The source of scope ambiguity in Polish ditransitives: QR or scope reconstruction

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A substantial body of work has shown that scrambling languages use overt movement to establish scope dependencies between QPs while covert operations like QR are not available or limited (e.g. Hungarian, in E. Kiss 1991, Szablocsi 1997). This study aims to experimentally investigate the correlation between the availability of scrambling in free word order languages, such as Polish, and the availability of scope changing mechanisms like QR and scope reconstruction. This correlation can be motivated by principles which favor isomorphism between the PF and LF representations (e.g. Reinhart's (2005) *Interface Economy*, Bobaljik and Wurmbrand's (2012) *Scope Transparency*) which would prevent the contexts that allow for word order permutations from admitting non-scope rigid interpretations. Ditransitive structures with quantified objects in Polish are well suited to test this assumption since they exhibit two object orders relatively freely, even in neutral intonation contexts, see IO-DO order in (a/b) vs DO-IO order in (c/d) in Table 1. Data gathered in an acceptability judgement questionnaire revealed that while one of the orders (IO-DO) is scope rigid, as predicted by the isomorphism principles, the reverse order (DO-IO) is scope ambiguous, which indicates that some LF mechanism is operative in this context.

Table 1. Materials: object.order x coordination x2 scope (disambiguation diagram)

(a) IO-DO order; no embedding	Nauczyciel pokazał jakiemuś uczniowi każdego naukowca.
	teacher showed some student$_{DAT}$ every scientist$_{ACC}$
(b) IO-DO order; embedding	Nauczyciel pokazał jakiemuś uczniowi pisarza i każdego naukowca.
	teacher showed some student$_{DAT}$ writer and every scientist$_{ACC}$
(c) DO-IO order; no embedding	Nauczyciel pokazał jakiegoś naukowca każdemu uczniowi.
	teacher showed some scientist$_{ACC}$ (to) every student$_{DAT}$
(d) DO-IO order; embedding	Nauczyciel pokazał jakiegoś naukowca rodzicowi i każdemu uczniowi.
	teacher showed some scientist$_{ACC}$ (to) parent and every student$_{DAT}$

This result mirrors the observations on scope readings provided for ditransitives in other scrambling languages (e.g. German, Japanese in Bobaljik and Wurmbrand 2012 and Russian in Antonyuk 2015) and it cannot be explained assuming strict scope rigidity in free word order contexts. Since one of the orders allows for scope ambiguity while the other is scope rigid, this effect has been attributed to overt movement of a QP in one but not the other, under the assumption that the two orders are derivationally related. This has given rise to two contradictory proposals. Namely, one which takes scope ambiguity to be a result of scrambling followed by scope reconstruction (e.g. Sauerland 2000, Bobaljik and Wurmbrand 2012) and one which takes scrambling to result in scope freezing (Antonyuk 2015). These two accounts assume two different canonical orders for ditransitives, i.e. IO-DO order and DO-IO order respectively. The second goal of this study was to test which of the scope changing mechanisms is responsible for scope ambiguity in DO-IO order by embedding the universal quantifier in coordination which should block QR of the universal QP, but not scope reconstruction of the existential QP (CSC, Ross 1967), compare (a/c) to (b/d). The prediction is that if scope ambiguity in DO-IO is due to QR, it should be blocked in the context with coordination, while if it is due to scope reconstruction, inverse reading should be available even with coordination. The constraint is represented in the diagrams below. While basic order in (1), regardless of which order it is, must remain scope rigid (i.e. the universal QP cannot move out and whether the existential QP ATB-moves and reconstructs or not, it still takes scope above the universal QP), the derived order in (2) allows for reconstruction of the ATB-moved existential QP below the universal in spec;VP. The diagrams in (1-2) illustrate that whichever object order is assigned the basic structure in (1), it should be scope rigid. Thus, if the scopally ambiguous DO-IO order becomes scope rigid in the contexts with coordination, it will suggest that this order has the structure in (1) which does not support reconstruction. However, if it remains scopally ambiguous, it will indicate that this order is derived as shown in (2). The results presented below showed that coordination did not diminish the inverse scope reading which suggests that scope reconstruction is responsible for scope ambiguity in the DO-IO order.

(1)

XP
X'
X⁰ ConjP
VP VP
QP ∃ V' QP ∃ V'
V NP V QP ∀

(2)

XP
QP ∃ X'
X⁰ ConjP
VP VP
NP V' QP ∀ V'
V QP ∃ V QP ∃
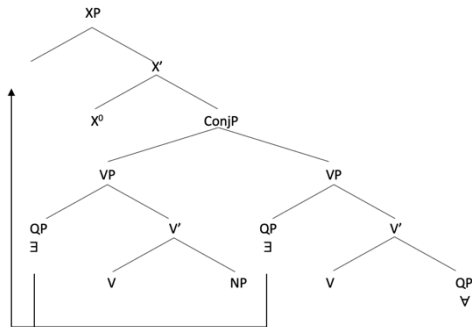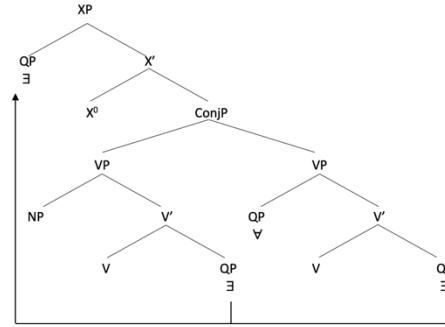
In addition, the experiment tested two classes of verbs which supposedly follow two different object order patterns (e.g. *pokazać* 'show' with IO-DO order as canonical, hence class1 vs. *powierzyć* 'entrust' with DO-IO basic order, hence class2), as argued in Dvořák (2010) for Czech. Parallel tests applied to Polish equivalents seem to converge with the patterns from Czech but the scope interpretation test required closer examination. As far as scope readings are concerned, the results of this experiment overlap for the two classes of verbs but the accessibility of inverse scope readings in DO-IO order with coordination is higher for class2 verbs than class1. This result could suggest that the two orders in class 2 verbs are basic, the IO-DO order with the structure in (1) while the ambiguous DO-IO order with a structure akin to the one proposed for prepositional datives in English (e.g. Bruening 2001).

The experiment was designed as follows. The participants (25 women and 9 men, Polish students of higher education, M_{age} = 24,35, SD = 3,22) were instructed to read a sentence, under which a diagram appeared illustrating either surface or inverse scope interpretation, as in (4) and (5). Their task was to rate the interpretation diagram on a scale ranging from 1- totally incompatible with the sentence to 7- totally compatible. The questionnaire consisted of 16 condition sentences (ambiguous) and 32 control sentences (unambiguous, 16 followed by matching diagrams and 16 by non-matching ones, as in (3)) and 14 unrelated fillers. The results evaluated in repeated measures *ANOVA* 2x2x2 (by subjects) yielded, among others, significant main effects for object.order ($p<.001$), coordination ($p=.001$) and scope ($p<.001$) for verb class1, and object order ($p<.001$) and scope ($p<.001$) for verb class2. In both classes of verbs there was a two-way interaction between object.order*scope ($p<.001$) and a three-way interaction between all the variables ($p=.003$ for class1 and $p=.014$ for class2). The interactions, in particular, showed significant effects of scope reading (existential vs. universal/inverse) which were stronger for IO-DO orders in both classes ($p<.001$, existential: class1 *Mean*=6,79, class2 *M*=6,93; universal: class1 *M*=2,41; class2 *M*=2,07) than for DO-IO order, for which the effect of scope was significant in class1 verbs ($p=.003$, existential *M*=6.21 vs universal *M*=5,03) but not for class2 verbs ($p=.093$, existential *M*=6.24 vs universal *M*=5,65).

(3) **Control sentence** (unambiguous), e.g. for IO-DO order, no embedding
   Nauczyciel pokazał kilku uczniom/jednemu ucznowi różnych naukowców.
   teacher showed several students$_{DAT}$ /one student$_{DAT}$ different scientists$_{ACC}$
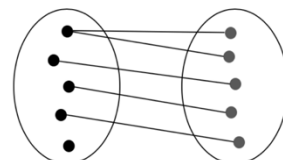
(4) **Surface scope** reading diagrams:
   a.   IO-DO order
   uczniowie   naukowcy
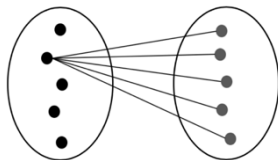
(5) **Inverse scope** reading diagrams:
   b. DO-IO order
   naukowcy   uczniowie

Selected references: Antonyuk, S. 2015. "Quantifier Scope and Scope Freezing in Russian". Doctoral dissertation, Stony Brook University. Bobaljik, J. and S. Wurmbrand. 2012. Word Order and Scope: Transparent Interfaces and the 3/4 Signature. *Linguistic Inquiry* 43. 3: 371-421. Ross, J. R. 1967. *Constraints on variables in syntax*. Ph.D. Dissertation. Cambridge, Mass: MIT.