Approximative inversion in Russian: an experimental study

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Problem. Approximative inversion (AI) is an East-Slavic construction wherein an inversion of a noun and its numeral modifier yields the semantics of numerical approximation (*čelovek desjat'* 'some ten persons'*, metrov za pjat' ot doma* 'some five meters from the house'). Though it has been studied by many scholars, its distribution still remains unclear: some authors explicitly or implicitly postulate that AI is acceptable in all syntactic positions ([Billings 1995], [Yadroff and Billings 1998], [Zaroukian 2019, 2012]), while other linguists note that there are contexts where it is infelicitous or impossible: "in INS and DAT with nouns that don't denote units of measure" ([Мельчук 1985]), "with non-measure nouns" ([Толстопятова 1986], [Исакадзе 1998], [Добрушина 2013], [Matushansky 2015]) "in NP's in inherent cases and in PP's in argument positions" ([Franks 1995])", "with prepositions that don't check the categorial feature [NUM], like *o* 'about'" ([Исакадзе 1998]), "with classifier-like nouns *čelovek* and *štuka* in indirect cases" [Yadroff 1999], "in inherent cases" [Perelstvaig 2006], "as non-quantified arguments" [Testelets 2010]. However, none of these observations have been checked in experimental or corpus studies. In my presentation, I will describe a series of experiments that rate the acceptability of AI in the contexts of different cases and prepositions. Such a study is necessary to further develop descriptively adequate models of AI and thus of Russian numeral constructions.

Hypotheses. Basing on the above-mentioned observations, a corpus study of AI and my own introspection, I suggest that there are 3 crucial factors that determine the distribution of AI: 1) case (direct / oblique), 2) context of the construction (measure-denoting, like *let dvadcati* 'some 20 y.o.' or *šagax v trex* 'some 3 steps away' / other), 3) noun type: *čelovek* and *štuka* (CL) / units of measure / number-denoting / other. Their interaction is outlined in Table 1.

Table 1. Hypotheses (grey cells mean "frequent in the RNC main corpus")

Case (IV1)	**Context (IV2)**	**Noun type (IV3)**			
		CL	MeasUnit	Number	Other
Direct	Meas	OK	OK	OK	?
	Non-meas	OK	OK	OK	?
Oblique	Meas	*	OK	OK	*
	Non-meas	*	*	OK	*

Design. The 1st experiment had a 2×4 design, with variables CONSTRUCTION (AI / non-AI) and NOUN TYPE (CL / MeasUnit / Number / Other). Case (INS) and context (non-measure) were controlled for. The 2nd one was 2×2×2, crossing CONSTRUCTION, CONTEXT (measure / non-measure), and NOUN TYPE (MeasUnit / Number); the case of all numeral constructions was the adnominal GEN. The 3rd experiment was 2×2×2(×2), crossing CONSTRUCTION, CASE (*na* + ACC / *k* + DAT), NOUN TYPE (Number / Other), and NOUN/PREPOSITION ORDERING for AI (N P Num / P N Num). The experiments were run on PCIbex Farm; the number of participants, recruited through the Yandex.Tasks platform, was 91, 123, and 197 respectively. In all 3 experiments, there were (4 test conditions + 4 control conditions without AI) × 4 items + 32 fillers + 6 practice sentences.

Results. The results were analyzed using linear mixed-effect models, selected according to the AIC and BIC criteria. In the 1st experiment, the hypothesis that AI with measure nouns would be rated significantly lower in non-measure contexts than non-inverted NumP's was borne out, as well as the hypotheses that AI with non-measure and both AI and non-AI classifier-like nouns would be rated low. The model showed that CONSTRUCTION and NOUN

TYPE were highly significant, and that there were significant interactions between CONSTRUCTION:AI and all NOUN TYPE's ($p<0{,}001$). In the 2nd experiment, the hypothesis that AI with measure nouns would be rated as high as non-inverted NumP's wasn't confirmed. In the model for this experiment, only the CONSTRUCTION:AI variable turned out to be significant ($p<0{,}001$). In the 3rd experiment, the hypothesis that AI in ACC would be rated as high as non-inverted NumP's and higher than AI in DAT wasn't also confirmed (see Fig. 1[1]). The model showed that CONSTRUCTION:AI and N/P ORDERING:P_N_Num were highly significant ($p<0{,}001$ and $<0{,}01$), and the interactions between CONSTRUCTION:AI and NOUN TYPE:Other, between NOUN TYPE:Other and N/P ORDERING:P_N_Num were mildly significant ($p<0{,}05$). In the 1st and 2nd experiments, the ratings of number-denoting nouns patterned with those of measure nouns, which contradicted the hypothesis that AI with such nouns would be rated as high as non-inverted NumP's. The experiments' results generally corroborate the corpus statistics[2], except for the fact that in the 2nd experiment, measure nouns in a measure context (GEN with parametric nouns, like *na vysote metrov dvuxsot* 'at the height of some 200 meters') were rated low, but in the corpus, measure nouns in other measure contexts were highly frequent.

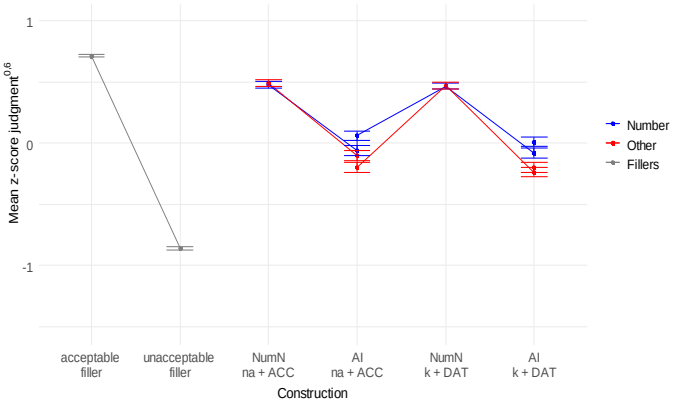

Fig. 1. Interaction plot for the 3rd experiment

All in all, the results of my experimental and corpus studies support the conjectures from [Исакадзе 1998], [Yadroff 1999], and [Testelets 2010], and partially – the ones from [Мельчук 1985], [Толстопятова 1986], [Pereltsvaig 2006], and [Matushansky 2015]. That is, AI is highly acceptable with all kinds of measure nouns in NOM, direct-object ACC, and in ACC and oblique cases in most measure contexts (as arguments and adverbials), mildly acceptable with non-measure nouns in structural NOM and ACC, with all kinds of nouns in the non-measure prepositional ACC, and lowly acceptable in oblique cases in non-measure contexts. The facts that nouns in AI cannot circumvent all sorts of P's and are unequally acceptable in the same cases pose difficulties for modelling both the derivation of AI and the structure(s) of regular cardinal NP's/NumP's. However, the direct / oblique case acceptability contrast indicates that non-inverted cardinal NumP's have two different structures for the "heterogenous" and "homogenous" patterns, contra e.g. [Ionin and Matushansky 2018] (possible due to re-categorization of cardinals in oblique cases). One may tentatively assume that there is more than one position that nouns can move to. In oblique measure contexts, this position is more likely to be in the PP domain (where a measure-denoting preposition acts as a probe), rather than in NP/NumP domain, like in the case of direct-case non-measure contexts. AI cannot be analyzed as head-adjunction, like in [Yadroff 1999] or [Иншакова 2014]: examples like *let primerno s desjati* 'since about 10 y.o.' contradict such accounts, as the adverb *primerno* intervenes between the probing head and the moving head. A sketch of a formal model of AI, based on [Ionin and Matushansky 2018] and [Harizanov 2019] (who shows that heads can move to specifier positions, thus abandoning the Chain Uniformity Condition), will be presented during the talk.

[1] The doubling of the AI z-scores is due to different acceptability of the N P Num and P N Num sub-conditions.

[2] The corpus statistics and the models' summaries will be presented during the conference talk.

Experimental item (3rd experiment):

Context for conditions 1-4: Сеня активно искал работу.

(1) a. На этой неделе он откликнулся на вакансий семьдесят. [*AI+NCOMM+Dir+PrN*]
b. На этой неделе он откликнулся вакансий на семьдесят. [*AI+NCOMM+Dir+NPr*]
(2) На этой неделе он откликнулся на семьдесят вакансий. [*non-AI+NCOMM+Dir*]
(3) a. На этой неделе он откликнулся на сотни полторы вакансий. [*AI+NNUM+Dir+PrN*]
b. На этой неделе он откликнулся сотни на полторы вакансий. [*AI+NNUM+Dir+NPr*]
(4) На этой неделе он откликнулся на полторы сотни вакансий. [*non-AI+NNUM+Dir*]

Context for conditions 5-8: Литературный багаж этого писателя был небольшим.

(5) a. В общей сложности он сводился к рассказам двадцати. [*AI+NCOMM+Obl+PrN*]
b. В общей сложности он сводился рассказам к двадцати. [*AI+NCOMM+Obl+NPr*]
(6) В общей сложности он сводился к двадцати рассказам. [*non-AI+NCOMM+Obl*]
(7) a. В общей сложности он сводился к десяткам двум рассказов.[*AI+NNUM+Obl+PrN*]
b. В общей сложности он сводился десяткам к двум рассказов.[*AI+NNUM+Obl+NPr*]
(8) В общей сложности он сводился к двум десяткам рассказов. [*non-AI+NNUM+Obl*]

References

Добрушина 2013 – Добрушина Е.Р. Существительные в функции «присчетных форм» в русском языке // Глагольные и именные категории в системе функциональной грамматики: СПб.: Нестор-История.

Иншакова 2014 – Иншакова Е.С. Аппроксимативная инверсия и структура количественной конструкции в русском языке: Курсовая работа. М: РГГУ.

Исакадзе 1998 – Исакадзе Н.В. Отражение морфологии и референциальной семантики именной группы в формальном синтаксисе: Дис. … канд. филол. наук. МГУ, 1998.

Мельчук 1985 – Мельчук И.А. Поверхностный синтаксис русских числовых выражений In: Wiener slawistischer Almanach. Sonderband 16. Vienna: Institut für Slawistik der Universität Wien.

Толстопятова 1986 – Толстопятова М.Ф. Семантика и прагматика аппроксимативных конструкций с числительным в русском языке // Zeitschrift für Slawistik. № 31.

Billings 1995 – L. Billings. Approximation in Russian and the Single-word constraint. Ph.D. dissertation, Princeton University.

Franks 1995 – S. Franks. Parameters of Slavic morphosyntax. NY: Oxford University Press.

Harizanov 2019 – B. Harizanov. Head movement to specifier positions. Glossa: a journal of general linguistics 4(1): 140.

Ionin and Matushansky 2018 – T.Ionin and O.Matushansky. Cardinals: The syntax and semantics of cardinal-containing expressions. Cambridge, MA: MIT Press.

Matushansky 2015 – O. Matushansky. On Russian Approximative Inversion. FDSL10, Leipzig.

Pereltsvaig 2006 – A.Pereltsvaig. Passing by cardinals: In support of Head Movement in nominals. FASL 14.

Testelets 2010 – Testelets Ya.G. Case Deficient Elements and the Direct Case Condition in Russian. In: Language and Language Behavior (Язык и речевая деятельность). Vol. 9.

Yadroff 1999 – M. Yadroff . Formal properties of functional categories: the minimalist syntax of Russian nominal and prepositional expressions. Ph.D.Thesis, Indiana University.

Yadroff and Billings1998 – M.Yadroff and L.Billings. The syntax of approximative inversion in Russian (and the general architecture of nominal expressions). FASL 6, Ann Arbor.

Zaroukian 2010 – E.Zaroukian. Expressing numerical uncertainty. LSA Annual Meeting.

Zaroukian 2012 – E. Zaroukian. Approximative inversion revisited. FASL19, University of Maryland.