Syntax of relativization in Russian Sign Language: Basic features

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Abstract: This paper provides a first syntactic description of relativization in Russian Sign Language (RSL). We collected production data from nine signers performing a picture-based task. The signers produced 88 instances of relative constructions with the head noun being the subject or direct object in the main clause and in the relative clause. We found that RSL has head-external (postnominal) relative clauses, head-internal relative clauses, and double-headed relative clauses. Relative clauses might also be extraposed to the sentence-final position or fronted. The main clause may be doubled, so that a part of it is repeated after the relative clause. Relative clauses might contain optional relative elements WHICH and INDEX, in clause-initial or clause-final position, or in both positions, and the two elements can co-occur. Finally, we found that relative clauses are nearly always prosodically separate from the main clause. The most frequent non-manual markers in relative construction are eye blinks; in addition, head leans and turns, eyebrow raise, and squints are sometimes used. However, no marker is specialized for marking the relative clause itself: they either are simply markers of boundaries of prosodic units (eye blinks), or they have some other functions (which we cannot fully identify yet). We conclude that RSL generally fits patterns found in other spoken and signed languages. However, we also observe specific differences, especially in the domain of non-manual marking.

Keywords: relative constructions, Russian Sign Language, sign languages

Синтаксис релятивизации в русском жестовом языке: основные свойства

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Аннотация: В данной статье дается первое описание синтаксиса предложений с относительным придаточным в русском жестовом языке (РЖЯ). Данные для исследования были собраны от девяти носителей РЖЯ при помощи задания с использованием картинок. В общей сложности было собрано 88 примеров использования относительной конструкции с вершиной-существительным

в роли подлежащего или прямого дополнения в главной и относительной клаузах. Мы обнаружили, что РЖЯ использует постноминальные относительные клаузы с внешней вершиной, а также клаузы с внутренней и с двойной вершиной. Главная клауза может подвергаться удвоению, так что ее часть повторяется после относительной клаузы. Относительная клауза может содержать необязательные относительные элементы который и ук (указательный жест) в начальной либо конечной позиции, или же в обеих позициях в относительной клаузе, и эти элементы могут комбинироваться. Наконец, мы обнаружили, что относительные придаточные практически всегда просодически обособлены от главной клаузы. Самыми частыми немануальными маркерами в конструкциях с относительными придаточными являются моргания; кроме того, иногда используются повороты и наклоны головы, поднятие бровей и прищур. В то же время, ни один из этих маркеров не является исключительно маркером относительных придаточных: все они или просто маркируют границы просодических единиц (моргания), или имеют другие функции (которые мы пока не можем полностью идентифицировать). Мы делаем вывод, что относительные придаточные РЖЯ в целом соответствует паттернам, обнаруженным в других жестовых и звуковых языках. Тем не менее, мы также обнаружили конкретные отличия РЖЯ от других языков, особенно в области немануального маркирования.

Introduction

Relativization concerns complex sentences containing a main (matrix) clause and a relative clause, where the relative clause and the matrix clause share a pivotal element (a noun phrase) [Branchini 2014]. The function of the relative clause is usually to delimit the reference of the noun phrase [Andrews 2007].

Relative clauses have been thoroughly investigated in spoken language research in various disciplines and frameworks. Both large-scale typologies and detailed formal accounts of relative clauses in certain languages exist [Dryer 2013a; De Vries M. 2002]. However, as in many other domains, these typologies and theories often ignore data from a large class of natural languages, namely sign languages.

While not aiming to amend this situation directly, here we provide a first description of the syntactic properties of relativization in Russian Sign Language (RSL) in the hope that it can be further used for comparison with other sign and spoken languages. In addition, such a description can contribute to the emerging field of studying complex sentences and subordination in sign languages [Herrmann et al. 2016]. Besides the description of basic features, we briefly demonstrate how relativization in RSL is both similar and different to what has been described for other spoken and sign languages.

In Section 1, we briefly introduce relativization in spoken languages, and in Section 2 relativization in sign languages. Section 3 describes the methods. The main results are presented in Section 4, and discussion follows in Section 5. The final section presents the conclusions.

1. Typology of relativization

Relative clauses have been a focus of much descriptive, typological, psycholinguistic, and theoretical research. A recent overview of typology of relative clauses is provided in [Andrews

2007]. We will not discuss all the aspects of relative clauses that have been studied, focusing instead on the syntactic aspects of relativization.[1]

The first major parameter concerns the syntactic position of the relative clause with respect to the matrix clause. A distinction is usually made between embedded and adjoined relative clauses: in the former, the relative clause modifies the noun phrase and is thus embedded in the main clause, while in the latter the relative clause is adjoined at the clause level. Embedded relative clauses can be further subdivided into head external (the head noun belongs to the matrix clause, and is not overtly realized in the relative clause (1)) and head internal (the head noun remains in the relative clause (2)). In addition, free relative clauses on the surface lack the head noun altogether (3) (this type usually coexists with headed relative clauses).[2] Finally, another rare type exists: double-headed relative clauses, where the head noun is overtly realized in both clauses (4).

(1)   The man bought the horse [that I saw]$_{RC}$.

(2)   ['ehatt gaat   akewii]=ve=ch   chepam   *Mesa Grande Diegueño*
       [dog   cat   chase]=DEF=SUBJ   get.away
       'The cat that the dog chased got away.' [Couro, Langdon 1975: 187, cited in Dryer 2013a]

(3)   I loved [what I saw]$_{RC}$.

(4)   [doü   adiyano-no]   doü   deyalukhe   *Kombai*
       [sago   give.3PL.NONFUT-CONN]   sago   finished.ADJ
       'The sago that they gave is finished.' [de Vries L. 1993: 78, cited in Dryer 2013a]

Externally-headed relative clauses can be further classified into pre-nominal and post-nominal. It has been shown that there is a relation between the position of such relative clauses and the order of main constituents: if language has the VO order, it almost always has postnominal relative clauses [Dryer 2013b].

A separate type of adjoined relative clauses is often distinguished under the label of correlative clauses [Lipták 2009]. Correlatives have received a lot of attention in recent years as they are syntactically distinct from embedded relative clauses. In correlative constructions, the relative clause does not show signs of syntactic subordination. It usually has some special relative marker (which can co-occur with the head noun inside the same clause), and in the main clause the head noun is usually accompanied by a demonstrative. In addition, correlative clauses usually precede the main clause [Ibid.].

(5)   [jo   khaRii   ai]$_{RC}$ vo   laRkii   lambii   hai].   *Hindi*
       REL   standing is   DEM   girl   tall   is
       'The girl who is standing is tall.' [Srivastav 1991: 642]

The different types of relative clauses occur with different frequencies in the (spoken) languages of the world. According to Dryer [2013a], externally-headed relative clauses are the dominant strategy in 87 % of all languages (based on the data from 824 languages), and 70 % of all languages have post-nominal head-external relative clauses as the dominant strategy. Internally-headed relative clauses are the main strategy in just 3 % of the sample, and correlatives in 1 %. However,

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[1] Relative clauses have different semantic types, not discussed in this paper. Most prominently, restrictive and appositive (non-restrictive) relative clauses can be distinguished: the former restrict the meaning of the head noun they modify, while the latter specify the meaning of the head noun [De Vries M. 2002].

[2] Going beyond the surface level, some researchers argued that free relative clauses are in fact head-internal, headed by the *wh*-word [Bresnan, Grimshaw 1978], also argued for sign languages by Donati & Cecchetto [2011], and other complex proposals not treating free realtive clauses as lacking the head also exist [Caponigro 2002]. Furthermore, free relatives can be classified in multiple sub-types [De Vries M. 2002].

as Dryer himself points out for internally-headed relative clauses, and as can be said looking at recent research on correlatives, these types are probably more frequent than it seems, because they have been recognized only recently, so many older descriptions might not mention them.

The second major parameter concerns marking of the head noun within the relative clause [Andrews 2007]. This parameter mainly concerns externally-headed relative and correlative clauses. Some languages use relative pronouns: specialized forms of pronouns that are not used in main clauses as argument pronouns (6). It is important to distinguish such pronouns from relative markers or complementizers as the English *that* in (1): the latter are not pronouns, as they do not show person marking.

(6)   The boy [**who** was sick]$_{RC}$ left.

Some languages use regular resumptive pronouns in relative clauses (7). Finally, many languages allow or require full omission of the head noun in the relative clause (8).

(7)   raʔit-i   ʔet   ha-yeled   she-/ʔasher   rina   ʔohevet   **ʔoto**   *Hebrew*
        saw-I   ACC   the-boy   REL   Rina   loves   **him**
        'I saw the boy that Rina loves.' [Borer 1984, cited in Andrews 2007: 220]

(8)   The boy [I saw __]$_{RC}$ left.

The third dimension of variation is how the relative clause as a whole is marked. In many languages it is introduced by some complementizer showing its subordinate status (see examples (1), (5), (7)), and in some languages it can be reduced and/or nominalized to some extent, for instance, through the use of non-finite verbal morphology (as in (4) above) [Andrews 2007]. As we discuss in the next section, and also in Section 4, sign languages have another specialized way of marking relative clauses, namely non-manual markers.

Finally, an important issue in typology and theory of relative clauses concerns the so-called Accessibility Hierarchy [Keenan, Comrie 1977], which concerns the grammatical function of the head noun in the relative clause. While all languages seem to allow the head noun to be the subject of the relative clause, direct object relativization is less frequently possible, indirect object relativization even less so, etc. While this is an important topic, we will not further discuss it in this paper, as we have not tested this hierarchy for RSL. Instead, we focus on relativization of subjects and objects only.

2. Relativization in sign languages

Relative clauses have been studied for several sign languages, including American Sign Language (ASL) [Liddell 1978], German Sign Language (DGS) [Pfau, Steinbach 2005], Italian Sign Language (LIS) [Branchini, Donati 2009; Cecchetto et al. 2006], French Sign Language [Hauser, Geraci 2018], Israeli Sign Language [Dachkovsky 2018], and Turkish Sign Language [Kubus, Nuhbalaoglu 2018]. A recent overview can be found in [Branchini, Kelepir 2017].

The same typological dimensions that were developed for spoken languages also apply to sign languages. For instance, externally-headed relative clauses can be found (9),[3] as well as internally headed relative clauses (10), double-headed relative clauses (11), and free relative clauses (12). One language can have several or all of these strategies, as is the case, for instance, in Turkish Sign Language [Kubus, Nuhbalaoglu 2018].

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[3] **Glossing conventions:** Signs are glossed in small caps. INDEX is a pointing sign, with lowercase number referring to the person. RPRO-H — human relative pronoun (in DGS). WHICH is a relative sign in RSL. Non-manual markers are placed above the glosses, with underscore showing their scope. See the full list of abbreviations in the end of the paper.

(9)   YESTERDAY MAN   [RPRO-H   CAT STROKE]$_{RC}$ ARRIVE   *DGS*

              (over [RPRO-H ... STROKE]: ___rel___)

'The main who is stroking the cat arrived yesterday.' [Pfau, Steinbach 2005: 513]

(10)   [RECENTLY DOG THAT CHASE CAT]$_{RC}$ COME HOME   *ASL*

              (over [RECENTLY ... CAT]: ___rel___)

'The dog which recently chased the cat came home.' [Liddell 1978]

(11)   [POINT GIRL BORROW BOOK]$_{RC}$ [THAT BOOK GONE]   *ASL*

              (over [POINT ... BOOK]: ___br___)

'The book the girl borrowed is missing.' [Galloway 2012, cited in Branchini, Kelepir 2017: 446]

(12)   [EXAM DONE WHO]$_{RC}$ [EXIT CAN]   *LIS*

              (over [EXAM DONE WHO]: ___br___)

'Who has taken the exam can go out.' [Branchini 2007, cited in Branchini, Kelepir 2017: 446]

Some authors have analyzed some of the relative constructions as correlatives, for instance, Cechetto et al. [2006] for LIS, while others have argued against such an analysis [Branchini, Donati 2009].

Some sign languages employ relative pronouns or other relative signs. DGS, for instance, uses two different types of pronouns depending on whether the head noun is human or non-human [Pfau, Steinbach 2005]. ASL has a relative sign THAT which can occur in the clause-final position [Liddell 1978].

An important feature of relative clauses in sign languages is that they are usually marked by non-manual markers. Some of the markers commonly mentioned in the literature are squinted eyes, raised eyebrows, and head movement. While for some sign languages non-manual markers have been claimed to be nearly obligatory [Branchini, Donati 2009], others have found much variation in the presence and type of non-manual marking [Kubus, Nuhbalaoglu 2018]. Dachkovsky [2018] argues that non-manual marking of relative clauses in Israeli Sign Language (squints and forward head movement) has recently undergone grammaticalization, so that that younger signers use it in a more regular and systematic way than older signers.

It is worth noting that many of the studies of relative clauses in sign languages are concerned with offering a formal analysis of the syntactic structure in the Generative Grammar framework [Branchini, Donati 2009; Cecchetto et al. 2006; Pfau, Steinbach 2005; Hauser, Geraci 2018]. Since we do not have a similar purpose in this paper, we do not discuss these analyses further.

3. Current study

3.1. Russian Sign Language

RSL is a natural sign language used by deaf and hard-of-hearing people in Russia. According to the 2010 census, 120 000 people are signers of RSL.[4] It emerged at the beginning of the 19th century when the first school for the deaf was established. RSL has been claimed to be historically related to French Sign Language, although not all researchers agree with this position [Bickford 2005].

While RSL is less well studied than ASL or DGS, some linguistic research has appeared in recent years. Most relevant for this paper is Kimmelman [2012], who described basic word order in simple sentence, and Burkova [2012], who described conditionals in RSL: probably, the first

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[4] http://www.rg.ru/2011/12/16/stat.html

description of complex clauses in this language. A small-scale annotated corpus of RSL has been created recently, and can be found at http://rsl.nstu.ru/site/index/language/en [Burkova 2015].

Importantly, RSL exists in constant contact with Russian, a situation common among the so-called urban sign languages [Zeshan 2008]. First, almost all signers also learn at least written Russian at school. Second, there exists a manual communication system, Signed Russian, which means using Russian (sometimes with voice, and sometimes with silent articulation) accompanied with RSL signs. Singed Russian is not a natural language, but a system of transferring Russian into the visual-manual channel. Thus, it lacks many of the grammatical features of RSL and follows the rules of Russian wherever possible. For historical reasons, Signed Russian is used a lot in deaf education and in sign language interpreting, and it has a high status even among deaf signers. Because of the constant contact between RSL and (Signed) Russian, we can observe many contact phenomena, such as borrowing and code-switching. This is also true to some extent for relative constructions, as we show in Section 4.

3.2. Participants

Although a corpus of RSL exists, it could not be used for the current study of relativization. First, the size of the corpus is quite small (under 6 hours of signing). Second, given that the current study is the first ever research on relativization in RSL, it was not clear how to search for and identify potential relative constructions in the corpus. We therefore collected novel production data from nine RSL signers. The procedure is described in the next section.

The sociolinguistic characteristics of the signers are summarized in the Table. The same labels for signers are used in all examples below.[5] While most signers are from Moscow, three signers are from other cities, so some amount of dialectal variation cannot be excluded. Furthermore, only five of the signers have deaf parents; however, the other signers are very fluent and use RSL as their main language.

Table

Sociolinguistic characteristics of the participants

Signer	Gender	Year of birth	Place of birth	Deaf parents
s1	female	1983	Moscow	no
s2	female	1987	Moscow	no
s4	male	1971	Moscow	yes
s5	female	1955	Grozny (Chechen Republic)	yes
s6	female	1976	Supovsky (Republic of Adygea)	no
s7	male	1983	Ekaterinburg	no
s8	female	1981	Moscow	yes
s9	female	1961	Moscow	yes
s10	female	1957	Moscow	yes

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[5] Note that signer s3 also participated in the data collection. However, we judged this signer's data to contain mostly Signed Russian, so we decided to discard it completely.

3.3. Stimuli and procedure

To elicit relative constructions, we used a task commonly employed for this purpose. We presented signers with pairs of pictures (most of which were designed for this study specifically) that were similar, but different in exactly two aspects. For instance, in one pair (Figure 1), the left picture contains a boy sitting down and holding a book, and the right picture contains the same boy standing up and holding a pot.
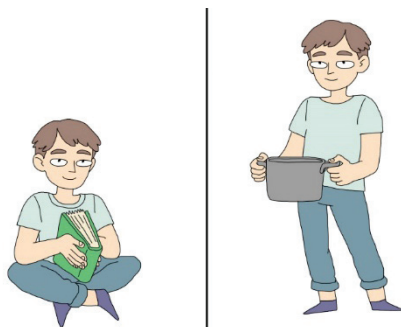
Figure 1. A picture used for data elicitation.

The task was conducted in RSL by the first author. First, the signer was asked to describe both pictures to make sure that they noticed the relevant details (these descriptions were not analyzed further). Second, two questions were asked about the pictures: the first one formulated in a way so that the potential head noun would be the subject of the main clause, and the second one in a way so that the head noun would be the object of the verb LIKE (which is a transitive verb in RSL) (13). Other similar pictures were used to elicit sentences where the head would be the object and the subject of the relative clause, too. In other words, we tried to elicit four types of constructions: with head noun being the subject/object in the main/relative clauses.

(13)   Question 1:   "Which of the boys is reading a book?"

   Expected answer: "The boy who is sitting is reading a book."

   (the head is the subject in both the relative and main clauses)

   Question 2:   "Which of the boys do you like more?"

   Expected answer: "I like the boy who is sitting/reading a book."

   (the head is the subject in the relative clause and the object in the main clause)

The data collection was conducted in two separate sessions. Signers 1–8 participated in the first session, which also included additional stimuli aimed at eliciting relativization of adjuncts. However, the data with adjunct relativization was not satisfactory, as the signers were mostly using ways of describing pictures without a relative clause (see below). We decided to leave the question of whether adjuncts could be relativized for future research. In the second stage, we created new pictures to elicit only subject and object relativization, and signers 1, 8, 9, and 10 participated. Signers 1 and 8 thus participated in both rounds; however, due to the fact that there was a six months period between the sessions, and that in the second session we used other stimuli, we do not think it affected our data.

In the first round, the stimuli were designed to elicit 12 target sentences with relative clauses (disregarding the adjuncts), and in the second round, 16 target sentences. This would result in 132

sentences based on the two sessions. However, the signers did not always produce sentences that could be further analyzed. First, in some cases they produced sentences not directly answering the question that was asked of them. Second, they sometimes used an alternative strategy, such as for instance saying "The girl with the ball is sitting" instead of the target "The girl that is holding the ball is sitting". Finally, some situations were described with very long sequences of clauses with no obvious relativization. After discarding such cases, we were left with 88 instances of relative constructions.

3.4. Acceptability judgments

For a related project which will not be discussed in detail in this paper, we also collected acceptability judgments for some specific types of relative constructions. Four signers participated in this task: signers 1, 4 and 8 (see above), and one other native signer. They were asked to judge signed productions of various sentences by the first author, and correct them if necessary. We used judgments to assess possible syntactic positions of relative signs, among other phenomena. We do not systematically analyze this judgment data for this paper; however, we mention it once below (25).

3.5. Annotation and analysis

We annotated the data using ELAN [Crasborn, Sloetjes 2008]. For each example, we annotated non-manual markers and their scope, the position of the head (in which clause the lexical sign surfaces), the syntactic roles of the head in the main and relative clauses, the type and position of the relative sign, and the overall syntactic structure of the construction.

Note that in determining the position of the head (whether it is in the relative clause or in the main clause) we used the surface position of the head lexical sign whenever possible: e.g., if the head is not even adjacent to the relative clause, it is clear that it is in the main clause, and if the head is embedded in the relative clause (surrounded by other signs belonging to the relative clause), it is clear that it is in the relative clause. However, quite often the surface position of the head is compatible with it belonging to either clause. For instance, if the head is the object of the main clause and the subject of the relative clause, and the relative clause follows the main clause, given that RSL has the basic SVO order [Kimmelman 2012], the head can be interpreted as belonging to either clause:

(14)   Subject Verb-main **head** Verb-relative $\Rightarrow$

   Subject Verb-main Object [__ Verb-relative] — a head-external relative clause OR

   Subject Verb-main [Subject Verb-relative]   — a head-internal relative clause

In such cases, we used prosodic (non-manual) markers as a criterion to determine clause boundaries. So, if in (14) there is a prosodic boundary before the head noun, we would consider it head-internal, and if there is a prosodic boundary after the noun, we would consider it head-external. As we discuss in Section 4.5, some type of such non-manual marking is always available. While prosodic constituents do not have to correlate perfectly with syntactic constituents, we argue that as a last resort prosodic marking is a reasonable criterion to determine syntactic boundaries [Crasborn 2007].

Another cue was the position of a relative sign. As we assumed that certain types of relative signs in RSL marked the relative clause boundary, the head noun preceding these relative signs were considered to be external to relative clause. In most cases, this criterion correlated with the prosodic criterion above.

4. Basic features of relativization

4.1. Headedness

In this section, we describe the head position in the relative construction, and briefly address the question whether the RSL relative constructions should be analyzed as correlatives.

The RSL examples in the rest of this paper are accompanied with **video files** with the exception of one example from the acceptability judgment elicitation — see the link in the end of the paper.

RSL turns out to have all possible types of relative clauses with respect to headedness: externally headed, internally headed, and double-headed. Example (15) shows an externally headed relative clause: the head noun CAR occurs in the object position of the main clause, while the relative clause is extraposed, and prosodically separated from the main clause by an eye blink.[6] In contrast, (16) shows an internally headed relative clause, as the head GIRL occurs between the object and the verb of this clause, and not in the main clause.[7] Finally, (17) shows a sentence where the head noun CAR occurs both in the main clause and in the relative clause; WHICH is a relative sign (see Section 4.3).

(15)   eb
       INDEX$_1$ **CAR** LIKE BLUE   [TURN.LEFT LEFT TURN.LEFT]$_{RC}$ [s1]
       'I like the blue car that is turning left.'

(16)   ___rhl eb   eb
       INDEX$_1$ LIKE   [BALL **GIRL** SIT   HOLD]$_{RC}$ [s1]
       'I like the girl who sits and holds the ball.'

(17)   INDEX$_1$ MORE LIKE **CAR**   [WHICH **CAR** TURN.LEFT]$_{RC}$ [s2]
       'I prefer the car that is turning left.'

In addition, some examples of headless relative clauses were produced, probably because the head was recoverable from the context (the question asked), as in (18). Note that the head is not completely absent, as there are pointing signs referring to it in both the relative and the main clauses.

(18)   eb
       INDEX$_1$ THINK EXAMPLE[INDEX$_3$ WASH WHICH]$_{RC}$ MORE LIKE INDEX$_3$ [s8]
       'I think for example that I like that one more [the dog] that is being washed.'

The most common type of relative clause is the externally headed relative clause (45 instances), followed by the internally headed relative clause (16 instances), and the double-headed construction (11 instances), as well as headless relative clauses (10 instances). In 6 cases we were not able to determine the structure well enough. Note however that given the sample size, conclusions about relative frequency cannot be drawn. What is clear is that all types of headedness are possible in RSL.

Given the flexibility of the head position in relative constructions in RSL, it might be attractive to offer a unified analysis of all cases as a correlative construction, as correlatives allow head realization in the relative clause, matrix clause, or both [Bhatt 2003; Lipták 2009]. However, there are several arguments against such unified analysis.

First, the relative clause in correlatives almost universally occurs in the sentence-initial position [Lipták 2009]. However, as examples above show, relative clauses in RSL can occur in the

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[6] The adjective BLUE is also extraposed, but it prosodically belongs to the main clause.

[7] Note that the relative clause is poly-predicative, but this does not change the fact that it is internally headed.

sentence-final position, and they can also be embedded in the argument position within the matrix clause (see also the discussion in the next section). Second, typologically, a demonstrative is usually required in the matrix clause in correlative constructions. Examples (15)–(17) above show that this is not the case in RSL.

While a unified correlative analysis for the relative constructions in RSL is thus unlikely, it is very possible that a correlative construction exists in RSL, as many languages have multiple syntactically different strategies of relativization. Nevertheless, the possibility of several relativization strategies makes it hard to distinguish correlative constructions from fronted relative clauses. The main challenge is to determine the dependent vs. independent syntactic status of the relative clause in this case. The data from production task did not reveal any examples with distinguishable correlative constructions, i.e. relative constructions with a fronted unambiguously syntactically independent relative clause. Therefore, we leave this topic for the future research.

4.2. Position of the relative clause

An important dimension of variation in relative constructions is the position of the relative clause.[8] Here RSL also has several options; however, not all theoretical possibilities are attested.

Concerning externally headed relative clauses, they can either follow the head noun immediately, as in (19), or be extraposed to the sentence-final position, as in (15) above, or be extraposed to the sentence-initial position, as in (20). Interestingly, these relative clauses never immediately precede the head noun.

$$\text{eb}$$
(19) GIRL [WHICH PET CAT]$_{RC}$ SIT   [s4]
      'The girl that pets a cat is sitting.'

        bhl   nods
(20) [GIRL DRAW]$_{RC}$ INDEX$_1$ LIKE INDEX$_3$ FLOWER   [s1]
      'I like the flower that a girl is drawing.'

Another interesting observation is that the majority of externally headed relative clauses are extraposed to the final position, or at least can be analyzed as extraposed (that is, they are not followed by any material from the matrix clause). In fact, there are only 5 cases similar to example (19), where the relative clause is fully embedded in the main clause. Given the size of the dataset, more research is desirable.

In contrast to externally headed relatives, double-headed relative clauses (although being too few to make any generalizations) tend to directly follow the head in the main clause (17) — we observed 6 cases of post-nominal double-headed relatives. However, extraposition to the sentence-final and sentence-initial positions are also attested.

Internally-headed relative clauses cannot be positioned with respect to the head in the main clause, but there still remain options: they can either occur in the position of the argument in the main clause, or they can be extraposed. However, in our data, it is often difficult to distinguish between these two options. Internally-headed relative clauses related to the object occur in the final (post-verbal) position (21) (except for one case), so such examples are compatible with both in-situ analysis and the extraposition analysis. The ones related to the subject of the main clause are less frequent in general: there are only 4 cases, 2 of which occur pre-verbally (in situ) (22), and two post-verbally (23).

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[8] We are disregarding doubling of the main clause here, see Section 4.4 for details.

$$\underline{\text{lhl}}\quad\text{eb}\qquad\qquad\underline{\text{nod}}$$
(21)　INDEX$_1$ LIKE　　　[GIRL　INDEX$_3$ BOY KISS INDEX$_3$]$_{RC}$　　　　　　　　[s10]
　　　　'I like the girl that is kissing the boy.'

$$\underline{\qquad\qquad\qquad\qquad\qquad\text{lhl}}\quad\text{eb}$$
(22)　[FIRST GIRL CAT PET WHICH INDEX$_3$]$_{RC}$　　　SIT CL:SIT　　　　　　　[s1]
　　　　'The first girl that pets a cat is sitting.'

$$\underline{\quad\text{br}}\quad\text{eb}$$
(23)　SHINE　　　　[WHICH INDEX$_3$ LARGE LAMP INDEX$_3$]$_{RC}$　　　　　　　[s8]
　　　　'The lamp that is large is shining.'

Concerning the headless relative clauses in our data, they are mostly related to the subject of the main clause, and they can occur both pre-verbally (which can be interpreted as in situ) and post-verbally (that is, possibly extraposed).

4.3. Relative signs

Concerning relative signs, RSL has three main options. First, a relative clause might lack any such sign, as in (15)–(16). Both head-internal and head-external relative clauses can occur without any relative sign. In fact, this is the most common single strategy, occurring in 35 cases in our data.

Second, a relative sign WHICH 'which/that' can be used, either alone or in combination with a pointing sign (see e.g. (19) and (22)). Third, a pointing sign INDEX$_3$ referring to the head noun might occur, as in (24). It is also possible for the latter two strategies to be combined, as in (23) above, where the relative sign WHICH in the initial position co-occurs with the pointing sign IN-DEX$_3$ in the final position.

$$\underline{\qquad\qquad\qquad\text{br}}\quad\text{eb}\qquad\qquad\underline{\quad\text{nod}}$$
(24)　DOG　　MORE BEAUTIFUL　　　[INDEX$_3$ BOY HUG　　INDEX$_3$]$_{RC}$　　　[s8]
　　　　'The dog that the boy hugs is more beautiful.'

The sign WHICH has some relation to the Russian relative pronoun *kotoryj* 'which'. This relation is clear from the mouthing of the Russian word that often accompanies this sign; however, the sign itself is not based on fingerspelling or initialization, so its manual part is not related to the Russian word. Note also that the same sign is used as a demonstrative 'this', with the mouthing of the Russian word *ètot* 'this'. Another symptom of this signs' connection to spoken (and Signed) Russian is the fact that, in explicit judgment tasks, the signers are somewhat unwilling to accept it, not being sure whether it belongs to the core RSL, or is a contact phenomenon.

At the same time, the distribution of this sign is quite different from the corresponding Russian relative pronoun. Firstly, while the Russian relative pronoun always occurs clause-initially, WHICH can occur clause-initially, as in (17) and (23), clause-finally, as in (18) and (22), or it can be doubled, as in (27) below. There is also an interesting pattern that emerged in elicitation of acceptability judgments. It turns out that the clause-final use of WHICH is only possible in internally headed relative clauses preceding the main clause (25), while there is no such restriction for the clause-initial use of WHICH.

(25)　^{OK}[GIRL DRAW INDEX$_3$ WHICH]$_{RC}$ INDEX$_1$ LIKE　　　　　　　　[judgments]
　　　　*INDEX$_1$ LIKE [GIRL DRAW INDEX$_3$ WHICH]$_{RC}$
　　　　*GIRL [DRAW INDEX$_3$ WHICH]$_{RC}$ INDEX$_1$ LIKE[9]
　　　　'I like the girl that is drawing.'

---

[9] The difference between the first and third options in (25) is prodosic: in the latter but not the former, the head noun is prosodically separate from the relative clause, which is signaled by a dedicated non-manual marker, i.e. an eye blink.

Secondly, unlike in Russian, where the head noun is always external to the relative clause, WHICH in RSL can also occur in internally headed relative clauses, as in (23) and (25) above, as well as in double headed relative clauses, as in (17) above.

Finally, while the Russian relative pronoun *kotoryj* can also be used as a question word, the RSL sign WHICH is not used as such. We thus conclude that even if WHICH was introduced via Signed Russian, it is a part of the grammar of RSL now.

An important question is whether WHICH should be analyzed as a relative pronoun or a relativizer. The crucial difference between the two is whether the element manifests agreement with the head noun [De Vries M. 2002]. WHICH itself does not show agreement, and thus should probably be classified as a complementizer.

However, an interesting feature of WHICH is that it is sometimes accompanied with a pointing sign (mostly in the order WHICH INDEX$_3$). Importantly, quite often WHICH and the pointing sign are prosodically connected. Specifically, the mouthing of the Russian word *kotoryj* always spreads to the pointing sign, and the passive hand from WHICH is often maintained in its configuration and location while the pointing sign is produced (Figure 2). These processes are indicative of the two signs forming one phonological word [Nespor, Sandler 1999]. Given that, we may think of it as a host + clitic construction with a cliticized index sign functioning as an agreement marker (for more details on cliticization in sign languages see [Sandler 1999]) and thus it might be reasonable to suggest that the combination of WHICH and INDEX$_3$ is in fact a relative pronoun, and not a complementizer.
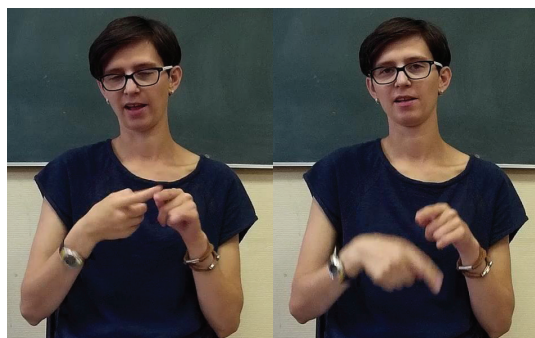
Figure 2. WHICH and INDEX$_3$ demonstrate spreading of the mouthing and of the passive hand. The second frame shows the downward INDEX$_3$ on the right hand. Note the continued mouthing on the second frame.

We now turn to INDEX$_3$, which can occur separately in relative clauses. INDEX$_3$ can occur clause-initially, clause-finally, or be doubled (24). It occurs in both head-internal and head-external relative clauses.

The sign itself is a simple pointing sign that can also be used as a pronoun in simple clauses, and as a determiner or demonstrative in noun phrases. Therefore, one might ask why pointing signs occurring in relative clauses should be analyzed as relative signs, and not as resumptive pronouns or determiners. We observed that quite often pointing sings in relative clauses occur in clause-initial and/or clause-final position, different from the argument that it refers to. For instance, in (24) repeated here as (26), there are two pointing signs. Even if the former can be analyzed as a determiner, the latter does not occur in the subject position and does not modify a noun, so we analyze it as a relative sign.

```
                    br    eb                      nod
(26)  DOG   MORE BEAUTIFUL       [INDEX₃ BOY HUG    INDEX₃]RC        [s8]
      'The dog that the boy hugs is more beautiful.'
```

On the other hand, many examples that we find in our dataset are indeed ambiguous: the pointing sign can often be analyzed as either being a clause-initial relative pronoun or a resumptive subject pronoun, or as either a clause-final relative pronoun or a resumptive object pronoun.

Unlike WHICH, for INDEX$_3$ it is clear that it can only be a (relative) pronoun, and not a complementizer, because it shows spatial agreement with the head noun (that is, it is directed to the location associated with the head noun).

Finally, as mentioned above, sometimes WHICH occurs in the initial position, and INDEX$_3$ in the final position, as in (23). The opposite pattern is not attested; however, given the restrictions on the final position of WHICH discussed above, this could have happened by accident in our dataset.

4.4. Main clause doubling

A prominent feature of our dataset is that quite often the main clause (or a part of it) is repeated after the relative clause (24 cases). For instance, in (27) the verb SIT from the main clause occurs both before and after the internally headed relative clause.[10]

```
             br
```
(27)   GIRL SIT   [WHICH INDEX$_3$ GIRL HOLD CAT PET INDEX$_3$ WHICH]$_{RC}$ SIT   [s8]
        'The girl that pets a cat is sitting.'

Importantly, all relative constructions with main clause doubling except for two cases are observed in the context of sentence-final relative clauses (base-generated or extraposed). Doubling in general is a very common phenomenon in sign languages, including RSL [Kimmelman 2013]. However, the status of this phenomenon is not clear. One could analyze examples like (27) as a simple discourse-level repetition (see for instance [Stolz et al. 2011]). However, given the frequency of doubling, and its interaction with grammar and information structure, at least some cases are more reasonably analyzed as a syntactic process (as e.g. in [Corver, Nunes 2007]).

Irrespective of the specific analysis of doubling in RSL, we want to make two points. First, main clause doubling is indeed a frequent phenomenon in relative constructions in RSL. Second, the tendency for the relative clauses to occur in the final position discussed above is somewhat mitigated by doubling: relative clauses are often followed by the doubled elements from the main clause. We return to this issue in Section 5.

4.5. Non-manual marking

In RSL, as in other sign languages, non-manual marking plays an important role in the relative constructions. In fact, as discussed in Section 3.5, we used non-manual marking as one of the criteria to determine clause boundaries, and therefore headedness of relative clauses in our data. While non-manual markers are important across sign languages, the specific markers vary. RSL non-manual markers also present an interesting pattern.

The first observation that can be made is that there are almost no examples where a boundary between the main and the relative clause is not marked in some way. A case that comes closest to this is example (28); however, the final sign in the main clause (LARGE.BOOK) is held for some time, and also a slight nod during the hold marks the boundary.

---

[10] Note that the relative sign WHICH also occurs twice. This was discussed in Section 4.3.

                                    nod
(28)   INDEX₁ LIKE LARGE.BOOK   INDEX₃ BOY READ   [s10]
        'I like the large book that the boy is reading.'

At the same time, we observe that no single marker obligatorily or even predominantly marks all relative constructions. The most common markers we found are eye blinks on the clause boundary (77 cases, see most examples above), head leans and turns (on the relative clause in 28 cases, see (22) above, but also on the main clause or a part of the main clause in 34 cases, see (21) above), eyebrow raise on the main clause (28 cases, see (27) above), and squint on the relative clause or specifically the relative sign (17 cases, see (29)), although squints also occur in the main clause. These different markers can of course co-occur.

               squint   eb
(29)   SHATTER BREAK   INDEX₃ GREEN INDEX₃   [s10]
        '[The vase] that is broken is green.'

A very important point is that none of these non-manual markers are specialized for relative clauses. Eye blinks are very common markers of clause boundaries, both cross-linguistically [Nespor, Sandler 1999] and in RSL [Burkova 2012], irrespective of the type of clause. Eyebrow raise marks not the relative clause, but the main clause. It is not entirely clear what the function of this marker is, but it might be used in answers to explicit questions marking the main proposition (see [Kimmelman 2014] for a discussion of such examples). Squints occur infrequently in our data (and also both on relative clauses and main clauses, or parts of them), so they cannot be markers of relativization per se. It is likely that they are used to mark noun phrases whose referents are given but not easily accessible, similar to the way they are used in other sign languages, such as DGS [Herrmann 2013]. However, given our limited dataset, we are not able to determine their function.

The only markers that might seem good candidates for specialized markers of relativization are head leans and turns. Such markers occur in a majority of cases. However, looking at them in more detail shows that this is not the case.

Importantly, they occur approximately equally frequently on the main clause and on the relative clause. While they are therefore useful in demonstrating the boundary between the clauses either way, they clearly do not unambiguously mark the clause's function.

It is also important to note that we grouped leans and turns together, while it is not clear whether they should be considered the same marker. Anatomically leans and turns are not a single phenomenon, although they might be still different phonetic realizations of the same phonological feature (see [Crasborn, van der Kooij 2013] for a similar idea for different markers). In addition, leans can be further subdivided into sideward leans, and backward or forward leans. Given previous research on other sign languages [Lackner 2017] we would expect different leans to have different functions. However, it is not possible for us to establish these functions using our dataset.

The variation in marking by head leans and turns of course can be simply due to the fact that multiple distinct relative constructions occur in our data. However, a preliminary analysis does not indicate that this is the case. We can observe that head leans and turns can occur on the main clause or on the relative clause for both head-internal and head-external relative clauses. Similarly, in relative constructions with WHICH the main or the relative clause can be marked by head leans and turns. We are thus not able to find a clear factor related to the structure of the sentence that would predict the occurrence of these markers.

We have to conclude that relative clauses in RSL are not marked non-manually in a consistent way. Relative clauses are (probably obligatorily) marked by some non-manual marker as a separate prosodic constituent, but they are not marked as relative clauses specifically. It is possible that head leans and turns have some function that is related to relativization, and that some subtypes of relative construction in RSL do in fact use them consistently, but this is left for future research.

5. Discussion

Based on this study, we observe that relative clauses in RSL in general fit the same patterns that are found in other spoken and signed languages. RSL has externally-headed, internally-headed, and double-headed relative clauses. Similar to most spoken languages [Dryer 2013a], the dominant pattern in RSL seems to be head-external relative clauses.

A slightly typologically unusual pattern concerns the positions of the relative pronouns WHICH and INDEX, both of which can occur clause-initially, clause-finally, or be doubled in both positions, or co-occur with each other. This position flexibility, and also the possibility of the clause-final position is reminiscent of another class of elements in sign languages, namely wh-signs. It has been observed that, while wh-words in spoken languages typically occur in the left periphery or in situ, in sign languages wh-signs are often doubled or occur in the clause-final position [Cecchetto 2012]. It seems that sign languages have a preference for placing some functional elements in the final position, which is not observed in spoken languages. However, relative signs in other sign languages investigated so far do not show such a variability in the position and none of them employed both clause-initial and clause-final relative signs in the same relative construction.

Another domain in which RSL data seems somewhat unusual is the amount of variation. As we discussed above, RSL has several syntactic strategies of relativization, and non-manual marking is also very variable. If we compare our findings to some reports on other sign languages [Liddell 1978; Pfau, Steinbach 2005; Branchini, Donati 2009], it might seem that RSL shows more variation. However, a recent corpus-based study of Turkish Sign Language [Kubus, Nuhbalaoglu 2018] also shows a large amount of variation in relativization strategies. We suspect that the amount of variation we found in RSL is not indicative of its typological peculiarity, but is an artifact of the methodology: when relying on mostly unguided picture-based production, as we did, or even more so on corpus data, as Kubus & Nuhbalaoglu did, one finds more variation than when relying on judgment data from a small number of signers/speakers.

Another difference between our findings and many of the descriptions of other sign languages concerns the non-manual marking. Apart from observing a lot of variation, we also have to conclude that we do not find any specialized non-manual markers of relative clauses (nor specialized combinations of markers). Here we might face a real domain of typological variation between the sign languages. Different markers are used in different languages, and with different regularity.

A parallel can be drawn to non-manual markers of negation in sign languages [Oomen, Pfau 2017]. First, while most sign languages use negative headshakes, others, such as Turkish Sign Language, also use negative backward tilts. Second, while in some languages non-manual marker alone is enough to express negation (e.g. in ASL), in others the presence of the manual sign is required (e.g. in LIS). Some authors thus use the distinction between non-manually dominant and manually-dominant sign languages (although see [Johnston 2018] for a recent critical evaluation). Similarly, both the form and the function of non-manual markers in relative clauses vary between sign languages. It might be interesting to see whether the use of non-manuals across domains (negation, relative clauses, question marking) shows general patterns in specific languages. More comparative research is clearly necessary.

The final issue that we wanted to mention is the case when the main clause is doubled (fully or partially) after the relative clause in RSL. As mentioned, this strategy almost always occurs in the context of sentence-final relative clauses. We thus hypothesize that the preference for main clause doubling may be explained by various reasons, one of which being a consequence of cognitive overload. In other words, signers might consider it necessary to repeat the main clause after the long and semantically peripheral constituent.

However, this specific discourse strategy, which might have initially been dictated by processing, seems to acquire grammatical functions (see also [Kimmelman 2013] for a proposal on grammaticalization of doubling). The first piece of evidence, as we have already mentioned previously, comes from the remarkable frequency of this strategy specifically in RSL relative

constructions. Similar patterns were not described for relative constructions in any other sign language. If it were only processing issue that motivated doubling, similar constructions would be found in other sign languages such as DGS [Pfau, Steinbach 2005] or LSF [Hauser, Geraci 2018], both of which employ primarily post-nominal externally headed relative clauses.

Another piece of evidence is provided by the prosody of the doubling constructions. While the first copy of the main clause is almost always separated from the relative clause by an eye blink, the second copy is frequently less marked prosodically. Among the 24 main clause doubling constructions, only in 12 cases the main clause is marked prosodically in any way, and only in seven cases it is separated by an eye blink. The lack of prosodic boundaries is indirect evidence for the lack of syntactic boundaries.

Interestingly, while collecting acceptability judgments, we found that the sentence-initial position of the relative clause is often preferred by signers even in case of object relatives. This contrasts with the more frequent sentence-final relative clauses in our production data. It might be the case that signers were more influenced by Signed Russian in the production task, therefore producing more sentence-final relatives, and that they employ the doubling strategy as a last resort to turn a Signed Russian-like structure into a more genuine RSL structure. However, this hypothesis was not specifically tested, so more research on main clause doubling is needed. In addition, more research is needed on grammaticalization of relative constructions and on the syntactic embedding in RSL in general in order to unambiguously determine the status of clauses in doubling constructions.

Summary

For a first description of relativization construction in RSL, we collected production data from nine signers performing a picture-based task. The signers produced 88 instances of relative constructions with the head noun being the subject or direct object in the main clause and in the relative clause.

We found that RSL has head-external (postnominal), head-internal, and double-headed relative clauses. Relative clauses might also be extraposed, typically to the sentence-final position. The main clause is sometimes doubled, so that a part of it is repeated after the relative clause. Relative clauses might contain relative pronouns WHICH and INDEX, in clause-initial or clause-final position, or in both positions, and the two pronouns can co-occur. Finally, we found that relative clauses are nearly always prosodically separate from the main clause. The most frequent non-manual markers in relative construction are eye blinks; in addition, head leans and turns, eyebrow raises, and squints are sometimes used as well. However, none of them is specialized for marking the relative clause itself: they either are simply markers of boundaries of prosodic units (eye blinks), or have some other functions (which we cannot fully identify yet).

Typologically, RSL enjoys the same range of options that has been described for spoken languages. The doubling and final position of the relative signs might be specific to sign languages. In the domain of non-manuals, we find both similarities and differences with other sign languages.

This study is clearly only a first step in understanding relativization in RSL. The issue of relativization of adjuncts remains completely unstudied; the functions of the non-manuals that sometimes occur in relative constructions must be investigated further. Finally, a typology of non-manual marking in relative clauses in sign languages seems a promising domain to research in future.

The video files of the examples can be accessed here: https://osf.io/3sjwk/

ABBREVIATIONS

ACC — accusative	bhl — backward head lean	CONN — connective
ADJ — adjective	br — brow raise	DEF — definite

DEM — demonstrative
eb — eye blink
lhl — leftward head lean
NONFUT — non-future
PL — plural

RC — relative clause
rel — non-manual marker of relative clause
REL — relative
rhl — rightward head lean

RPRO-H — human relative pronoun
SUBJ — subject

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