

How words meet signs: A corpus-based study on variation of mouthing in Russian Sign Language

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Резюме

В статье обсуждается феномен использования слов звучащего языка в жестовых языках (в виде беззвучной артикуляции, или маусинга) и представляется обзор лингвистических исследований этого феномена. Этот феномен еще недостаточно изучен в жестовых языках и вопрос о его лингвистическом статусе является весьма актуальным. Исследований, посвященных этому феномену в русском жестовом языке (РЖЯ), на данный момент не существует. Эта статья приводит аргументы в пользу использования корпусных исследований для изучения (беззвучной) артикуляции в жестовых языках. В центре внимания статьи — первый анализ этого феномена на примере двадцати частотных жестов в корпусе РЖЯ. Наш анализ артикуляции в РЖЯ показывает, что жесты РЖЯ часто сопровождаются русскими словами или их частями, что описано и для других жестовых языков. Более того, РЖЯ отличается более низкой частотой использования артикуляции в проанализированных жестах. Данное исследование также показывает интересную особенность артикуляции в РЖЯ: использование в артикуляции именного склонения.

1. Introduction

The phenomenon of mouthing in sign languages has received a lot of attention in the last decades and it continues to be an area of fruitful research and controversial debates especially with regard to its linguistic status as well as consistency of production (Bank et al. 2011, 2016; Mohr 2014; Johnston et al. 2016; Giustolisi et al. 2016). Despite the fact that mouthing is an integral part of communication between native Deaf signers in natural conversation without hearing people present (Bank 2014), this phenomenon is still far from being thoroughly understood. In particular, the level of integration and conventionalization of mouthing into the sign language system is still not clear to linguists. This paper adds novel data by looking at mouthing in Russian Sign Language (Russian *Русский жестовый язык* or РЖЯ; henceforth: RSL). Mouth actions in this language have never been studied before. Furthermore, this paper highlights the latest tendencies on mouthing research and points out how corpus-based approaches contribute to the analysis of mouthing.

The paper is organized as follows: after a short introduction to the phenomenon of mouthing in 2, I provide an overview of research on mouthing in sign languages in section 2.2. Section 3 specifically addresses the disagreements on the linguistic status of mouthing. Section 4 briefly introduces the recent corpus

approaches to mouthing research. In Section 5 I give some sociolinguistic background on RSL and describe the methodology, and present the research questions and findings. Sections 6 and 7 debate and summarize findings of this paper.

2. The phenomenon of mouthing

Mouth movements that resemble the articulation of a spoken word are known as mouthings in sign language research (Boyes-Braem & Sutton-Spence 2001). For example, in German Sign Language (*Deutsche Gebärdensprache*, DGS) the manual sign MAN is usually accompanied by the mouthed word *Mann* ‘man’ with or without vibration of the vocal cords (voicing) or air turbulence (whispering)¹. Several authors have explored this phenomenon with data from different sign languages, yet still mouthing patterns and their grammatical functions are not fully understood. Two pioneering studies on mouthing (Vogt-Svendsen 1981 for Norwegian Sign Language and Schermer 1990 for the Sign Language of the Netherlands (*Nederlandse Gebarentaal*, NGT)) inspired a book edited by Boyes-Braem & Sutton-Spence (2001), where the authors focus entirely on mouth patterns in various sign languages. Their work has laid the ground for further research of this unique sign language phenomenon. Boyes-Braem & Sutton-Spence (2001) standardize the terminology *mouthing* and *mouth gestures* for two different types of mouth patterns and gather research on mouthing in nine different sign languages: British, Finnish, German, Italian, Norwegian, Swedish, Swiss-German (*Deutschschweizerische Gebärdensprache*,

1 Apart from mouthing, the phenomenon of articulating spoken language words during signing is analyzed from at least two different (mostly sociolinguistic) perspectives in the current literature. On the one hand it is used by deaf, hearing and CODAs (hearing children of deaf adults) in the primary sign language settings. In this case, Zeshan & Panda (2018) consider the voicing and inflections as the main distinguishing factors between mouthing and co-use of spoken language while signing. They explicitly define mouthings as silent mouth movements consisting of uninflected words and use the term “sign-speaking” for code-blending situations, when “words are spoken out loud”. This does not appear to be entirely unproblematic, since mouthings also occur voiced (Bank 2014) and inflected (Mohr 2014; Racz-Engelhardt 2016). In the context of alternate sign languages, developed by speakers as a form of communication instead of speech, the frequent simultaneous co-production of signing and speaking is usually referred to as co-signing speech (CoS) (Green & Wilkins 2014; Green et al 2018) independent of the voicing feature (but different in Bauer 2014). In these cases, sign and speech combine to a multimodal composite utterance such as the Arandic example, when a person says *kwatye-ke* (water-DAT) and simultaneously produces a manual sign NOTHING/NO/NEGATION formed by a rapid ‘flip’ of a flat hand to convey a proposition ‘there is no water’ (Green & Wilkins 2014: 238). No criteria have yet been proposed to draw the line between mouthing, sign-speaking and co-signing speech.

DSGS), NGT and Indo-Pakistani Sign Language (IPSL) (Sutton-Spence & Day 2001; Raino 2001; Ebbinghaus & Heßmann 2001; Ajello et al. 2001; Vogt-Svendsen 2001; Bergmann & Wallin 2001; Boyes-Braem 2001; Schermer 2001; Zeshan 2001). More recently, there have also been three comprehensive corpus investigations of mouthing (Mohr 2014 for Irish Sign Language; Bank 2014 for NGT; Racz-Engelhardt 2016 for Hungarian Sign Language; see section 4 for details).

2.1 Terminology issues

The terminological divergences that were present in the middle of the 1990s (i.e. *oral* or *spoken components*, *word pictures*, *visual mouth segments*) appear to have been solved and the term *mouthing* describing mouth movements that have a relationship with a spoken language has become generally accepted among linguists². In the linguistic literature on Russian Sign Language there is no established corresponding terminology for the two different types of mouth patterns and no studies on the use of mouth actions in RSL have yet been carried out. Occasionally one comes across the English term *маусинг* (*mouthing* in Cyrillic). In Bauer (2018) I suggest using in Russian the term *artikuljacija* ‘articulation’ to refer to the phenomenon of mouthing and the term *žesty rta* ‘gestures of the mouth’ to refer to mouth gestures, which are not associated with the articulation of spoken words.

2.2 Mouthing research

Facial activities or non-manual signals carry important lexical, prosodic, morphological and syntactic information in sign languages (Pfau & Quer 2010; Herrmann & Steinbach 2011; 2013). The growing research on mouthing in the last decades has shown that they contribute significantly to the formal and semantic aspects of sign languages. Mouthing may “specify or complement the meaning of the sign” or “disambiguate minimal pairs” (Schermer 2001: 277). Mouthing also has different stylistic functions in sign languages (cf. Boyes-Braem & Sutton-Spence 2001; Balvet & Sallandre 2014) and may indicate socio-linguistic differences within a language community (Mohr 2014). The use of mouthing has been documented for various sign languages around the world (Crasborn et al. 2008; Nadolske & Rosenstock 2007; Zeshan 2001) with the exception of Kata Kolok, a village sign language of Northern Bali, which is reported to use no mouthing (De Vos & Zeshan 2012: 17).

2 In the German linguistic literature two terms are still in use, namely *Ablesewörter* (as e.g. in Becker 2016) and *Mundbilder* (as in Pfau & Steinbach 2016).

| | | | | | |
|------|----|-----------------|-------------|---------------|------|
| | | ‘society’ | ‘lovers’ | ‘bird.PL.GEN’ | |
| | | <u>obščestv</u> | <u>ljub</u> | <u>ptic</u> | |
| SIGN | IX | SOCIETY | LOVE | P-T-I-C | BIRD |

‘There is a sign on it: The society of bird watchers.’ (RSLM-cr1-s10-a11.eaf⁶)

2.2.1 Reduced mouthing

In terms of form, mouthing may be fully pronounced, temporally reduced, repeated or spread across adjacent manual signs. A mouthing is considered reduced when its parts are invisible, as in the DGS examples *wi(chtig)* ‘important’, *fer(tig)* ‘ready’ or NGT *aksp* for *accepteren* ‘to accept’ (Boyes-Braem 2001: 104; Bank 2014: 24). Research shows that unstressed syllables are reduced more often and temporal reduction thus typically happens in the form of deleting word-final consonants (Bank et al. 2011; Johnston et al. 2016). Mouthings may be reduced to a single syllable or to very short mouth movements as in the NGT example *zien* ‘see’, which is reduced to only *z* (Bank 2014: 38). Schermer (1990) even suggests that temporally reduced mouthings are similar to mouth gestures, since they are no longer identifiable by themselves as spoken lexical items.⁷ Ebbinghaus & Heßmann (1995) observe that in DGS reductions occur more often on verbs than on nouns. They assume that a reduction of a German verb does not impair the understanding of the meaning in the same way as the reduction of a noun does.

Furthermore, Sandler & Lillo-Martin (2006: 105) reason that reduced mouthings apparently conform to the rhythm of the monosyllabic form of the sign. This, however, does not explain the variation of reduced mouthings as found in Bank et al. (2011). Bank et al. show that the reduction of mouthings in NGT occurs on the stressed syllable of the Dutch word, suggesting that signers have knowledge of the rhythmic structure of Dutch words. Whether the signers have access to the prosodic information of spoken words, however, is still a matter of further research and can best be tested in future investigations in a sign language surrounded by a spoken language with a different word stress pattern.

Russian Sign Language lends itself well to researching reduced mouthing, since in contrast to Germanic word stress patterns, where the first syllable is usually stressed, spoken Russian is a free-stress language, i.e. the stress can fall on any syllable in a word. Additionally, due to the vowel reduction phenomenon in Russian, vowel quality varies greatly depending on whether the vowel occurs in stressed or in unstressed syllables (Yanushevskaya & Bunčić 2015). Therefore, the reduction of mouthing in RSL calls for research.

6 RSL examples are taken from the RSL corpus (<http://rsl.nstu.ru/>). In brackets, I refer to the file name used in the corpus.

7 As will be shown in chapter 5, there are some RSL mouthings in the corpus which are sufficiently abbreviated and thus become indistinguishable from mouth gestures.

2.2.2 *Inflected mouthing*

Mouthings have typically been observed and described without any inflectional markings. Previous sign language research accounted for occurrences of inflections in mouthing only as exceptions (Ebbinghaus & Heßmann 1995; Zeshan 2001; Hohenberger & Happ 2001). Mohr (2014) reports on the occurrence of inflected mouthing with examples of tense marking on verbs, e.g. the mouthing *left* co-occurring with the sign LEAVE, and plural marking on nouns, e.g. the mouthing *holidays* with the sign HOLIDAY (see also the occurrences of “frozen forms” in Sutton-Spence 2007).

The use of inflected forms for any morphosyntactic categories in mouthings would suggest that not only the lexicon of the spoken language is activated during signing, but also its grammar. A recent corpus study by Racz-Engelhardt (2016) demonstrates the frequent use of inflected mouthings by Hungarian Sign Language signers. The mouthed verbs and nouns in Hungarian Sign Language are frequently inflected for person, number and case.

2.2.3 *Mouthing and word class*

Mouthings are usually reported to accompany nouns and morphologically simpler signs more frequently than verbs or morphologically complex signs (such as spatial verbs with classifier constructions). In studies of noun-verb pairs in Austrian Sign Language (ÖGS) and Auslan, it was noticed that mouthing is much more likely to occur with nouns than with verbs. In Hunger’s (2006) study of ÖGS, 92% percent of the nouns and only 52% of the verbs were accompanied by mouthing. In Auslan, about 70% of the nouns were accompanied by mouthing, but only 13% of the verbs (Schembri & Johnston 2007). Similarly, Kimmelman (2009) has already found that in RSL mouthings accompany nouns much more often than verbs and noted that mouthing can be called a reliable criterion to distinguish word classes in sign languages (mostly nouns from verbs; cf. also Voghel 2005, Schwager & Zeshan 2008). A recent corpus study by Bank et al. (2011), however, finds no word class specific pattern in their corpus study of NGT mouthings. Instead, the authors observe an alternate use of mouthings and mouth gestures accompanying adjectives and nouns (we could not confirm Bank et al.’s (2011) observation for RSL, see section 6.1).

2.2.4 *Sociolinguistic factors*

In terms of sociolinguistic factors, the influence of particular aspects has been found to have a significant effect on the use of mouthing. Gender and age were clearly the most important factors for Irish Sign Language (ISL) (Mohr 2012, 2014). Men tend to use fewer mouthings than women in ISL. Age has also been found to have an effect in the New Zealand Sign Language (NZSL; McKee &

Kennedy 2006). A preliminary analysis of variation in mouthing in NZSL shows that signers over the age of 65 years accompany an average of 84% of manual signs with mouthing components, compared to 66% for signers under 40 years. Within NGT no age, gender or nativeness-related differences in the use of mouthings were found. Bank et al (2016) did find an effect both for region and for the level of education in that higher-educated signers used fewer mouthings. Nadolske & Rosenstock (2007) found more mouthings in interactive than in narrative registers of the American Sign Language (ASL).

3. The linguistic status of mouthing

The linguistic status of mouthing continues to be an area of controversial debate in the current sign language literature (Capek et al. 2008; Bank et al. 2011, 2016; Hosemann 2015; Johnston et al. 2016; Giustolisi et al. 2016). The continuum of opinions ranges from mouthings as instances of online code-blending, where signers can freely and simultaneously combine elements from a spoken and signed language, to mouthings as part of a sign's phonological description just as other phonological formational categories of hand configuration, location and movement. Several authors thus consider mouthing to be an inherent part of the sign language lexicon (e.g. Boyes-Braem 2001; Sutton-Spence & Day 2001; Ajello et al. 2001; Vogt-Svendson 2001), whereas other researchers argue that mouthings should not be regarded as part of the lexicon (Hohenberger & Happ 2001; Ebbinghaus & Heßmann 2001; Vinson et al. 2010; Bank 2014).

According to the first view, mouthings are interpreted as loan elements from the surrounding spoken language, which have become fully integrated and embedded into the system of manual signs. Under this view, mouthings, being completely integrated in the sign language production system, may be reduced, spread or repeated to maintain alignment with the duration and rhythm of the signs' manual components (Boyes-Braem 2001; Vogt-Svendson 2001).

According to the second view, Hohenberger and Happ (2001) claim that mouthings are not a part of the sign language system but are rather phenomena of language performance. They reason that mouthings originated in oralist education and should therefore be regarded as an incidental consequence of language contact. Under their view, mouthings are not part of the sign lexicon and are, thus, not linguistically relevant.

Ebbinghaus & Heßmann (2001) take an alternative view by proposing a semiotic model for sign language systems, according to which signing is multi-dimensional communication, where mouthing is a meaningful component together with manual signs and non-manual elements. Due to the high frequency of mouthings and their contribution to the meaning of the sign, Ebbinghaus & Heßmann (2001) interpret mouthings as an integral part of DGS signs.

Keller (2001) illustrates another viewpoint by suggesting a kinematic analysis which treats mouthing as visual units rather than spoken words.

3.1 Mouthing as an integral part of the phonological representation of signs

The views presented above amount to the overarching question whether or not mouthings are specified in the lexicon of sign languages. There are arguments for both sides.

One of the arguments supporting the hypothesis that mouthing is an intrinsic part of the linguistic system of sign languages is that mouthings are not always semantically congruent with the manual signs they accompany. Thus, mouthing can add extra semantic information to the sign (Sutton-Spence & Woll 1999). The Auslan sign SPOUSE can, for example, be specified with the English mouthings *wife* or *husband* (Johnston & Schembri 2007). Mouthing can thus be used as a device of specification. Vogt-Svendsen (2001: 22) gives the example of the Swedish word for 'white' being mouthed along with the Swedish Sign Language sign AREA to mean 'white area'.

Another argument for considering mouthing as a part of the lexical/phonological specification of a sign is their phonemic value. Mouthing can distinguish minimal pairs of signs. Many signs in DGS, like e.g. BROTHER and SISTER, are produced with an identical handshape, orientation, location and movement. Many such otherwise polysemous signs can be distinguished by an accompanying mouthing. A similar example for using mouthing as a device for disambiguation is found in Adamorobe Sign Language, a village sign language in Ghana, where the signs for BLACK, WHITE and RED, being manually identical, are distinguished by mouthings (Nyst 2007).

Several recent experimental studies provide further evidence for the assumption that mouthings are an integral part of the phonological representation of signs (e.g. Capek et al 2008; Hosemann 2015). An ERP study by Hosemann (2015) reveals the co-activation of spoken language during the processing of sign language sentences by deaf native signers of German Sign Language. The participants in Hosemann's study were presented DGS examples without any overt mouthings on prime or target signs to exclude the co-activation of German translations. Nonetheless, a significant priming effect was observed and showed that the orthographic/phonological representation of German words is activated during DGS processing. Hosemann accounts for this bimodal priming effect by assuming mouthing to be a part of the sub-lexical representation of the sign (as well as of the spoken word).

3.2 *Mouthing as an instance of code-blending*

There are, however, observations which are not easily compatible with the view that mouthings are specified in the sign language lexicon. One of these is the study by Bank et al. (2011) on variation in mouth actions with manual signs. While a steady simultaneous occurrence and synchronization of mouthings and manual elements may suggest a fixed shared lexical representation of sign and mouthing, high variability in the combination of mouthings and manual signs provides strong evidence against an account positing that mouthings are a part of lexical signs. In an NGT Corpus study Bank et al. (2011) find substantial variation in mouthings not only in timing (i.e. temporal reduction) but also in the type of mouth actions. Signs in NGT can apparently be combined with either mouthing or mouth gesture depending on the context (Bank 2014: 42). The sign *CI*, for example, was equally accompanied by mouthing and mouth gesture in 42 percent of its tokens. The sign *GROUP* was accompanied in 21 percent of its tokens by mouthing and in 31 percent by mouth gestures. This alternative use of mouthing and mouth gestures led the authors to claim that there is no fixed form of a mouthing accompanying a sign. Bank et al. (2011) thus argue in favor of the assumption that mouthings are not part of the lexical entry of a sign but are rather instances of code-blending⁸ (Bank et al. 2011; Bank 2014).

Another observation supporting the view that mouthing is not a formal component of signs is substantial individual variation (Crasborn et al. 2008). In Auslan sample mouthing rates range from 6% to 84% in the study by Johnston et al. (2016). The authors argue that since the use of mouthing is never obligatory, mouthings cannot be specified in the signer's mental lexicon. An experimental study by Vinson et al. (2010) also favors this position. The authors compare manual semantic errors and mouthing semantic errors in picture-naming and word-translation tasks by eight deaf and seven hearing BSL signers. Their main finding is that mouthing showed semantic effects only in picture-naming tasks and not in the word-translation tasks, which Vinson et al. (2010) attribute to the transparent mapping between orthography and phonology and suggest that manual components and mouthings do not have a shared lexico-semantic representation.

4. Corpus approaches

Most research on mouthing in sign languages is based on the analysis of data sets of a small number of deaf signers or on introspection of hearing signing researchers. There is no doubt that these studies are important, but they may

8 The term *code-blending*, which had been used before for code-mixing within a word (e.g. Kaufman & Aronoff 1991: 175), was introduced by Emmorey et al. (2005) to describe the code-mixing behavior while mixing spoken English and ASL.

not always offer a representative view of mouthing behavior in everyday sign language use. Especially when analyzing the frequency of mouthings, the reliance on small datasets might be problematic, given a high individual variability of mouthing patterns, as has been reported for different sign languages. Zeshan (2001) observes a highly variable amount of mouthings in the Indo-Pakistani Sign Language. Bank (2014) also finds substantial variation between individual signers in the large NGT corpus.

Only in recent years have corpora with naturalistic sign language data become available and the corpus approaches to mouthing research become possible. The use of larger corpora for mouthing research is an asset due to the various registers typically present in such datasets. Systematic corpus-based studies of mouthings report a much higher percentage of mouthings if compared to previous studies. While mouthings represent only 35% of all mouth actions in the NGT data based on two signers (Crasborn et al. 2008), a new NGT corpus containing video data of 92 signers reveals a significantly higher percentage of mouthings (80%; Bank et al. 2011). Johnston et al. (2016: 13) explain this with the finer discrimination of mouth action types as well as a better identification and annotation of mouthing throughout various genres and in larger datasets. The recent corpus-based research on mouthing can be exemplified by the following three studies.

Susanne Mohr's (2014) empirical study is the first to explore mouth activity in Irish Sign Language as represented in the Signs of Ireland Corpus. She proposes a very fine-graded classification of mouthings based on the semantic and the temporal relationship between a mouthing and a manual sign it accompanies. She distinguishes nine types of mouthings and discusses reduced and spread mouthings as well as combinations of mouthing and fingerspelling as separate types (Mohr 2014: 118).

The most comprehensive sign language corpus used for mouthing research is the NGT Corpus, which consists of around 75 hours of signing by 92 pre-lingually deaf NGT signers (Bank et al. 2011, 2015, 2016; Bank 2014). Underlying the semantic relationship between a mouthing and a manual sign it co-occurs with, Bank discerns two main types of mouthing in his corpus-based study: (1) *standard* vs. (2) *special*. Mouthings which are time-aligned with and have the same meaning as the signs they accompany are referred to as *standard mouthings*.⁹ Mouthings which do not display a semantic overlap with a manual sign or occur without any manual counterpart are termed *non-standard* or *special mouthings*. The latter type falls into three different subtypes, namely

9 The term *standard mouthing* has been successfully taken over by other authors and will be used in the present study as well.

- (i) solo mouthings, which occur while the hands rest,
- (ii) added mouthings, which do not accompany any specific sign,
- (iii) specifying mouthings, which do not denote the same semantic concept as the co-occurring manual sign.

The study by Johnston et al. (2016) investigates the conventionalization of mouth actions in Auslan and draws on 50 video clips from the Auslan corpus. The authors take over the notions of standard and special mouthings as proposed by Bank et al. (2011), although the latter are also termed unique or non-standard mouthings. Furthermore, they differentiate ten categories of mouthings in their annotation scheme, focussing on the temporal relationship between a mouthing and the manual sign it co-occurs with (Johnston et al. 2016: 10). Thus, according to the degree of articulation they distinguish between a complete articulation of a word, an articulation of the initial, medial, final segment, and so on.

No other large-scale study on mouthings was carried out, although we are in need of further detailed descriptions of how, in the sign language production, these mouth movements are used and how they may contribute to the utterances of which they are a part. Undertaking a new corpus-based study of mouthings in Russian Sign Language appears to be essential for two reasons: (i) it promises to have a significant impact on the description of this under-investigated language, and (ii) it can provide further insights into mouthing patterns.

5. Mouthing in Russian Sign Language

5.1 *Russian Sign Language*

Russian Sign Language is used by deaf and hard-of-hearing people in Russia. According to the latest census organized in 2010, 120,000 people are using this sign language. It is likely that the number of people using RSL is much higher, since it is not yet clear where RSL is used outside the territory of Russia. RSL is possibly used in some former USSR countries such as Ukraine, Belarus or Tadzhikistan. However, research is needed to confirm this assumption. As the first school for deaf children was founded at the beginning of the 19th century in Pavlovsk, RSL can be estimated to be approximately 200 years old. Although RSL is just as old as most West European sign languages and has a comparable history of deaf education and a much higher number of signers as compared to many other European sign languages, it still remains considerably understudied.

The general scientific interest towards Russian Sign Language did not arise until the 1980s (see Zajceva 1987 and Grenoble 1992 for a short overview of RSL grammar). Most of the research on the structure of RSL has been conducted by Zajceva, who has studied RSL mostly from a pedagogical perspective. The results of her research are presented in the only monograph on RSL (Zajceva 2000). The absence of legal recognition of this sign language within the Russian

society might be a consequence of this scholarly neglect. Less than fifteen years ago the term *Russian Sign Language* was nonexistent in the literature and many Deaf RSL signers defined it as a jargon without its own grammar. In 2012 RSL received its official status.¹⁰

Only very recently has more linguistic research on RSL been conducted and have selected aspects of RSL grammar and lexicon been described (Prozorova & Kibrik 2007; Prozorova 2009; Burkova & Varinova 2012; Burkova 2012, 2015; Borodulina 2012; Kimmelman 2009, 2012, 2014; Filimonova 2016; Burkova et al. to appear). Many topics in the grammar of RSL still remain unexplored. Little research has been conducted on non-manual markers of RSL. No studies on the use of mouth actions in RSL have yet been carried out and there is no information available on the distribution mouthings in RSL.

5.2 RSL corpus

This investigation of mouthing in RSL draws from an existing online corpus of RSL developed during the project “Corpus-Based Research on Morphosyntax and Vocabulary of the Russian Sign Language” (<http://rsl.nstu.ru/>, Burkova 2015). The RSL corpus was designed for research and educational purposes. It offers new opportunities for linguists to study the structures and functions of RSL and can serve as a starting point for building a larger national corpus of RSL. The corpus has been collected and annotated in Novosibirsk and Moscow and currently contains about 180 video clips presented by 59 RSL signers (men and women aged from 18 to 63 years). The corpus contains video recordings of personal stories, narrations, monologs, dialogs, and cartoon retellings, which are transcribed and translated into written Russian.

RSL as presented in the corpus demonstrates some instances of code-mixing or code-switching to Signed Russian, which is naturally found in daily use of RSL signers. Moreover, it illustrates at least two different dialectal variations of RSL, namely “the Siberian” and “the Moscow” one (Burkova & Varinova 2012), and presents a great opportunity to study cross-modal language contact phenomena such as mouthing and to investigate its sociolinguistic variation.

5.3 Research questions

The aim of this study is to find out whether mouthings occur with the Russian signs in a similar way as in the sign languages described so far. It furthermore seeks to answer the following two questions:

¹⁰ On December 30, 2012, the President of the Russian Federation signed the Federal Law “On amendments to articles 14 and 19 of the Federal Law ‘On the social protection of persons with disabilities in the Russian Federation’”, which defines the official status of RSL (<http://kremlin.ru/events/president/news/17244>).

1. Do manual signs favor a particular type of mouth action (see below for various types) to be combined with, or can manual signs freely appear with any mouth action?
2. Is there variation in the selection of the Russian lexical items with manual signs, or does a manual sign always appear with the similar mouthing?

5.4 Methodology

In this pilot study on mouthing in RSL, distribution and variation of mouthings on the basis of a set of twenty frequently occurring signs was analyzed. To allow for better comparability, the design of the study by Bank et al. (2011) was replicated here. However, only variation in meaning was analyzed (i.e. whether mouthings differ in meaning from the manual part of the sign). Cases of temporal variation were left aside for further explorations. Within the RSL corpus, the twenty most frequently occurring signs were identified regardless of register (see table 1). Since mouthings are reported to occur more frequently with content signs than with function signs (Boyes-Braem & Sutton-Spence 2001; Mohr 2014), only content signs were investigated. INDEX signs (IX) or multi-functional and polysemous signs such as PALM-UP (PU) being the most frequent in the RSL corpus were thus excluded from this preliminary study.

| Gloss | No. of signs | Gloss | No. of signs |
|-------------|--------------|---------------|--------------|
| LOOK | 332 | MONEY | 92 |
| THINK | 161 | TAKE | 85 |
| MOM | 149 | CHILDREN | 83 |
| GOOD | 120 | FOR-EXAMPLE | 82 |
| HOUSE | 113 | SCHOOL | 82 |
| WANT | 111 | SIGN-LANGUAGE | 80 |
| SIT | 110 | NOW | 74 |
| STUDY | 110 | DIFFERENT | 67 |
| DEAF | 96 | TEACH | 56 |
| INTERESTING | 95 | DO | 52 |

Table 1: Glosses for the 20 most frequent signs in the RSL corpus (excluding IX and PU)

For all the twenty selected tokens, the immediate surroundings were annotated for mouth actions. Mouth actions which were judged to be Russian lexical items by a native RSL signer were annotated as mouthings. Mouth gestures were also annotated, but were not further classified into different types (cf. Crasborn et al. 2008, Johnston et al. 2016).

Two ELAN tiers were added for study-specific annotations: 1. a *mouthing* tier, which entailed the exact visible articulation of a Russian word or its part(s),

A frequent RSL sign on average combines with mouthing in 45% of its tokens. Mouth gestures (35%) form the second largest category of mouth actions in the sample. 19% of all sign tokens are not accompanied by any mouth action at all, and the rest was indecipherable¹¹. The quantitative results for each of the annotated signs are shown in figure 2 below, which demonstrates that RSL signs often combine with standard mouthings, although they do so in quite different proportions (from 22% in the sign NOW to 76% in the sign CHILDREN). Figure 2 shows the percentages of tokens where the investigated RSL signs are accompanied by standard mouthing, mouthing variant, overlap from adjacent signs, mouth gesture or no mouth action.

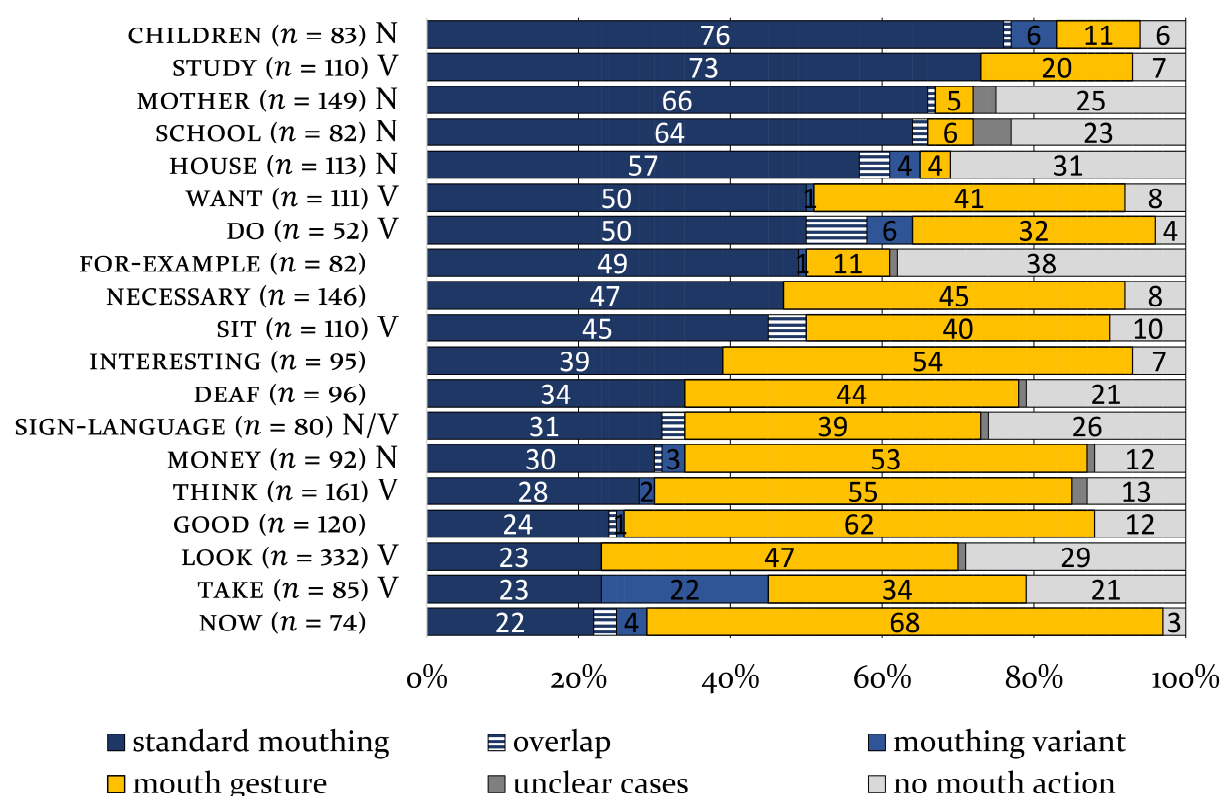


Figure 2: Distribution of the different mouth action types for 20 frequent RSL signs

The data in figure 2 show that standard mouthing is the most frequent category. It can be exemplified by the articulation *dom* 'house' accompanying a semantically congruent sign HOUSE as shown in (2) (repeated here in (4) for convenience). This mouthing occurred statistically more often with the sign HOUSE and is, therefore, referred to as 'standard'. In (5) the sign HOUSE is accompanied by a non-standard mouthing *domašnjaja* 'domestic'. It appears quite seldom in the corpus and is therefore treated as mouthing variant.

11 In less than 1% of all tokens, the mouth was covered by one or both hands and the mouth actions could not be identified by the annotator.

- (4) ‘house’
dom
 CL:HIGH HOUSE CL:HIGH
 ‘There is a high building’.
- (5) ‘very’ ‘much’ ‘house.GEN.SG’ ‘rich’ ‘domestic.F’ library
očen’ mnogo doma bogat domašnja biblioteka
 VERY MUCH IX HOUSE RICH HOUSE BOOK:PL ++ PILE
 ‘I have lots of books at home, a rich home library’ (RSLN-n2-s4-h-std.eaf)

It is evident from figure 2 that in most of the cases RSL signs are combined with mouthings, mouth gestures, or no mouth actions at all. The sign NECESSARY, for example, is almost equally accompanied by mouthing (47%) and mouth gesture (45%). The sign FOR-EXAMPLE is not combined with any mouth action in 38% of its tokens.

Figure 2 shows consistency in the occurrence of standard mouthing in the investigated sample of RSL data. All twenty selected RSL signs tend to occur with the standard mouthing rather than with a different lexical item or a mouthing of adjacent signs (see the columns for ‘mouthing variant’ and ‘overlap’). Examples of overlap mouthings as in (6) appear seldom in the RSL data. The mouthing *dom* ‘house’ in (6) stretches over the sign WALL, which is accompanied by an overlap mouthing.

- (6) ‘house’ ‘chimney’
dom truba
 HOUSE WALL CHIMNEY
 ‘There is a chimney near the wall of the house’ (RSLM-cr8-s12-a13.eaf)

Within our sample, only one sign systematically appears with two synonymous mouthings. The sign TAKE is accompanied by the mouthing *vzjat’* ‘take’ and *polučit’* ‘receive’. Other cases of mouthing variants are also semantically related. For example, the sign GOOD is accompanied twice by a mouthing *vo*, an adverbial modifier with meaning ‘very good’, ‘quite’, ‘one hell of’. The sign FOR-EXAMPLE appears once in the corpus with the mouthing *vot* ‘here’. The sign HOUSE appears with the mouthing *domašnij* ‘domestic, homely’ and with the mouthing *zadanie* ‘homework’. While the first mouthing variant is an adjective form of *dom* ‘house’, the latter mouthing variant is not directly related to the meaning of the standard mouthing. In this case, the mouthing seems to complement the sign by adding new information to it. Similarly, the sign DO has three tokens where mouthing differs from the standard. In all cases the sign was accompanied by the interrogative *čto* ‘what’ to convey the meaning ‘what would you do’. As a whole, the category ‘mouthing variant’ is infrequent for all signs.

Within the set of twenty frequent RSL signs, a few instances of inflected mouthings were found. These were included into the category ‘standard mouthing’. Figure 3 shows the distribution of such inflected mouthings.

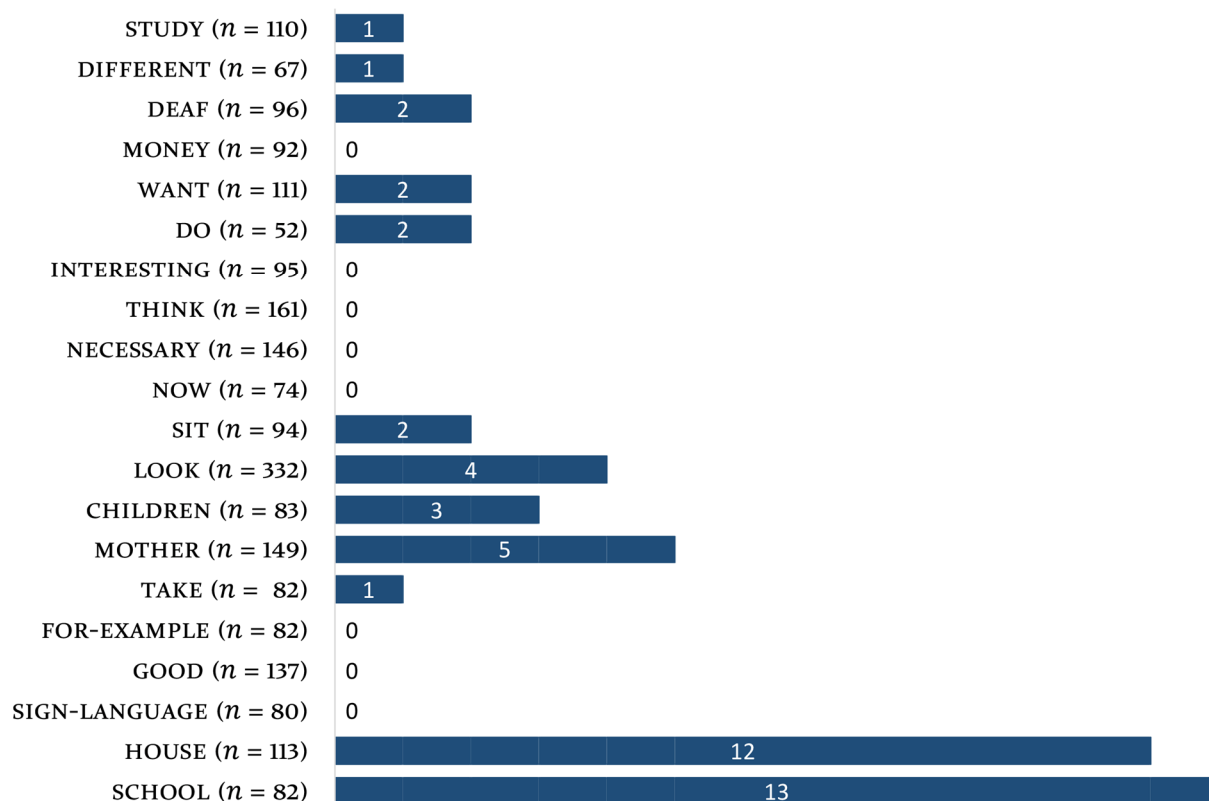


Figure 3: Distribution of inflected mouthings for 20 frequent RSL signs (in absolute numbers)

Within this set of RSL signs, twelve signs were combined with inflected mouthings. These mouthings were mostly inflected for case, but instances of gender, number and aspect inflections were also found (the next section discusses the inflected mouthings in more detail). The rest of the signs never appeared with inflected mouthings.

6. Discussion

6.1 Frequency and word class

The first question in our study addresses the propensity of RSL manual signs to combine with a particular type of mouth action. Out of five mouth action categories introduced in 5.4, mouthings and mouth gestures prevail in the data with a slight tendency towards mouthings (see figure 1). Using a similar methodology as in Bank et al. (2011) and analyzing 20 frequent signs in the corpus provides an ideal basis for comparison with NGT. This comparison shows that RSL differs from NGT with regard to the proportion of signs found to co-occur with mouth actions, especially mouthings. The percentage of mouthings per sign in RSL is not as high as in NGT. In NGT, 10 out of 20 signs are accompanied by mouthings at a rate higher than 85%. In our RSL data, none of the 20 frequently occurring signs appears with mouthings in 85% of its tokens. While all

twenty frequent RSL signs show great variations in their proportions of mouthings from 22% to 76%, only three signs co-occur with mouthings at rates between 64% and 76% (see figure 2). These are three nominal signs, namely CHILDREN (76%), MOM (66%) and SCHOOL (64%), and the verbal sign STUDY (73%).

The fact that a verbal RSL sign is accompanied by mouthings at such a high rate seems to contradict the common assumption discussed in 2.2.3 about mouthings to be associated with nouns. If we compare nominal and verbal RSL signs co-occurring with mouthings in the given sample, the RSL data confirm the assumption that mouthings accompany nouns more often than verbs (see figure 4). The difference between the two groups appears to be significant (t-test: $p < 0.001$). However, not all RSL signs in the sample were considered. Some signs, such as SIGN-LANGUAGE, may alternate in their verbal and nominal use in the corpus and were, therefore, excluded from the above calculation. Only those RSL signs that were used exclusively as nouns or as verbs were analyzed. Figure 4 shows the median for the nominal sign group (64%) and for the verbal sign group (42%) accompanied by mouthings.

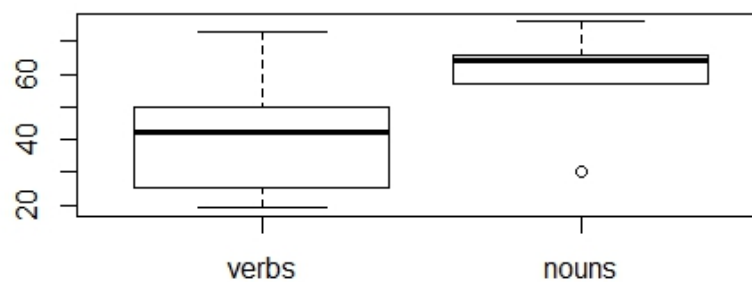


Figure 4: RSL nominal ($n = 5$) and verbal signs ($n = 7$) accompanied by mouthings

In his study on the noun/verb distinction, Kimmelman (2009) shows similar distribution patterns of mouthings in RSL, i.e. nouns are associated with mouthings. Moreover, he provides a conclusive explanation for the fact that mouthing is much more common with nouns than with verbs. By comparing various phonological features, Kimmelman observes the higher iconicity of verbs and the higher economy of nouns. Due to the more economic articulation, nouns are less perceptually salient and are therefore combined with mouthings more often for a better interpretation of the sign. This iconicity/economy principle accords with Kuyseva's (2018) observations, although her study does not consider nouns and verbs but size and shape specifiers (SASSes) in RSL. Kuyseva's study indicates that lexicalized SASSes (frozen signs or lexemes) co-occurred with mouthings much more often than productive (non-frozen) SASSes, which were rather associated with mouth gestures. Balvet & Sallandre (2014) have also recently reported a similar association between mouthings and lexical units in a cartoon retelling subcorpus of six French Sign Language signers.

Observing the data in figure 2, one could infer a covariance between categories of mouthing and mouth gestures. Moreover, there is a strong negative correlation between mouthings and mouth gestures in the RSL data set (-0.786 , $p < 0.05$, $n = 20$). A low number of mouthings co-occurs with a high number of mouth gestures. This is not surprising and has also been observed in other sign languages (Bank et al. 2011; Johnston et al. 2016): If a sign is accompanied by a mouth gesture, no mouthing can occur.

RSL also differs with regard to the proportion of RSL signs found to co-occur with the category ‘no mouth action’. The numbers of this category in RSL are rather high in the investigated sample (see figure 2). For all twenty RSL signs this category varies between 3% and 38% (18% on average), which differs significantly from NGT (3%) but is comparable to Auslan (24%) (Bank et al. 2011; Johnston et al. 2016; see table 2). The numbers for the category ‘mouth gestures’ in our sample are also considerably higher than for other sign languages.

| | (standard) mouthing | overlap | mouthing variant | mouth gesture | no mouth action |
|--------|------------------------|---------|---------------------|------------------|--------------------|
| RSL | 42% | 2% | 2% | 34% | 19% |
| NGT | 73% | 3% | 4% | 17% | 3% |
| Auslan | 57% | N/A | N/A | 20% | 23% |

Table 2: Mouth action rates in RSL compared to other sign languages¹²

A direct comparison with other sign languages for which the data is available (shown in table 2) reveals that the RSL mouthing rates are quite low. In NGT data two signs even co-occurred with mouthings in 100% of their tokens, namely SCHOOL and UNDERSTAND. Bank et al. (2011) reasoned that this might be because mouthings have disambiguating function in those two signs. We do not attest such high frequencies in RSL, although in some signs, such as in DO, mouthing may also disambiguate the manual part from the otherwise homonymous sign WORK.

6.2 Variation

The second question is concerned with the variation in the selection of the Russian lexical items with manual signs. For the whole twenty-sign sample, no strong variation in the choice of the lexical item from the spoken Russian with

¹² In the table the percentages do not add up to 100% in the case of RSL due to the presence of a small number of unclear cases. The NGT and Auslan data are taken as reported in Johnston et al (2016) and Bank et al (2011). N/A stands for figures not coded by the researchers.

a given manual sign has been observed. The data reveal a strong consistency in the form of RSL mouthing with regard to the Russian lexical item. The category of mouthing variants represents 1.6% for all signs in the sample (see figure 2). With the exception of the sign TAKE, which co-occurred with two mouthing variants in 23% and 22% of its tokens, the other 19 signs were accompanied by the standard mouthings, which is also comparable to other sign languages for which data is available (Bank et al. 2011; Johnston et al. 2016).

This study did not account for individual variation in mouthing use in the RSL corpus, but we observe strong differences in the rate of mouthings by individuals. While some RSL signers produce a great amount of mouthings, other signers in the corpus tend to use very little mouthing in their signing. For example, one of the RSL signers never used a mouthing with the sign HOUSE. The analysis of individual variation should be the focus of future studies.

6.3 Inflections

The RSL data reveal a particularly interesting feature of mouthings, namely the use of inflections. Some mouthings in the RSL Corpus occur not in their citation form, as previously reported for many other sign languages (Ebbinghaus & Heßmann 1995 and Hohenberger & Happ 2001 for DGS; Zeshan 2001 for IPSL; Boyes-Braem 2001 for DSGS) but as an inflected form. Recently Racz-Engelhardt (2016) identified a frequent use of inflected mouthings for person, number, case and to some extent tense, definiteness and mood in Hungarian Sign Language. In our study, twelve signs were combined with inflected mouthings (see figure 3). These mouthings were mostly inflected for case (i.e. *škol-u* ‘school-ACC.SG’ with the sign SCHOOL, *dom-a* ‘house-GEN.SG’ with the sign HOUSE, *mam-u* ‘mom-ACC.SG’ or *mam-e* ‘mom-DAT.SG’ with the sign MOM), but instances of gender (*uvidel-a* ‘look:PFV:PST-SG.F’, *xoroš-ij* ‘good-NOM.SG.M’), person (*delajj-eš* ‘do-2SG’ with the sign DO), number (*dom-a* ‘house-NOM.PL’ with the sign HOUSE) and aspect (*u-videl* ‘PFV-look:PST.SG.M’ with the sign LOOK) inflections were also attested. It is not surprising that the sign FOR-EXAMPLE was not accompanied by an inflected mouthing, since adverbs are not inflected in spoken Russian. Many signs such as GOOD or SIGN-LANGUAGE were mostly accompanied by a reduced mouthing, which makes it impossible to identify a potential inflection.

The use of inflected mouthings in RSL calls for more research. The occurrence of syntactic information on RSL mouthing will have an important implication for the linguistic status of mouthings in sign languages. Spoken Russian is a highly inflected language, which may foster the occurrence of inflected mouthings in RSL. Much of the work of Russian grammar is done by inflectional morphology. Each of the inflectable word classes has numerous forms variously distinguished by person, number, gender, case, tense, mood, voice or

aspect. The category of aspect is the most prominent and characteristically Slavic category. Every verb is classified as perfective or imperfective. Thus, the investigation of inflected mouthing in RSL Corpus might reveal more interesting results.

7. Summary

The paper presents results from the first study of mouthing in the online RSL corpus. The selection of twenty highly frequent signs was chosen for two reasons: 1) for a better comparison with the latest NGT study by Bank et al. (2011), and 2) for practical feasibility reasons, as annotating a large repertoire of signs is a very time-consuming undertaking. Therefore, occurrences and variation of mouthings on the basis of a set of twenty frequently occurring signs was analyzed. The study raised the question of whether mouthings occur with the RSL signs in a similar way as the sign languages described so far. It could be shown that mouthings are a part of RSL communication and co-occur with many RSL signs.

We have shown that all manual signs can be combined with mouthings or mouth gestures. The category 'no mouth action', when the mouth stayed in a neutral position, was also common for all signs. This high variability of mouth actions accompanying RSL manual signs does not support the idea that mouthings are a part of the lexical entry of a sign. Within the selection of highly frequent RSL signs, mouthings do not appear to be obligatory. No RSL sign is accompanied by mouthings in more than 80% of its tokens in our sample.

Our study affirms previous descriptions of mouthing to rather accompany the nominal signs. Even though it was demonstrated that all manual signs can co-occur with mouthings, nouns were on average accompanied by mouthings more often than verbs. Just as other sign languages, RSL also shows a strong negative correlation between mouthings and mouth gestures. There is a tendency for signers to use mouthings less frequently as mouth gesture rates increase.

Our second finding accords with the observation made by Bank et al (2011). In RSL, there is little variation in the selection of the Russian lexical items with manual signs. Apart from one noted case, RSL signs generally appear with the standard mouthing. This strong link between manual sign and a standard mouthing may suggest a fixed shared lexical representation of sign and mouthing. However, the occurrence of inflected mouthings in our sample leads to the conclusion that there is no fixed form of mouthing accompanying a manual sign.

While there is little variation in the choice of lexical items, there is significant variation in the type of mouth actions, in particular between mouthing, mouth gesture and no mouth action in RSL. Therefore, no definitive answer to the overarching question on the linguistic status of mouthings can be given here.

The substantial variation of mouthing and mouth gesture evokes further questions concerning their use and the role they play in sign language lexicon and/or discourse. The role mouthings play in the processing of the manual sign, particularly those without a disambiguating function, still needs to be investigated by further studies. Our study shows that a substantial number of RSL signs are not accompanied by any mouth action at all. We therefore need accounts of the circumstances in which mouthings are used and the circumstances when they are not used; and whether the amount of mouthings changes with the register, and the extent to which social differences affect the occurrence of mouthing. These questions appear to be more auspicious than the linguistic status issue, and we intend to answer them on the basis of a large corpus study that is yet to be conducted.

The most striking finding is that sign languages differ with regard to the frequency of mouthing with manual signs. Our data show that RSL mouthing rates are lower than for other sign languages for which the data are available.

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Acknowledgements

The research reported here was conducted in the context of a postdoc grant awarded to the author by the German Research Foundation (DFG) (grant BA 4311/1-1). The author thanks an anonymous reviewer and co-editor Daniel Bunčić for their constructive suggestions on improving an earlier version of this article.

Abbreviations

| | | | |
|--------|--|------|---|
| ASL | American Sign Language | DSGS | Swiss German Sign Language (<i>Deutschscheizerische Gebärdensprache</i>) |
| Auslan | Australian Sign Language | | |
| CI | Cochlea implant | ELAN | EUDICO Linguistic Annotator (EUDICO = European Distributed Corpora project) |
| CL | Classifier construction | | |
| CODA | child(ren) of Deaf adults | ERP | event-related potential |
| CoS | co-signing speech | IPSL | Indo-Pakistani Sign Language |
| DGS | German Sign Language (<i>Deutsche Gebärdensprache</i>) | | |

| | | | |
|------|--|------|--|
| ISL | Irish Sign Language | PU | Palm-Up |
| IX | Index sign | RSL | Russian Sign Language |
| NGT | Sign Language of the Netherlands (<i>Nederlandse Gebarentaal</i>) | SASS | size and shape specifier |
| NZSL | New Zealand Sign Language | РЖЯ | Русский жестовый язык (Russian Sign Language) |
| ÖGS | Austrian Sign Language (<i>Österreichische Gebärdensprache</i>) | | |