, I. (1997) The Syntax and Processing of Russian Scrambled *Constructions*. PhD thesis, CUNY.
Sekerina, I. (to appear) Scrambling and Processing: Dependencies, Complexity, and Constraints. In *Word Order and Scrambling*, Karimi, S. (ed). Malden: Blackwell.
Stepanov, A. (1998) On Wh-Fronting in R. *NELS 28*. In Tamanji, P. and K. Kusumoto (eds), 453-467.
Strahov, N. (2000) A Scrambling Analysis of R Wh-Questions. *FASL 9*, S. Franks et al. (eds)
Szucsich, L. (2002) Nominale Adverbiale im Russischen – Syntax, Semantik, Informationsstruktur. Slavistische Beiträge 414. Munich: Sagner.
Toman, J. (1981) Aspects of Multiple Wh-Movement in PL and CZ. In *Levels of Syntactic Representation*, R. May and J. Koster (eds), Dordrecht: Foris, 293-302.
Wiltschko, M. (1997) D-linking, Scrambling and Superiority in German. *GAGL* 41: 107-141.

Roland Meyer
Institut für Slavistik
Universität Regensburg
93040 Regensburg
Germany
e-mail: roland.meyer@sprachlit.uni-regensburg.de