ORDER ICONICITY PRINCIPLE IN TEMPORAL INTERPRETATION OF RUSSIAN PERFECTIVE PARTICIPIAL AND CONVERBIAL CLAUSES

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Abstract. Pragmatic factors frequently affect the interpretation of grammatical constructions, and the category of relative tense is no exception. To arrange the events on the timescale with respect to each other interlocutors may resort to the implicit content of the phrase – implicatures. The current study observed the effect of a specific pragmatic phenomenon – Order Iconicity Principle (OIP) – on the interpretation of non-finite taxis constructions in Russian: perfective past participles (*prichastija*) and perfective converbs (*deeprichastija*). According to this principle, the perceptually and statistically preferred temporal interpretation of sequential events is the one which iconically corresponds to the predicates' order of mentioning. Based on a series of self-paced reading and interpretation acceptability judgements (IAJ) experiments, I suggest that OIP applicability scope can be extended from coordinated structures with perfective verbs [Paducheva 2017; Khrakovskij 2009] and dependent temporal clauses [Clark & Clark 1968; Sasanuma & Kamio 1976; Natsopoulos et al. 1991; Jansen 2008] to non-finite constructions. In accordance with the hypotheses, for both Russian perfective participles and converbs there was a significant OIP effect, manifested in higher acceptability rates and shorter interpretation latencies for iconic temporal interpretation even when the interpretations were not contextually or lexically supported. Due to the difference in the syntactic and discourse properties of the constructions (scale of finiteness, syntactic function, preservation of the dynamic verb semantics and category of absolute tense; [Vjal'sova 2008]; [Krapivina 2009]; [Say 2020]), a significantly smaller OIP effect was noted for participles. Results of an additional pilot study including free-interpretation of these constructions even further suggest that highly debatable posteriority interpretation in Russian non-finite clauses [Rappaport 1984; Shigurov 1991; Weiss 1995; Akimova & Kozintseva 2001; Khrakovskij 2003; Birzer 2010] to be a specific realization of OIP implicature for Russian perfective converbs and of an absolute past reference for Russian perfective past participles.

Keywords: converbs, participles, taxis, Order Iconicity Principle, non-simultaneity, implicature.

1. Introduction

Semantic-pragmatic interface is a rapidly developing field of linguistics, exploring the interaction of meanings comprising the explicit content of a proposition and those derived on the basis of conversational principles. Taxis relations are not an exception. Conceptualized differently in various theories (see [Muraviev 2017] for an overview) they involve relations of mutual characterization between two or more distinct states or events (eventualities) and their relative dislocation on the timescale in abstraction from the current state of communication (absolute tense, interlocutors' point of view etc.; [Jakobson 1957: 101]) or within an integral period: past, present, or future [Bondarko 1987: 234]. Types of taxis relations distinguished also significantly vary from one classification to another [Muraviev 2017: 20–33], but all of them share a three-partite distinction of simultaneity (1), and non-simultaneity, encompassing precedence (2) and posteriority (3)[11]. Other, non-temporal relations, such as cause, condition,

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[11] Here I adopt a traditional (at least for Russian) terminology and refer to anteriority/posteriority as the relation, where the subordinate clause event temporally precedes/follows the situation expressed by the main clause

concession or goal, are alternatingly distinguished as equally prominent taxis relations, built over the primary temporal relations [Jakobson 1972: 101; Khrakovskij 2009: 35; Birzer 2010: 50–51; Muraviev 2017: 14], the periphery of taxis [Bondarko 1987] or non-taxis interpretative meanings [Tesnière 1988; Mel'čuk 1998].

(1) *Gary cooked dinner, while Mary danced in the hall* (Gary cooked and Mary danced simultaneously).
(2) *Gary cooked dinner after he bought the vegetables* (First Gary bought the vegetables and then he cooked dinner).
(3) *Gary cooked dinner before Sophie arrived* (First Gary cooked dinner and then Sophie arrived).

Importantly, taxis relations exert their influence on multiple language layers and closely interact with pragmatic properties of conversation [Muraviev, 2017: 5, 46–47] and, therefore, constructions denoting them are expected to be influenced by pragmatic implicatures, such as **Order Iconicity Principle (OIP)** [Khrakovskij 2009: 18; Muraviev 2017: 37; Padučeva 2017: 362; Kroeger 2018]. Having a range of different terms (e.g., "Order-of-mentioning principle" [Clark & Clark, 1968], "Chronology Principle" [Tai 1985: 50], "maxim of succession by default" [Simone 1995: 162] or "principle of unmarked temporal interpretation" [Declerck 2006: 427]), it propagates the iconic correspondence of the predicates linear order and temporal sequence of the events they denote. It was shown to significantly affect the interpretation and processing of coordinate [Jansen 2008; Padučeva 2017; Khrakovskij 2009; Yevseyev 2012] and finite temporal constructions [Clark & Clark 1968; Suzuki 1972; Sasanuma & Kamio 1976; Natsopoulos et al. 1991; Ye et al. 2012]. There was, however, less consistency concerning the question, whether this principle is extended to non-finite taxis constructions, and one of the aims of this paper is, thus, to is to specify the scope of Order Iconicity Principle by examining OIP in Russian non-finite taxis constructions.

Another goal is to fill in a specific lacuna that concerns temporal interpretation of Russian perfective converbs (*deepričastija*) and participles (*pričastija*). Both constructions primarily function as sentential adjuncts [Testelets 2001], are part of the verbal inflection paradigm [Say 2020] and mainly pertain to the written speech usage. Russian converb is a clause linking device, combining verbal (base, event semantics, aspect, reflexiveness, government) and adverbial (immutability, secondary predication role) features and syntactically occupying an intermediate position between a clause and an adverb [Testelets 2001: 267]. Russian participle is an attributive non-finite verbal form, combining the features of the verb (lexical meaning, dependents, grammatical categories of mood, aspect and tense) and the adjective (noun modifier role, agreement on gender, number, case and animacy) [Say, 2011]. In terms of taxis, imperfective converbial and participial (at least the present one) forms are normally associated with simultaneity and perfective ones – with non-simultaneity [Krapivina 2009: 43–44, 48; Bikkulova 2011; Say 2014a: §3.3; Muraviev 2017]. However, while anteriority is assumed their basic taxis interpretation, it has been a matter of debate, whether these forms are able to denote posteriority [Weiss 1995; Krapivina 2009; Birzer 2010; Krave 2010; Bikkulova 2011; Say 2014b].

The two objects of this study possibly refer to one and the same phenomenon, which is why their interaction is observed in the current study. As posteriority reading for Russian perfective taxis forms was numerously reported to be dependent the iconic placement of the dependent clause after the main one [Rappaport 1984; Akimova & Kozintseva 1987; Khrakovskij 2003; Birzer 2010]), it seems rather plausible to be another manifestation of OIP implicature. The research questions are, thus, as follows: 1) Is OIP effect extended to non-finite taxis constructions? 2) If so, is there a difference in effect size due to syntactic, discourse and

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(e.g., [Khrakovskij 2003]; [Krapivina 2007]; [Say 2020]), although there are contrasting points of view (e.g., [Givón 1990]; [Muraviev 2017]).

paradigmatic properties of the constructions? 3) Does posteriority interpretation in these constructions represent the inherent taxis meaning of a form or arise as an OIP implicature?

To address those questions, I present a series of self-paced reading experiments, where participants are presented with converbial and participial constructions in different contexts and are asked to judge the acceptability of a particular temporal interpretation. By attaining participants' interpretation acceptability judgements (IAJ) and interpretation latencies (RT), which are to serve as off-line and on-line measurements of temporal interpretation relative difficulty, I expect to arrive at a better understanding of the nature of posteriority interpretation in Russian non-finite clauses. Pilot free-interpretation experiment, where participants were supposed to suggest their own interpretation for the constructions, supplements the main experiment.

2. Order Iconicity Principle and its application

OIP is an implicature, constructed iconically from linear order and aspectual properties of the predicates and resulting in easier processing and higher frequency of iconic constructions, where temporal relations between the denoted events, correspond to the predicates' linear order. As most implicatures, it is cancelable (4) and sees obvious exceptions (5–6), when two or more perfective predicates have a common reference point and observation window [Khrakovskij 2009: 1].

(4)   *My sygrali partiju v tennis i s"eli po xotdogu… Snačala poeli, a potom sygrali.*
       'We played a game of tennis and ate a hot dog each… First we ate, and then we played'.

(5)   *On potolstel i obrjuzg*. (Khrakovskij, 2009)
       'He got fat and flabby'.

(6)   *My nemnogo posideli i pogovorili o našix planax*. (Khrakovskij, 2009)
       'We sat for a while and talked about our plans'.

I assume that it arises on the basis of the maxim of manner (submaxim "be orderly") [Grice 1975]. Assume, the speaker uttered "*Mary washed the dishes and wrote an email to her parents*". Given the Standard Recipe and perfective telic predicates, the Listener would plausibly perceive the two events as following one another due to having clear-cut starting and final boundaries, signaling completion and "external view" on the two situations [Sichinava 2011; Padučeva 2017]. Assuming that the Speaker is cooperative and follows the maxim of manner, among the two possible non-simultaneity readings the iconic interpretation seems more plausible, facilitating sentence processing for the Listener. If s\he would have wanted to express the sequence of the events, inverse to the linear order of the predicates, he would have presented the events in an inverse order.

The OIP for coordinate structures with finite perfective verbs seems to be the most productive for coordinate structures (>90% iconic utterances in the corpus [Jansen 2008: 78; Yevseyev 2012], but is not limited to it, to a less of an extent affecting the interpretation of dependent finite temporal clauses with conjunctions 'before' and 'after' ([Clark & Clark 1968; Sasanuma & Kamio 1976; Natsopoulos et al. 1991; Jansen 2008], but see [Prideaux 1989; Jou & Harris 1990; Fedorova 2005]). The applicability of OIP, however, has not been thoroughly investigated for non-finite taxis constructions, although there is reasonable ground to assume, it is the case (e.g., converbs [König 1995: 75]). Similarly, to gradual difference between the workings of subordination and coordination [Cristofaro 2003], OIP principle could be a continuum-like property, which extends to different constructions with varying effectiveness.

Apart from the construction properties, the extent to which OIP effect is pronounced may also depend on the language under discussion, specific text discourse properties and personal style of the speaker\writer [Fedorova, 2005; Yevseyev 2012], involving different interpretation strategies used by different speakers. For instance, texts closer to oral speech exhibit OIP to a greater extent, as it is the most evident way to organize the text, whereas more narrative genres,

for which the text may be revised multiple times show less compliance with OIP [Yevseyev 2012: 52–53].

3. Posteriority reading and OIP in Russian perfective participles and converbs

Specialized posteriority, involving the event denoted by the dependent clause to temporally follow the event denoted by the main clause (7–8), is a relatively rare typological phenomenon for participles and converbs [Nedjalkov 1995: 131; Muraviev 2017: 13; Shagal 2017] and it is openly doubted to be present in Russian non-finite forms due to its high dependence on context and additional lexical means ([Shigurov 1991], [Weiss 1995], "natural chronology" and "deflexion" of [Lehmann 1998]; [Krapivina 2009: 47]) and rare occurrence in corpus [Birzer 2010; Bikkulova 2011; Yevseyev, 2012]. Furthermore, the only position where the posteriority meaning arises in Russian – postposition – is a favorable context for **non-temporal circumstantial interpretations** [Krave 2010]. Finally, perfective present (=future) participle, which can easily denote posteriority as its intrinsic meaning is relatively unproductive [Krapivina 2009].

(7) *On brosil papirosku na zemlju, **rastoptav** ee dvumja sliškom sil'nymi udarami nogi*. (Rappaport 1984, p. 86)
'He threw the cigarette on the ground, **having trampled** it with the two far too strong stomps of the feet'. (= First, he threw the cigarette, then he trampled it).

(8) *Vmeste s ètoj partiej priexal **stavšij pozdnee izvestnym** amerikanskij biznesmen Armand Xammer kak predstavitel' firmy Forda*. (Say, 2014b, §3.2.1.3.)
'Along with this party came the American businessman Armand Hammer, **who later became famous**, as a representative of the Ford company'. (= First the American businessman came, then he became famous).

This asymmetry in non-simultaneity interpretations preference, which I am to call General Anteriority Preference (GAP), is noted not only for converbs and participles, but is extended to dependent temporal clauses in general, as suggested by typological [Weiss 1995; Muraviev 2017: 15, 111; Shagal 2017] and corpus studies [Jansen 2008: 83; Yevseyev 2012: 60–67]. Anteriority being a more default and unmarked meaning for those [Khrakovskij 2009: 56] is understandably motivated by better compatibility with the backgrounding function of dependent taxis constructions and their tendency to code less important collateral information [Cristofaro 2003: 25–26; Yevseyev 2013: 574]. At the same time posteriority is the prerogative of foreground constituting independent constructions [Weiss 1995: 245; Hopper 1979: 214–215].

Despite that, posteriority is accepted by some authors as a separate taxis meaning for perfective converbs [Rappaport 1984; Akimova & Kozintseva 1987; Khrakovskij 2003; Birzer 2010] and participles [Say 2014b] in postposition or a specific realization of their basic "vague" meaning [Krave 2010: 7]. As clause order is assumed crucial for temporal interpretation of converbs [Birzer 2010; Onipenko & Bikkulova 2014; Givón 1990; Thompson & Longacre 1985; Chafe 1984; Kortmann 1991: 117–152; König 1995: 75–85; but see [Haspelmath 1995: 14], [Lehmann 1998: 116]), associated with specific discursive functions and information structure, it is expected to allow posteriority and follow OIP, which is supported by [Yevseyev 2012] (87.3% iconic order utterances for Russian perfective converbs), although less frequently in postposition, where OIP is commonly disrupted (47.7% non-iconic utterances; [Yevseyev 2012: 54–55]). Prepositive converbial clauses tend to serve as "guideposts" or coherence bridges between the preceding context and the main clause, often by means of introducing repeated, topical information and non-assignment of illocutionary force [Chafe 1984; Givón 1990; Thompson & Longacre 1985; Thompson, Longacre & Hwang 2007), and, thus, are more compatible with denoting events preceding or the main one [Hopper 1979]. Postpositive converbs, on the other hand, as "afterthoughts" having "a flavor of a separate, added comment" [Chafe 1984; Onipenko

& Bikkulova 2014] tend to preserve the line of the agent, are more prone to mark significant information [Givón 1990; Thompson & Longacre 1985; Thompson et al. 2007: 296; Say 2020: 50–52] and, therefore, are more compatible with posteriority taxis function [Hopper 1979].

As for the participles, if they follow OIP and allow posteriority readings in postposition, they are likely to do so in their non-restrictive (appositive) usage, introducing additional background information, being prosodically detached from the head [Krapivina 2009: 38–39; Say 2011: § 6.3.1] and typologically seen as structurally and semantically similar to conjunction constructions, even assumed to have coordinate constructions as an underlying syntactic representation [Thompson 1970; Cristofaro 2003].

Due to several syntactic, discourse and paradigmatic differences there are also reasons to assume that OIP would be more pronounced for converbs, than for participles and, similarly, posteriority interpretation would be more characteristic of the former, than the latter. To begin with, Russian converb modifies predicates, sentences or clauses, i.e., main situation as a whole [Nedjalkov 1995: 97], while Russian participle performs relative clause functions, modifying only the participants or elements of the situation [Krapivina 2007: 27–32]. Relative relations between the main and the subordinate clause are established on the basis of the participant they share, thus, time reference may be more or less irrelevant [Shagal 2017: 110]. Secondly, while converbial constructions involve subject coreference, control over the action and the same modality plan, this not essentially true for participles, proposing subjective link between the eventualities, united within the cognition of the speaker or observer [Vjal'sova 2008]. Furthermore, participles are generally worse at preserving the inherent verb dynamics and denote a temporally unfolding property or atemporal entity associated with the result of this action [Pušina 2009: 164–165; Verkhoturova 2012: 60] by providing a "summary scan" of the processual verb base [Langacker 1987: 76]. They primarily serve to organize the text, express background, descriptive and static information [Vjal'sova 2008: 18–20]. Moreover, as the category of absolute tense is more preserved for Russian participles, intricate interaction of the participial tense system with the aspectual properties of the base creates additional ambiguity between absolute or relative tense, complicating the definition of specific taxis meaning [Krapivina 2009; Say 2014a; Shagal 2017: 110–113; Say 2020: 605–609]. Finally, posteriority, similarly to general future reference is poorly compatible with the factual character of the information introduced by the participle as it often carries irrealis flavor. The fact that the states of affair, characterizing the participant of the main situation, are only to take place in the future (if they are at all), seems pragmatically inefficient with respect to the factual manner of eventualities representation by participles.

Based on the experimental, corpus and typological evidence presented, my hypotheses are as follows:

H1. OIP effect is present for Russian perfective participles and converbs, manifested in a) greater acceptability of iconic interpretations, b) shorter RTs, faster acceptability and longer rejection of iconic interpretations and vice versa for non-iconic ones.

H2. OIP effect is significantly more pronounced for Russian perfective converbs, manifested in significantly larger a) acceptability and b) interpretation speed difference for iconic and non-iconic interpretation.

H3. Posteriority interpretation is significantly acceptable for Russian perfective participles and converbs in postposition to the main predicate, even without contextual or lexical information in its support (=in a neutral context).

H4. Posteriority is significantly less acceptable for Russian perfective participles, manifested in smaller acceptability judgment ratings for this interpretation.

H5. Anteriority interpretation is more acceptable than posteriority interpretation for both Russian perfective converbs and Russian perfective participles and is easier processed, as indicated by faster RTs.

H6. There is a significant inter-participant variability

Another factor, influencing temporal interpretation is **"event coherence"** (*svjaznost sobytij*, [Fedorova 2005]) encompassing additional lexical, semantic or pragmatic cues (world knowledge, lexical meaning of the verb or "deflexion" [Lehman 1989], temporal adverbs etc.). Cases of these factors suggesting a preferred (frequent/typical) sequence for the two situations are called coherent situations (9), while cases, where there is no "standard" order for a set of situations – accidental (10).

(9)   *Kostja zadul svechi na torte, zagadav zhelanie.*
      'Kostja blew out the candle, having made a wish'.
      (thinking of a wish usually comes before blowing out the candles)

(10) *Zhora protjor pyl' so shkafov, poliv tsvety.*
      'Zhora wiped the dust off the bookshelves, having watered the plants'.
      (dusting off the bookshelves and watering the plants can possibly occur in any sequence)

For asyndetic or coordinate constructions coherence weakens OIP effect, while for relative and complement clauses it strengthens it (42% → 61%; [Jansen 2008: 81]). Converbs are also shown to depend on the extralinguistic and contextual information cross-linguistically to override GAP and to denote iconic postpositive interpretation [König 1995; Kortmann 1995; Birzer 2010; Yevseyev 2012: 49–50; Muraviev 2017: 127]. Therefore, the following hypotheses are suggested:

H7. Event coherence, arguing in favor of anteriority, would significantly facilitate the corresponding interpretation, manifested in a) increased acceptability of the consistent interpretation an b) reduced RTs.

H8. Event coherence, arguing in favor of anteriority, would block posteriority interpretation regardless of its position.

A series of experiments conducted to test for those hypotheses is described in the following section.

4. Methods

Three experiments, involving a self-paced reading task and an interpretation acceptability judgment task, were hosted online on the IbexFarm[12] (Experiment 0–1) and its more recent replacement – PCIbex platform ([Zehr & Schwarz 2018]; Experiment 2)[13]: one with Russian perfective converbs (Experiment 0) and two experiments with participles, relativizing subject (**participle (subj)**; Experiment 1) or adjunct NP (**participle (adj)**; Experiment 2). Participants read the target sentences, varying by Clause Order and Coherence (presence\absence of a contextual support in favor of anteriority interpretation), regulating their appearance as a full sentence with the space bar, and accepted ("yes"/J) or rejected ("no"/F) the interpretations suggested in a form of an explicit finite temporal construction consistent with posteriority or anteriority interpretation of the stimuli (Fig. 1). Participants' answers and RTs were recorded, serving as the indicators of relative interpretation acceptability and processing difficulty.

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[12] https://github.com/addrummond/ibexfarm
[13] Demo version of Experiment 2: https://farm.pcibex.net/r/duxrEJ/. Due to the closure of IbexFarm, materials and code of Experiments 0–1 are available here.
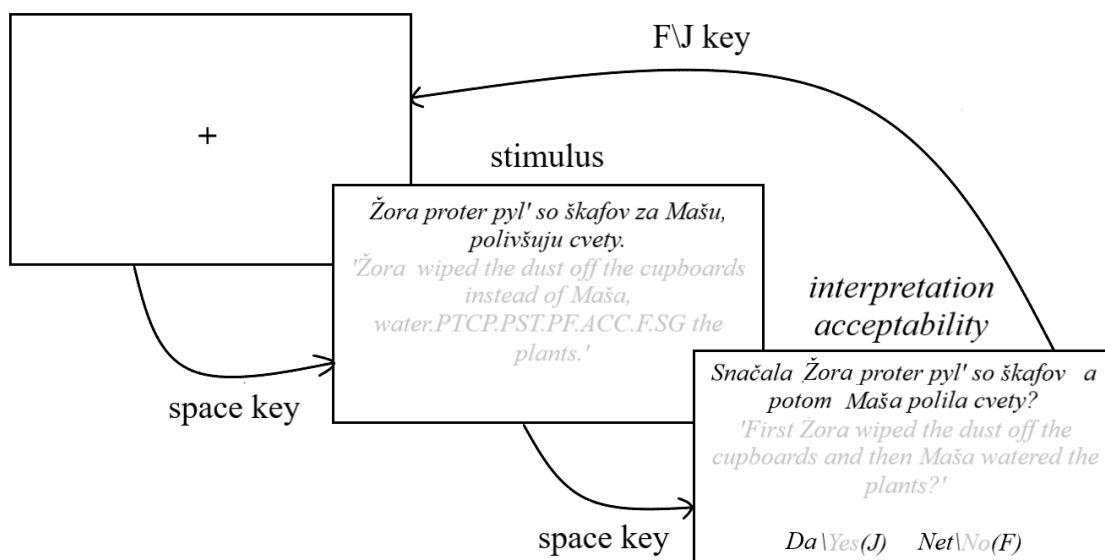
Figure 1. Experimental procedure

Each of the experiments was conducted in Russian and contained 128 stimuli in total, distributed among 4 experimental lists (8 for Experiment 0) in a Latin square design, and 24 fillers, the same for each list. There were 16 stimuli for each of 8 experimental conditions (Clause Order (2) * Coherence (2) * Question Type (2)). Stimuli contained perfective processual transitive past tense predicates, were balanced by length between the groups (6–7 phonetic words, 33–70 symbols). Dependent clause was shorter than the main one by 2 (Exp. 0, Exp. 1) or 3 (Exp. 2) phonetic words. Examples of the stimuli are presented below (a full list is available in the Appendix):

(11) Exp 0. Coherent stimulus, converb in preposition
Pojmav maršrutku, Lëva peredal den'gi za proezd.
'Having caught the minibus, Lev handed over the money for the trip'.

(12) Exp 0. Coherent stimulus, converb in postposition
Lëva peredal den'gi za proezd, pojmav maršrutku.
'Lev handed over the money for the trip, having caught the minibus'.

(13) Exp 0. Accidental stimulus, converb in preposition
Poliv cvety Žora proter pyl' so škafov.
'Having watered the flowers, Zhora wiped the dust from the shelves'.

(14) Exp 0. Accidental stimulus, converb in postposition
Žora proter pyl' so škafov, poliv cvety.
'Zhora wiped the dust from the shelves, having watered the flowers'.

(15) Exp 1. Coherent stimulus, participle (subj) in preposition
Pojmavšij maršrutku Lëva peredal den'gi za proezd.
'Lev, who caught the minibus, handed over the money for the trip'.

(16) Exp 1. Coherent stimulus, participle (subj) in postposition
Lëva, pojmavšij maršrutku, peredal den'gi za proezd.
'Lev, who caught the minibus, handed over the money for the trip'.

(17) Exp 1. Accidental stimulus, participle (subj) in preposition
Polivšij cvety Žora proter pyl' so škafov.
'Zhora, who had watered the flowers, wiped the dust from the shelves'.

(18) Exp 1. Accidental stimulus, participle (subj) in postposition
Žora, polivšij cvety, proter pyl' so škafov.
'Zhora, who watered the flowers, wiped the dust from the shelves'.

(19) Exp 2. Coherent stimulus, participle (adj) in preposition
Za Lenu, pojmavšuju maršrutku, Lëva peredal den'gi na proezd.
'For Lena, who caught a minibus, Lev handed over the money for a ride'.

(20) Exp 2. Coherent stimulus, participle (adj) in postposition
Lëva peredal den'gi na proezd za Lenu, pojmavšuju maršrutku.
'Lev handed over the money for a ride for Lena, who caught a minibus'.

(21) Exp 2. Accidental stimulus, participle (adj) in preposition
Za Mašu, polivšuju cvety, Žora proter pyl' so škafov.
'Instead of Maša, who watered the plants, Žora wiped the dust off the shelves'.

(22) Exp 2. Accidental stimulus, participle (adj) in postposition
Žora proter pyl' so škafov za Mašu, polivšuju cvety.
'Zhora wiped the dust from the shelves for Masha, who watered the flowers'.

In Exp. 1 participles relativized the subject of the main clause and critical items were identical to the ones from Experiment 0, involving only a change in verb form (*sdelav* do.CVB.PST.PF → *sdelavšij* do.PTCP.PST.PF.M.SG). As participles cannot be detached from their nominal head – the subject – which has a prototypical position in the beginning of the sentence, clause order was not manipulated in this case and no OIP effect or posteriority acceptability was expected, serving as a baseline. Exp. 2 contained participial clauses relativizing an adjunct situated in a prepositional group, which has a less fixed position and its displacement minimally changes the Information Structure in comparison with the subject or direct object making it easier to manipulate Clause Order. Lexical and semantic content of the stimuli was modified minimally and the stimuli were balanced on preposition (*dlja* 'for', n=4; *za* 'on account of', n=4; *s* 'with', n=8) and the length of the sentence (mean$_{acc}$=59.9, SD$_{acc}$=5.1; mean$_{coh}$=59.9, SD$_{coh}$=5.7; t-test; t = 0.64775, df = 27.767, p>0.52) and Coherence factor in a separate questionnaire. 11–15 native Russian speakers, who were not the participants of the main experiments, evaluated each pair of events presented as coordinate clauses on two 4-value scales: 1) acceptability of the order in which the events were presented; 2) acceptability of the inverse event order. There is a significant difference between those groups in inverse order acceptability (Exp. 0–1: mean$_{acc}$=3.87; SD$_{acc}$=0.16; mean$_{coh}$=1.73; SD$_{coh}$=0.51; paired WilcoxTest; p<0.001; Exp. 2: mean$_{coh}$=1.693; mean$_{acc}$=3.449; Welch Two Sample t-test; t=–18.53, df=27.005, p<0.001).

Fillers were finite coordinate 'and' constructions with coreferent (Exp. 0–1; 23) and non-coreferent subjects (Exp. 2; 24) to match the stimuli.

(23) *Petja$_i$ namotal na šeju šarf i Ø$_i$ zavjazal botinki.*
'Petya$_i$ wrapped a scarf around his neck and Ø$_i$ tied his shoes'.

(24) *Petja namotal na šeju šarf i Žora zavjazal botinki.*
'Petya wrapped a scarf around his neck and Zhora tied his shoes'.

Overall, 245, 120 and 134 Russian native speakers of 20–57 years of age (mean = 31, SD = 5.4) participated in Exp. 0, 1 and 2, respectively, after the exclusion of the results of inaccurate

respondents (reading times > 500 ms for more than 20% of the stimuli or > 50% incorrect answers to the control stimuli). Prior to the analysis I also excluded answers with RT outside range 500–10.000 ms (3.4% of the data). There was 42.5%–57.5% distribution between males and females in all three experiments and the majority of the participants in all experiments had a higher education degree (Exp. 0: 45.7%; Exp. 1: 58.3%; Exp. 2: 49.3%), but some only secondary (Exp. 0: 32.2%; Exp. 1: 25%; Exp. 2: 34.3%) and unfinished higher education degree (Exp. 0: 22%; Exp. 1: 16,7%; Exp. 2: 16.4%). All participants gave an informed consent.

Additionally, 11 Russian native speakers (13–55 years of age; mean=37; SD=16.4; f=7), who did not participate in the main experiments, took part in a pilot free-interpretation experiment and were asked to give the first temporal interpretation coming to mind in a free oral form for the same stimuli as in the Exp. 0 and 2. The only difference is that contexts, where natural chronology supports posteriority interpretation (25), were additionally included.

(25) *Anton zasušil polevye cvety dlja Kati, sostavivšej krasivuju èkibanu.*
‘Anton dried wildflowers for Katya, who made a beautiful ekibana’.

5. Results and Discussion

This section presents the results attained and discusses their implications. Statistical analysis included the application of mixed-effects linear regression model for log-transformed RT and mixed-effects logistic regression model for the binary IAJ. Clause order, interpretation and coherence were included as treatment-coded independent variables and individual participants and stimuli – as random effects.

5.1. OIP effect in different constructions
Starting with the main effect of OIP, it is significantly pronounced in IAJs for all constructions, where clause order is manipulated, but not participles (subj) (50.4% vs. 50.6%; p=0.87), which did not change their disposition with respect to the main predicate (Fig. 2). For coordinate clauses (93.1% vs 4.7%; p<0.001), converbs (72.7% vs 28.1%; p<0.001) and participles (adj) (50.9% vs. 46%; p<0.03) iconic interpretation is significantly more appropriate, confirming the hypothesis H1a[14]. Expectantly (hypothesis H2a), the extent of OIP prominence depends on the construction type: it is more pronounced for coordinate constructions than for perfective converbs (93.1% vs 72.7%; p<0.001) and the least – for participles (adj) (50.9% vs. 46%; p<0.001).

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[14] Notably, these results were unaffected by the general acceptance bias, reflecting overall preference to accept an interpretation, rather than to reject it, irrespective of what is this interpretation is, was found (p>0.9).
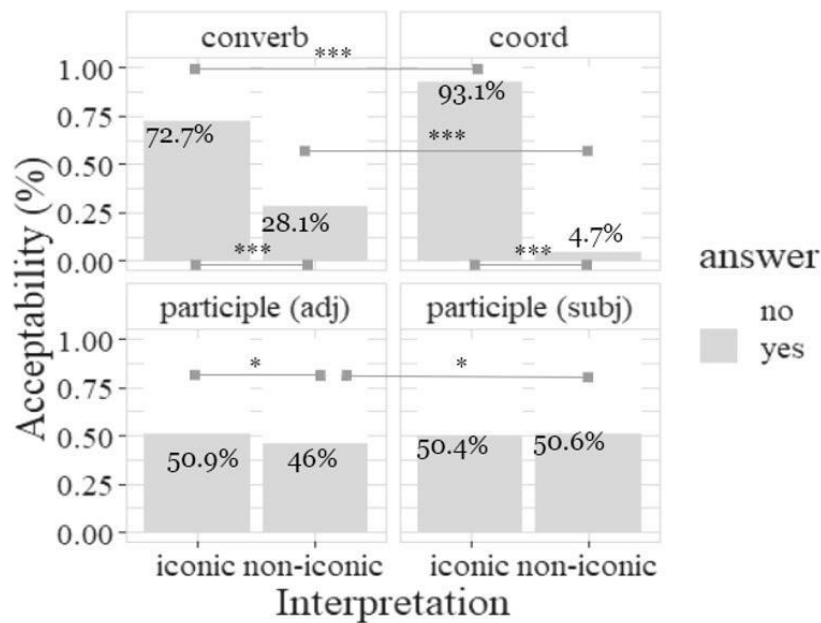
Figure 2. Interpretation acceptability for different construction types, depending on the Order Iconicity (neutral contexts only)

RTs showed clear OIP consistent patterns only for converbs and coordinate clauses: decision about the interpretation acceptability is significantly faster made for iconic interpretations (conv: –132.7 ms, p<0.05; coord: –163.4 ms, p<0.025; part: p>0.05; fig. 3), accepting iconic interpretation was faster than rejecting it (conv: –731.7 ms, p<0.001; coord: –452.6 ms, p<0.0035), negating non-iconic interpretation was faster than negating iconic interpretation (conv: –508.3 ms, p<0.001), non-iconic interpretation was faster (and, thus, easier) rejected than accepted (coord: –524.2 ms, p<0.001; conv: –392.6 ms, p<0.001) and accepting iconic interpretation was faster than accepting non-iconic one (conv: –616 ms, p<0.001; coord: –767.7 ms, p<0.001; fig. 4). For participles (subj) there was general acceptance bias: accepting both iconic (–291.2 ms, p<0.001) and non-iconic interpretation (–291.2 ms; p<0.001) was faster than rejecting it. Participles (adj) take an intermediate position between those two poles, showing both OIP and acceptability bias patterns. On one hand, negating non-iconic interpretation was faster (and, thus, easier) than negating iconic interpretation (–87.6 ms, p<0.013). On the other hand, accepting both iconic (–182.2 ms, p<0.001) and non-iconic interpretation (–182.2 ms, p<0.001) was faster than rejecting it.

These results highlight the continuum-like nature of OIP effect applicability and support hypotheses H1b and H2b. The effect is, indeed, less pronounced for dependent constructions, which are worse at dynamics preservation and discourse continuation, involve factive information transmission and having a narrow modification scope. Besides, coordinate clauses and participles (subj) seem to be easier for temporal interpretation, than converbs and participles (adj) (coord << part (adj); –181.5 ms; p<0.0015; coord << conv; –342.8 ms; p<0.03; part(subj) << conv; –306.5 ms; p<0.0035) possibly reflecting the inherent ambiguity of the latter constructions.
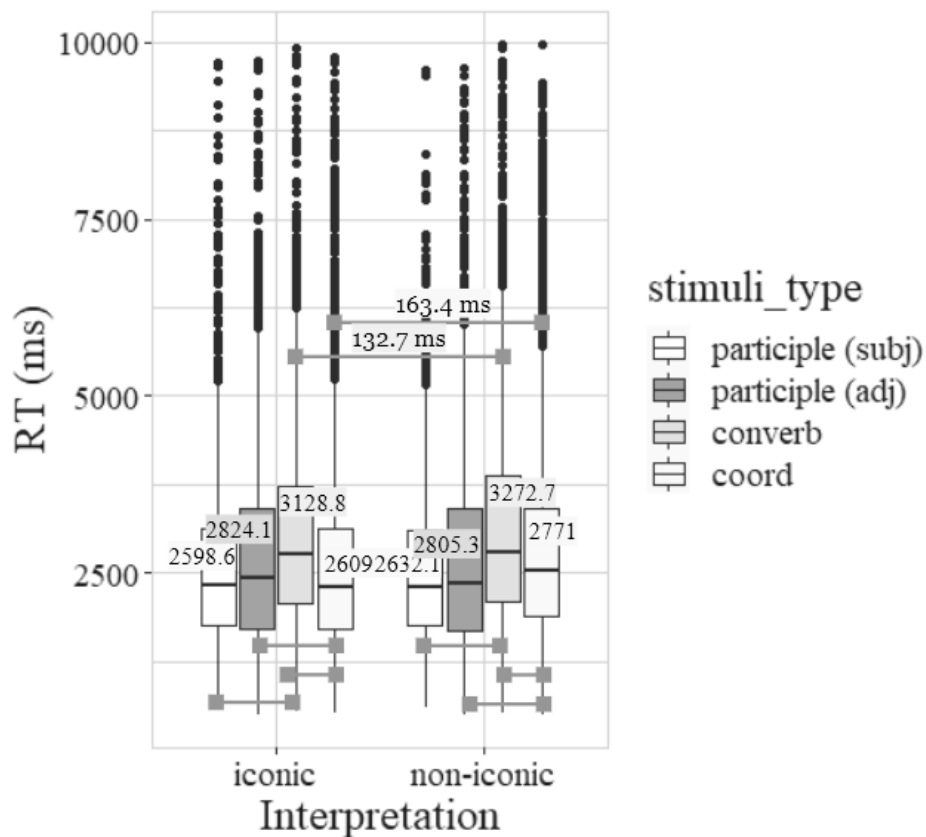
Figure 3. RTs for different construction types, depending on the Order Iconicity
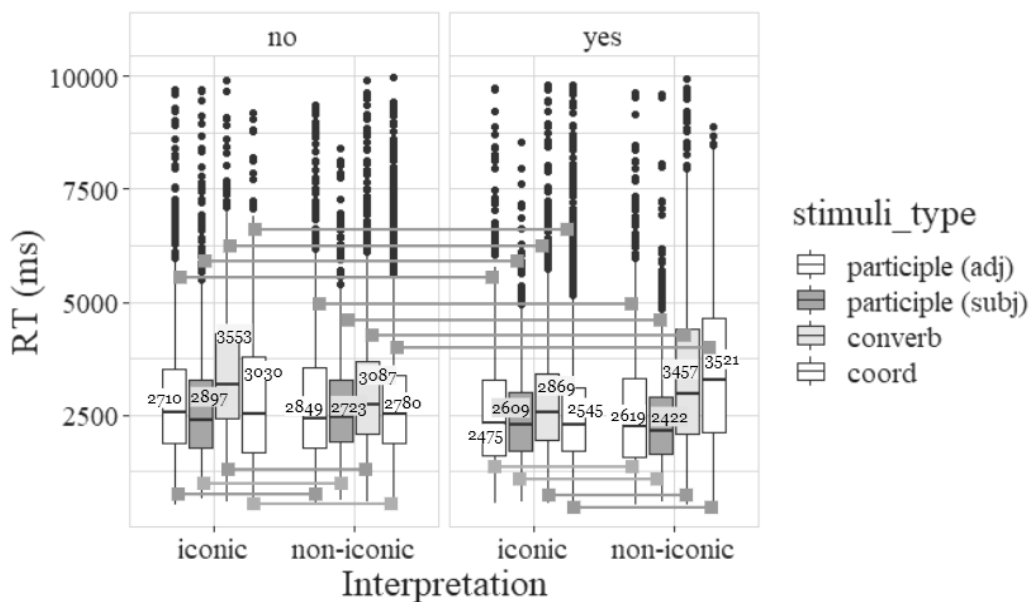(neutral contexts only)

Figure 4. RTs for different construction types, depending on the Order Iconicity and Answer
(neutral contexts only)

5.2. Anteriority and posteriority acceptability

In this section relative acceptability of anteriority and posteriority interpretations in different contexts would be regarded. Consistently with the **GAP effect**, anteriority is indeed more acceptable ($p<0.001$; Fig. 5) and processed faster than posteriority for all dependent

constructions (conv: (–163 ms; p<0.001; part (adj): –201 ms; p<0.001; part (subj): –192 ms; p<0.001; Fig. 6) as a significantly more prototypical interpretation, consistent with backgrounding discourse function of dependent taxis constructions [Hopper 1979; Thompson 1987; Jansen 2008; Vjal'sova 2008; Yevseyev 2013]. This confirms the hypothesis H5.
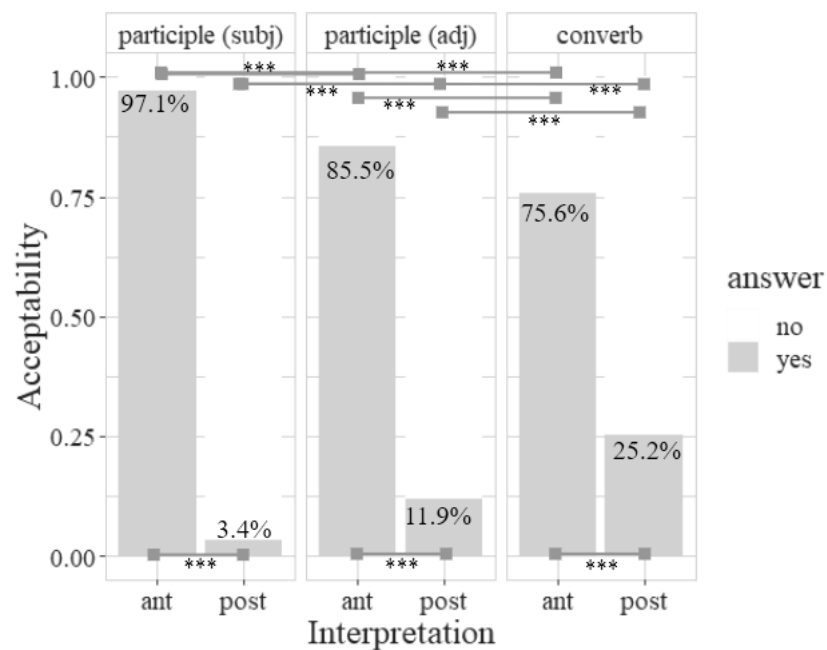

Figure 5. Interpretation acceptability for different construction types, depending on the Interpretation (neutral contexts only)
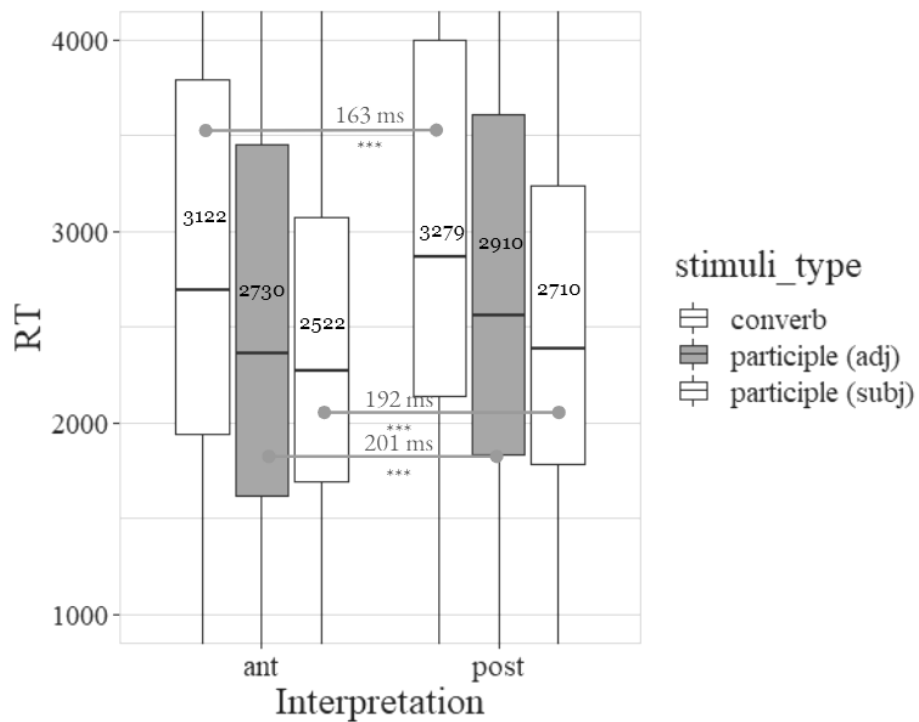
Figure 6. RTs for different construction types, depending on the Interpretation
(neutral contexts only)

Posteriority, nevertheless**,** is still marginally acceptable for Russian perfective converbs in postposition, with below or around chance possibility, when context and our world knowledge do not contradict this interpretation (Fig. 7), and above chance, when there is lexical or contextual prompt in favor of this interpretation (free-interpretation experiment; Table 1; 69.57%). At the same time, anteriority interpretation became less probable than chance in posteriority-coherent contexts (30.43%). The only context of ambiguity, where anteriority and posteriority are not significantly different in acceptability, is postposition of a converb in a neutral context (53.4% vs. 47.5%; $p>0.07$). As we can see in Fig. 7, Clause Order significantly affected the interpretation of converbs (43.3% difference in a neutral context; $p<0.001$) and marginally – the interpretation of participles (adj) (5–6% difference; $p<0.015$), but not participle (subj) ($p>0.6$), supporting hypothesis H3. Furthermore, posteriority is in general more acceptable for converbs, than for participles (adj) and even more so than participles (subj) (25.2% vs. 11.9% vs. 3.4%; $p<0.001$), speaking in favor of the hypothesis H4. The difference in narrative status of the events, denoted by the constructions, their syntactic function, cognitive representation of the event and absolute tense category preservation, indeed, largely influences posteriority acceptability.

Russian perfective participles, however, are peculiar with respect to the unboundedness of posteriority interpretation to postposition, allowing posteriority even in preposition (9.3%; $p<0.003$). Moreover, in free-interpretation experiment only participles received absolute past reading (21%; Table 1), indicating that absolute tense category has an immediate effect on their temporal interpretation. It also suggests that posteriority interpretation could arise not due to OIP, but general past tense reference.
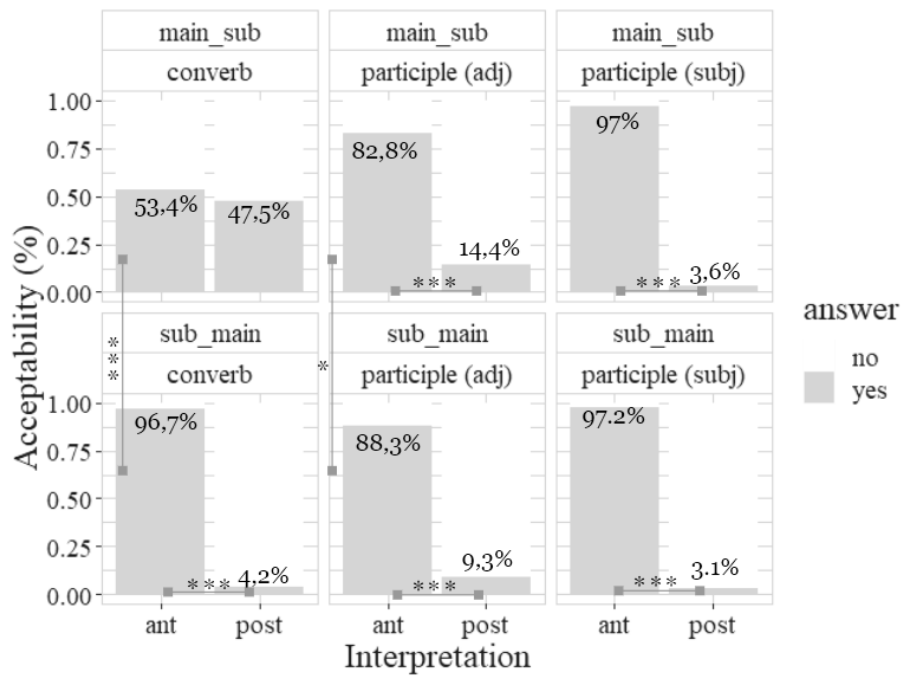
Figure 7. Interpretation acceptability for different construction types, depending on the Clause Order and Interpretation (neutral contexts only)

Table 1

First interpretation of past tense stimuli, depending on the construction, coherence and clause order

			first interpretation			
construction	coherence	Order	absolute past	anteriority	posteriority	simultaneity
converb	accidental	main-sub		72.73%	27.27%	
		sub-main		95.45%	4.55%	
	anterior	main-sub		95.45%	4.55%	
		sub-main		100.00%		
	posterior	main-sub		30.43%	69.57%	
		sub-main		68.18%	31.82%	
participle	accidental	main-sub	4.35%	78.26%	8.70%	8.70%
		sub-main	13.04%	73.91%		13.04%
	anterior	main-sub		95.65%	4.35%	
		sub-main		95.83%	4.17%	
	posterior	main-sub	3.70%	37.04%	59.26%	
		sub-main		62.50%	37.50%	

5.3. Influence of the Event Coherence

Event coherence was shown to play an important, but not defining role in temporal interpretation of taxis, contradicting Narrative Event Chronology approach [Lehmann 1998; Fedorova 2005; Birzer 2010]. Acceptability of converbial interpretations in the main experiment were affected up to 25% (p<0.001; Fig. 8) and acceptability of participial constructions – up to 5% (p<0.02), with anteriority becoming more acceptable in coherent contexts, lexically or pragmatically supporting it, and posteriority becoming less acceptable, but only in postpositive contexts, where there is competition between several possible meanings. Coherence had more of an effect in free-interpretation experiment, totally blocking posteriority in anteriority consistent contexts for both converbs and participles and deflating the difference in posteriority acceptability in a neutral context in postposition vs. preposition for converbs (27.3% vs. 4.6%) and participles (8.7% vs. 0%; Table 1). Nevertheless, in cases when clause order supported anteriority and coherence – posteriority, these situations were resolved in favor of anteriority. Therefore, the hypothesis H7 is supported, while H8 is not, implying that clause order is a much more significant parameter of temporal interpretation, than was suggested by Narrative Event Chronology approach [Lehmann 1998]. For Russian perfective participles, on the other hand, Event Coherence seems to be the only deciding factor for posteriority interpretation to arise (Table 1).
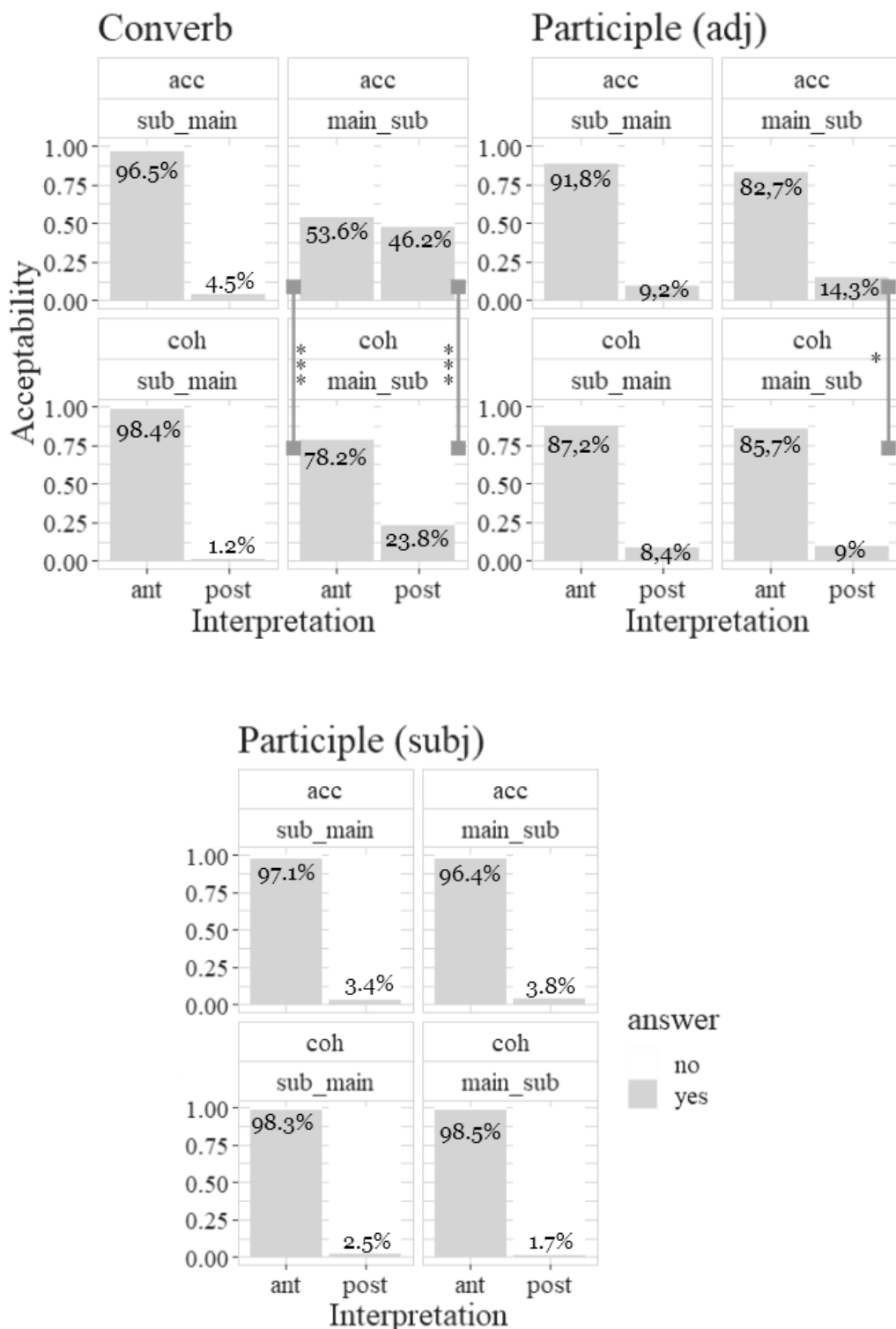
Figure 8. Interpretation acceptability depending on the Coherence,
Clause Order and Stimuli Type

5.4. Inter-participant variation

Despite the common patterns observed so far, tendency to follow OIP is subject to inter-participant variation in accordance with [Yevseyev 2012] and hypothesis H6. Mean acceptability scores distribution shows three major groups, who interpret postpositive perfective converb as denoting predominantly anteriority (~100), predominantly posteriority (~80) and having 50\50 distribution of the interpretations (~60; fig. 9–10). These two interpretations have a weak tendency to be mutually exclusive for the same participant: the more s\he accepts anteriority, the

less s\he accepts posteriority and vice versa (cor=–0.569; t=–10.63, df=236; p<0.001; Fig. 11). This implies that people tend to adhere to either OIP or GAP, although there are many intermediate cases.
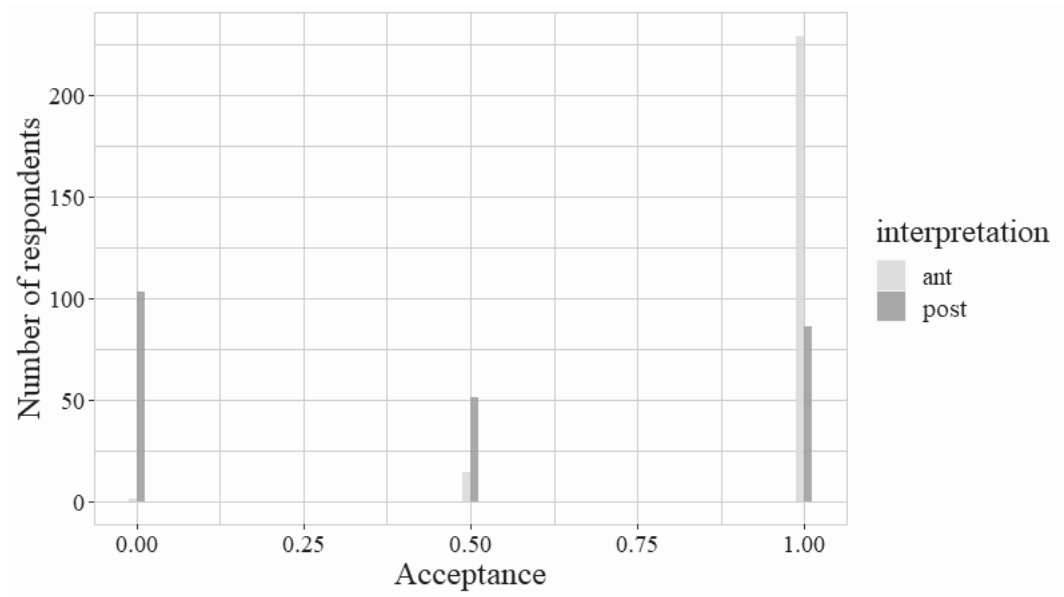

Figure 9. Distribution of mean interpretation acceptability (per participant) scores for converbs when the order is iconic
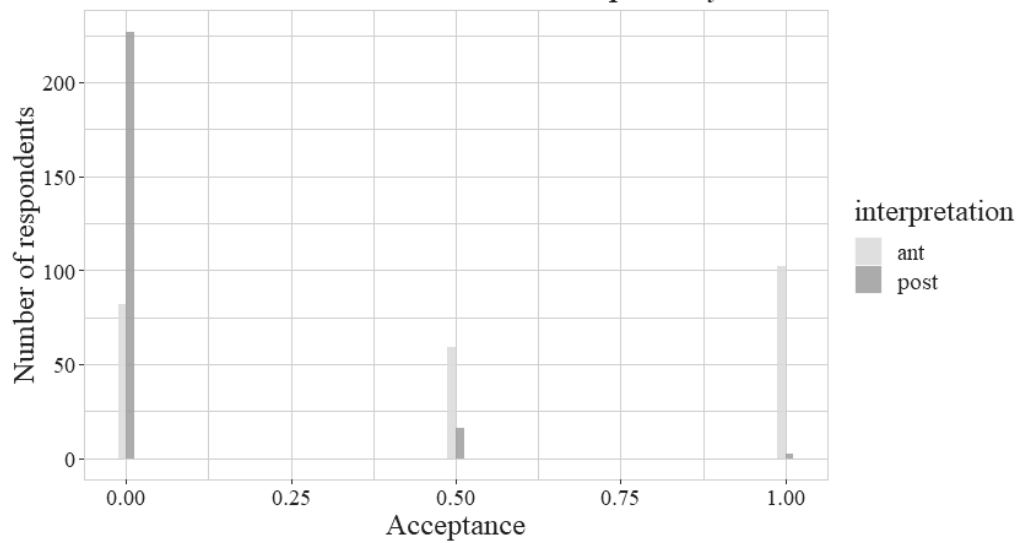

Figure 10. Distribution of mean interpretation acceptability (per participant) scores for converbs when the order is non-iconic
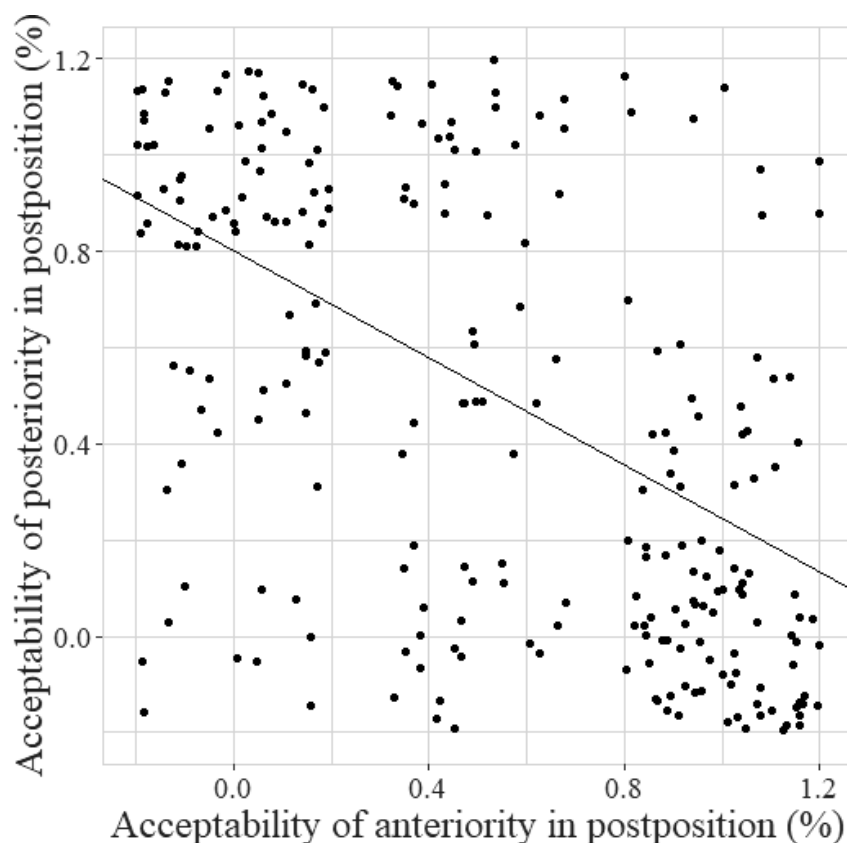
Figure 11. Distribution of mean converb interpretation acceptability (per participant) scores for when the order is non-iconic

Additional analysis of the participants profile suggests, that higher education experience reduces the order iconicity preference for converbs by approximately 8% (p<0.008) and self-reported usage frequency of converbs in written speech is negatively correlated with the extent of OIP reliance by participant (slope=–0.07142, SD=0.02490, t=–2.869, p<0.02), while self-reported exposure to participles in oral speech is positively correlated with it (slope=0.04532, SD=0.01352, t=3.353, p<0.009). It is on a par with claims that order iconicity and language linearization are of more importance in oral speech [Chafe 1984; Kortmann 1995; Yevseyev 2012), whereas in written speech the focus is on shaping the narration and (re)structuring the text so that it better fits the aim of composition.

5.5. Posteriority: a taxis relation or an OIP implicature?

Given the results, posteriority reading for Russian perfective converbs is unlikely to comprise a taxis relation. It is quite marginal in comparison with anteriority and without contextual strengthening is restricted to only certain idiolects predominantly in oral discourse. I propose that it is a specific manifestation of OIP implicature, derived on the basis of maxim of manner [Grice 1975]. As is common for implicatures, especially temporal ones (e.g., Cessation Temporal Inference [Cremers at al. 2018]), OIP in case of Russian perfective converbs is not conventional, arising more frequently than chance only with the help of additional lexical or pragmatic means (e.g., world knowledge, deflexion, temporal adverbs etc.) in contrast to sequential meaning ('and then') for coordination, where sequential reading is "built up from the explicit content of the utterance by conceptual strengthening" [Kroeger 2018: 162–165, 170] and affects the truth values of the sentence [Levinson 2000]. In case of Russian perfective converbs the implicature is rather weak due to the contradicting GAP and competition with coordinative constructions – a more prototypical means to code an iconic sequence.

For perfective participles OIP is further inhibited by weaker dynamic preservation, absolute past reference restrictions, more pronounced backgrounding functions, factivity of the information about the main event participant and restricted scope of relativization. I assume posteriority to be one of the realizations of its vague temporal meaning, lying on the intersection of general past reference and non-simultaneity taxis relation incurred by perfective aspect.

6. Conclusion

In this study, I presented experimental evidence for Order Iconicity Principle (OIP) extending to non-finite taxis constructions on Russian material, although to a less extent than for finite coordinate and temporal subordinate clauses. OIP effect was also dependent on the narrative status and cognitive representation of the events, denoted by the construction, its syntactic function and absolute tense category preservation and, therefore, less pronounced for participles, than for converbs. This study also presents some evidence in favor of posteriority interpretation for Russian perfective converbs as a specific realization of OIP implicature based on the submaxim of manner ("be orderly"; [Grice 1975]) rather than taxis meaning. Its infrequency is arguably due to concurrent General Anteriority Prominence and coordinate clauses as more prototypical means to denote a succession of events. For Russian perfective participles I assume posteriority to be a realization of its absolute past reference.

References

Akimova, T., Kozintseva, N. *Zavisimyj taksis (na materiale deepričastnyx konstrukcij)* [Dependent taxis (on the basis of converbial constructions)]. // *Teorija funkcional'noj gramatiki: Vvedenie. Aspektual'nost'. Taksis* [Functional grammar theory: Introduction. Aspect. Taxis] / Bondarko, A. (Ed.) — 1987 — Leningrad: Nauka [Science] — Vol. 25.

Bikkulova, O.S. *Deepričastie* [Converb] In Materials for the project of corpus description of Russian grammar (http://rusgram.ru), 2011.

Birzer, S. *Russkoe deepričastie. Processy grammatikalizacii i leksikacii* [Russian converb. Processes of grammaticalization and lexicalization] — München: Otto Sagner, 2010 — 284 p.

Bondarko, A. *Teorija funkcional'noj grammatiki: Vvedenie, aspektual'nost', vremennaja lokalizovannost', taksis* [Theory of functional grammar: Introduction, aspectuality, temporal localization, taxis.] — Leningrad: Nauka [Science], 1987 — 352 p.

Chafe, W. How people use adverbial clauses. // Annual Meeting of the Berkeley Linguistics Society — 1984. — Vol. 10 — Pp. 437–449.

Clark, H. H., Clark, E. V. Semantic distinctions and memory for complex sentences // Quarterly journal of experimental psychology — 1968. — Vol. 20(2) — Pp. 129–138.

Cremers, A., Kane, F., Tieu, L., Kennedy, L., Sudo, Y., Folli, R., Romoli, J. Testing theories of temporal inferences: Evidence from child language // Glossa: a journal of general linguistics — 2018 — Vol. 3(1) — Pp. 1–21.

Cristofaro, S. Subordination — OUP Oxford, 2003 — p. 354

Declerck, R. The Grammar of the English Verb Phrase. Vol. 1. The Grammar of the English Tense System. — Berlin / New York, 2006 — p. 553

Fedorova, O. *Pered i posle: čto prošče? (Ponimanie složnopodčinennyx predloženij s pridatočnymi vremeni)* [Before and after: which is easier? (Understanding complex sentences with subordinate tense clauses)] // *Voprosy jazykoznanija* [Topics in the study of language] — 2005 — Vol. 54. — Pp. 44–58.

Givón, T. Topic continuity in discourse — Amsterdam: John Benjamins, 1984 — p. 41.

Givón, T. Iconicity, Isomorphism and Non-Arbitrary Coding in Syntax. In Haiman, J. (ed.). Iconicity in Syntax — Amsterdam / Philadelphia, 1985 — Pp. 187–219.

Givón, T. Syntax: a functional-typological introduction: 2V. — Amsterdam: Benjamins Pub. Co, 1990

Grice, H. P. Logic and conversation. // Speech acts — Brill, 1975 — Pp. 41–58.

Haspelmath, M., König, E. Converbs in cross-linguistic perspective: structure and meaning of adverbial verb forms-adverbial participles, gerunds. — Mouton de Gruyter. Berlin – New York, 1995 — p. 565.

Hopper, P. J. Aspect and foregrounding in discourse. // Discourse and syntax — Brill, 1979. — Pp. 211–241.

Jakobson, R. Shifters, Verbal Categories, and the Russian Verb — De Gruyter Mouton, 1957. — Pp. 41–58.

Jansen, F. Order of mention and the position of temporal clauses in Dutch complex sentences // Segmentation in Discourse — 2008. — Vol. 77. — Pp. 77–85.

Jou, J. &. Harris, R. J. Event Order versus Syntactic Structure in Recall of Adverbial Complex Sentences // Journal of psycholinguistic research — 1990 — Vol. 19. — Pp. 21–42.

Khrakovskij, V. S. *Kategorija taksisa (obščaja xarakteristika)* [Taxis category (general characteristics)] // *Voprosy jazykoznanija* [Topics in the study of language] — 2003 — Vol. 2. — Pp. 32–54.

Khrakovskij, V. S. *Taksis: semantika, sintaksis, tipologija.* [Taxis: semantics, syntax, typology.]. // *Tipologija taksisnyx konstrukcij* [Typology of taxis constructions] — 2009 — Pp. 8–100.

König, E. The meaning of converb constructions. // Haspelmath, M. / König, E.(eds). Converbs in Cross-Linguistic Perspective: Structure and Meaning of Adverbial Verb Forms – Adverbial Participles, Gerunds. — Berlin – New York, 1995 — Pp. 57–96

Kortmann, B. Adverbial participial clauses in English. // Haspelmath, M. / König, E.(eds). Converbs in Cross-Linguistic Perspective: Structure and Meaning of Adverbial Verb Forms – Adverbial Participles, Gerunds. — Berlin – New York, 1995 — Pp. 189–237.

Krapivina, K. A. *Pričastnyj taksis v russkom jazyke* [Participial taxis in Russian]: Bachelor's Thesis — St. Petersburg State University. 2009

Krave, M. F. Russian converbs–temporal interpretation and information structure // Bergen Language and Linguistics Studies — 2010 — Vol. 1. — Pp. 1–16

Kroeger, P. *Analyzing meaning: An introduction to semantics and pragmatics.* —Language Science Press, 2018 — p. 502..

Langacker, R. W. Nouns and verbs // Language — 1987 — Vol. 63. — Pp. 53–94.

Lehmann, V. *Zeitliche Kohärenz* [Temporal coherence] // *Slavistische Linguistik* [Slavic linguistics] — 1997 — Pp. 101–123.

Levinson, S. Presumptive meanings: The theory of generalized conversational implicature: Master Thesis — MIT Press, 2000.

Mel'čuk, I. *Kurs obščej morfologii* [General morphology course] // *Jazyki russkoj kul'tury* [Languages of Russian culture], Vol. I. — Mocsow, 1997.

Muraviev, N. *Taksis i taksisnye formy v jazykax mira: taksonomija i tipologija* [Taxis and taxis forms in the languages of the world: taxonomy and typology]: PhD Thesis — Moscow, 2017

Natsopoulos, D., Mentenopoulos, G., Bostantzopoulou, S., Katsarou, Z., Grouios, G., & Logothetis, J. Understanding of relational time terms before and after in Parkinsonian patients // Brain and language — 1991 — Vol. 40(4) — Pp. 444–458.

Nedjalkov, V. P. Some typological parameters of converbs. // Converbs in cross-linguistic perspective. Structure and meaning of adverbial verb forms-adverbial participles, gerunds. — Berlin – New York, 1995 — Pp. 97–136.

Onipenko, N. K., Bikkulova, O. S. *Semantiko-sintaksičeskie vozmožnosti russkogo deepričastija* [Semantic and syntactic possibilities of Russian adverbial participle] // Stilistika segodnja i zavtra [Stylistics of today and tomorrow] — 2014 — Pp. 267–270.

Padučeva, E. *Semantičeskie issledovanija: Semantika vremeni i vida v russkom jazyke; Semantika narrativa* [Semantic studies: Semantics of time and aspect in Russian; Narrative Semantics]. — Litres, 2017.

Prideaux, G. D. Text Data as Evidence for Language Processing Principles: The Grammar of Ordered Events // Language Sciences — 1989 — Vol. 11(1). — Pp. 27–42.

Pušina, N. I. *Neličnye formy glagola v onomasiologičeskom i kognitivnom aspektax* [Non-personal verb forms in onomasiological and cognitive aspects] // *Vestnik Udmurtskogo universiteta. Serija «Istorija i filologija»* [Bulletin of the Udmurt University. Series "History and Philology"] — 2009 — Vol. 1 — 160–172.

Rappaport, G. C. Grammatical function and syntactic structure: The adverbial participle of Russian — Slavica Pub, 1984 — p. 218.

Say, S. *Prichastie* [Participle]. Materials for the project of corpus description of Russian grammar (http://rusgram.ru), 2011.

Say, S. *Dejstvitel'noe prichastije* [Active participle]. Materials for the project of corpus description of Russian grammar (http://rusgram.ru), 2014

Say, S. *Dejstvitel'noe prichastije prošedšego vremeni* [Past active participle]. Materials for the project of corpus description of Russian grammar (http://rusgram.ru, 2014

Say, S. (2020). *Vzaimodejstvie kategorij vremeni i reprezentacii v russkom jazyke* [Interaction of time and representation categories in the Russian language]. // *Ierarhija i vzaimodejstvie grammaticheskih kategorij glagola* [Hierarchy and interaction of grammatical categories of the verb] — Pp. 582–618.

Sasanuma, S., & Kamio, A. Aphasic's comprehension of sentences expressing temporal order of events // Brain and language — 1976 — Vol. 3(4) — Pp. 495–506.

Shagal, K. Towards a typology of participles: PhD Thesis — University of Helsinki, 2017

Shigurov, V. *K probleme kategorial'noj interpretacii vida i otnositel'nogo vremeni deepričastij* [On the problem of categorical interpretation of the type and relative tense of converbs] // *Inženernye texnologii i sistemy* [Engineering technologies and systems] — 1991 — Vol. 4.

Sichinava, D. *Vid* [Aspect]. Materials for the project of corpus description of Russian grammar (http://rusgram.ru), 2011.

Simone, R. Iconic aspects of syntax: A pragmatic approach // Amsterdam studies in the theory and history of linguistic science series — 1995 — Vol. 4 — Pp. 153–153.

Suzuki, K. Comprehension of sentences expressing temporal order of events in children of two to six years old: Unpublished thesis — Keio University, 1972.

Tai, J. Temporal sequence and Chinese word order // Iconicity in syntax — 1985 — Pp. 49–72.

Tesnière, L. Basis of the structural syntax. — Moscow: Progress, 1988

Testelec, Ja. *Vvedenie v obščij sintaksis* [Introduction to the general syntax.] — RGGU, 2001

Thompson, S. A. "Subordination" and narrative event structure // Coherence and Grounding in Discourse. — Amsterdam and Philadelphia: John Benjamins, 1987 — Pp. 435–454.

Thompson, S. A. The deep structure of relative clauses. // Studies in linguistic semantics. – 1971. – Vol. 78. – p. 94.

Thompson, S. A., Longacre, R. E. Adverbial clauses // T. Shopen (ed.). Language typology and syntactic description: Complex Constructions. — 1985 — Vol. 2. — Pp. 171–234.

Thompson, S., Longacre, R., Hwang, Sh. Adverbial clauses. // Shopen T. (Ed.) Language typology and syntactic description — Cambridge, 2007 — Vol. 2.

Verxoturova, T. L. *Nabljudatel' v grammatike (semantika neličnyx form glagola v kontekste modusa vosprijatija)* [Observer in grammar (semantics of non-personal verb forms in the context of the mode of perception)] // *Vestnik Irkutskogo gosudarstvennogo lingvističeskogo universiteta* [Bulletin of Irkutsk State Linguistic University] — 2012 — Vol. 2s (18). — C. 59–63.

Vjal'sova, A. P. *Tipy taksisnyx otnošenij v sovremennom russkom jazyke (na materiale pričastnyx konstrukcij)* [Types of taxis relations in modern Russian (based on the material of

participial constructions)]: Doctoral Dissertation. — V.V. Vinogradov Russian Language Institute of the Russian Academy of Sciences, 2008.

Weiss, D. Russian converbs: a typological outline. // Converbs in Cross-Linguistic Perspective: Structure and Meaning of Adverbial Verb Forms – Adverbial Participles, Gerunds. — Berlin – New York, 1995 — Pp. 239–282.

Ye, Z., Kutas, M., George, M. S., Sereno, M. I., Ling, F., Münte, T. F. Rearranging the world: Neural network supporting the processing of temporal connectives // NeuroImage, 2012 — Vol. 59(4) — Pp. 3662–3667.

Yevseyev, V. Non-iconic chronology in Russian narrative texts. Its types and motivations // Zeitschrift für Slawistik — 2012 — Vol. 57(1) — Pp. 46–70.

Yevseyev, V. (2013). Motivations for non-iconic chronology in English narrative texts // Linguistics — 2013 — Vol. 51(3) — Pp. 555–584.

Zehr, J., Schwarz, F. PennController for Internet Based Experiments (IBEX). —2018.

Appendix 1. Experimental data and stimuli

https://drive.google.com/drive/folders/1r6AzUlBZJITTSE5SS7uvsVHeOeTj4cGR?usp=sharing