Size and Shape Specifiers in Russian Sign Language: a Morphological Analysis

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ABSTRACT

This dissertation presents an in-depth analysis of size and shape specifiers in Russian Sign Language (RSL). Size and shape specifiers, or SASSes, are signs widely used in sign languages of the world to describe visual characteristics of objects. Highly iconic, they have been noted to possess a range of peculiar features, such as combining categorical and gradual properties, composing the meaning of the whole out of the meanings of parts, and denoting different characteristics of the object simultaneously (location, orientation, length, width, overall shape, and some others). Despite their extensive use, SASSes received surprisingly little attention in the literature.

This dissertation fills this gap in the existing body of knowledge by conducting a thorough analysis of SASSes in RSL. It (1) defines the properties of SASSes that set them aside as a separate group of signs; (2) determines the status of SASSes in the sign language lexicon; (3) compares the way SASSes describe objects with the way(s) spoken languages do. The method of the study entails collecting a corpus of video-recordings with semi-spontaneous signing, which is followed by a detailed phonetic transcription of SASSes occurring in the corpus (overall, 625 tokens) in ELAN. A subsequent feature by feature analysis of structural elements in these signs (namely, handshape, place of articulation, movement, and mouth actions), allows us to establish SASSes as a distinct group with its unique set of properties. This is pioneering research that sets the grounds for the future typological analysis of these signs cross different sign languages.

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List of sign languages and abbreviations

Sign language	Abbreviation
Adamorobe Sign Language	AdaSL
American Sign Language	ASL
Australian Sign Language	Auslan
Bouakako Sign Language	n/a
British Sign Language	BSL
French Sign Language	LSF
German Sign Language	DGS
Hong Kong Sign Language	HKSL
Israeli Sign Language	ISL
Italian Sign Language	LIS
Kenyan Sign Language	LAK
Norwegian Sign Language	NSL
Sign Language of the Netherlands	NGT
Swedish Sign Language	SSL
Swiss German Sign Language	DSGS
Russian Sign Language	RSL
Taiwan Sign Language	n/a
Yolngu Sign Language	YSL

Glossing conventions

The table below presents the glossing conventions adopted in this dissertation.

Gloss	**Explanation**
VASE	Glosses in small caps are approximate translations of signs
ROCKING.CHAIR	If two English words are used to gloss one sign, the words are separated by a dot
'ribbon' L-E-N-T-A	Fingerspelling is glossed with a dash between the letters. English translation is given in single quotes above the fingerspelled word.
'There are three brushes on the table'	Free translations of signed utterances are given in single quotation marks
SASS:rectangular	SASSes are glossed with the prefix 'SASS:'
SASS:thin-cylindrical-long	If a SASS expresses a complex meaning, the semantic components are separated by a dash
CL:located-thin.object-two	Classifier predicates are glossed with the prefix 'CL:'
INDX	Index (pointing sign)
POSS	Possessive marker
-1, -2	First and second-person marking on pronouns, possessive signs and agreeing verbs
-PL	Plural marker
-LOC	Locative modification
RH	Right hand
LH	Left hand

Non-manual markers are given above the glossing line, the length of the underline reflecting the scope of the non-manual marker.

'pipe' *truba*	Mouthing is glossed with transliteration of a Russian word in italics. English translation is given in single quotes above the mouthing.
'second' *vtor(oi)*	If articulation of the Russian word is reduced during mouthing, the reduced part is placed in brackets
MG: /af/	Lexical mouth gestures are glossed with the prefix 'MG:' followed by the mouth gesture label placed in slashes.

MG: /ldn, ls/	Non-lexical mouth gestures are glossed with the prefix 'MG:' followed by the markers describing the form of the mouth gesture (see Table 2.4)
+C	eye contact
bl	eye blink

Occasionally, I give examples from spoken languages. The table below presents the list of spoken language markers used in the dissertation.

INS	Instrumental case
THEME	Theme
PROGR	Progressive aspect

For each example, I indicate the source it is taken from. For examples from my data, the information about the particular video-file, the signer and the time of the sign is provided in square brackets. For example, the code [Af3; 01:37.2] refers to the signer A, file 3 from the corpus, and the sign is produced at 01:37.2.

Chapter 1: Introduction

Sign languages of the world are widely known to use iconic signs of special type to describe the size and/or the shape of objects. In these signs, the hands outline the contour of the referent. Consider examples from Yolngu Sign Language (YSL), an aboriginal language of Australia:



(a) SASS: long-vertical (b) SASS: long-diagonal (c) SASS: rectangular

Figure 1.1. YSL Size and Shape Specifiers
(Bauer 2014: 210, 211)

The first sign may describe any long vertical three-dimensional object, such as a tree. The second sign might characterize such objects, as a house or a shop. Finally, the third sign specifies the rectangular shape of a referent, such as a door, a window, a TV screen, or a mirror. These signs are known by different names: 'size and shape specifiers', or SASSes (Bauer, 2014; Johnston & Schembri, 2007), 'tracing size and shape specifiers' (Supalla, 1982, 1986), 'depicting nouns' (Ferrara, 2012), and 'contour signs' (Zwitserlood, 2003). They were first described in American Sign Language (ASL) by Supalla (1982, 1986), but have been found since in many languages, for example, Sign Language of the Netherlands (NGT; Zwitserlood, 2003), Australian Sign Language (Auslan; Johnston & Schembri, 2007), British Sign Language (BSL; Sutton-Spence & Woll, 1999), Swedish Sign Language (SSL; Lars, 2000), to name but a few.

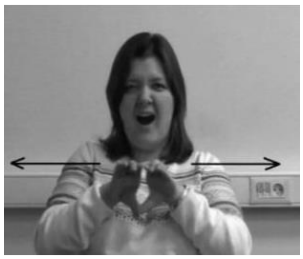
Despite a seeming simplicity of these signs, they pose a number of fundamental theoretical challenges in sign linguistics. First, there are no existing lists of all possible SASSes in any sign language description. The creation of such a list is a very difficult task due to the high degree of iconicity in these signs. SASSes are so accurate in describing the object's appearance that every new object can potentially lead to a new sign form. As an example of this, see different sign forms expressing the idea 'thick' in Russian Sign Language:



(a) SASS:thick (wall) [Af1; 02:05.8]



(b) SASS:thick (tree) [Af1; 06:30.7]



(c) SASS:thick (rope) [Af1; 04:59.3]

Figure 1.2. RSL SASSes 'thick' in the context of different nouns[1]

This context dependence brings into question the status of these signs. Should they be considered words? Or are they functionally closer to co-speech gestures in spoken languages? Even if we find a way to outline a set of all possible SASSes in a language, what is the meaning of every given form? SASSes seem to express very complex information about objects, including their general shape, size, orientation, and position in space. Does the definition of every SASS need to be specified with respect to all these parameters?

The place of SASSes in the language system is another grey area. It is not clear whether they constitute an independent well-defined set of items, or rather are part of a larger group of signs. If they are a separate group, then what are its definitional properties? Moreover, is this group homogenous or can it be divided into several clusters?

Finally, can SASSes be compared to spoken language words describing size and shape? Or do they constitute a unique phenomenon for the visual modality instead?

None of these questions received satisfying answers in the literature. The reason for this is the lack of a study focusing specifically on these signs (with the exception of Nyst (2016) and Fornasiero (2020)). Meanwhile, answering these questions has important theoretical implications, since it deepens our understanding of how sign versus spoken language users describe the real world, what is the nature of the dichotomy 'categorical' versus 'gradient' with respect to the language elements, and where does the language stop and the non-linguistic communication begin. This dissertation aims to contribute to these issues by presenting an in-depth morphological analysis of SASSes in Russian Sign Language (RSL). The research questions it poses are:

1) What are the definitional properties of SASSes? Can they be differentiated from other signs and claimed as a separate group?
2) How do different structural elements of SASSes contribute to the meaning of the whole sign?
3) Do SASSes describe reality in a gradient or categorical manner?
4) If SASSes describe the world categorically, then how do they categorize different shapes and sizes?

This introductory chapter provides the necessary background relevant for this study. It is divided into two parts. The first part (§1.1) gives general information about sign languages. It starts with a brief history of sign language research (§1.1.1). This is followed by a short overview of RSL, the language of the study. Section 1.1.3 introduces the basic terminology with respect to the structure of sign, including manual (§1.1.3.1) and non-manual (§1.1.3.2) components.. Then, the

[1] Hereafter the data is from my fieldwork, unless other is specified.

role of iconicity (§1.1.4) and the heterogeneity of sign language lexicon (§1.1.5) are addressed. The second part (§1.2) discusses theoretical issues around the object of my study which have been addressed in the literature. Section 1.2.1 summarizes existing accounts of SASSes and defines their place in the sign language lexicon; section 1.2.2. describes different approaches to the meaning of these signs, and section 1.2.3. deals with the categorical and gradient features of SASSes' structural elements.

1.1. Sign Languages

1.1.1. Brief history of research

Sign Languages are natural languages used by deaf communities throughout the world. Nowadays, their natural and fully independent language status is a commonly accepted fact. Until relatively recently, however, there has been a number of misunderstandings about the nature of these languages. In the first half of the 20th century, the dominant view was that sign languages were limited and simplified communicative systems, akin to co-speech gestures or pantomime (McBurney, 2012). For example, Bloomfield (1933:39) defined sign languages as "slight modifications" of the common gesture, he believed sign language signs to be based on spoken language conventions. To some extent, this view was motivated by the widespread teaching methods of the time. The notorious International Congress on Education of the Deaf (Milan, 1880) resulted in spreading of the oral education method. It entailed teaching deaf students to read lips and to pronounce spoken language words. This method aimed to facilitate the integration of deaf and hard-of-hearing people into the hearing community. In reality, it resulted in the crisis of sign languages worldwide (Zaitseva[2], 2000).

Publication of the monograph 'Sign language structure: An outline of the visual communication systems of the American deaf' by William Stokoe (1960) became a turning point in sign language research. In this monumental work, Stokoe presented an analysis of the American Sign Language (ASL) structure and showed, among other things, that sign language signs are not holistic units, but consist of smaller structural elements instead. He argued that these structural elements do not carry meaning by themselves, but can act as minimal distinctive units. Therefore, ASL meets the 'double articulation' requirement: its phrases can be divided into meaningful units (i.e. signs; 'the first articulation'), which can be furthermore divided into meaningless units (i.e. sign components; 'the second articulation' in Martinet's (1966) terminology). This gives a strong argument in favour of considering ASL a rightful language. This argument was further strengthened by multiple studies, focusing on the structure of verbal constructions in sign languages (Fisher, 1973; Padden, 1983), word formation processes (Supalla & Newport, 1978), classifier constructions (Supalla, 1986), and diachronic changes (Frishberg, 1975; Woodward, 1976), among other things.

The volume 'The signs of language' by Klima and Bellugi (1979) is another fundamental work in the history of the sign language linguistics. This work discusses the internal structure of ASL signs, the historical development of this language, various grammatical phenomena, and the possibility of using the language for poetic purposes. Among other things, it describes neurological processes activated during the use of ASL. As the authors argue, these processes occur in the same areas of the brain, as in the case with spoken languages.

[2] In this thesis, names of Russian scientists as well as examples of Russian words/phrases are spelled according to the British System (British Standard 2979, 1958) as cited in (Timberlake, 2004: 25, Table 1.5).

At its first stage, the research of sign languages was directed towards proving their language status. As a consequence, the analyses of the time underlined the similarities between sign and spoken languages and mostly ignored the differences. Starting with the 1980s, however, when the status of sign languages in the USA and Europe was already well established, sign language linguistics changed its course of thought. More and more studies focusing on unique aspects of sign languages started appearing, see, for example, (Engberg-Pedersen, 1993; Valli & Lucas, 1995) on the use of the signing space, (Vogt-Svendsen, 1983; Bergman & Wallin, 2001) on the non-manual articulation, (Liddell, 2003) on the combination of gradient and categorical semiotic tools in sign language communication. These and other studies showed that the use of the visual communication channel has a large impact on language organization. The 'language' status of sign languages does not mean that their structure is parallel to the structure of spoken languages and that they can be analyzed using the same terms and toolbox. The question to what extent sign and spoken language share properties is still one of the burning questions in linguistics.

1.1.2. Russian Sign Language

To date, we know of at least 144 sign languages used all over the world (Gordon&Grimes, 2005). These languages differ in the amount of attention they received from the academic community. While some languages have been a constant object of research throughout the history of sign language linguistics, others remain largely understudied to this day. RSL, the research language of this thesis, belongs to the latter group. RSL is a language used by the Deaf community in Russia and some other former Soviet countries, such as Ukraine and Belorussia. According to the 2010 census, the number of RSL users in Russia is approximately 121000 people[3].

The emergence of RSL is attributed to the foundation of the first Russian school for deaf children in Pavlovsk in 1806. This scenario, according to which a sign language emerges when a large group of deaf individuals congregates at educational and/or social institutes for the deaf, is typical of urban sign languages (de Vos & Pfau, 2015). Some researchers believe RSL to be related to French Sign Language (LSF), as the first teachers in the Pavlovsk school were trained in France and Vienna. This issue, however, remains open to debate, as no detailed study on the relation of these two languages has been undertaken. Bickford (2005), who carried out a lexical comparison of East European sign languages, found no evidence in favor of this hypothesis.

There is little evidence of pronounced dialectal variation in RSL. Grenoble (1992) presents a brief comparison of dialects signed in Moscow vs. St. Petersburg; Burkova and Varinova (2012) discuss differences between the dialects spoken in Moscow and Siberia. Both studies report only phonological and lexical variation and no syntactic differences between the dialects (see, for example, different signs for 'dog' in Moscow and Siberian dialects, Figure 1.3). There is, however, also a report on some grammatical variation across RSL dialects in the domain of reflexive pronouns (Kimmelman, 2009).

[3] The statistics is taken from the summary of the 2010 census that can be accessed at https://rg.ru/2011/12/16/stat.html



a



b

Figure 1.3. Signs DOG in Moscow (a) and Siberian (b) dialects of RSL
[RSL corpus]

Along with RSL, the second system of manual communication has recently been in use in Russia – Signed Russian, known by the term 'calqued speech' in the Russian tradition. Signed Russian translates spoken Russian into signs, following the word order of spoken (literary) Russian' (Grenoble, 1992). Example (1.1) from (Zaitseva, 2000) illustrates the difference between Signed Russian and RSL:

(1.1) Russian:	*nad*	*stul-om*	*torsher*
	above	chair-ins	floor_lamp
Russian Signed:	ABOVE	CHAIR	FLOOR_LAMP

RSL: $\left\{\frac{\text{RH:FLOOR_LAMP}}{\text{LH:CHAIR}}\right\}$

'There is a floor lamp above the chair'

The sentence 'There is a floor lamp above the chair' is signed very differently in Signed Russian and RSL. In the former, three signs are produced in the same order as in spoken Russian. The only difference is that Signed Russian typically lacks inflectional forms: thus, it does not express the instrumental case of the noun 'chair' in this sentence. In RSL, this sentence is produced with two simultaneous signs: the right hand articulates the sign FLOOR_LAMP, the left hand – the sign CHAIR, the relative position of these two objects is iconically reflected in the relative location of the two hands (Fig. 1.4):



Figure 1.4. RSL: 'There is a floor lamp above the chair'
(Zaitseva, 2000:59)

Signed Russian is not typically used in the Deaf community, but until recently, this was the language of official interpreting. It is also sometimes used by deaf and hard-of-hearing people who have not attended a school for deaf children and have acquired written Russian as their first

language. That is why socio-linguistic information on participants is particularly important in an RSL study.

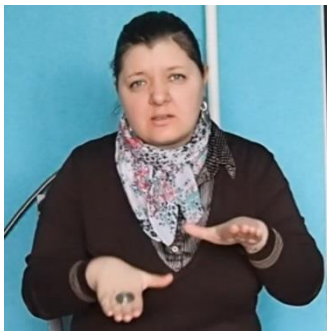
Despite the long history and wide usage, RSL was acknowledged as a language of the Russian Federation relatively recently. It acquired official status in 2012. As a consequence, there is still severe lack of language infrastructure and research. Until recently, most research of the deaf in Russia and other countries of the former USSR focused on pedagogy and psychology. The only exceptions were the work of Zaitseva who is considered a pioneer of RSL research (Zaitseva, 1987) and Grenoble who wrote an overview article of RSL grammar (Grenoble, 1992). Recently, three PhD theses on RSL have been defended (Filimonova, 2015; Kimmelman, 2014; Prozorova, 2009). Other studies include term papers by undergraduate and graduate Moscow students (Kimmelman, 2007; Prozorova, 2004; Shamaro, 2006; Tsȳpenko, 2008, among others) as well as works of a Novosibirsk research group (see, for example, Burkova, 2012; Filimonova, 2012). The Novosibirsk group also developed a corpus of RSL published on-line in 2014 (www.rsl.nstu.ru; hereafter referred to as the RSL corpus). Non-manual articulation in RSL has been addressed in the works of Bauer (2019) and Drozdenko (2018). To date, RSL remains largely understudied with many aspects of grammar and lexicon undescribed.

1.1.3. Structure of the sign

This section presents basic information about the structure of the sign in sign languages. It is traditionally accepted that the sign consists of the manual and non-manual parts. The manual part is articulation of the hands. The non-manual part includes movements of the torso, the shoulders, the head, and different parts of the face. Section 1.1.3.1 introduces the manual components, Section 1.1.3.2. deals with the non-manual components. In Section 1.1.3.2, special attention is paid to the articulation of the mouth, since it plays an important role in the structure of SASSes.

1.1.3.1. Manual components

The manual part of the sign consists of smaller structural elements. The amount of these elements is different in different accounts. While in some frameworks, the sign is built from as little as three components (Stokoe, 1960), others propose an extensive phonological system (Brentari, 1998). It is widely accepted that the structural elements of the sign are clustered into two groups, i.e. manual and non-manual components. The manual components describe the form of the hand(s). According to the most general view, which is accepted in this dissertation, they include hand configuration, hand orientation, location, and movement. The hand configuration is the form of the hand during the sign production. For example, in RSL, the hand can be flat (as in the sign WALK, Fig. 1.5a), closed in a fist (as in the sign COLD, Fig. 1.5b), have a stretched index finger (as in the sign NEAR, Fig. 1.5c), etc.



(а) WALK [Af3; 02:03.7]



(б) COLD [Af3; 05:49.8]



(в) NEAR [Af3; 04:32.1]

Figure 1.5. RSL signs with different manual components

The hand orientation can be static, or it can change during the sign production. In the examples above, the hands are oriented horizontally (1.5a), they are placed on the ulnar side with the fingers away from the signer (1.5b), and the active hand is oriented diagonally towards the top-left corner of the signing space (1.5c). The location is the place of the articulation of the sign. In Figures 1.5a-b the signs are articulated in the neutral space in front of the signer. In Figure 1.5c, the sign is articulated on the nose. Finally, the movement is a complex component which includes direction, trajectory, size, repetition, and, sometimes, speed. For example, in the sign WALK (Fig. 1.5a), the hands move in alternating arcing movements, imitating the walk; in the sign COLD (Fig. 1.5b), the hands perform simultaneous repeating small movements towards and away from the signer; in the sign NEAR (Fig. 1.5c), the active hand touches the nose several times.

An important quality of sign components, discovered by Stokoe (1960), is the possibility to act as minimal distinctive units. Consider the RSL pairs MAN versus WOMAN and TUESDAY versus WEDNESDAY (Fig. 1.6 and 1.7). The former two signs differ in the place of articulation (the temple versus the chin), the latter ones – in handshape (versus [4]).



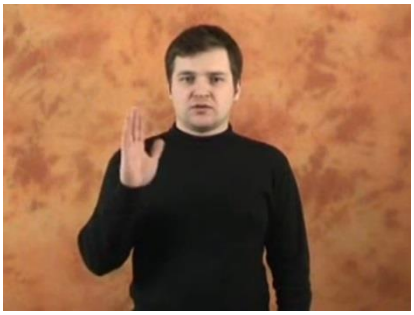
(a) MAN



(b) WOMAN

Figure 1.6. RSL signs that differ in place of articulation (www.spreadthesign.com)

[4] Images of handshapes in the text are created with the font of the Center for Sign Linguistics and Deaf Studies (CSLDS, CUHK).



(a) TUESDAY



(b) WEDNESDAY

Figure 1.7. RSL signs that differ in hand configuration
(www.spreadthesign.com)

As sign components can form minimal distinctive oppositions, they are frequently compared to spoken language phonemes. An important difference between these two entities is the simultaneous expression of sign language components and, typically, the sequential use of spoken language phonemes. In order to differentiate between the two notions, Stokoe (1960) proposed the term 'chereme' for structural elements of the sign. However, the term did not settle in sign language linguistics.

Various notation systems have been developed to enable formal and machine-readable descriptions of signs. The first one was proposed by Stokoe et al. (1965) for ASL. It was phonological and provided specifications of three sign components (handshape, location, and movement) with a finite set of values for each component (nineteen handshapes, twelve locations, and twenty-four movements). Nowadays, phonetic notation systems with a detailed sign description, which can be potentially applied to any sign language, are more widespread. Consider, for example, the SignWriting notation, developed by Sutton (1981, 1996), and the HamNoSys system (Hanke, 2004), first published in1987 (Prillwitz et al., 1987). The latter is used in this project (see Chapter 2 'Methodology' for a detailed discussion).

1.1.3.2. Non-manual components

Along with the hands, signers use other parts of the body in communication. These parts of the body typically include the chest, the head, the whole face, as well as the eyebrows, the eyes, and the mouth. These non-manual elements have been argued to express various grammatical, discourse, and lexical meanings (Boyes-Braem & Sutton-Spence, 2001). This section discusses one non-manual articulator which plays an important role in the semantics of SASSes, i.e. the mouth. It introduces the terminology and classification of mouth movements which is used in the thesis.

With respect to its connection to the spoken language of the community, the mouth articulation is divided into two types: *mouthing* and *mouth gestures* (Crasborn et al., 2008; Boyes-Braem & Sutton-Spence, 2001). Mouthing is the product of direct contact with the spoken language of the community. It is the silent articulation of spoken language words. An example from RSL is the articulation of the Russian word 'remember', i.e. *pomnit'*, during the production of the sign REMEMBER.



(а) *p* (б) *o* (в) *mn* (г) *it'*

Figure 1.8. Mouthing *pomnit'* 'remember' in the RSL sign REMEMBER
[Tf2; 00:34.6]

Although originally mouthings are borrowings from spoken languages, they have been argued to be fully integrated into the morpho-syntactic structures of sign languages (Vogt-Svendsen, 2001; Crasborn et. al, 2008). Their functions include disambiguation of signs with the same manual part (as NGT signs BROTHER and SISTER), creating complex meanings when paired with semantically incongruent manual signs (NGT sign EAT paired with the mouthing *brood* 'bread' means 'to eat bread'; example from Crasborn et al, 2008), and differentiating between different types of signs. With respect to the latter, mouthings have been claimed to occur more regularly with nouns, than with verbs and adjectives; and more regularly with core, than with peripheral signs (see a detailed discussion of these notions in Section 1.1.5 below).

The second type of mouth articulation is mouth gestures. Unlike mouthing, mouth gestures are believed to be created within sign languages themselves. The set of these elements is not homogenous, it consists of, at least, three classes: adverbial, echo-phonological, and semantic mouth gestures[5]. Adverbial mouth gestures express an additional piece of information to the one carried by the manual part of the sign. Prototypically, this is the meaning of degree or mode of action (Crasborn et al., 2008). Thus, in the example below, the British Sign Language (BSL) sign DRIVE is accompanied by the non-manual articulation /mm/ (the lips are relaxed and slightly protruded). This mouth gesture has the meaning 'with no effort'. Therefore, the whole sign expresses the idea 'to drive in a relaxed manner'



Figure 1.9. BSL sign DRIVE (in a relaxed manner) (Lewin & Schembri, 2011: 94)

With nominal signs, adverbial mouth gestures function as modifiers. In Figure 1.10, the Norwegian Sign Language (NSL) manual sign FLOWER is co-articulated with the mouth gesture

[5] In some works, an additional type of mouth gestures is distinguished i.e. mouth activity in the context of the whole face activity (Crasborn et al., 2008; Johnton et al., 2016). In this type, mouth acts as a part of a global facial expression (such as, the expression of disgust or happiness). Since mouth in these expressions does not act as a separate articulator, I do not discuss it further.

/fu/ (the lips are slightly open and protruded, the lip corners are slightly raised) that means ‘small’. The whole sign, therefore, acquires the meaning ‘small flower’.



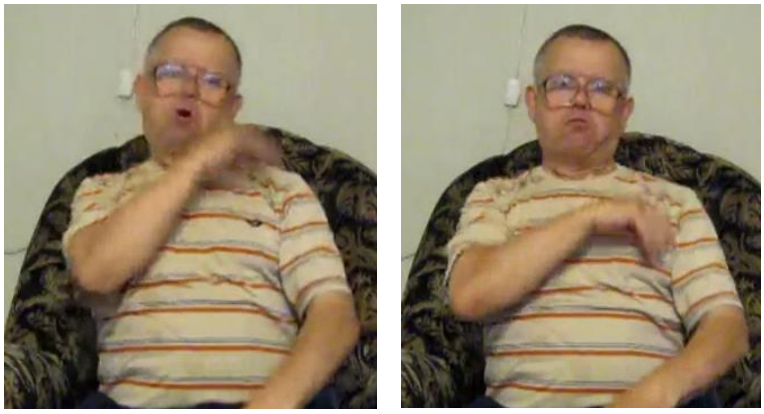
Figure 1.10. NSL sign FLOWER (small) (Vogt-Svendsen, 2001:22)

Echo-phonological mouth gestures are mouth movements that ‘mirror’ manual movements of the sign. They were first discovered and named so by Bencie Woll on the material of BSL. The ‘mirroring’ can take different forms. For example, the change of the hand aperture from open to closed (as in  → ) leads to the closing of the mouth (as is illustrated in Fig. 1.11); the opening of the hands, on the contrary, causes the opening of the mouth; small repetitive finger movements lead to the constant air exhalation, etc.



Figure 1.11. BSL sign DISAPPEAR with echo-phonology (Crasborn et al., 2008:50)

Echo-phonology is claimed to be semantically empty and to represent an obligatory component of the sign structure. This holds true for, at least, some RSL signs. For example, the sign CAN has an obligatory echo-phonological mouth gesture /ap/ (Fig. 1.12). Without it, the sign is considered ungrammatical. It cannot be co-articulated with the silent Russian word *moch’* ‘can’ either.



(а) *a* (б) *p*

Figure 1.12. RSL sign CAN with the obligatory echo-phonological mouth gesture /ap/ [RSL corpus][6]

In the third mouth gesture type, which is referred to as 'enacting', the mouth iconically enacts a physical action. For example, in the BSL sign INFLATE-BALLOON below, the lips are pressed and the cheeks are puffed to imitate the action of inflating a balloon.

[6] The example can be accessed at http://rsl.nstu.ru/data/view/id/15/t/106960/d/107410



Figure 1.13. BSL sign inflate-balloon with enacting mouth articulation (Lewin & Schembri, 2011:93)

In this example, the meaning of the mouth articulation 'doubles' the meaning of the manual sign. It is also possible for enacting to perform an action different from the action expressed by the hands. Crasborn et al. (2008) give an example from BSL, where the hands articulate the sign RUN, the face imitates screaming, and the whole sign expresses the complex action of running while screaming. These usages bring some cases of enacting close to adverbials.

Sandler (2009) distinguishes a fourth type of the sign language internal mouth articulation, i.e. iconic mouth gestures. As their name states, these mouth gestures iconically represent visual aspects of the situation, described by the hands. The figure below depicts three signs from the retelling of the cartoon 'Canary Row' in Israeli Sign Language (ISL). In 1.14a, Sylvester crawls upwards insight a tight pipe. While the hands show the movement of the cat, the face represents the idea of tightness. In 1.14b, the signer describes a bowling ball. The dominant hand in this sign shows a classical bowling grip, and the face shows the spherical shape of the ball. Finally, in 1.14c, the sign depicts a zigzag shape of the pipe. Here the lips 'double' the movement of the hands, showing a zigzag twist.



(а) CAT-MOVES-IN-TIGHT-PIPE (б) BOWLING-BALL (в) ZIGZAG-SHAPED

Figure 1.14. Iconic mouth gestures in ISL (Sandler, 2009: 28)

As Sandler (2009) argues, the lips in these mouth gestures functionally perform the same role as co-speech gestures. Their goal is to provide additional visual information to the meaning expressed by the manual components. Practically, however, iconic mouth articulation often falls into one of the three aforementioned groups. For example, the examples in Figures 1.14a-b can be analyzed as adverbials, and in 1.14c, as echo-phonology.

The figure below summarizes the different types of mouth movements observed in sign languages. The dashed arrow leading to the type 'iconic' means that the separate status of this type is uncertain.

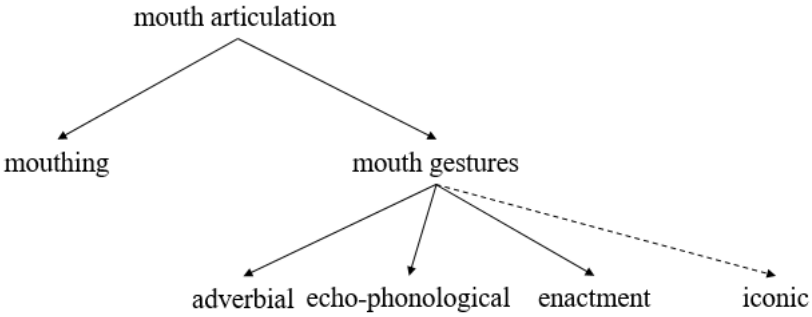


Figure 1.15. Types of mouth movements in sign languages.

1.1.4. Iconic devices in sign languages

Sign languages of the world widely use iconic imagery in their signs. It has been noted that the way in which hands depict images in iconic signs is not uniform. Rather, different iconic strategies are used depending on the nature of the resemblance between the object and the sign. In his combined account for iconic signs and gestures, Kendon (2004) distinguishes three fundamental representation techniques, i.e. *modeling*, *enactment* (or *pantomime*), and *depiction.* In *modeling,* a body part is used as if a model for some object (such as connecting curved index and thumb in the handshape to represent a small round entity, for example, a coin). In *enactment*, a body part engages in a pattern of action that is similar to some actual pattern of action that is being referred to (such as moving two hands in fists in alternating semi-circular movements in front of the signer to represent a person driving a car). Finally, in *depiction*, a body part 'draws' an object in the air (such as outlining a rectangular shape in the space in front of the signer to represent a painting). A more detailed classification of representation strategies is proposed in Streeck (2008). Although his model is built to account for iconic gestures, it can be applied to sign language signs as well. Streeck distinguishes twelve 'depiction practices'. Besides *modeling*, *drawing* (Kendon's *depicting*), and *pantomime*, the practices include *bounding* (a gesture depicts length, width, or height by a relative position of two hands or the thumb and the index), *handling* (objects are indirectly represented by a schematic act that 'goes with' them), *making* (a gesture simulates the making or shaping of an object), among others.

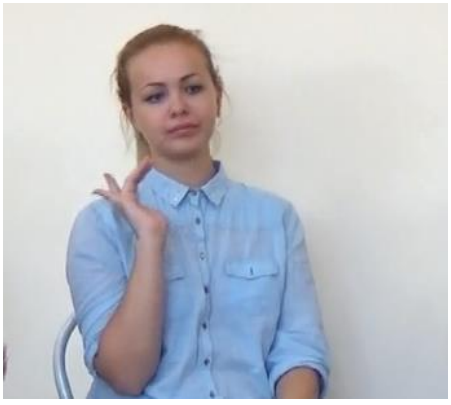
Both Kendon and Streeck attribute a particular representation strategy to a sign/gesture as a whole. Some other researchers proposed an alternative approach that describes iconicity on the sub-sign level. The motivation behind this view lies in the complex iconic imagery some signs entail. This complexity can be disentangled when separate components of these signs are treated separately. In her influential model of iconic signs, Taub (2004) distinguishes several *iconic devices* attributed to separate sign components. These include (but are not limited by):

- shape-for-shape iconicity;
- path-for-shape iconicity;
- space-for-space iconicity;
- size-for-size iconicity;
- body-for-body iconicity.

In shape-for-shape iconicity, the *shape of the articulator* is used to encode images of similar shapes. For RSL, this device is illustrated in Figures 1.16 and 1.17. In these signs, the arm / the configuration of the hand iconically depicts the shape of the object. In 1.16, which shows the sign TREE, the passive arm represents the surface on which the tree is standing, and the active arm stands for the tree itself: the forearm corresponds to the tree trunk, and the hand with the spread fingers shows the tree crown. Figure 1.17 depicts the sign ROCKING.CHAIR. The middle and ring fingers stand for the chair seat, and the index and little fingers represent the chair back. The movement of this sign is also iconically motivated: it imitates the rocking movement of the chair.



Figure 1.16. RSL sign TREE
[Af2; 01:23.1]



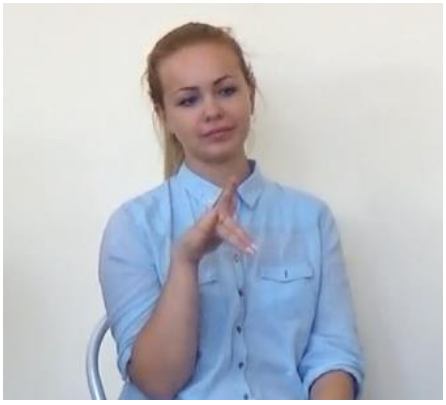


Figure 1.17. RSL sign ROCKING.CHAIR
[L; 05.48.2]

'Path-for-shape' iconicity represents itself in the *movement* of the hand(s). It either shows the movement of the object (as in the case with the rocking chair) or outlines the object's contour. For example, in the RSL sign MAST, illustrated in Figure 1.18, the hand's upward movement marks the straight shape and the vertical orientation of the mast. In the sign PLANK (Fig. 1.19), the hands move along the sides of a conceptual plank.



Figure 1.18. RSL sign MAST
[Al; 05:59.0]



Figure 1.19. RSL sign PLANK
[Ds; 03:41.8]

In 'space-for-space' iconicity, it is the *location* component of the sign that creates an iconic image. In signs using this device, the place of articulation is meaningful. It represents the location of an object in the mental space. Take, for example, the RSL sign TEAR. The stretched index finger in this sign touches the signer's cheek and makes a short downward movement along the surface of the cheek. The location of the hand at every moment of the sign production iconically shows the location of the tear. The same iconic device is used in so-called pointing signs, agreement verbs, and classifier constructions. These signs are introduced and described in Section 1.1.5 'Sign language lexicon'.



Figure 1.20. RSL sign TEAR
(www.spreadthesign.com)

In size-for-size iconicity, the size of articulation represents the size of the referent. There are several ways to iconically depict the object's size. Firstly, it can be represented via the relative position of the two hands (such as in the RSL signs BIG or SMALL, Fig. 1.21a-b). Secondly, if the iconic sign uses the signer's body to represent body parts, then the body provides the context in which we can figure out the referent's size, see an illustration in Fig. 1.22 (the RSL sign HEAD). Thirdly, Taub (2001) mentions the use of the non-manual component as an iconic device of representing the size, i.e. smaller, compressed mouth shapes for denoting 'small', and relaxed, wider mouth shapes for 'big'. For RSL, this distinction is discussed in Chapter 4.



(a)



(b)

Figure 1.21. RSL signs BIG (a) and SMALL (b)
(www.spreadthesign.com)



Figure 1.22. RSL sign HEAD
(www.spreadthesign.com)

Finally, in body-for-body iconicity, the whole body of the signer is profiled. Consider the example below. In the RSL sign BEAR, the whole body represents the body of the bear: the signer's hands stand for the bear's paws, the signer's torso stands for the bear's trunk, etc.

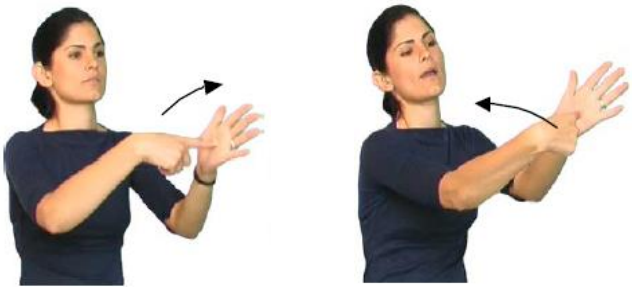


Figure 1.23. RSL sign BEAR
(www.spredthesign.com)

This model is further developed by Nyst (2016) who proposes a more fine-grained taxonomy of 'shape-for-shape' and 'size-for-size' iconic devices. Nyst's model of size and shape depiction is discussed in Section 1.2 'Size and shape specifiers: theoretical issues'. The sub-sign approach to iconicity adopted by Taub and Nyst has fundamental implications for the understanding of the nature of this phenomenon. If not the whole sign, but its smaller part applying an iconicity device, then several iconicity devices can be applied in a sign simultaneously. Indeed, both Taub (2004) and Nyst (2016) report cases where multiple iconicities are at work at the same time in their data. For example, the shape-for-shape device in a sign can co-act with the path-for-shape and the size-for-size devices. This is of primary relevance for the analysis of SASSes. Belonging to a so-called 'peripheral' group of sign language lexicon, SASSes have been claimed to iconically describe various aspects of the object's appearance simultaneously. Moreover, the meaning of the whole sign is presumably compositionally formed from the meaning of its separate components. I take this assumption as a starting point of my investigation. The next section explains the heterogeneity of sign language lexicon and introduces the distinction between the 'core' versus 'peripheral' signs.

1.1.5. Sign language lexicon

Sign language signs are not uniform but differ with respect to their conventionalization, or the level of 'entrenchment' in the lexicon. At the one end of this continuum are signs with a well-established form and meaning. These signs do not change in different contexts. They can be unambiguously interpreted without a context, and they are used the same way by different members of the community. These signs are typical members of sign language dictionaries. They are referred to as 'core' or 'fully lexicalized' signs (Johnston & Schembri, 2010). Examples of fully-lexicalized signs in RSL are MAN, WOMAN, TUESDAY, WEDNESDAY (Fig. 1.6, 1.7). At the other end of this continuum are 'partly lexicalized' (or 'peripheral', 'productive') signs that do not have a constant form associated with them. Instead, they change their form depending on the context they are used in. Without this context, these signs cannot be fully interpreted. Consider the example below.



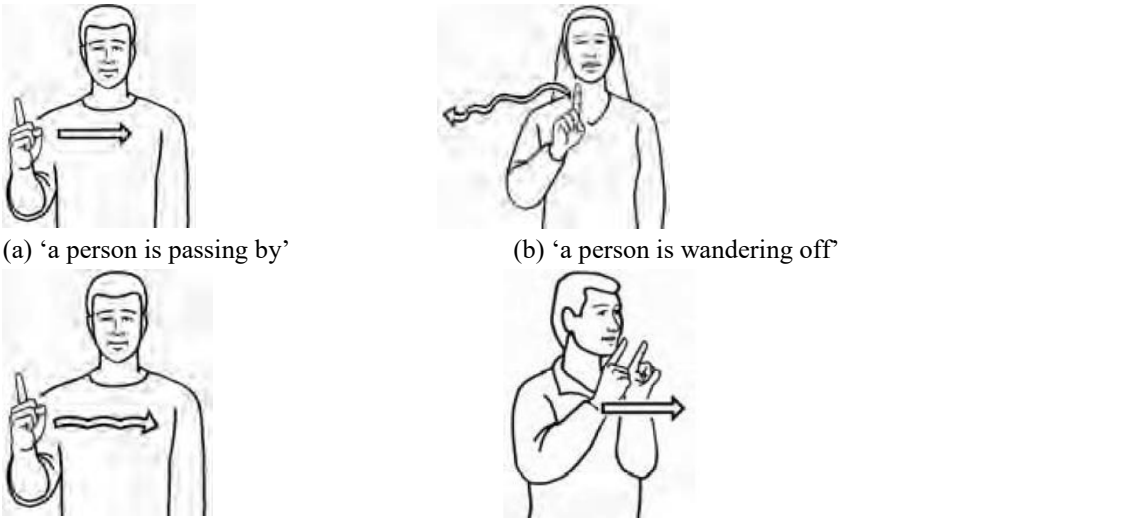
(a) ‘I show you’ (b) ‘you show me’

Figure 1.24. ISL indicating verb SHOW

(Sandler & Lillo-Martin, 2001)

Figure 1.24 illustrates the use of the so-called ‘indicating’ verb SHOW in ISL. The initial and final locations of the hands in this sign are not fixed, but depend on the participants of the situation: the hands move from the agent towards the recipient. These verbs are sometimes analyzed as having agreement morphemes (Lillo-Martin & Klima, 1990; Padden, 1990). See, however, (Liddell, 2003) for an alternative analysis.

Figure 1.25 illustrates another group of partly-lexical signs, i.e. sign language entity classifier predicates. Handshape in these signs denotes a class of objects (in this case, people), while location and movement components reflect displacement of the object in space. Different types of movement and start/end locations of the referent leed to different forms of these signs.



(a) ‘a person is passing by’ (b) ‘a person is wandering off’

(b) ‘a person is strolling by’ (d) ‘two persons are moving forward, one behind another’

Figure 1.25. Auslan entity classifier constructions

(Johnston & Schembri, 2007)

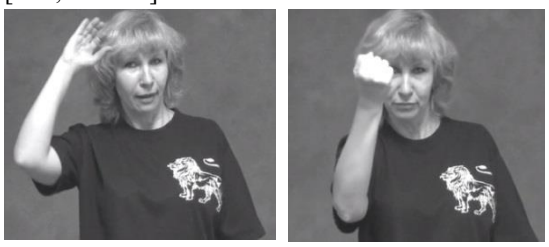
SASSes also belong to partly-lexicalized signs. As Figure 1.2 shows, they change their form depending on the context. Figure 1.26 gives another example of this. In this figure, SASSes describing pointed objects are represented. You can see that they change their manual components depending on the object they describe. Thus, the pointed elbow (1.26a) is depicted with the active hand in the configuration → moving away from the passive elbow in a straight line. The pointed knife (1.26b) is described with the hand in the configuration → located in the neutral space in front of the signer and moving away from the passive index finger in a straight line. Finally,

the pointed horn (1.26c) is represented by the active hand in the configuration → located on the head and moving away from it in an arcing line.



(a) SASS:pointed (elbow)
[Vf1; 03:51.6]

(b) SASS:pointed (knife)
[Vf1; 02:39.4]



(c) SASS:pointed (horn)
[Vf1; 03:26.7]

Figure 1.26. Different forms of SASSes denoting quality 'pointed' in RSL

A prominent quality of these signs is compositionality. Their different components express different aspects of the situation, and the meaning of the whole sign is formed out of the meanings of the parts. Importantly, peripheral signs express their meaning via the simultaneous use of various iconic devices. For example, in Figure 1.26a, which depicts a pointed elbow, the place of articulation of the sign refers to the location of the described object (space-for-space iconicity), the hand configurations classify the elbow as a three-dimensional referent (shape-for-shape iconicity), the hand orientation and the movement direction show the orientation of the elbow (space-for-space iconicity), the movement trajectory marks its overall shape (path-for-shape iconicity), and, finally, the change of the hand aperture indicates that the object in question is 'thick' in the middle and 'thin'at the end, i.e. pointed (size-for-size iconicity). The possession by these components of well-defined meanings contrasts them to structural elements of non-iconic fully-lexicalized signs. See, for example, the RSL sign GREEN below. None of this sign's components have a meaning, the sign acquires the idea 'green' as a whole. Due to this difference, signs like GREEN are usually treated as *monomorphemic*. Since the components in the sign GREEN do not carry any semantics, the sign itself is the smallest meaningful unit, i.e. morpheme.



Figure 1.27. RSL sign GREEN
(www.spreadthesign.com)

In contrast, partly-lexical signs are treated as *polymorphemic*: different components in these signs (and sometimes parts of the components) carry separate meanings and, therefore, act as the smallest meaningful units. This terminology is adopted in my work and reflected in the title of the dissertation 'Size and shape specifiers in Russian Sign Language: a morphological analysis'. As Chapter 2 'Methodology' discusses, I investigate SASSes by describing their components, i.e. morphemes, one by one. Therefore, I call this analysis 'morphological'.

1.2. Size and shape specifiers: theoretical issues

This section presents theoretical issues with SASSes that motivate the research questions of this dissertation. Section 1.2.1 describes previous accounts of SASSes and discusses their status as a separate group within sign language lexicon. Section 1.2.2 deals with the semantic organization of SASSes, and section 1.2.3 discusses the categorical versus gradient nature of SASSes' components. The background literature for research question 4 of my thesis on the semantic categorization of SASSes in comparison to spoken language qualitative lexemes is presented in the introductory section of Chapter 5.

1.2.1. Defining size and shape specifiers

Research question 1 of my dissertation is "What are the features of SASSes and how do they differ from other signs?". The term *Size and Shape Specifiers* was introduced at the end of the 1970s. Newport and Bellugi in their paper (1978) discuss the representation of Rosch's three categorization levels in ASL, i.e. 'superordinate' – 'basic'- 'subordinate'(as in *musical instrument – piano – grand piano*). They observe that compounds with the second part outlining the contour of an object are sometimes used for the lowest level of categorization, see some examples below. They refer to this second part of the compounds as SASSes.

(1.2) brick: RED-RECTANGULAR
photograph: PICTURE-RECTANGULAR
credit card: SIGNATURE-RECTANGULAR
bench: CHAIR-OBLONG

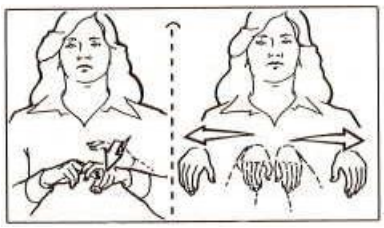


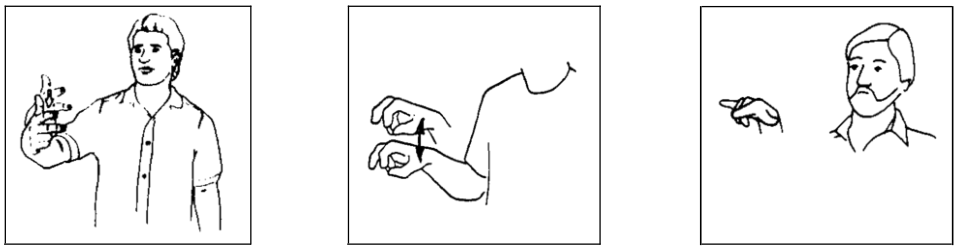
Figure 1.28. ASL subordinate term 'bench': CHAIR-OBLONG
(Newport & Bellugi, 1978: 67)

Newport and Bellugi (1978) claim that SASSes are conventionalized gestures that do not describe precise dimensions of the shape, but, rather, denote general classes of objects. Importantly, this work discusses SASSes as parts of compounds exclusively and does not propose an analysis of SASSes as individual signs.

The first morphological account for SASSes was proposed in (Supalla, 1982, 1986). In his paper 'The classifier system in American Sign Language' (1986), Supalla distinguishes five classes of signs with meaningful hand configurations in ASL:

1. semantic classifier;
2. instrument classifier;
3. size-and-shape-specifier;
4. bodypart classifier;
5. body classifier.

In signs with semantic classifiers, the hand articulator represents the semantic category of the referent object:



(a) 'vehicle is located' (b)'small animal hops' (c) 'airplane flies'

1 .

Figure 1.29. ASL semantic classifier constructions
(a: Valli & Lucas, 1995:75,27; b: Supalla 1982:49,17; c: Supalla 1986:208,6, as cited in Zwitserlood, 2003: 18)

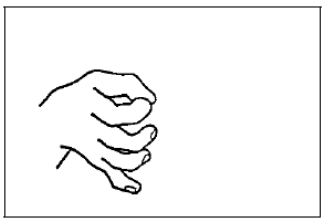
Instrument classifiers are hand configurations that represent either a mechanical instrument or a hand which acts on the object:



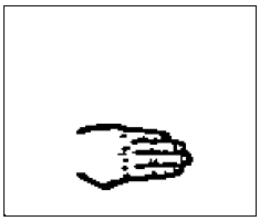
(a) ASL CL:'hold-cup' (b)SSL CL:'drill'

Figure 1.30. ASL and SSL instrumental classifiers
(a: Valli & Lucas, 1995: 79; b: Wallin, 1996: 114, as cited in Zwitserlood, 2003: 19, 20)

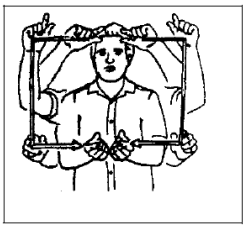
Size and shape specifiers represent various visual aspects of the referent object:



(a) ‘small round object’



(b) ‘wide flat object’

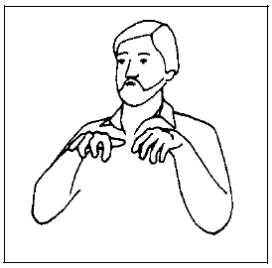


(c) ‘rectangular’

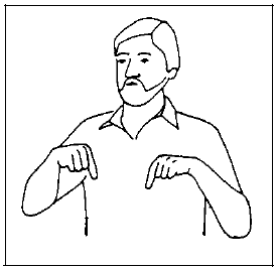
Figure 1.31. ASL SASSes

(Supalla, 1982: 27.7, as cited in Zwitserlood, 2003: 19, 21)

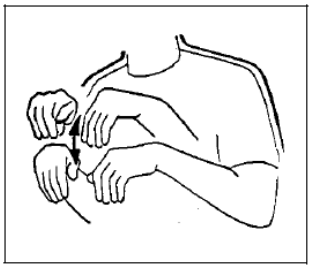
Finally, in body and body part classifier constructions, the body itself (or a body part) represents an entity:



(a) ‘claws’



(b) ‘legs’



(c) ‘animal hoops’

Figure 1.32. ASL body and body part classifiers

(Supalla, 1986: 209-10, as cited in Zwitserlood, 2003: 22-23)

According to this view, SASSes belong to the large group of sign language classifiers and are essentially *handshapes*, not independent signs. These handshapes function as morphemes combining with verbs of motion or location, which agree with the noun in various aspects of size and shape. A typical example of such combination in RSL is presented in Figure below:



Figure 1.33. RSL: ‘A plum fell from a plum tree’

[RSL corpus][7]

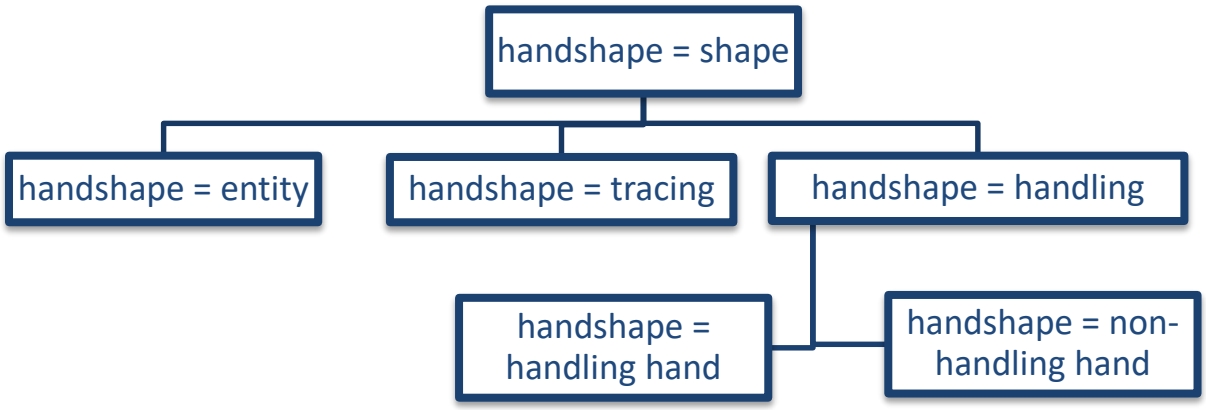
In Figure 1.33, the signer produces the phrase ‘a plum fell from a plum tree’ in RSL. Both hands in this phrase have the handshape , which iconically depicts the rounded shape of plums on a plum tree. A downward arching movement of the right hand depicts the falling of the plum. According to Supalla’s model, this is an instance of a verb root ‘to fall’ that combines with a SASS handshape. This handshape classifies the object of falling as small, rounded, and three-dimensional.

At the same time, Supalla (1986) acknowledges the existence of signs that depict the size and shape of objects not only with the handshape, but also with movement patterns. An example of such a sign is RECTANGULAR, presented in Figure 1.31c. The movement in this sign does not represent the motion of an object (as in Fig. 1.33). Instead, it contributes to the iconic image of the object’s form. Supalla calls these signs *tracing SASSes*. He claims that they are morphologically derived

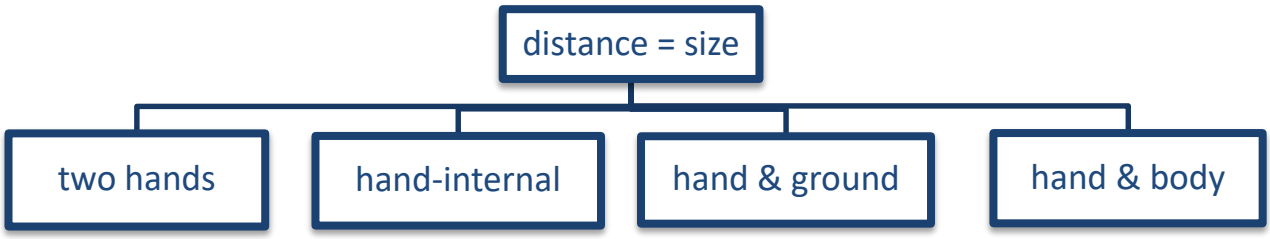
[7] The example can be accessed at http://rsl.nstu.ru/data/view/id/172/t/63940/d/64900

from SASS handshape (*static SASSes*) by adding a movement component: the hand traces a two- or three-dimensional outline of the referred object. Supalla notes that not every shape that can be sketched with the hands is grammatical in sign language. For example, the tracing movement in ASL tracing SASSes always starts with both hands together in one place; then one hand would move away in one direction, or both hands would move in opposite directions.

The view according to which SASSes do not constitute a separate group of elements in sign language lexicon, but rather are a part of a larger whole is shared by some other researchers, in particular, Nyst (2016) and Ferrara (2012). Nyst (2016) focuses her analysis of the depiction of size and shape in sign languages on iconic devices. She brings the diversity of attested depicting tools in this domain down to two main strategies, namely 'shape-for-shape' depiction and 'distance-for-size depiction' (both devices are also proposed in Taub's model, the latter is referred to by the name 'size-for-size' iconicity). The first strategy uses the shape of the articulator to depict the shape of an object. This object can be a non-hand three-dimensional entity (handshape = entity), a handling or a non-handling hand (handshape = hand), or a two-dimensional trace left by a part of the articulator as if it was dipped in paint. The second strategy consists in depicting the object's size via the distance between two points, which can be (1) the two hands; (2) the thumb and fingers of one hand; (3) a hand and the ground; (4) a hand and a body location. The figure below represents the graphs summarizing these types (taken from Nyst, 2016:82, 89).



(a) 'Shape-for-shape' iconicity



(b) 'distance-for-size' in space iconicity

Figure 1.34. Nyst's model of size and shape iconicity (2016)

The movement component of the signs depicting the size and shape of objects is presented as a secondary tool. Nyst argues that when the movement of a sign contributes to the iconic image of the referent's form, it does so in a dependent way. Therefore, although Supalla offers a morphological account of peripheral signs with meaningful handshapes, whereas Nyst develops a model of iconic tools of size & shape depiction, these two approaches have a lot in common with respect to how they treat size and shape elements. Both approaches see the tracing movement in SASSes as a secondary tool that can combine with a SASS handshape (or/ and location in Nyst's account) to create a more complex iconic image. Moreover, in both accounts, signs that denote the object's location or displacement (Supalla's semantic classifier, instrument classifier, and static SASS constructions) and the signs that trace the outline of the object (Supalla's tracing SASSes) are treated as elements of one group.

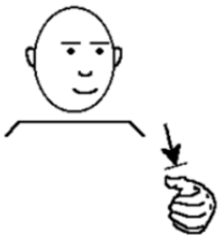
Ferrara (2012), in her account of peripheral signs in Auslan, shares the view according to which SASSes are part of a larger group. Following Liddell (2003) and Johnston & Schembri (2007), she refers to this group as 'depicting signs'. This term differs from Supalla's 'classifiers' in that it does not presuppose any link between these signs and spoken language items (Supalla chose the term 'classifier' to draw the connection with spoken language verbal classifiers). Importantly, SASSes in Ferrara's account are not handshapes, but independent signs. Their semantics is formed through a cognitive process of real-space blending, where all sign components equally contribute to the meaning of the whole. SASSes constitute one group of depicting signs out of four:

1) signs depicting the movement and displacement of entities (DSM);
2) signs depicting the location of entities (DSL);
3) signs depicting the handling of an object (DSH);
4) signs depicting the size and shape of an entity (DSS), i.e. SASSes.

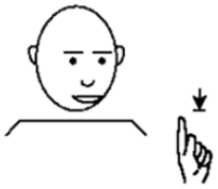
The close connection of SASSes to other types of depicting signs and the fundamentally similar nature of all the four types shows itself in cases where the categories overlap. Thus, as Ferrara argues, many signs depict the size and shape of an entity (DSS) while also depicting a location (DSL); and signs depicting the movement of an entity (DSM) can also depict the entity's shape (DSS) to some extent.

An alternative line of thought on SASSes is represented, first of all, by works of Zwitserlood (2003) and Fornasiero (2020). Thus, Zwitserlood (2003) argues for a revised classification of meaningful handshapes in sign languages. She makes this point by comparing Supalla's static (Fig. 1.33) and tracing (Fig. 1.31c) SASSes. Zwitserlood argues that the main common property of these two types of SASSes is the fact that they represent the size and shape of a referent. However, they differ in the means they use to do it. In static SASSes, the shape is represented solely by the hand configuration. In tracing SASSes, the hand follows a trajectory through space that traces the shape of the referent, while the hand configuration contributes to meaning with respect to this shape (Zwitserlood, 2003). Zwitserlood lists differences between static and tracing SASSes, based on the material of the Sign Language of the Netherlands (NGT):

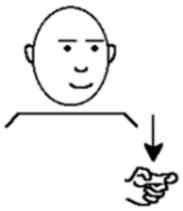
1. Both types of SASSes can be used to locate a referent in signing space. However, when a static SASS is used, it is placed at a locus in signing space by means of a small movement of the hand towards the locus. When a tracing SASS is used an outlining movement takes place at a locus in signing space:



(a) be-LOC$_{right}$-CL: cyl_ent
'There is a cylindrical entity to the right'



(b) be-LOC$_{right}$-CL:l&t_ent
'There is a long and thin entity to the left'



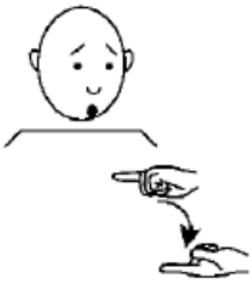
(c) be-LOC$_{right}$-cyl_ent
'There is a cylindrical entity to the right'



(d) be-LOC$_{right}$-round_ent
'There is a flat round entity to the right'

Figure 1.35. Localization of a referent with static (a, b) and tracing (c, d) SASSes in NGT (Zwitserlood, 2003: 154)

2. Static, but not tracing, SASSes can be used to indicate an orientation change or a path motion of a referent.

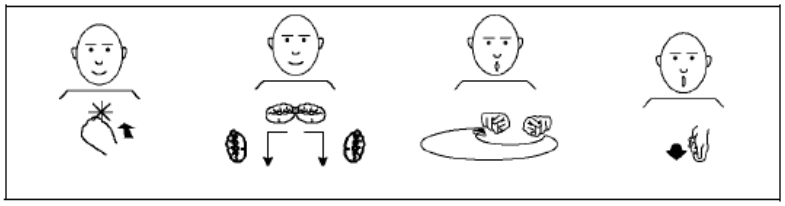


LOC_{right}-move.down-CL:l&t_ent
'A/the pen to the right falls down'

Figure 1.36. Indicating a path motion of a referent with static SASSes in NGT
(Zwitserlood, 2003: 156)

In tracing SASSes, the movement component is necessary for outlining the referent's form and is not connected in any way to its path. Thus, without movement, the sign in (1.35c) would not indicate a cylindrical entity, but a flat (small) round entity, the sign in (1.35d) would not indicate a round entity, but a dot or a thin entity.

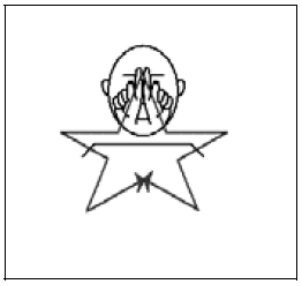
3. In contrast to static SASSes, tracing SASSes are never used to track reference in discourse.
4. Tracing, but not static, SASSes can function as modifiers:



I table kidney-shaped buy
'I bought a kidney-shaped table'

Figure 1.37. NGT tracing SASSes that function as modifiers
(Zwitserlood, 2003: 162)

5. When a signer uses a static SASS, he/she often represents the shape of the referent globally or focuses on a part of its shape that can be represented easily or that is considered important. In contrast, tracing SASSes can be very specific about the shape of the referent (see, for example, Figure 1.38). Owing to the expressive power of the movement component, these signs, in contrast to static SASSes, form an open class with an infinite number of elements.



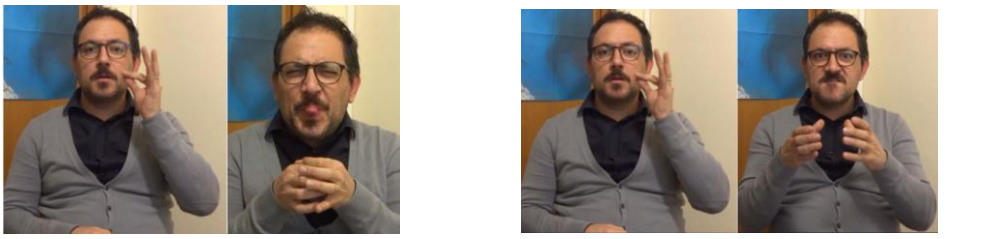
be-LOC_{center}-flat_star-shaped_ent
'There is a flat star-shaped entity (vertical) here at the center'

Figure 1.38. NGT SASS depicting specific shape
(Zwitserlood, 2003: 157)

Drawing on these differences, Zwitserlood (2003) argues for a revised classification of sign language meaningful handshapes. According to this revised classification, Supalla's (1986) semantic classifiers, instrumental classifiers, and static SASSes should be combined in the sign language classifier group, while tracing SASSes should form a separate class of signs.

This view is adopted by Fornasiero (2019, 2020) in her analysis of evaluative morphology in Italian Sign Language (LIS). Fornasiero investigates strategies of encoding diminutive,

augmentative, endearment, and pejorative features in LIS. She identifies SASSes as one of the devices to express the meanings 'big' and 'small', as in:



(a) CUP SASS-rounded.DIM (b) CUP SASS-rounded.AUG

Figure 1.39. Expression of augmentative and diminutive meanings with SASSes in LIS (Fornasiero, 2019)

Note that strictly speaking in these signs there is no movement at all. However, these SASSes are similar to prototypical tracing SASSes (Fig. 1.31c, 1.37, 1.38) in that they function as adjectives and cannot possibly depict the object's displacement. Basing on the morphosyntactic features of these signs, Fornasiero sets them apart from verbal depicting signs that use the movement component to show the (change of) the object's position in space.

As this section shows, there is no consensus in the linguistic community on how to treat SASSes. In particular, their status as independent signs versus sub-sign elements and the belonging to a larger group of sign language lexicon are under debate. In my work, I adopt Zwitserlood's distinction between the iconic peripheral signs that use the movement component to show the object's displacement/location and the signs that do not do that, and I refer to the latter group as SASSes. These are the signs that constitute the object of my research. They can have a tracing movement, or they can be produced without movement at all (as in Fig. 1.39). Importantly, they can not have a movement that would show their position in space. My dissertation analyzes the properties of these signs in RSL, defines their semantics and their status in the RSL lexicon. The one-by-one analysis of sub-sign elements of RSL SASSes allows us to determine whether all components of these signs equally contribute to the semantics of the whole or some of them form the basis of the size & shape depiction, while the others are secondary. The advantages of treating tracing SASSes as a separate group and the implications for the theoretical model of these signs are presented in the discussion chapter of this thesis.

1.2.2. Semantic structure of size and shape specifiers

There is a general agreement among sign language linguists that SASSes are highly iconic and that their meaning is compositionally formed from the meanings of the parts. Take as an example the depiction of the star in Figure 1.38 above. The translation provided in Zwisterlood (2003:157) 'There is a flat star-shaped entity (vertical) here in the center' can be decomposed into a set of smaller meanings. Each of these meanings maps onto a particular sub-sign element. Thus, the flatness of the object is expressed by the stretched index handshape; the star shape is expressed by the movement trajectory; the orientation of the object is shown via the hand orientation and the movement direction; finally, the central location of the object is expressed with the place of articulation in the neutral space in front of the signer. Additionally, the extent of the movement shows the size of the star. This example illustrates the default set of meanings that can be simultaneously expressed by a SASS sign: object's size, shape, location, and orientation. While the marking of the object's *location* and *orientation* by the corresponding SASS components does not

raise a lot of discussions, there exist different accounts of how *size* and *shape* meanings map onto sub-sign elements.

For example, there is no consensus on the type of meaning expressed by SASS **handshapes**. Zwitserlood (2003) argues that hand configurations in SASSes indicate the dimensionality of the entity that is outlined by hands. A very similar view, but in different words is expressed in (Lars, 2000). Lars states that the handshape in these signs describes the extension of the smallest dimension, while the movement describes the extension of the largest dimension. Other researchers propose to divide handshape into a set of smaller meaningful elements. Supalla (1986) in his morphological account of SASS handshapes proposes to distinguish four different morphemes expressed by the hand:

1) a general shape morpheme: straight (the hand is extended straight) vs. round (the hand is curved)
2) a dimension morpheme: thin (for straight objects: only index finger is involved; for round objects: index+thumb) vs. narrow (+middle finger) vs. wide (+third and little finger)
3) a size morpheme: big (for straight objects: + forearm; for round objects: the degree of openness) vs. small
4) an arrangement morpheme: solid (keeping fingers together) vs. intervals (fingers are set apart but parallel to each other) vs. spread out (fingers diverge across a flat or a curved plane in space)

The figure below illustrates some shape & dimension morpheme combinations:

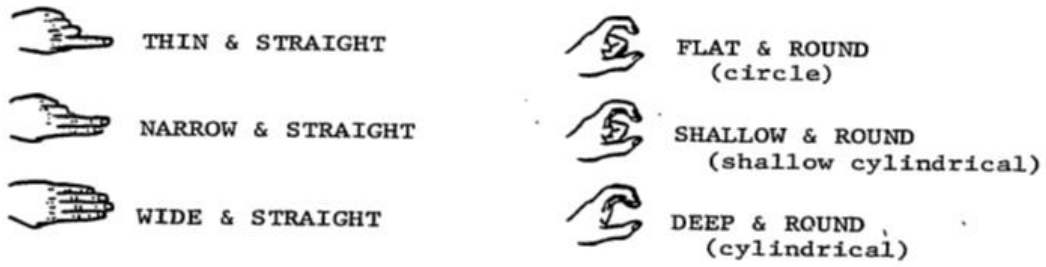


Figure 1.40. Combinations of shape and dimension morphemes in ASL SASSes
(Supalla, 1982:38)

In this list, the general shape (1) and the arrangement (4) morphemes mark the shape, while the dimension (2) and the size (3) morphemes mark the size. A similar view is presented in the work by Eccarius (2008) on handshape contrast in sign languages. Eccarius uses the phonological model of Brentari (1998) to describe the distribution of different size and shape meanings among the structural elements of the handshape. According to this model, the phonological form of the handshape can be described via two groups of features, i.e. selected fingers and joint configuration. Selected fingers are the most prominent fingers in the handshape, which can interact with other parts of the body. For example, the handshape ☝ has a selected index finger, 🤏 – index and thumb, 🖐 – four fingers and thumb. The joint configuration defines the form of the selected fingers. They can be straight (☝), bent (☜), curved (🤏), they can touch the thumb (🤌), or be flexed (✊). The model is presented in Figure below. Note that the node JOINTS has two branches, i.e. base joints and non-base joints. The base joint is located at the base of the finger close to the palm, whereas the non-base joints are located closer to the finger extremity. In size&shape depicting handshapes, according to Eccarius (2008), the base joints and the quantity of the selected fingers mark the size

of a referent, while the non-base joints mark the shape of the referents. This analysis is adopted by Fornasiero (2019).

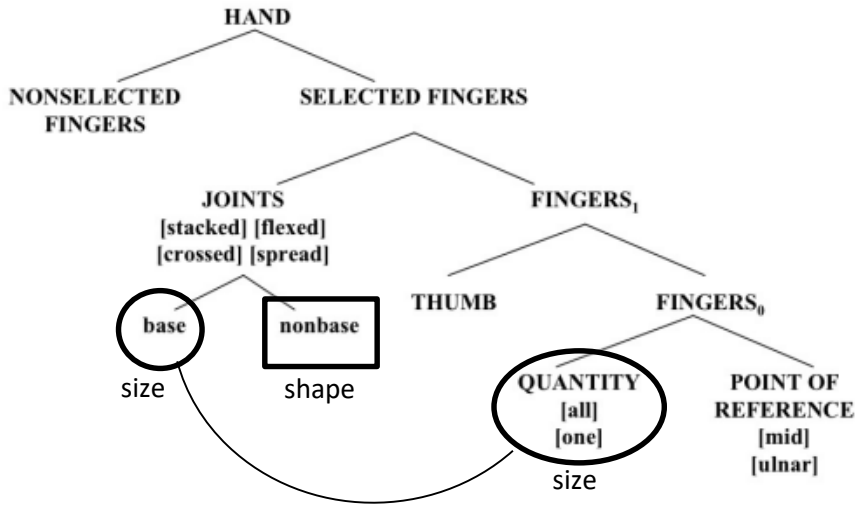


Figure 1.41. Phonological structure of handshape with features that depict size & shape of objects in SASSes
(Brentari, 1998; Eccarius, 2008)

Non-base joint configuration in this model refers to the rounded versus the straight shape of selected fingers; base joint configuration is responsible for the hand aperture; and quantity of selected fingers is Supalla's dimension morpheme that determines whether the depicted referent is flat, shallow or deep (thin, narrow, or wide in case of two-dimensional entities).

Besides handshape, another point of discussion with respect to the semantic structure of SASSes concerns **non-manual** components. While some researchers do not attribute any importance to non-manuals in expressing the meanings of size & shape (Supalla, 1986), others acknowledge an important role they play in the semantics of these signs. Fornasiero (2018) argues that non-manuals are the main carriers of the evaluative meanings in LIS. In particular, squinted eyes and protruded tongue accompany SASSes depicting *small* objects, while furrowed eyebrows and teeth biting the lower lip accompany SASSes depicting *big* objects. The meanings 'small' and 'big' can be also conveyed by manual features (distance between the hands, hand aperture), but this is not necessary. As long as a specific non-manual is present in the sign, the meaning is clear, see examples below.



(a) BOX.aug (b) BOX.dim

Figure 1.42. Non-manual features denoting the meanings 'big' and 'small' in LIS
(Fornasiero, 2018: 23,24)

Nyst (2007) also underlines the importance of the non-manual articulation in depicting the object's size. In her PhD dissertation presenting a descriptive analysis of Adamarobe Sign Language (AdaSL)[8], Nyst distinguishes four mouthings conveying the idea of size: [abo] 'big', [spread lips, teeth closed + ttt] 'small', [spread lips, teeth closed] 'tall', and [spread lips, teeth closed] 'short'. She argues that these non-manuals convey a subjective judgment of the relative size of an entity, i.e. they mark it as being bigger or smaller than the norm. Elements of the manual sign (such as distance between the hands, distance between the thumb and fingers, and others), on the contrary, depict the absolute size of a referent. This means that the same manual sign can be accompanied by different mouthings depending on the depicted object. For example, the same absolute distance between the hands aligned with the sides of the signer's torso would be accompanied by the mouthing 'small' if the object is a cow, and 'big' if the object is a rat.

The final point of discussion with respect to the semantic organization of SASSes is how the size and shape meanings spread over the remaining components of the sign and whether all the components contribute equally to the meaning of the whole. As I already mentioned before, Supalla (1986) and Nyst (2016) see the role of the movement component in SASSes' semantics as secondary. According to Nyst, the movement can contribute to the depiction of size and shape, but it does so in a dependent way. Combining with a handshape denoting particular shape, the movement can depict a virtual elongation of the shape depicted by the hand. For example, the fist in AdaSL depicting signs expresses a sphere-like shape (as in Fig. 1.43a, where it is used to depict a breast in the sign WOMAN). Combined with a tracing movement, this handshape denotes elongated cylinders (as in Fig. 1.43b depicting horns of a cow).



(a) AdaSL sign WOMAN (b) AdaSL sign COW

Figure 1.43. Combination of iconic handshape and tracing movement in AdaSL depicting signs. (Nyst, 2016: 83, 85)

The movement can also combine with distance-for-size depiction devices and to express the change in size. For example, the upward movement combined with the sign HEIGHT.OF.ANIMAL (Figure 1.44) depicts the change in the animal's height, i.e. growing.

[8] AdaSL is the sign language used in the village of Adamorobe in the Eastern Region in Ghana.



Figure 1.44. AdaSL sign HEIGHT.OF.ANIMAL
(Nyst, 2016: 92)

Finally, the movement can indicate the size of the object by sequentially locating the hand at the object's opposing sides. This can be expressed simultaneously with the meaning of elongation. For example, in Figure 1.43b, the movement of the sign not only indicates that the depicted object is an elongated cylinder, but also shows how big the object is by stopping at a specific location to the side of the head.

Nyst's model of iconic tools for the depiction of size and shape allows for a typological comparison of different strategies used by sign languages in this domain. She tests this application of the model by comparing the depiction of size in six sign languages, three of Western European origin and three of West African origin (Nyst, 2018)[9]. The comparison shows that although all languages in the sample use SASSes to express the meanings in question, they differ significantly in the form of SASSes, which is motivated by different iconic devices. Western European sign languages show size by delimiting a stretch of space, mainly, hand-internally or with two hands (Fig. 1.45). West African languages, on the contrary, show a strong preference towards depicting size on the body. In these SASSes, the extreme end of the selected body part presents one delimiting point. The second point of delimitation is provided by one of the digits or by the opposing hand (Fig. 1.46; these signs are compared to RSL SASSes produced on the body in Section 3.3.2).



(a) NGT sign CUP



(b) NGT sign BIG

Figure 1.45. Signs delimiting a stretch of space in NGT
(Nyst, 2018: 356)

[9] The languages in question are NGT, LSF, Auslan versus AdaSL, Malian Sign Language, and Bouakako Sign Language.



(a) tip of the finger (b) full arm length

Figure 1.46. Signs delimiting a part of the body to depict size in AdaSL (Nyst, 2018: 357)

This study has important implications for the theory of the sign language iconicity, since it shows that the choice of a particular representation technique in the domain of size and shape is not solely defined by features inherent to the referent, but is also a subject of cross-linguistic variation. This is in line with the findings of Padden et al. (2013) on representation techniques selected to depict hand-held tools in sign language.

My thesis contributes to the typological observations discussed in Nyst (2018) by presenting an analysis of signs depicting size and shape in RSL. However, I have a different approach to the description of this domain. As I stated above, I adopt Zwitserlood's (2003) distinction between the verbal signs that describe the displacement/location of the referent versus the adjectival/nominal signs that depict the object's shape and size. I focus my analysis on the latter group. I do not assume in advance the unequal status of the sub-sign elements in SASSes. As the final chapter of my dissertation discusses, I believe that the secondary role given to the movement component by Nyst (2016) and Supalla (1986) comes from treating adjectival tracing SASSes and verbal depicting signs as one group.

I define the semantic structure of SASSes by investigating them from two directions, i.e. starting 'from the form' and 'from the meaning'. The first direction is a detailed one-by-one description of SASSes' sub-sign elements. For each sign component, I define the inventory of possible forms and the meaning of each form. The questions I ask at this stage are: 'How many handshapes (movements, locations, orientations) are used in RSL SASSes?' and 'What does each handshape (movement, location, orientation) mean?' Besides manual structural elements (Chapter 3), I conduct a thorough analysis of the mouth articulation accompanying SASSes (Chapter 4). I limit the investigation of the non-manual component by mouth articulation, since it has been argued to be the most closely connected to so-called lexical meanings (as opposed to grammatical ones, see a discussion in Chapter 5). At the same time, I acknowledge the potential contribution the upper part of the face can make to the semantics of RSL SASSes (as Fornasiero (2018) finds in LIS), and leave this aspect for future research. This approach 'from the form' allows me to establish inventories of sub-sign elements and to see how each of them separately contributes to the meaning of the whole.

The second direction of my investigation starts 'from the meaning'. I create a list of common size & shape meanings and define how each meaning is expressed by RSL SASSes, i.e. how different sign components work together to express a particular aspect of the referent's appearance (Chapter 5). The questions I ask at this stage are: 'How small spherical (elongated cylindrical, big rectangular, etc.) objects are depicted in RSL?' I then compare it to categorization strategies of some spoken languages to create the foundations for the cross-modal typology in this domain.

This two-way approach (from the form and from the meaning) allows me to give a complete account of RSL SASSes' semantic structure and to see where the RSL data stands with respect to the questions raised in this section, i.e. the possibility of splitting the handshape into a set of smaller meaningful elements, the role of the non-manual component, and the potential unequal status of manual components in SASSes.

1.2.3. Categorical versus gradient in size and shape specifiers

The previous section discusses research question 2 of this thesis: "*What* elements carry the meaning in SASSes and *what* this meaning is". This section gives the necessary background on research question 3, which is *how* the meaning is expressed by SASSes' structural elements. Highly iconic, these signs have been argued to change the form depending on the slightest changes in the referent's appearance. As Zwitserlood (2003) states, one of the differences between SASSes and verbal classifier signs, is that SASSes do not classify referents, but instead specify them. This implies different conceptualization of objects. C*lassification* of objects presupposes a closed list of groups, and each time a lexeme is used with a classifier marker, the referent in question is marked as belonging to one of these groups. In contrast, *specification* does not presuppose a closed list of groups. Instead, every time a specifier is used with a lexeme, it states that the referent has a certain quality (in case of SASSes, certain size, shape, location, and orientation). There is no limitation on the number of possible values of the quality in question. It means that, according to this view, there is no upper boundary for the number of potential SASS forms.

A very strong dependency of the form of these signs on the visual characteristics of the entity/situation they depict raised questions about semiotic means they use to encode the message. For example, Cogill-Koez (2000a, 2000b) claims that when signers use these signs, they find themselves not in the linguistic, but in the schematic visual representation mode, which is commonly seen in drawing. Liddell (2003) proposes an account, according to which depicting (and pointing) signs have two parts, i.e. the symbolic linguistic and the gestural part. The linguistic part consists of clearly defined morphemes that are kept in signers' mental lexicons and describe the world *categorically*. The gestural part reflects the characteristics of a referent in an *analogue* manner. It does not have a closed list of forms and it is not remembered by signers, but is *created* every time the sign is used.

The same distinction, but from a different theoretical perspective, is proposed by Ferrara & Hodge (2018). Following Clark (1996), they see language as 'actioned' via three methods of signaling: describing, indicating, and depicting, which represents the semiotic plurality of human communication. Descriptions are fully conventionalized 'pre-agreed' form-meaning pairings, indices are forms that anchor communicative events to a specific time and place. Finally, depictions express meaning through perceptual resemblances, they do not have to be conventionalized in the community. Each method is fundamentally different from the other, and they can be used alone or in combination with others during the joint creation of multimodal 'composite utterances'. SASSes, in this framework, are examples of composite utterances: they combine fully conventionalized symbolic and highly dynamic depicting aspects.

If we accept the dual nature of SASSes (and other peripheral signs), then the question arises what components of these signs are fully conventionalized, and what components can dynamically change. Emmorey and Herzig (2003) investigate this issue by conducting a series of psycholinguistic experiments. In one of them, they asked native signers of ASL to place a round

sticker in relation to a bar in a square frame. Where the sticker should be placed was indicated by another native signer who produced a classifier construction. See some examples of the stimuli below:

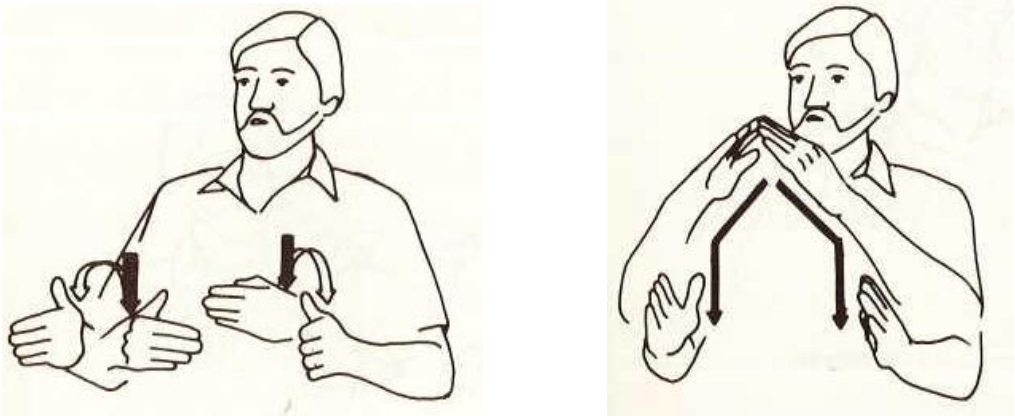


Figure 1.47. Stimuli for the study on categorical versus gradient properties of ASL classifier constructions
(Emmorey & Herzig 2003:225)

Overall, 30 different positions were presented in the stimuli. The experiment showed that the signers treated the location component of the classifier constructions in a gradient manner, and that every change of this value was reflected in the position of the dot with respect to the line. For the handshape component, a similar experiment showed the opposite result. These findings are in line with Liddell (2003) who lists location, hand orientation, and some aspects of movement among the gestural elements of depicting signs.

The question about gradient versus categorical encoding of reality by depicting signs is closely related to their status in the sign language lexicon. Thus, if they are not fully categorical, they cannot be considered 'words' in the strict understanding of the term. It is unclear how to represent these signs in dictionaries and whether they have correlates in spoken languages. It might be the case that in this zone, sign languages use a unique way of conceptualizing reality.

The picture is even more complicated, since not all signs that look like SASSes seem to exhibit the same degree of flexibility of form depending on the depicted object. Consider, for example, the ASL signs below:



(a) lexSASS:BOX (b) lexSASS:HOUSE

Figure 1.48. ASL fully lexicalized SASSes
(Supalla, 1986)

The sign in Figure 1.48a outlines a flat square object located horizontally in front of the signer. The sign in Fig. 1.48b shows a three-dimensional object with a pointed top. In both instances, the

handshape, movement, and location of the hand have interpretable meanings. Yet, these signs are not the prototypical instances of SASSes. The meaning of these signs is more concrete than the one expressed solely by the manual components. Thus, the item in Fig. 1.48a denotes not just any flat square object, but a box, and the item in Fig. 1.48b refers specifically to a house. Moreover, these signs do not change their form so easily depending on the context, and the object they denote does not have to be of exactly the same shape as outlined by the hands. For example, the sign in Fig. 1.48b can be used for referring to any house, not only to a house with a pointed top. These qualities set the signs in Figure 1.48 apart from the SASSes discussed so far and bring them close to fully-lexicalized signs.

Such heterogeneity is characteristic of not only SASSes, but other depicting signs as well. For example, Johnston & Schembri (2007) give the example of the Auslan sign MEET, which looks like a construction with two entity classifiers, but is, in fact, a fully lexicalized sign.



Figure 1.49. Auslan sign MEET
(Johnston & Schembri, 2007: 164)

Two main points of debates with respect to fully versus partly lexicalized depicting signs deal with the type of boundary and the nature of the connection between them. While some researchers postulate a categorical distinction between fully and partly lexicalized signs (Liddell & Johnson, 1986), others claim that there is a continuum with some depicting signs exhibiting features of both groups and, therefore, falling in-between the extremes (Lepic & Occhino, 2018; Namboodiripad et al., 2016). Another question concerns the nature of the historical connection between the two groups. According to a widely accepted view, signs from the partly-lexicalized end can shift overtime towards the fully-lexicalized end via the process of *lexicalization* (Johnston & Ferrara, 2012). During this process, they fix their form and acquire a specific meaning, not computable from the meanings of the parts. According to an alternative approach, fully-lexicalized depicting signs are created directly *by analogy* with partly-lexicalized signs (Van der Kooij & Zwitserlood, 2016). Neither of these issues has been addressed with respect to SASSes. While some researchers analyzed SASSes as members of the fully-lexicalized group (Newport & Bellugi, 1978); others focused on the partly-lexicalized items (Bergman & Wallin, 2001). Supalla (1982, 1986) in his account gives examples of both fully-lexicalized and partly-lexicalized SASSes, but does not discuss the difference between them.

This dissertation contributes to these debates by analyzing properties of RSL SASSes. It describes the form and distribution of SASSes' components on the spectrum from core-like items (as in Fig. 1.48) to more dynamic instances of SASSes and offers an account which unites both the categorical and the gradient interpretation of these signs. The next chapter describes the methodology used in this project.

Chapter 2: Methodology

Since the morphological analysis of SASSes has never been the focus of a study before, there is no toolkit for it. One of the aims of this dissertation is to develop a methodology enabling a thorough investigation of SASSes in RSL and, potentially, in other sign languages. This chapter is divided into three parts: data collection (§2.1), data annotation (§2.2), and data analysis (§2.3). The first part describes the two sources of RSL data I used: RSL corpus (§2.1.1) and videos recorded specifically for this study (§2.1.2-2.1.3). In the section on data annotation (§2.2) I give a working definition of SASSes (§2.2.1), describe transcription of the manual components (§2.2.2) components and mouth articulation (§2.2.3). Finally, the last section (§2.3) discusses some general points of the data analysis.

2.1. Data collection

2.1.1. Russian Sign Language corpus

In order to be able to understand the nature of a lexical item, one needs to look at its linguistic behavior in most various contexts. Thus, the corpus analysis is chosen as the most appropriate approach to address the issue. Since a general corpus of RSL exists, it was used as the first source of the data. Published on-line in 2015 (http://rsl.nstu.ru/), this corpus contains more than 230 videos from 43 native signers, accompanied by linguistic annotations. It has been created as a part of the project 'Corpus-Based Research of Morphosyntax and Vocabulary of the Russian Sign Language' by the Novosibirsk State Technical University team, with Svetlana Burkova as the project leader.

The videos are recorded during the period between 2008 and 2016. They represent different text types: monologues, dialogues, cartoons retelling, picture-based story-telling, and linguistic questionnaire-based materials. Native signers are males and females ranging from 18 to 63 years of age with varying degrees of deafness (deaf, hard of hearing, hearing children of deaf parents). Some of the signers use the Siberian dialect of RSL (those who live in Novosibirsk, Tomsk, Altai region, Krasnoyarsk region, the Republics of Sakha, Buryatia, Khakassia), the rest are users of the Moscow dialect.

The videos are annotated using ELAN 4.9.4 software (Sloetjes & Wittenburg, 2018). Each video is accompanied by four ELAN tiers: 'RH-gloss', 'LH-gloss', 'Translation', and, optionally, 'Comments' (See Fig. 2.1). The tiers 'RH-gloss' and 'LH-gloss' contain word-by-word translations to Russian for each hand together with some grammatical information (person, tense, sometimes number, etc.). The tier 'Translation' contains sentence translations from RSL to Russian. In the tier 'Comments', additional notes are presented.

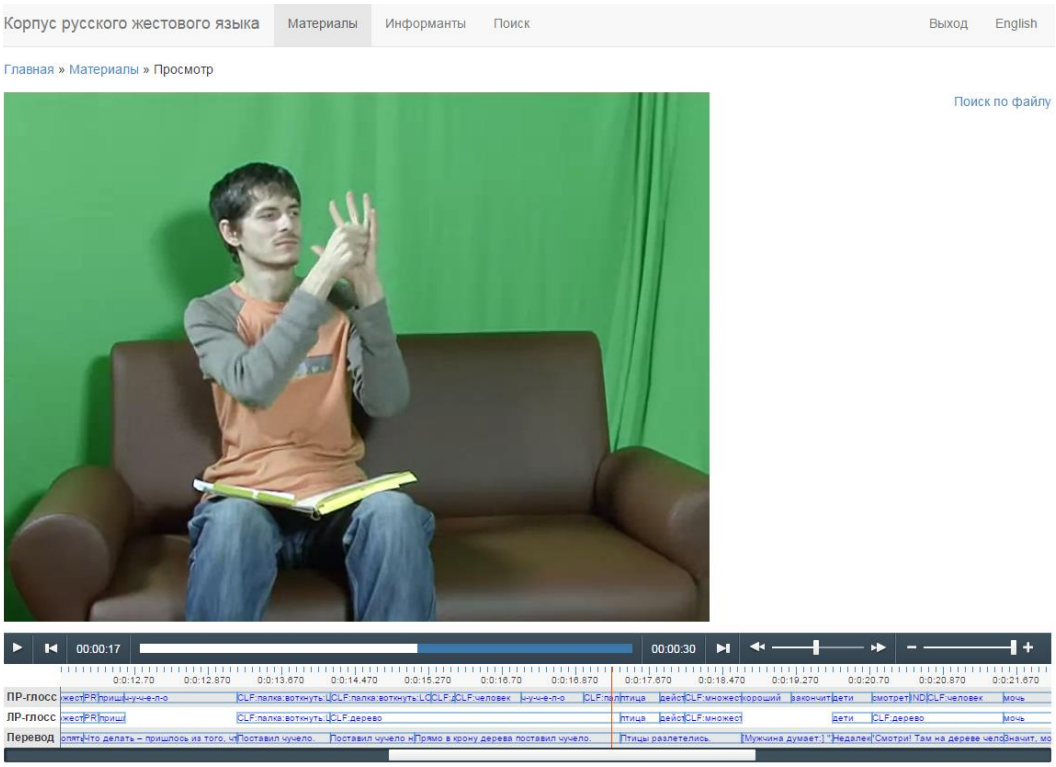


Figure 2.1. RSL corpus mark-up

The string searching algorithm with a limited number of regular expressions ('-' to exclude a substring from the search, '|' to add the condition 'or') is available for users. The search can be performed on any of the four tiers and can be limited by the text genre and signers' characteristics (Fig. 2.2).

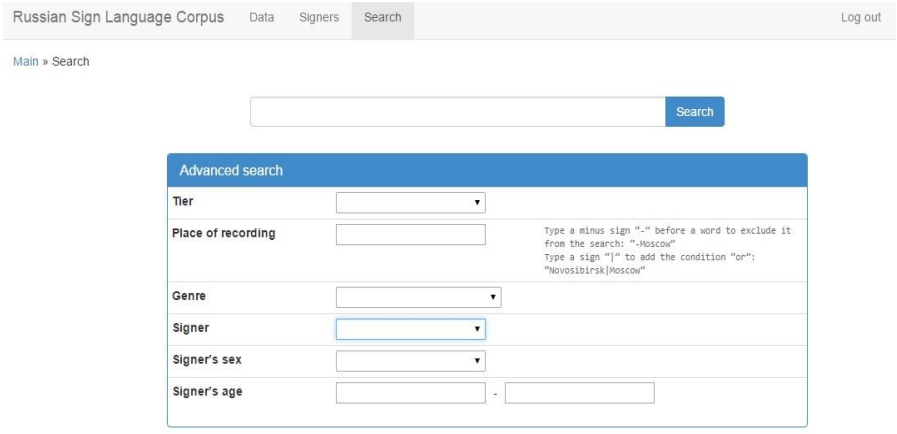


Figure 2.2. RSL corpus search web-page

Due to the specific character of the RSL corpus annotation, two methods of collecting data were used:

- by classifier tag;
- by Russian input.

Collecting data by classifier tag

As mentioned above, the tiers 'RH-gloss' and 'LH-gloss' contain not only word-by-word translations, but also some grammatical information. Among these, is the tag denoting Russian Sign Language classifier constructions: CL. Some of the examples are: *CL:mashina* (lit., CL:car) for the semantic classifier 'car' and *CL:oval'nyi.predmet.polozhit'* (lit., CL:oval.object.put) for the handling classifier 'handle.oval.object'. As SASSes are often considered to be part of the sign language classifier group (see §§1.1.5 and 1.2.1), I carried out the search using this tag. Overall, 1267 signs are marked with this tag in the corpus. Figure 2.3 shows their distribution. The majority of CL-marked signs are entity/semantic classifiers, while SASSes occupy less than 2% of the sample (namely, 22 out of 1267 signs).

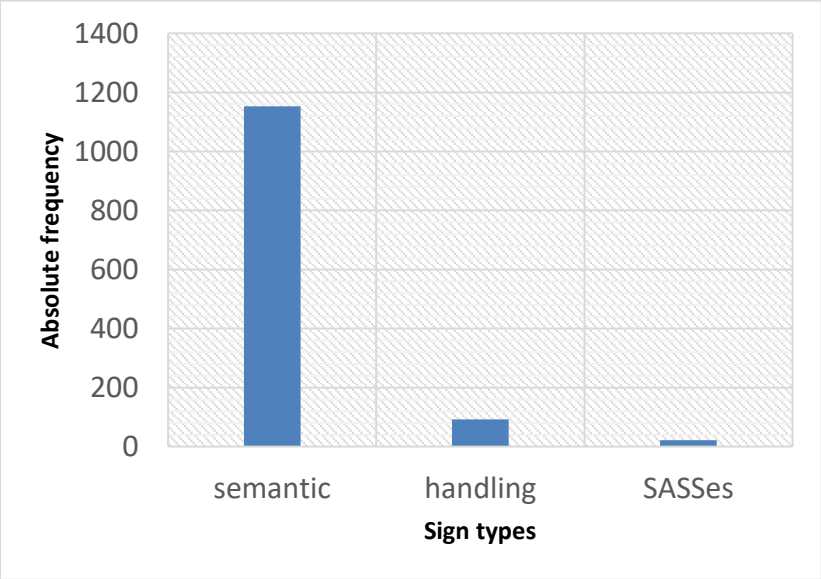


Figure 2.3. RSL corpus signs marked with the tag 'CL'

Collecting data by Russian input

The marking of SASSes with the CL-tag in the RSL corpus is not consistent. This is probably due to the lack of a clear understanding of the nature of these signs. In order to expand the sample, I used an additional method of collecting data – by Russian input. As SASSes denote the form and size of objects, I performed the search by Russian adjectives and nouns with the form and/or size meanings against the 'RH-gloss', 'LH-gloss', and 'Translation' tiers.

I compiled a list of Russian form and shape words using the Russian national corpus (RNC, http://ruscorpora.ru/en/index.html). The Russian national corpus includes more than 60 000 texts (~ 150 mln words) in Russian with rich annotations providing grammatical and semantical information about tokens. A high number of tags enables a complex search of various kinds in the corpus. See the search web-page and an example of annotation for the word *kruglyi* 'round' (Figures 2.4 and 2.5, respectively).

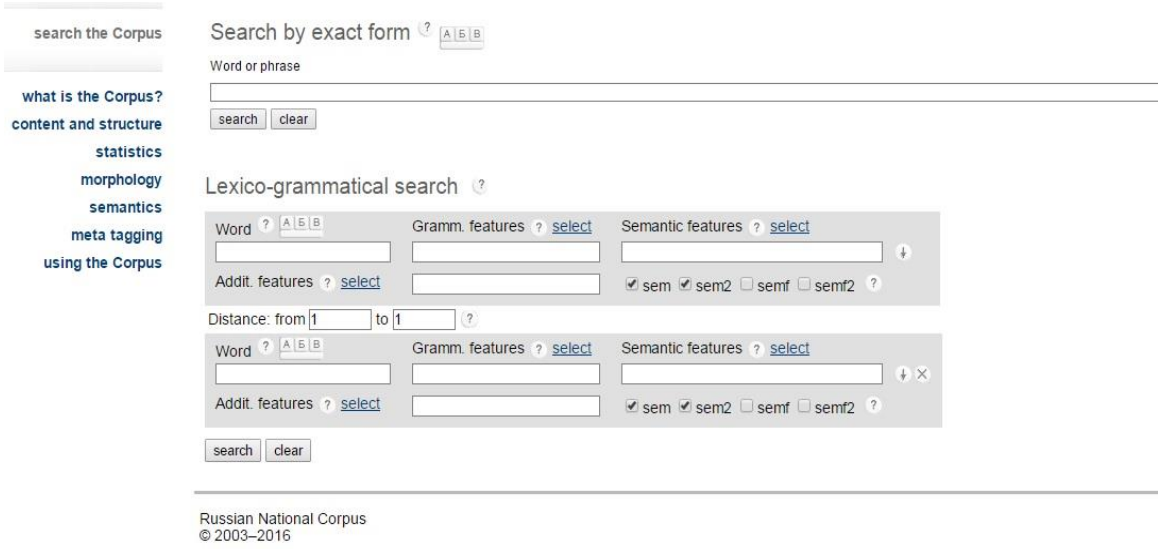


Figure 2.4. RNC search web-page [10]

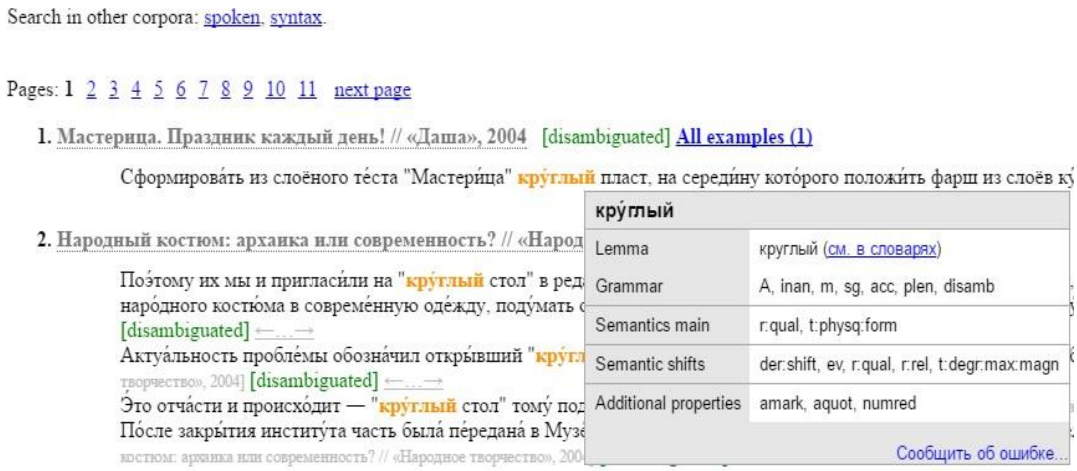


Figure 2.5. Annotation of the word *kruglyi* 'round' in RNC

Three semantic tags in the corpus refer to size and shape:

- t:form
- t:physq:form
- t:size,

where 't' stands for 'taxonomic class' and 'physq' – for physical quality.

I performed a search using all three semantic tags. It resulted in 52 Russian adjectives and 23 nouns with the meanings in question. Table 2.1 gives the list of words.

RNC gloss	Adjective	English translation	Noun	English translation
t:form/ t:physq:form	vypuklyi	dome shaped	arka	arch
	gladkii	smooth	vitok	coil
	izvilistyi	sinuous	gora	pile
	izognutyi	bent	izgib	bent

[10] http://ruscorpora.ru/en/search-main.html

	kolokol’chatȳi	bell shaped	liniya	line
	krivoi	curved	polosa	lane
	oval’nȳi	oval	ryad	row
	okruglȳi	roundish	sfera	sphere
	ostrȳi	pointed	tolshcha	thickness
	spiral’nȳi	spiral	ugol	angle
	stolbik	column shaped	tsep’	chain
	tolstȳi	thick	cherta	line
	pologii	slightly sloping	krest	cross
	volnistȳi	wavy	kryuchok	hook
	gibkii	flexible	lepestok	petal
	dugoobraznȳi	arched	stolbik	column
	zakruglennȳi	rounded	tsilindr	cylinder
	kvadratnȳi	square	gorb	hump
	zvezdnȳi	star shaped		
	kol’tsevoi	circular		
	kruglȳi	round		
	lentochnȳi	ribbon shaped		
	lineinȳi	linear		
	nerovnȳi	uneven		
	otvesnȳi	vertical		
	ploskii	flat		
	piramidal’nȳi	pyramidal		
	polukruglȳi	semicircular		
	pryamoi	straight		
	rovnȳi	even		
	tonkii	thin		
	tupoi	blunt		
	udlinennȳi	elongated		
	uzorchatȳi	ornamental		
	utolshchennȳi	thickened		
t:size	bol’shoi	big	vȳsota	heigh
	vysokii	high	glubina	depth
	gigantskii	gigantic	protyazhenie	extension
	glubokii	deep	razmer	size
	dlinnȳi	long	tolshchina	thickness
	korotkii	short	shirina	width
	krupnȳi	large		
	malen’kii	small		
	melkii	minute		
	nebol’shoi	not big		
	nizkii	low		
	ob’’emnȳi	extensional		
	ogromnȳi	huge		

	srednii	average		
	tesnȳi	tight		
	uzkii	narrow		
	shirokii	wide		

Table 2.1. Russian adjectives denoting form and shape of objects in Russian National Corpus

The search in the RSL corpus by these Russian inputs resulted in 133 more size and shape specifiers, with the overall size of the sample being equal to 155 signs. These SASSes are produced by people with different sociolinguistic backgrounds, they occur in different types of text, in different semantic contexts, and in different syntactic positions. For example, in Fig. 2.6 the SASS is used as an adjective (ex.2.1), while in Fig. 2.7 it performs the function of a noun (ex.2.2).



Figure 2.6. SASS:square
[RSL corpus][11]

(2.1) INSIDE ALWAYS HARE CAGE **SASS: SQUARE**
'A hare always sits in a square cage'



Figure 2.7. SASS:thin.stick
[RSL corpus][12]

(2.2) **SASS:THIN.STICK** CARRY
'They used to carry thin sticks'

However, the sample of 155 items by itself is not enough to carry out an exhaustive analysis. For example, there are no SASSes in this sample describing wavy or straight objects; thin or thick flat objects (like a wall or a fence), and so on. To achieve the representativity of the data, I collected an additional corpus of video-recordings with stimuli designed specifically for this study.

[11] http://rsl.nstu.ru/data/view/id/170/t/6840/d/8110
[12] http://rsl.nstu.ru/data/view/id/29/t/33930/d/34480

2.1.2. Corpus collected for this study

Sign language linguistics uses various elicitation materials, of which the most common types are: spoken language input, moving pictures, and still pictures (Hong et al., 2009). Spoken language input allows for a high degree of control over the elicited phenomenon. It has, however, been reported to affect the results of the elicitation. As I argue in (Kyuseva, 2017), RSL utterances translated from Russian differ from the spontaneously produced signed phrases in the non-manual articulation accompanying the signs. Since the non-manual component plays an important role in the SASSes' semantics (see Chapter 5 for a detailed account), these signs have to be collected with a method that does not affect it. Out of the two remaining options (static versus moving pictures), I chose static images, as size and shape specifiers denote static characteristics of objects. The data was collected in a form of communicative games ('matching task type' scenario). As an alternative to picture description, communicative games keep participants engaged; they enjoy the process of playing a game and are not trying to guess the purpose of the study.

The tasks involved two participants sitting opposite one another. The participants were presented with a set of stimuli each (the same or different, depending on a task). Each participant could only see his/her set of stimuli. The goal of the tasks was to achieve matching of the two participants' stimuli (either in order or in form). Overall, four games were used for the data collection:

- 'spot-the-difference' task
- 'man and dog' game
- 'draw a picture' task
- 'stacks and squares'

I. 'Spot-the-difference' task

This task was originally proposed in (Van Engen et al., 2010; Baker & Hazan, 2011) for the elicitation of the spontaneous speech dialogues. It is designed for two participants. Each of them is presented with a different version of the same cartoon-style picture. They have to collaborate to find 10 differences between the two pictures without looking at each other's pictures. The example of stimulus material developed in (Baker & Hazan, 2011) is given in Figure 2.8.

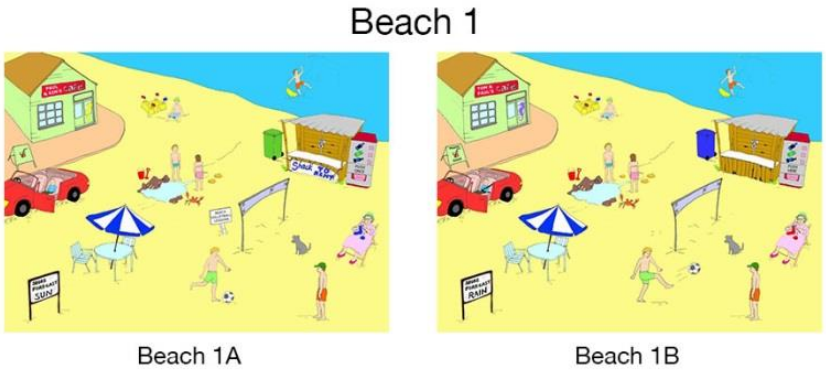


Figure 2.8. Original 'spot-the-difference' task proposed in (Baker & Hazan, 2011)

This task has already been used for the collection of the sign language data. For example, Crasborn and Zwitserlood (2008) report on the use of this methodology in building the corpus

of NGT. For my project, a new set of stimuli has been designed. Overall, six pairs of pictures with 10 differences in each pair have been used for data collection (drawings by Violetta Ivanova). In the stimuli, the following set of visual oppositions is reflected:

Shape

rounded vs. rounded oblong vs. rounded flat

angular vs. angular oblong vs. angular flat

pointed vs. round-shaped

straight vs. bent vs. wavy

smooth vs. hubby

Size

normal

big vs. small

long vs. short

tall vs. low

thick vs. thin

wide vs. narrow

Dimensionality

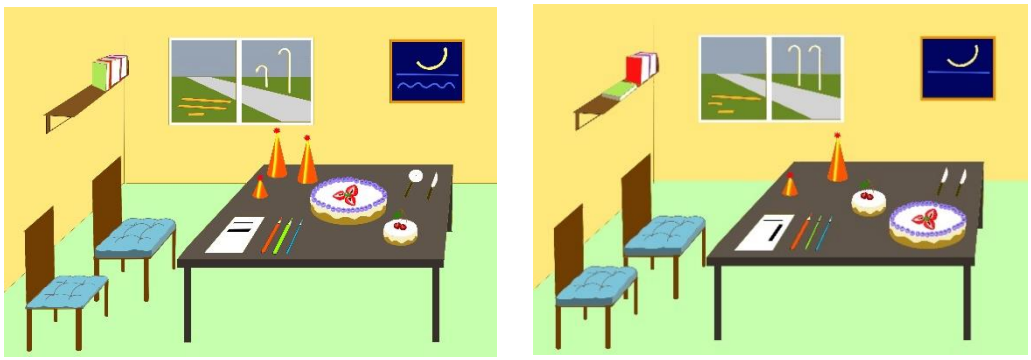
2D vs. 3D

This list was formed on the basis of the analysis of the corpus sample with 155 RSL size and shape specifiers. The table below illustrates some combinations of these characteristics:

	2D & normal	3D & long	3D & short	3D & thick	3D & thin
rounded	mirror				
rounded oblong		long pipe	short pipe	thick stick	thin stick
rounded flat				thick hat box	thin hat box
pointed	knife	long pointed snout	short pointed snout	pointed stick	pointed horn
round-shaped	butter-knife	long round snout	short round snout	round-ended stick	round-ended horn
straight	straight line	long straight path	short straight path		
bent	bent line	long bent path	short bent path		
wavy	wavy line	long wavy path	short wavy path		

Table 2.2. Visual oppositions that form the underlying structure of the stimuli

As can be seen in this table, not all the combinations of shape and size & dimensionality are present. Some of them are logically implausible and thus the correspondent cells are left blank. For example, a rounded three-dimensional object (like ‘ball’ or ‘orange’) cannot be thick or thin (two right upper cells) without being flat (as ‘hat box’ or ‘block of cheese’) and cannot be long or short (two central upper cells) without being oblong (as ‘stick’ or ‘pipe’). Figure 2.9 illustrates one pair of pictures (the full set of stimuli is given in the appendix).



A B

Figure 2.9. Stimuli for the 'spot-the-difference' task developed for this project

Differences between the pictures in Figure 2.9 are:

1) Chair pillows. Picture A: a thin pillow and a thick pillow. Picture B: two pillows of the same size.
2) Knives in the right farthest corner of the table. Picture A: a pointed knife and a round knife. Picture b: two pointed knives.
3) Street lamps on the street. Picture A: a tall street lamp and a low street lamp. Picture B: two street lamps of the same size.
4) Planks on the street. Picture A: two long planks and one short plank. Picture B: two short planks and one low plank.
5) Pencils on the table. Picture A: two thick pencils and a thin pencil. Picture B: two thin pencils and a thick pencil.
6) Books on the bookshelf. Picture A: all standing. Picture B: the green book is lying.
7) Lines on the sheet of paper. Picture A: parallel lines. Picture B: perpendicular lines.
8) Birthday caps. Picture A: two big caps and one small cap. Picture B: one big cap and one small cap.
9) Cakes on the table. Picture A: the big cake is in the center. Picture B: the small cake is in the center.
10) Blue picture on the farther wall. Picture A: there is a wavy line. Picture B: there is no wavy line.

Not all the differences between the pictures are in the form or shape of objects. For, example, in Figure 2.9, only five out of ten differences are of this sort. The remaining differences refer to other visual characteristics, such as orientation (6, 7), quantity (8), relative position (9), presence/absence of an object (10). Differences 6-10 in this set, firstly, constitute fillers and prevent participants from focusing too much on the shape of objects. Secondly, they ensure producing SASSes in non-contrastive positions. Thus, for example, Difference 2, which is in the object's size, most often led to sentences where SASSes were in a position of the contrastive topic ('On my picture, the second knife is round, on yours it is pointed'). Difference 7, on the other hand, was usually described with the object's orientation in this position, while SASS was produced in a neutral place in a sentence ('On my picture, the thick line is horizontal, on yours it is vertical').

The stimuli prompted participants to use a lot of SASSes in the process of playing the game. As a result, in 30 minutes of data, 598 out of 1659 signs are marked with the prefixes 'SASS' or 'lexSASS', which is more than one-third of all signs. SASSes collected with these stimuli

constitute the core data for my analysis. The remaining sources (the sample collected from the RSL corpus together with video recordings of other communicative games) provided additional data I used when the list of SASSes collected with the 'spot-the-difference' task was not representative enough to support my arguments.

II. 'Man and dog' game

This task is inspired by the 'Man and tree' game developed within the Nijmegen 'Space Project' (Senft, 2007). The aim of this project was to investigate the conceptualization of space and spacial reference in a cross-linguistic perspective (Pederson et al., 1998). 'Man and tree' is one of several interactive games used for data elicitation. All these games involved a 'director' consultant who was allowed to see a certain stimulus, and a 'matcher' who was not. The players were sitting side by side with a screen separating them so that they could not see each other's stimuli.

The 'man and tree' game (also called 'photo-photo' game) consists of four series of 2x12 photographs depicting certain localizations and configurations of objects. Before the game, the two sets of 12 photos are each shuffled and laid out in front of each player, in a grid. After this, the director is asked to pick a photo and to describe it. When the matcher finds the photo described by the director, the players pick up the photo from their grid and put it upside down on a pile beside this grid. After the game, i.e. when all 12 photos have been described, the piles are compared with each other. One of four sets of photographs includes images of a man in a certain position to a tree (Fig. 2.10 shows the drawings of these photographs). This set gave the name to the game.

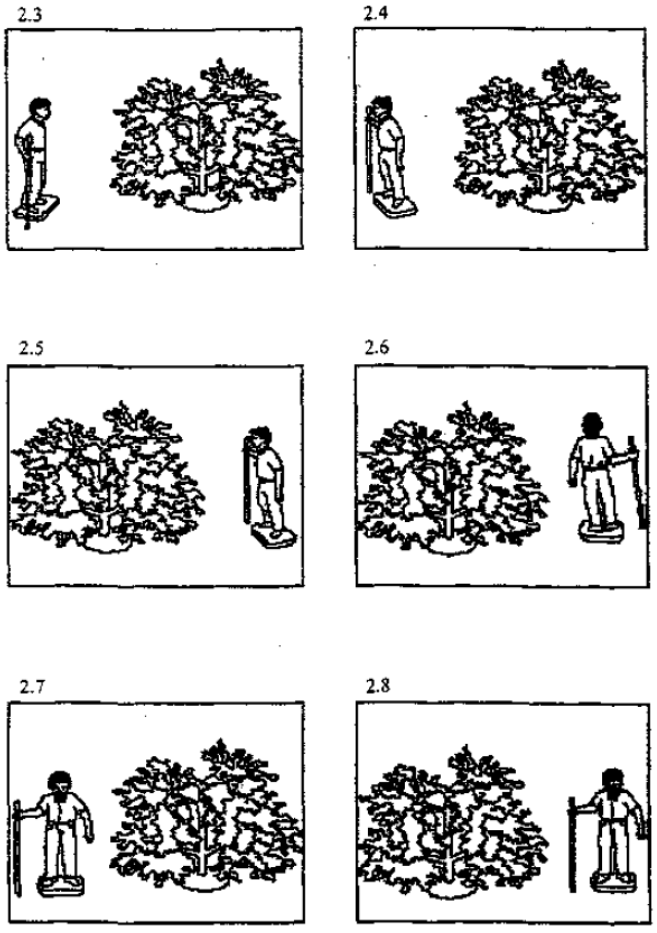


Figure 2.10. Drawings of the 'Man and tree' photos
(Senft, 2007:230,13.6)

For the research purposes of my project, a new set of stimuli has been developed. As opposed to the 'man and tree' images, my pictures are cartoon-like drawings (the artist is Violetta Ivanova). 12 images represent a man and a dog standing next to each other. The orientation and relative position of them is the same in all pictures. The images differ in the size and shape of the characters' clothes and bodyparts. These objects are not well represented in the 'spot-the-difference' stimuli. At the same time, they constitute an important concept for human culture and cognition. Moreover, bodyparts and clothes are usually referred to in sign languages with a specific iconic strategy: pointing to a signer's body. Therefore, one might expect that SASSes in this zone will also exhibit peculiar features. Fig. 2.11 illustrates 6 pictures out of 12 (the full set is given in the appendix).

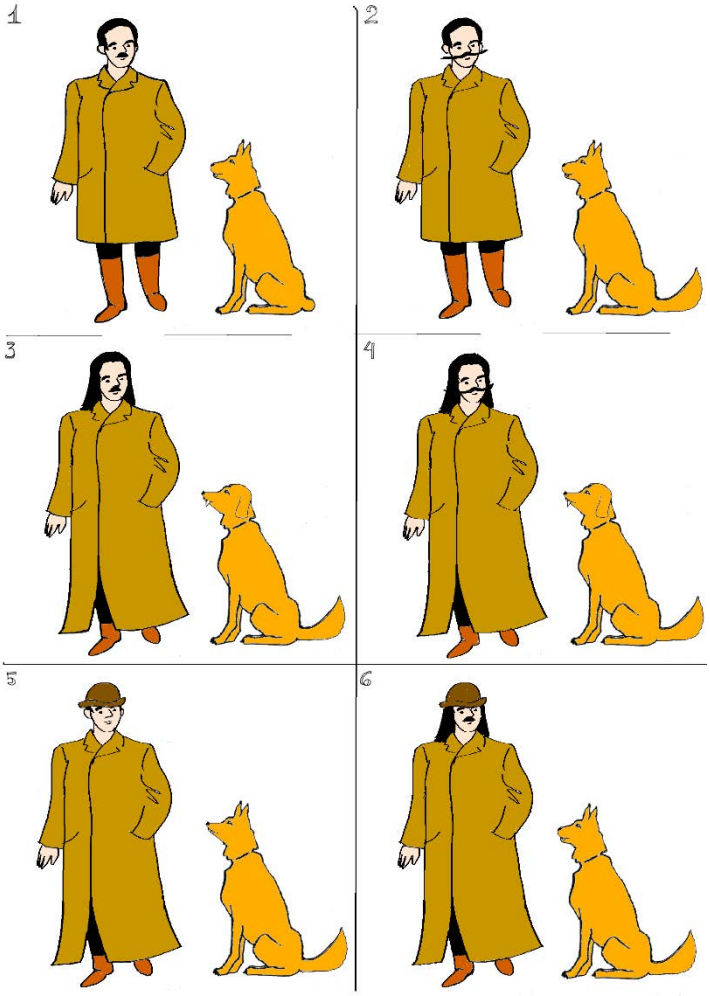


Figure 2.11. 'Man and dog' stimuli developed for this project

Due to certain limitations in settings, the rules of the game were slightly different from those used in the 'man and tree' task by the Nijmegen group. The full procedure of the data collection is discussed in Section 2.1.3 below.

III. Stacks and squares

Effects of the object's orientation on the SASS form were addressed in the third communicative game used in the research -- 'Stacks and squares'. The game is described in (Cooperrider et al., 2014). Originally, it was designed to elicit pointing gestures and demonstratives in sign languages. As well as the 'man and tree' game, this task presupposed different roles of the participants: a director and a matcher, where the former tells the latter how to arrange objects ('stacks') on a fixed array of locations ('squares', Fig. 2.12). Unlike the 'man and tree' and many other communicative games, the participants work in full view of each other. They are seated on different sides of the array of five square cloths laid on the ground, with a stack of objects off to one side of the array. The director is shown a photo of the objects arranged in a particular way on the cloth squares, and is told that the goal is to get the matcher, who cannot see the photo, to arrange the objects just like they are in the photo. The set of objects contains 11 items: three colored beanbags, four yellow foam cubes, two cylindrical tops (a big one and a small one), and two cardboard cylinders (a small one and a big one).



Figure 2.12. Fixed array of squares used in the 'stacks and squares' game
(Cooperrider et al., 2014)

In my data collection sessions, I used the original materials discussed in (Cooperrider et al., 2014)[13]. However, not all objects from the set are suitable for the collection of SASSes. For example, the colored beanbags are most often referred to by different color terms, rather than by a SASS. The same looking objects (foam cubes) are also unlikely to draw the use of the signs in question. Therefore, I combined a mixed stack of objects, taking some from the original set and adding a number of new items. The resulting set consists of 14 objects:

[13] I am very thankful to Gabrielle Hodge for providing me with this material.

- two plastic bottles: a big one and a small one;
- two white cylindrical tops: a big one and a small one;
- two boxes of the same color: a thick one and a flat one;
- two sticks: a short one and a long one;
- two wooden cubes: a big one and a small one;
- two brushes: a thin one and a thick one;
- a triangular prism;
- a fine-linked chain.

The objects were arranged on the squares in different locations and orientations (no more than eight objects on a picture), and then photographed. Overall, five photos (one with five objects for the warm-up and four target ones) were used in the data collection, see an example in Fig. 2.13 and the full set of pictures in the appendix.

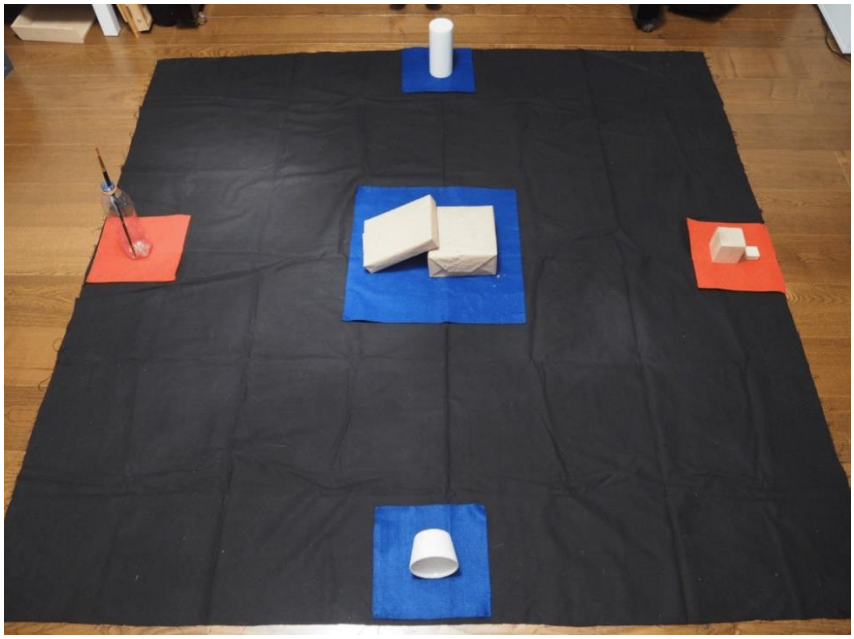


Figure 2.13. 'Stacks and squares' stimuli developed for this project

IV. 'Draw a picture' game

The fourth communicative game gives an opportunity to investigate non-conventionalized uses of SASSes. In this game, designed for this project, the director is given a sketch with geometrical figures arranged in various relative positions and orientations (see Fig. 2.14 and the appendix, the drawings are by Viktor Kyusev). Their task is to explain to the matcher what is drawn on the sketch, so that the latter draws the same picture on a blank sheet of paper. When the game is finished, the two sketches (the original one and the one the matcher drew) are compared and discussed. As the objects on the stimuli are very simple to draw, the director has the opportunity to use more pantomime-like forms of signs, just drawing the picture with his hands in the space in front of him. The data collected with the help of this task provides a valuable point of comparison with both SASSes used in the context of lexicalized signs and, potentially, co-speech gestures used by hearing participants.

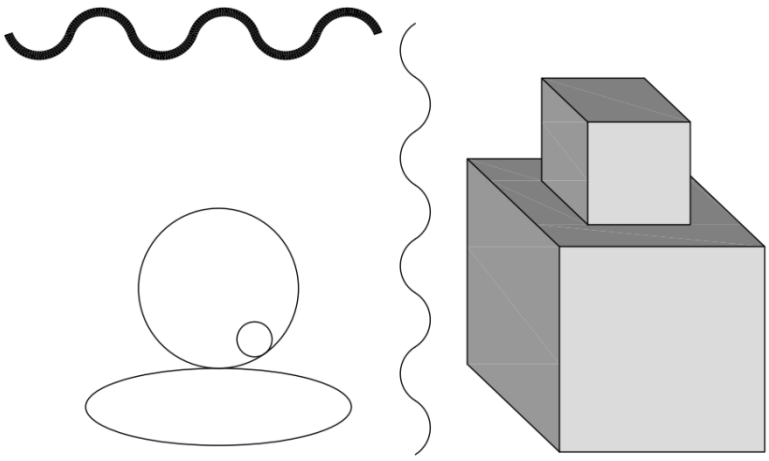


Figure 2.14. Stimuli for the 'draw a scheme' task

2.1.3. Elicitation procedure

Participants

Overall, 18 native RSL signers participated in the data collection, ten of which are users of the Moscow dialect (six female, four male) and the remaining eight – of the Siberian dialect (three female, five male). The age ranges from 24 to 57 years old. All participants are deaf and use RSL fluently. The signers come from various sociolinguistic backgrounds. Some of them are born from deaf parents and have been using the sign language from early childhood. Others grew up in hearing families and were first exposed to RSL in a school at the age of 5-7 years old. The collected data provide valuable material for studying sociolinguistic aspects of the use of SASSes. However, this kind of study lies outside the scope of my project. Therefore, I treated the group of the participants homogenously, unless there were clear indications that their sociolinguistic background had to be addressed in order to provide an accurate account of the data.

Settings

Four people participated in every data collection session: two participants, an interpreter, and the experimenter (myself). Relative disposition of the participants, cameras, and game material posed a challenge, deepened by the absence of a specialized space for the data collection. The latter took place at different locations, including university rooms, administrative offices, and private spaces – depending on the preference of the participants. Therefore, the equipment had to be easily relocatable. The final layout for all games except the Stacks and Squares task is given in Fig. 2.15. The participants are seated facing each other at a distance of 2 meters approximately. Two cameras are located so that the four points (the participants and cameras) form a trapezium. The cameras are oriented along the diagonals of the trapezium. The stimuli pictures are lying on support desks at a 45-degree angle to the participants, on the other side of cameras. The experimenter and interpreter are standing behind the cameras.

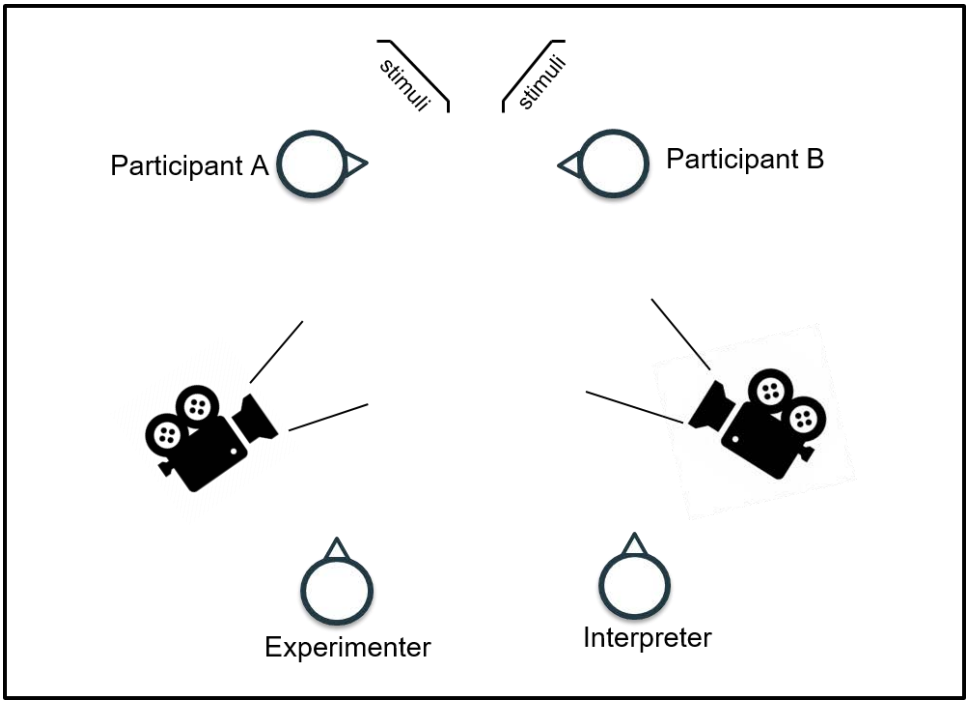


Figure 2.15. Equipment layout for all games except 'stacks and squares'

In the Stacks and Squares task, the layout was the same as in the original version (Cooperrider et al., 2014). The five cloth squares are located in the center with two cameras to the opposite sides facing each other. The director is seated before the array of clothes; the experimenter with a laptop is next to him/her. The matcher and the stack of objects are located to another side of the squares. Finally, the interpreter is outside the reach of the cameras.

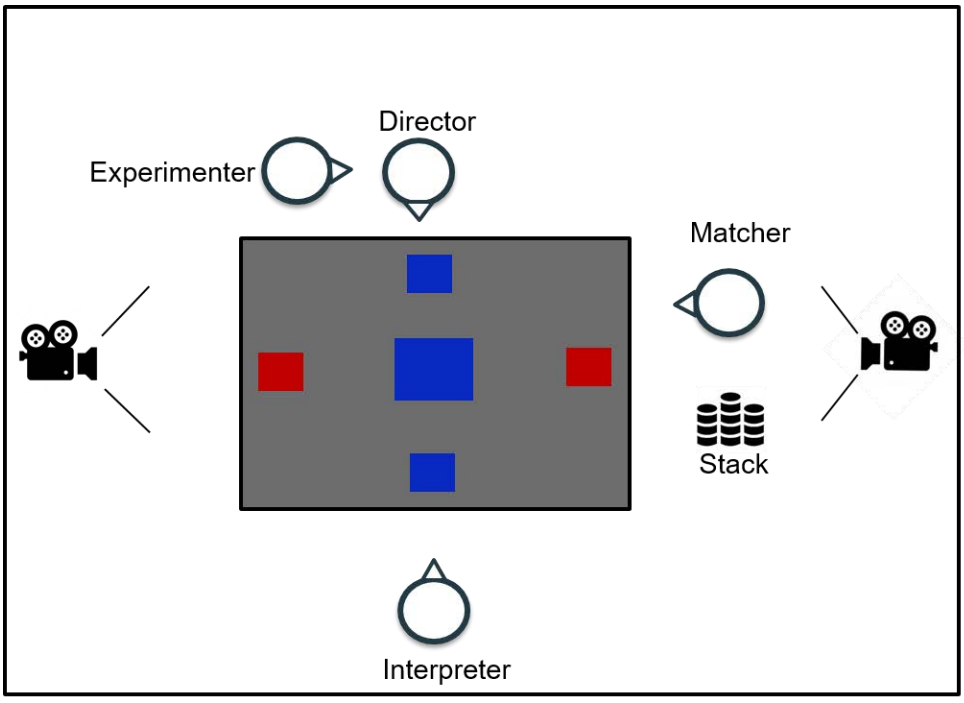


Figure 2.16. Equipment layout for 'stacks and squares' task

Sessions

The sessions were structured to take 25-35 minutes. In the beginning, the participants read the plain language statement and sign the consent form. If they have questions about the purpose, methodology, risks, results, or other aspects of the study, they clarify them with the experimenter, when necessary, having recourse to the interpreter. After that, three games out of four are played. Before each game, the participants read the rules and discuss them with the experimenter to make sure they clearly understand the task. The participants play in fixed pairs throughout the whole session. As my analysis for the most part is based on the 'spot-the-difference' data, this task is the first in order. Each pair of participants plays it twice with a change of stimuli after the first round. The following is the list of rules the participants read before the game (translated to English):

1. Each of you is presented with a picture. The pictures are very similar, but there are 10 differences between them.
2. You can see your picture only; you should not look at your partner's picture.
3. Your task is to spot the differences between the pictures by discussing what is drawn on them.
4. Any of you can talk in any order.
5. The game does not have a time limit.

After each round (approximately, 5 minutes), the participants are allowed to look at their partner's pictures and discuss mistakes (if any).

The second in order is either the 'man and dog' or the 'draw a scheme' game. In both cases, the rules are different for the director and the matcher. The 'man and dog' rules for the director are:

1. You can see twelve pictures put in a certain order in front of you. Your partner has an identical set of pictures put in an unordered pile.
2. Your task is to explain to your partner the order your pictures are set in so that he/she can replicate it with their pictures.
3. You cannot look at each other's pictures

The matcher's rules are:

1. You can see twelve pictures in front of you. Your partner has an identical set of pictures put in a certain order.
2. Your task is to follow your partner's instructions and to replicate this order
3. You cannot look at each other's pictures

The 'draw a scheme' rules for the director are:

1. You can see a picture with geometrical figures arranged in various relative positions and orientations in front of you.
2. Your task is to explain to your partner what is drawn on the picture so that they can replicate it.
3. You cannot show the picture to your partner.

The matcher's rules are:

1. You have a sheet of paper and a pen in front of you.
2. Your task is to follow your partner's instructions and to draw schematically what he/she says.

The second game is followed by a five-minute break, during which the participants could discuss the gameplay and look at each other's stimuli. The third game is either 'draw a scheme' or

'stacks and squares'. In the latter case, the rules are the same as in the original version (Cooperrider et al., 2014).

Director:

There are several pieces of cloth that have been laid out in front of you, and there are bunch of objects of different colors off to one side. I am going to show you a picture of the objects arranged on the cloths. Your task is to tell your partner how to arrange them just like they are in the picture.

Matcher:

There are several pieces of cloth in front of you, and there are bunch of objects of different colors off to one side. I am going to show to your partner a picture of the objects arranged on the cloths. Your task it to follow your partner's instructions and to arrange the objects just like they are in the picture.

After the third game, the participants are given an opportunity to ask any remaining questions about the tasks or particular aspects of the research. At the end of the session, they receive monetary compensation for the participation.

Overall, I collected approximately 3 hours of RSL semi-spontaneous data with the help of these four games. Table 2.3 shows the time distribution of the stimuli.

Data collection across time					
Game	Stimuli	Parties	Duration	Overall parties	Overall duration
Spot the difference	Picture 1 'Room'	3	13:50	16	1:18:19
	Picture 2 'Country house'	3	11:49		
	Picture 3 'Shop'	3	09:51		
	Picture 4 'Birthday'	2	11:09		
	Picture 5 'Fields'	3	20:52		
	Picture 6 'Cats'	2	10:48		
Man and dog	Set 'Man and dog'	4	22:15	4	22:15
Draw a scheme	Picture 1 'Cylinders'	2	6:09	8	34:54
	Picture 2 'Squares'	2	10:43		
	Picture 3 'Cubes'	2	7:34		
	Picture 4 'Arch'	2	10:28		
Stacks and squares	Pictures 1-5	4	39:42	4	39:42
Overall				32	2:55:10

Table 2.3. Time distribution of the stimuli

2.2. Data annotation

2.2.1. General tiers and working definitions

Collected data were transcribed in the ELAN 4.9.4 software (Sloetjes & Wittenburg, 2018) with two video inputs from the two cameras; see Fig.2.17.

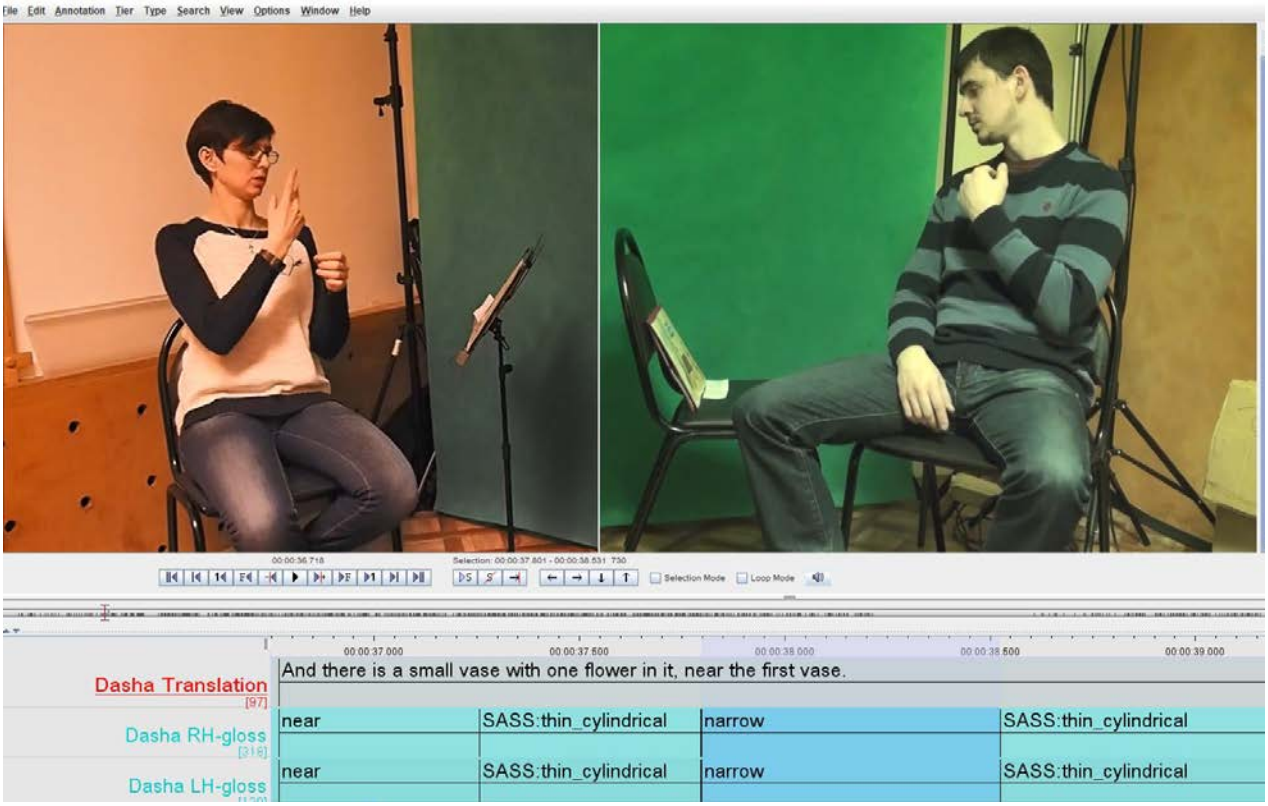


Figure 2.17. Data annotation in ELAN

The annotation consisted of three general and five phonetic tiers for each participant. The three general tiers are:

- sentence translation
- right hand (RH) gloss
- left hand (LH) gloss

These tiers were filled for all the sentences in the corpus. Size and shape specifiers received the prefix 'SASS:'. I assigned this tag according to the following working definition of SASSes I elaborated basing on the literature review:

Size and Shape Specifiers:
1. denote size and/or shape of objects;
2. their movement cannot denote the object's displacement in space

The first feature distinguishes SASSes from semantic and handling classifier constructions, as instead of characterizing objects' visual characteristics, the former refers to them by a semantic class, while the latter – by a pattern of interaction with them. The second feature excludes static SASSes (in Supalla's terms; 1982, 1986) from the object of my study. Although Supalla's static SASSes refer to an object by its form, the movement in these signs does not outline the object's contour, but shows its location or the trajectory of its movement. See an example from RSL:




‘There are three brushes on the table’
RH: static SASS ‘long-thin-object:three’
LH: static SASS ‘flat surface’

Figure 2.18. RSL static SASSes in Supalla’s terms (1986); the object is placed at a locus in a signing space by means of a small RH movement towards the locus
[D; 01:16.2]

This, together with the fact that static SASSes syntactically function as intransitive verbs, brings these signs near semantic classifier constructions. In fact, as mentioned earlier, Zwitserlood argues that static SASSes should be included in this group (Zwitserlood, 2003).

I further divide Size and shape specifiers into *static* and *tracing* SASSes, but I use these terms differently from Supalla (1982, 1986). Neither static nor tracing SASSes, according to my definition, can denote the object’s displacement or location with their movement. However, it is the movement’s semantics that differentiates between these two groups. In tracing SASSes, this component outlines the contour of an object, see an example below.



Figure 2.19. RSL tracing SASS:rectangular (chin-up bar)
[R; 05:25.4]

In static SASSes, the movement is epenthetic. The hands move from the neutral position in front of the signer towards the imaginary ends of a described object. Static SASSes provide very limited information about the object’s form. Instead, their main function is to indicate the object’s size, see some examples below.



(a) SASS:‘long’ (about a brush) [G; 01:21.1]



(b) SASS:‘thin’ (about a plank) [R; 05:04.3]

Figure 2.20. RSL static SASSes

Additionally, I divide the SASSes observed in my data into two groups with respect to the degree of their conventionalization, i.e. lexical versus productive SASSes. I marked the former group with the prefix tag ‘lexSASS:’ instead of ‘SASS:’. The lexicalized SASSes have a non-compositional meaning and a stable form that does not change in different contexts. The productive signs, on the contrary, have a flexible form and a predictable meaning (see a detailed discussion of these signs in Chapter I of this thesis).

Lexicalized size and shape specifiers:

1. have a meaning that cannot be calculated as a sum of their components’ meanings;
2. usually denote a concrete object;
3. have an iconic form that shows aspects of the object’s size and shape;
4. their movement component cannot denote the object’s displacement in space



Figure 2.21. RSL lexicalized SASS:VASE
[D; 00:30.6]

Sometimes a categorization of a SASS as a lexicalized versus a productive sign presented a challenge in my data. Primarily, this is connected with a partial context-dependency of a sign. For example, in the sign ROAD, the handshape and the trajectory of the movement are fixed, but the hand orientation, the place of articulation, and the movement direction are flexible.



(a) SASS: ROAD [T; 00:23.9]



(b) SASS: ROAD [T; 00:56.0]

Figure 2.22 RSL sign ROAD. Variants with different directions of movement.

Signs with a size&shape inflection present another type of complication. The movement in these signs is normally fixed, but it can be changed (shortened or extended) in order to express the meaning of big or small size. See, for example, Fig. 2.23b, where the complex meaning 'long fence' is expressed in one sign.



(a) RSL: FENCE [A; 03:54.7]



(b) RSL: LONG.FENCE [A; 04:06.2]

Figure 2.23 Size&shape affixation in RSL

In these cases, I made my decision based on the semantics of the sign. If a sign has a meaning which can be fully composed from the meanings of its components, then it falls in the productive

group. If, on the contrary, a sign exhibits non-compositional aspects of semantics, I mark it with the tag 'lexSASS:'. In line with this logic, the signs in Figures 2.22 and 2.23 were categorized as lexicalized: although the components in these SASSes are, at least partly, meaningful, none of them expresses the ideas 'fence' and 'road', respectively.

It is important to keep in mind, however, that at this stage of the transcription, the decision to categorize any particular SASS as a lexicalized or productive was not crucial, since both groups of signs were then annotated and analyzed in the same fashion. Any sign that iconically shows aspects of the size and/or shape of a referent and that cannot be used to denote the referent's displacement was included in the sample. The existence of intermediate cases, like those represented in Figures 2.22 and 2.23, demonstrates that the division between lexical and productive signs is not categorical in nature. Instead, it is a continuum with some signs being placed at its ends, and others exhibiting features of both groups. At the same time, it was useful to categorize the SASSes in my sample into these two types for some further observations.

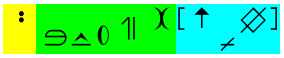
2.2.2. Phonetic transcription of the manual components

The step described in the previous section was followed by the phonetic transcription of the signs with the prefixes 'SASS' and 'lexSASS'. The phonetic transcription is structured in five ELAN tiers:

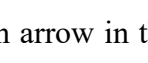
- RH manual_icons
- RH manual_text
- LH manual_icons
- LH manual_text
- nonmanual

The manual part of SASSes (first four tiers) was annotated in accordance with the Hamburg Sign Language Notation System (HamNoSys, https://www.sign-lang.uni-hamburg.de/dgs-korpus/index.php/hamnosys-97.html). HamNoSys is a phonetic transcription system originally developed on the material of German Sign Language (DGS). It is available as a Unicode-based character set which has its roots in the Stokoe notation system (Stokoe 1960; Stokoe, Casterline, & Croneberg 1976). It does not rely on conventions that differ from country to country, such as the national fingerspelling alphabets, and thus can be applied to any sign language.

HamNoSys notation for a single sign consists of a description of the initial posture (handshape, hand orientation, and location) and the actions changing this posture in sequence or in parallel. For two-handed signs, an additional symmetry operator shows how the description of the dominant hand is copied to the non-dominant hand. Example (2.3) shows the HamNoSys notation for the sign VASE in Fig. 2.21:

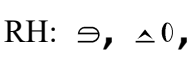
(2.3) 

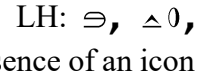
This notation is composed of three parts: symmetry operator (yellow), initial configuration (green), and action/movement (blue). The green part describes handshape, orientation, and location of the dominant hand. In example 4, the hand is in the configuration  (⊃), oriented along the mid-sagittal plane (⏥), palm to the left (0), touching () the side of the non-dominant hand's thumb (). The symmetry operator () says that the non-dominant hand has symmetrical handshape, orientation, and location. Thus, the yellow and green parts together describe the initial position of

the hands in the sign VASE (Fig. 2.21a). The upward movement of the dominant hand is marked with an arrow in the blue part. The signs  indicate that the non-dominant hand is not moving and stays in its original position.

The classical HamNoSys syntax forces referring to the same component in different parts of the expression. Thus, if the hand configuration changes during a sign, this will be marked in the blue part. In this case, icons referring to handshape will be in both green (initial handshape) and blue (change in handshape) parts. This is not convenient for my research purposes, as I aim to analyze all sign components separately. Therefore, the syntax in my annotation differs from the classical one in several ways.

First, I annotate the left and the right hand separately; I do not use symmetrical markers. Second, I write an annotation for each component in the order: (I) handshape, (II) orientation, (III) location, and, finally, (IV) movement. Annotations for different components are comma-delimited. My version of the notation for the RSL sign VASE is:

(2.4) RH: 

LH: 

The absence of an icon in the movement slot of the left hand indicates the absence of movement. If there is a change in handshape, orientation, or location, this is marked in the corresponding slots. In (2.4), the dominant hand changes location from the thumb side of the non-dominant hand to the upper neutral space. The initial location is given to the left of the arrow in the correspondent slot, and the final one – to its right.

I write this representation of signs in the tiers 'RH_manual_icons' and 'LH_manual_signs', respectively. For automatic processing, I use the textual representation of the HamNoSys notation (tiers 'RH_manual_text' and 'LH_manual_text'). It is too lengthy to look at during manual analysis, but is useful for automatic statistical computations. The textual equivalent of the annotation in (2.4) is:

(2.5) RH:<! hamceeall,hamcomma,hamextfingero,hampalml,hamcomma,hamthumbside,hamtouch,hamreplace,hamshoulders,ham comma,hammoveu !>

LH: <! hamceeall,hamcomma,hamextfingero,hampalmr,hamcomma,hamchest,hamcomma !>

The modified HamNoSys transcription, described in this section, enabled the general analysis of the data at the preliminary stages of the research. Sometimes, however, at more developed stages, certain adds-on to this transcription were required. I provide a detailed account of additional annotations in the chapters that deal with the relevant aspects of the analysis.

2.2.3. Transcription of the mouth articulation

The fifth ELAN tier in the phonetic transcription group contains the annotation of the mouth articulation. Out of the wide range of the non-manual activity, I mark only the movements of the lower part of the face, because it was reported to be connected with the lexical meaning of signs (Wilbur, 2000). I adopt the traditional distinction between the mouthing and the mouth gestures introduced in Chapter I, where the mouthing is the silent articulation of spoken language words, whereas the mouth gestures are sign language internal lip movements. Both types of mouth articulation accompany SASSes in my data.

While there is a widespread way of annotating mouthing (namely, with corresponding words of the dominant spoken language), the same cannot be said about mouth gestures. HamNoSys provides a very limited set of icons for facial articulation, see an example below:

(2.6)  -- cheeks puffed

 -- tongue pushed into cheek (visible from the outside)

Another phonetic notation system, SignWriting (Parkhurst & Parkhurst, 2008; Sutton, 1981), has a developed set of figures describing facial movements, see some examples in (2.7). However, as opposed to HamNoSys, SignWriting does not have textual representations of the icons, and it is problematic to process this notation automatically.

(2.7)  nose wrinkle

 eyes squinted

 rounded mouth (‘oh’)

Up to date, notation systems for the non-manual component are mainly created and used in sign linguistics locally for specialized research projects. Depending on the purposes of the project, notation systems can

- have different scopes (only echo-phonology, Bergman & Wallin, 2001; Woll, 2009; only adverbials, Johnston, 2014; only mouth gestures, Burkova & Filimonova, 2016; Ekman & Friesen, 1978; Sutton-Spence & Day, 2001; all kinds of mouth actions, Vogt-Svendsen, 2001);
- describe the form vs. the function of mouth actions (Hoiting & Slobin, 2002);
- be phonetic vs. phonological (Bergman & Wallin, 2001).

For my purposes, the annotation needs to be phonetic (as there is no phonological description of RSL non-manuals), form-driven and cover all kinds of mouth gestures. Among the existing notation systems, the following four are the most suitable for my needs:

1) Facial action coding system, FACS (Ekman & Friesen, 1978; Ekman et al., 2002);
2) Sutton-Spence & Day’s non-manual annotation system for BSL (Sutton-Spence & Day, 2001);
3) Vogt-Svendsen’s non-manual coding system for Norwegian SL (Vogt-Svendsen, 2001);
4) Burkova & Filimonova’s non-manual annotation system for RSL (Burkova & Filimonova, 2016).

Facial action coding system (FACS; Ekman & Friesen, 1978; Ekman et al., 2002) categorizes facial behaviors based on the muscles that produce them. It proved to be a useful annotation tool in sign language research (see, for example, Sandler, 2009). Each observable component of facial movement is called an Action Unit, or AU. Annotations consist of names of AUs participating in a facial expression (marked with figures) and the intensity scoring for each AU (marked with English letters from A (the weakest) to D (the strongest)). For example, the following expression gets the

annotation: 12B + 25C + 26C, where AU12 is pulling the corners of the lips back and upward, AU 25 is a partition of lips and AU25 is a jaw drop.

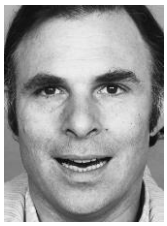


Figure 2.24. Facial expression marked in FACS as 12B + 25C + 26C
(Ekman et al., 2002:488)

As FACS provides a very detailed description of facial expressions, mastering this system takes a lot of time (as estimated in (Ekman et al., 2002), approximately 100 hours of self-study). A comprehensive manual with a large number of photos, videos, and extensive explanations is available.

Sutton-Spence & Day's (2001) non-manual annotation system for BSL is organized as a decision tree, where one has to make several decisions about a particular mouth position to reach the notation tag. At the upper level, one decides whether the mouth in a particular articulation is open or closed. If the mouth is, for example, open, the next decision to make is whether teeth are visible or not. If they are visible, then the next choice is whether both the top and the bottom teeth are visible, or only the top ones. Eventually, a series of decisions will lead to an annotation maker. See a fragment of the tree below:

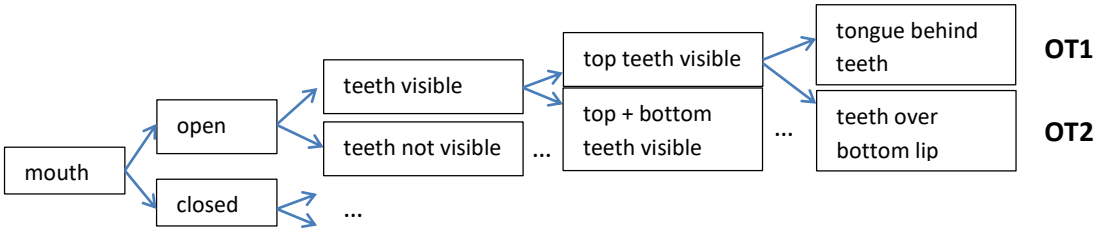


Figure 2.25. Fragment of the Sutton-Spence&Day decision tree

This annotation presupposes a hierarchy of parameters: '+/- open mouth' takes the role of the highest and the most general feature, '+/- visible teeth' is one step more specific, and so on. The annotation tags consist of two letters (OT 'open + teeth', OL 'open + lips', CN 'closed + neutral', or CP 'closed + puffed [cheeks]') followed by a number (which does not reflect anything, but simply indicates a particular mouth articulation).

A relatively different system is proposed in (Vogt-Svendsen, 2001). It focuses on the description of the lower part of the face. The annotation specifies the degree of the jaw opening (closed, crack, open, gap), the lips position (neutral, stretched out, sucked in, bent upwards, etc.), and, if marked, the cheeks position, the tongue position, and the use of air. For example, in the following NSL sign HAVE-NOT-DONE, the mouth gesture gets the annotation: 'jaw cracked, lips pursed together'.



Figure 2.26. NSL: HAVE-NOT-DONE
(Vogt-Svendsen, 2001: 10, Fig. 1)

If a mouth configuration changes during the sign, all the static sequences are annotated. For example, in the following sign GO-AWAY, the mouth is initially open and then closed. The first part gets the annotation 'jaw open, lips neutral', the second one – 'jaw closed, lips pressed together'.



Figure 2.27. NSL: GO-AWAY
(Vogt-Svendsen, 2001: 11, Fig. 2)

Finally, Burkova & Filimonova's system for RSL non-manuals describes the whole body. The following parts are specified: eyebrows, eyes, gaze, mouth, head, nose, cheeks, shoulders, trunk. The annotation tags are 2-4 letter sequences, see some examples below:

(2.8) mo 'mouth open'
ebl 'eye blink'
hn 'head nod'

Among these four notations, two describe mouth articulation as a combination of several mouth parts: the jaw (which can be open or closed), the cheeks (which can be puffed, neutral or sucked in), the teeth (which can be visible or not) and so on: Sutton-Spence & Day's coding system and Vogt-Svendsen's notation. I adopt this division in my project to account for potential connections between separate parts of the mouth and particular SASS meanings.

As opposed to Vogt-Svendsen's system, Sutton-Spence & Day's annotation presupposes a hierarchy of parameters (jaws>teeth>tongue, etc.) which I decided not to assume in advance. Thus, Vogt-Svendsen's system is the best match for my project. As this annotation was developed for NSL and as a notation system created on the base of RSL exists, I combined Vogt-Svendsen's approach with Burkova&Filimonova's notation tags (adding new tags wherever necessary). The resulting annotation system is presented in the table below (also repeated in Appendix II). The notation markers which are not presented in Burkova&Filimonova's system and which are created for my study are marked with red color.

1	**Jaw**	
	mcl	closed
	mcr	crack
	mo	open
	mwo	wide open
2	**Lips – markedness**	

	ln	neutral
	Ø	marked
3	**Lips – corners**	
	lup	corners up
	ldn	corners down
4	**Lips – horizontal plane**	
	ls	lips stretched
	lso	one corner stretched
	lc	lips contracted
5	**Lips – midsaggital plane**	
	lpd	lips protruded
	llpd	lower lip protruded
	ldr	lips drawn
	lbt	lower lip bitten
6	**Lips – vertical plane**	
	lpr	lips pressed
	ulup	upper lip up
7	**Lips – air**	
	lvb	lips vibrate
	llp	space under lower lip is puffed
8	**Cheeks**	
	chp	cheeks puffed
	chpo	one cheek puffed
	chs	cheeks sucked in
9	**Tongue**	
	tt	tongue protruded
	tch	tongue pushed into cheek
	tll	tongue pushed into the space under the lower lip
10	**Air**	
	msc	inhalation
	mssc	sharp inhalation
	mbl	exhalation
	msbl	sharp exhalation

Table 2.4. RSL mouth gesture notation system used in this project

In this notation system, four parts of the lower face (jaw, lips, cheeks, tongue) and the use of air are described. The position of the lips is further divided into six clusters of features: markedness, lips corners, lips position in the horizontal plane, lips position in the vertical plane, lips position in the midsaggital plane, and the use of air which affects the lips. Overall, there are 10 groups of features. Only one feature from each group can be realized in one mouth gesture. It does not mean that all mouth actions get annotations consisting of 10 markers. Only the degree of the jaw opening and one (any) of the six lips position groups have to be specified. Thus, the shortest annotations include only two markers (Fig. 2.28, 2.29). Some annotations are longer (Fig. 2.30, 2.31). If a mouth configuration changes during the mouth gesture, both initial and final configurations are specified (semicolon-delimited, Fig. 2.32).



Figure 2.28. RSL:high (fence); MG: mo, ln
[T; 03:28.9]



Figure 2.29. RSL:low (fence); MG: mcl, ldn
[R; 03:42.8]



Figure 2.30. RSL:thin-cylindrical; MG: mcr, ln, tt, mbl
[T; 01:53.3]



Figure 2.31. RSL:smooth; MG: mcr, lc, chs, msc
[T; 03:23.1]

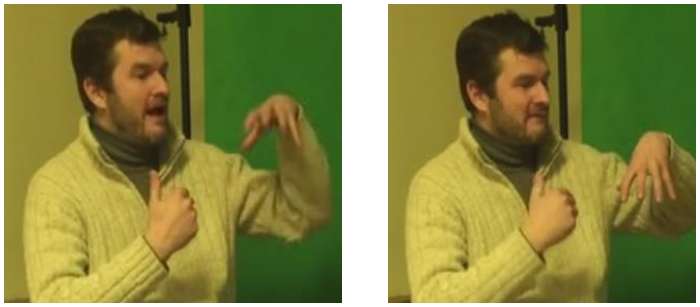


Figure 2.32. RSL:big.rock; MG: mo, ls; mcr, ls, lbt, mbl
[R; 11:45.9]

Table 2.5 gives an example of an annotation on all five phonetic tiers (for the SASS in Fig. 2.33).



Figure 2.33. RSL SASS:long (brush)
[R; 01:18.2]

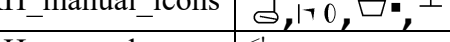
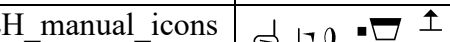
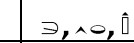
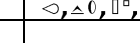
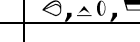
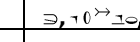
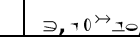
Tier	Annotation
RH_manual_icons	
RH_manual_text	<! hamfinger2,hamthumbacrossmod,hamcomma,hamextfingeruo,hampalml,hamcomma,hamshoulders,hamlrat,hamcomma,hammoveo !>
LH_manual_icons	
LH_manual_text	<! hamfinger2,hamthumbacrossmod,hamcomma,hamextfingeruo,hampalmr,hamcomma,hamlrat,hamshoulders,hamcomma,hammoveo !>
Nonmanual	mcr, ulup, lbt, mbl

Table 2.5. Phonetic annotation of the sign in Figure 2.33

Following data annotation, the completed ELAN transcription is then exported as a tab-delimited csv file. The raw file is further processed with Python programs to eliminate empty rows and to fix a wrong alignment of tiers whenever it occurs. The processed files are organized as tables with SASSes as rows and annotations on different tiers as columns, see an example below (without textual HamNoSys representations and sentence translations):

begin time	**RH_gloss**	**LH_gloss**	**RH_man_form**	**LH_man_form**	**nonman**
07:56,9	SASS:thin_long_straight	SASS:thin_long_straight			mcl, ls; mcl, ls, tt
13:20,3	SASS:thin_short_cylindrical	SASS:thin_short_cylindrical			mcl, lpr, ldn; mcl, lpr, ldn, tt
00:53,9	SASS:thin_tall_cylingrical				mcr, ls, lc, mbl
04:33,3	SASS:thin_tall_straight				mcr, ls, lc, mbl
04:46,6	SASS:thin_long_straight				mcr, ls, lc, mbl

04:50,2	SASS:thin_long_straight				mcl, ls
07:56,0	SASS:thin_long_straight				mcl, lpr; mcl, lpr, tt
12:17,6	SASS:thin_flat_rectangular				mcl, lpr; mcl, lpr, ls, tt

Table 2.6. Fragment of the table with the annotation of RSL SASS

Tables formed on the basis of separate ELAN files are then combined into one table with all transcribed SASSes. This overall table has an additional column with the name of the file the SASS is taken from. This table contains the main sample for the analysis. It is then modified and processed in different ways depending on the current task.

This chapter described the methodology used in my project with the focus on data collection and data annotation. Since this is pioneering research, both steps required developing new tools: I designed a specialized set of stimuli for collecting the data and a new notation system for transcribing the mouth articulation. The next two chapters present the morphological analysis of RSL SASSes: Chapter 4 describes the manual components and Chapter 5 deals with the mouth articulation.

Chapter 3: Manual components in RSL SASSes

This chapter analyzes three manual components of RSL SASSes: the handshape (§3.1), the movement (§3.2), and the location (§3.3). Some works also include the orientation among the basic manual components (see, for example, (Battison, 1978)). However, the orientation on its own proved to be not relevant for the SASSes' structure. Therefore, I do not discuss this component in a separate section. At the same time, I do mention it in the section on the movement component, since the change of orientation sometimes plays a role in the interpretation of the SASS's semantics.

In calling the analysis I present here 'morphological', I follow the traditional understanding of the term 'morpheme', according to which it is a minimal meaningful linguistic unit. As the introductory chapter of this thesis discusses, sign language signs can have a variety of morphological structures. In some of them, separate components do not carry any semantics, and the sign gets a meaning only as a whole. These signs (also referred to as 'fully-lexicalized') are usually treated as monomorphemic. In other signs, different sign components are meaningful on their own. These signs are sometimes referred to as polymorphemic. Despite a large number of approaches to SASSes in the literature, all researchers discussing them agree on their polymorphemic status, i.e. the fact that different components in these signs carry separate chunks of semantics. Therefore, in my analysis, I approach these signs in the same way. I analyze separate components of SASSes with the assumption that they carry some meaning and, therefore, constitute separate morphemes (or bundles of morphemes).

Each section starts with a brief overview of theoretical challenges the component poses and the specific research questions I aim to answer. This is followed by the discussion of methodological decisions I take in order to enable an adequate analysis of the component. Then, the results of the analysis are presented with a further discussion of the contribution of my findings to the existing body of knowledge about sign language signs, in general, and SASSes, in particular.

3.1. Handshape

As Chapter 1.2.2 of this thesis discusses, the main question with respect to handshapes in SASSes is what kind of meaning they carry and whether they should be analyzed as consisting of smaller meaningful elements. While some researchers see handshapes as indivisible wholes, contributing to one aspect of the object's visual image, others propose to see it as a collection of smaller structural elements, each of which expresses a separate size and/or shape meaning. This chapter aims to determine what analysis is the most suitable for the RSL data. It does this by defining the inventory of SASS handshapes in RSL and analyzing these handshapes one by one. It also discusses the categorical versus gradient status of some hand configurations, namely  and . These handshapes have been reported to change aperture in order to reflect the object's size (Lars, 2000). This raises the question of whether the change of aperture in these signs is analogue or categorical in nature. In this chapter, I present an analysis arguing for the categorical interpretation of these handshapes. Since the HamNoSys notation contains non-transparent pictures of handshapes (such as ☝, ☖, ⊃) which are difficult to read, I represent handshapes with images and textual descriptions.

3.1.1. Data processing

This section describes the steps I took in order to outline the inventory of handshapes occurring in RSL SASSes. Taking the table with the phonetic transcription of SASSes in my sample as a base (see Section 2.3 and Table 2.6, specifically), I used Python 2.7 software to create a frequency list of handshapes. In two-handed signs, I accounted for the dominant handshape only. In signs with a changing handshape, I accounted for both the initial and the final configurations. The overall number of analyzed handshapes is 695. In this set, there are 84 distinct handshapes, out of which 33 occur more than five times. The table below presents the 10 most frequent SASS handshapes in my data:

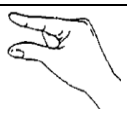
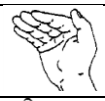
№	handshape	textual description	frequency
1		Stretched index finger, thumb across the hand	60
2		Fingers stretched together, thumb along the hand	49
3		Index finger and an opposed thumb curved	40
4		Index finger and an opposed thumb stretched	40
5		Stretched index finger, thumb along the hand	31
6		Fingers bent together, thumb along the hand	30
7		Fingers stretched together, thumb stretched away from the hand	26
8		Index finger and an opposed thumb stretched, large aperture	23
9		Fingers curved together, thumb curved and opposed	21
10		Index and thumb curved and in contact	21

Table 3.1. Frequent SASS handshapes in RSL[14]

[14] Pictures of hand configurations in tables are from HamNoSys illustrations (Hanke, 2004).

Not all grammatically valid RSL handshapes occur in SASSes. For example, there are no , , or  configurations in my data, although they are possible RSL handshapes and can be part of lexicalized signs or classifier constructions (see examples below).



(a) SIZE



(b) DOCTOR



(c) INTERNET

Figure 3.1. RSL handshapes not occurring in SASSes
(www.spreadthesign.com)

At the same time, the handshapes occurring in SASSes cannot be reduced to the RSL basic handshape set in the sense of Battison (1978). According to his definition, the handshape is basic if it can occur on the passive hand in a two-handed sign, in which the hands do not share the same specification for the handshape. In ASL, for example, seven handshapes can be encountered in this context, while in Kenyan Sign Language (LAK) the basic handshape set consists of 11 items (Morgan & Mayberry, 2012). Although there is no study defining this set for RSL, it is clear that it does not match the SASS handshape list. For example, the handshape  is basic (Fig. 3.2), but does not occur in SASSes. On the other hand, the configuration  is very frequent in SASSes, but, to my knowledge, it cannot be used in the basic handshape context.



Figure 3.2. RSL: UMBRELLA
(www.spreadthesign.com)

Thus, the handshapes occurring in RSL size and shape specifiers constitute a separate set. An important assumption about this set is the presence of meaning. As I argue in the beginning of this chapter, SASS handshapes are not semantically empty, but bear a chunk of semantics that they contribute to the meaning of the whole sign. Even a preliminary observation, however, shows that not all 84 formally distinct SASS handshapes act as semantically distinct units. For example, the stretched index handshapes with the thumb across versus along the hand (rows 1 and 5 in Table 3.1) occur in very similar contexts and seem to have the same meaning. Thus, the number of semantically distinct SASS handshapes is lower than 84. My task, therefore, is to establish the groups of handshapes such as within each group the distinction between the forms does not bear any semantics

but is influenced by other factors. I refer to these groups as form-meanings units (FMUs)[15]. I expect the handshapes belonging to one FMU to have allophonic relations and to be to some extent predicted from the phonological context. In terminology, proposed by Kooij (2002), the differences between the handshapes **within** the groups can be accounted for by *phonetic implementation rules*. The differences **between** the groups have a different nature. SASS handshapes express meanings iconically, which means that certain aspects of their form are motivated by the shape and/or size of the depicted object. Therefore, I expect the differences between FMUs to be connected to the semantics they express. In Kooij's (2002) terminology, these are accounted for by *semantic implementation rules.* For each FMU in my data, I establish a *semantically profiled part*, i.e. the part of the hand which iconically depicts an aspect of the object's appearance. I mark this part with dots and/or lines on the handshape. This part cannot be a subject of phonological variation. Instead, it is fixed within each FMU group.

I use the following principle for establishing handshape FMUs in RSL SASSes:

Two hand configurations belong to the same FMU, if:
1) they have the same meaning;
2) they have the same set of selected fingers.

As Chapter 1.1.2 discusses, selected fingers constitute one of two main groups of features that characterize the phonological form of the sign language handshape (see, for example, Brentari, 1998; Sandler, 1989), the second one being joint configuration. Selected fingers are the most prominent fingers in the handshape, which can interact with other parts of the body. The joint configuration is the form of selected fingers. These two groups of features have been noted to play unequal roles in the handshape phonology. Selected fingers have a higher status in defining the handshape than joint configuration. This is reflected, among other things, in the Handshape Sequence Constraint, according to which in monomorphemic signs with a change of handshape 'the initial and final handshapes are specified for the same selected fingers' (HSC, Sandler, 1989: 72, postulated for ASL). It means that in a well-formed sign the hand cannot change, for example, from  to  or from to , because these handshapes have different specifications of selected fingers (index & middle versus index & thumb; and index & thumb versus all, respectively). A change from  to  or from  to , on the contrary, is possible. One way to interpret it: the change in selected fingers is too drastic for the sign to be considered well-formed (which, in turn, most probably is due to physiological reasons). Sandler (1989) also points out that handshapes with the same set of selected fingers share some phonetic and phonological properties. This is reflected in her phonological model of the handshape: the node 'selected fingers' dominates the node 'position' (which is equivalent to joint configuration). I adopt this idea by postulating that the same set of selected fingers is necessary for two hand configurations to be considered instances of the same handshape.

[15] The term is widely used by the Radbout University research group on sign language linguistics. One of their projects is devoted to establishing sub-sign form-meaning units in sign languages (https://www.ru.nl/sign-lang/projects/form-meaning-units/).

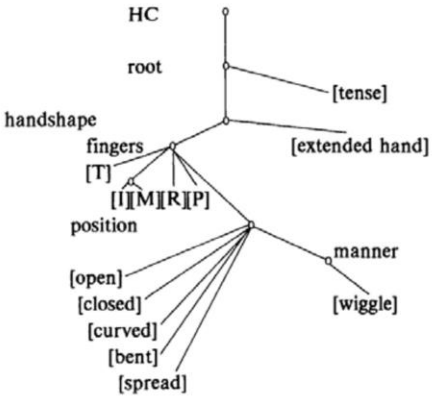


Figure 3.3. Handshape phonology by Sandler
(Sandler 1989: 61, 14)

The morphological analysis of SASS handshapes was conducted in three stages:

I. to deduce the meaning each of 84 distinct handshapes expresses;
II. to group handshapes with the same meaning and selected fingers together into FMUs;
III. to choose the default form for each FMU.

Establishing phonetic implementation rules that define the use of FMU variants in different contexts is not part of this thesis. However, in some places, where these rules can be easily traced or where the use of a particular form is motivated by a non-phonological condition, I comment on it.

In order to deduce the semantics of a handshape (stage I), I analyzed the meaning of SASSes it occurs in. I considered the common semantical part across all SASSes in question to be the meaning of the handshape. For example, the handshape  (fingers curved, touching the thumb) accompanies the following size and shape signs in my data:

- lexSASS:pipe
- SASS:long_straight_cylindrical
- SASS:c-shaped_cylindrical
- SASS:g-shapes_cylindrical
- SASS:thick_long_cylindrical
- SASS:pointed_long (about shoes)

These signs have different hand orientations, locations, movements, and non-manual components. The only common part in their form is the handshape. The only common part in their meaning is the semantic component ‘cylindrical’. Thus, it is plausible to attribute this semantics to the handshape in question.

The next stage (II) is the search for handshapes with the same meaning and similar form (i.e., the same set of selected fingers). In my set, only the handshape  (fingers curved and flexed, touching the thumb) satisfies these two conditions. It occurs in the following SASSes:

- SASS: thin_tall_cylindrical (about a vase)
- SASS: long_cylindrical (about a pipe)

Consequently, I combine these two configurations in one FMU, and I assign to it the meaning ‘cylindrical’. The last stage is to choose one configuration of the handshape as the default form. In this decision, I was guided by the following principles: the default hand configuration (1) should be

more frequent; (2) should have the widest distribution; (3) is the one that occurs in lexicalized SASSes. I treat the default handshape of the FMU as the one from which all other phonetic variants are derived. In the given example, the handshape  (fingers curved and not flexed) is default as it is more frequent (10 vs. 4 entrances), appears in more diverse contexts, and accompanies the lexicalized SASS PIPE in my data.

3.1.2. Data analysis

Following the procedure described in the previous section, I determined 16 handshape FMUs. All of them designate specific geometrical properties of the object. The table below presents the full inventory of the RSL SASS handshapes. The rest of the section gives a detailed description of each handshape.

№	Handshape	Meaning	Prototypical objects
1		narrow long two-dimensional	stripes
2	 (I)	cylindrical three-dimensional	pipes
3	 (II)	thick long wide	books
4	 (I)	cylindrical three-dimensional	pipes
5	 (II)	thin long	lines
6		cylindrical three-dimensional	pipes
7		round three-dimensional	sphere
8	 (I)	thin long	ropes
9	 (II)	two-dimensional (contour)	mirrors (shape)
10	 (III)	thin long	1D objects (size)
11	 (I)	flat	surface
12	 (II)	two- and three-dimensional	2D&3D objects (size)
13		several thin long parallel objects	fence/grass
14		two thin long parallel objects	two parallel lines
15		three thin long parallel objects	three parallel lines
16		thin wide long	sheet of paper

Table 3.2. SASS handshapes: morphological inventory

Handshape : ‘stripes’

This handshape denotes long narrow things, like a stripe, a road, or a plank. They are perceived as two-dimensional objects with one dimension (length) bigger than the other (width). The hand moves along the length of the object with the thumb and the index finger delimiting its width, see the illustrations below.



Figure 3.4. Profiling of handshape



(a) SASS:long-arcing (small path) [G; 07:01.3]



(b) SASS:narrow-long-straight (road) [T; 00:36.6]



(c) SASS:wide-wiggly (ribbon) [D; 01:48.6]

Figure 3.5. RSL SASSes with handshape

This handshape has the following variants:

№	Handshape variants	Textual description	№ of entrances
1		Index and thumb curved	40
2		Index and thumb bent	40
3		Index and thumb curved, large aperture	23
4		Index and thumb bent, small aperture	21
5		Index and thumb curved, small aperture	16
6		Index and thumb stretched, thumb positioned perpendicular to the hand	6
Overall			146

Table 3.3. Variants of handshape

The variants of this FMU differ in two features, i.e. configuration of the non-base joints (curved versus non-curved) and position of the base joint, i.e. hand aperture. The non-base joint configuration has been argued to convey certain aspects of the referent's shape, such as roundness. Indeed, it plays this role in some FMUs discussed below. However, in the handshape , the index finger and the thumb are not profiled (only their tips are), therefore the shape of these digits can be changed without consequence for the meaning. The distance between the index tip and the thumb tip (base joint configuration) corresponds to the width of the depicted object. This distance can be consciously manipulated in order to reflect the size of the depicted dimension. I, however, argue that such manipulation happens only in marked contexts and that hand configurations with different sizes of aperture should be included in one FMU (see Section 3.1.3 for a detailed argumentation).

Two hand forms in this set have a high frequency, i.e.  (index and thumb curved) and  (index and thumb bent). They both occur in very diverse contexts. However, only the former () is used in lexicalized SASSes in my data (Fig. 3.6). Hence, I consider it to represent the default form of the FMU.



(a) lexSASS:PLANK [D; 02:20.7]



(b) lexSASS:ROAD [T; 00:23.9]

Figure 3.6. RSL lexicalized SASSes with handshape 

Handshape : pipes and books

This handshape form two FMUs, depending on the profiled part of the hand. If the inner side of the hand is in focus (Fig. 3.7), the handshape denotes cylindrical three-dimensional objects, like a pipe, a vase, a street lamp.



Figure 3.7. Profiling of handshape  (I)



(a) SASS:narrow-tall-cylindrical (cabin) [E; 08:09.6]



(b) SASS:arcing-long-cylindrical (pipe) [G; 07:36.6]



(c) SASS:thick-straight-cylindrical (pipe) [T; 00:52.4]

Figure 3.8. RSL SASSes with handshape (I) 'pipes'

If the distance between the fingertips and the thumb is profiled, the handshape denotes three-dimensional objects with two dimensions significantly bigger, than the third one (a wall, a book, a layer of dust). The hand moves along the length of the object, while the fingers and the thumb delimit its thickness (the smallest dimension).

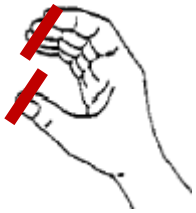


Figure 3.9. Profiling of handshape (II)



(a) SASS:thick-tall (wall) [E; 05:34.6]



(b) SASS:flat-rectangular (box) [R; 07:12.8]



(c) SASS:thick-straight (plank) [S; 03:07.0]

Figure 3.10. RSL SASSes with handshape (II) 'books'

This handshape has three variants:

№	Handshape variants	Textual description	№ of entries
1		fingers and thumb curved	19
2		fingers and thumb curved, large aperture	8
3		fingers bent, thumb stretched perpendicular to the hand	7
Overall			34

Table 3.4. Variants of handshape

Similar to the handshape above, the differences between the variants concern the aperture and the non-base joint configuration. Only variants 1 and 2 can appear in FMU (I) 'pipes'. The hand configuration with the non-curved fingers and thumb (row 3 of Table 3.4) interferes with the semantic profiling of the handshape and blocks the interpretation of the round shape. Therefore, it is not applicable to this FMU. FMU (II) 'books' can have all three variants. As the handshape variant 1 in Table 3.4 is the most frequent and as it occurs in lexicalized SASSes in my data, I consider it to be the default hand configuration for both FMUs.



(a) lexSASS:VASE [D; 00:30.6]



(b) lexSASS: ROUND-BOX [D; 03:27.6]

Figure 3.11. RSL lexicalized SASSes with handshape

Handshape : pipes and lines

This handshape can also form two FMUs, depending on the profiled part. If the inner circle composed of the thumb and the index finger is in focus, the hand configuration describes long cylindrical three-dimensional objects: a pipe, a stick, a perch.



Figure 3.12. Profiling of handshape (I) 'pipes'



(a) SASS:straight-tall-thin (vase) [E; 07:47.5]



(b) SASS: arcing-cylindrical (pipe) [R; 12:50.7]



(c) SASS:curved-thin (mug handle) [S; 06:12.8]

Figure 3.13. RSL SASSes with handshape (I) 'pipes'

In this meaning, the handshape has two variants with the form as the prototypical one. See examples of this handshape in lexicalized SASSes below.

№	Handshape	Textual description	№ of entries
1		Index and thumb curved, in contact	16
2		Index and thumb curved and flexed, in contact	8
Overall			24

Table 3.5. Variants of handshape (I) 'pipes'



(a) lexSASS:PERCH [E; 04:32.5]



(b) lexSASS:HANDLE [S; 06:04.5]

Figure 3.14. RSL lexicalized SASSes with handshape (I) 'pipes'

If only the tips of the thumb and the index finger are profiled, then the handshape denotes long unidimensional objects (type 'line'): a thread, a picture frame, a line.



Figure 3.15. Profiling of handshape (II)



(a) SASS:thin-long-arching (pipe) [R; 06:57.9]



(b) SASS:thin-arching (cage handle) [S; 02:29.7]

Figure 3.16. RSL SASSes with handshape (II) 'lines'

In this meaning, the handshape has three variants. The variant is the most frequent and, hence, is the candidate for the underlying form. However, there is no other evidence in favor of this (or any other) decision, since I did not encounter any lexicalized SASSes with this handshape, and all the variants occur in the same types of contexts.

№	Handshape	Textual description	№ of entries
1		Index and thumb bent, in contact; non-selected fingers flexed	12
2		Index and thumb curved, in contact; non-selected fingers flexed	5
3		Index and thumb curved, in contact; non-selected fingers stretched	5
Overall			22

Table 3.6. Variants of handshape (II) 'lines'

This set of configurations overlaps but does not match exactly the set in Table 3.5. In the handshape 'lines', there is no variant with the curved and flexed ( ) index finger, instead, there are two variants with curled non-selective fingers (and). I hypothesize that this mismatch is not accidental and is strongly correlated with the semantics of the handshape. Thus, in the variant with the curved and flexed index finger, the profiling of the point (as in Fig. 3.15) is clouded, since tips of the thumb and the index finger do not touch each other. The absence of the handshape in the FMU (I) 'pipes' is, probably, also due to the profiling issues. The circle formed by the index finger and the thumb in this configuration is occluded by the remaining fingers. In the handshape, there is no circle at all. This is in line with the study of size versus shape gestures by Hassemer & Winter (2016). They analyze the 'precision grip' holding gesture with profiled thumb and index finger and show that its interpretation largely depends on the position of the three non-profiled fingers. In case they are curled, the configuration is more probably perceived as a height gesture. If they are not curled and, hence, do not occlude the inner circle formed by the thumb and

the index finger, the chance of the handshape to be interpreted as the shape gesture, showing a round form, gets higher:



(a) height (b) shape

Figure 3.17. Height versus shape gestures
(Hassemer & Winter, 2016: 5, 1)

Handshape : pipes

This handshape describes cylindrical objects, like a pipe, a stick, a chair leg. The inner side of the hand is profiled.



Figure 3.18. Profiling of handshape



(a) SASS:c-shaped-cylindrical (pipe) [R; 04:06.9]



(b) SASS: thin-cylindrical (vase) [T; 00:49.2]



(c) SASS:thick-arcing-cylindrical (pipe) [R; 07:43.1]

Figure 3.19. RSL SASSes with handshape

This handshape has two variants. The form with non-flexed selected fingers is the default one, since it is the most frequent, has a wider distribution (see the discussion in the beginning of this section), and can accompany lexicalized SASSes.

№	Handshape	Textual description	№ of entries
1		Fingers and thumb curved, in contact	10
2		Fingers and thumb curved and flexed, in contact	4
Overall			14

Table 3.7. Variants of handshape



TWO-PIPES [T; 01:32.5]

Figure 3.20. RSL lexicalized SASS with handshape

Handshape : sphere

This handshape denotes spherical and dome-shapes objects, like a ball, a stone, a pile of sand. All inner side of the hand is profiled.



Figure 3.21. Profiling of handshape



(a) SASS:big-spherical (ball) [D; 02:52.1]



(b) SASS:small-spherical (ball) [D; 02:52.7]



(c) SASS: big-dome-shaped (pile of sand) [G; 06:26.3]

Figure 3.22. RSL SASSes with handshape

There are four variants of this handshape. The configuration with spread and curved fingers and an opposed thumb (row 1 in Table 3.8) is the default one: in my data, it is the most frequent and it accompanies the lexicalized SASS BALL.

№	Handshape	Textual description	№ of entries
1		Fingers spread and curved, an opposed thumb curved	18
2		Fingers spread and curved, an extended thumb curved	6
3		Fingers spread and half-curved, an extended thumb curved	1
4		Fingers spread and curved, almost touching the thumb, an opposed thumb curved	1
Overall			26

Table 3.8. Variants of handshape



BALL [G; 02:45.7]

Figure 3.23. RSL lexicalized SASS with handshape

Handshape : ropes, mirrors, and 1D objects

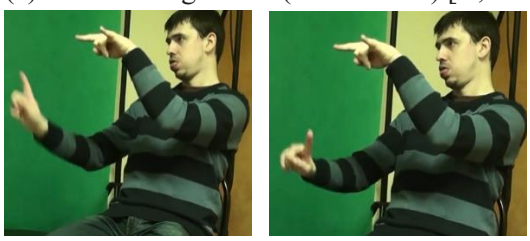
This handshape constitutes part of three FMUs depending on the movement and the profiled part. In the first usage, the whole finger is profiled (Fig. 3.24). In this case, this handshape denotes long thin objects, such as thread, ropes, twigs, thin sticks. Conceptually, this finger becomes the referent, i.e the line along which the hand moves.



Figure 3.24. Profiling of handshape (I) 'ropes'



(a) SASS:straight-thin (window bar) [R; 05:07.6]



(b) SASS:twisting-long-thin (thread) [G; 02:34.4]



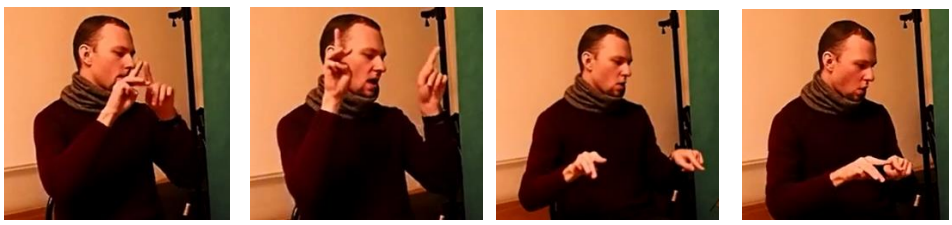
(c) SASS:rectangular (chin-up bar) [R; 08:08.4]

Figure 3.25. RSL SASSes with handshape ☝ (I) 'ropes'

The second possible use of the handshape – with only the tip of the index finger profiled. In this case, the hand 'draws' the outline of the object. The object is prototypically two-dimensional (a mirror, a painting, a photo), but can also be unidimensional (a line, a thread, a mug handle).



Figure 3.26. Profiling of handshape ☝ (II) 'mirrors'



(a) SASS: rectangular (window) [S; 03:07.6]



(b) SASS:oval (mirror) [D; 03:45.4]



(c) SASS: curved (cage handle) [E; 06:20.5]

Figure 3.27. RSL SASSes with handshape ☝ (II) 'mirror'

Finally, the ☝ handshape can be used in static SASSes. In this case, again, the tip of the index finger is profiled (Fig. 3.26). However, in contrast to the FMU II, the hand does not outline the object's contour. Instead, two hands are held at the ends of the object's projection. The object should be thin and long, like a stick, a brush, or a chair leg.



(a) SASS:tall (chair leg) [S; 07:53.2]



(b) SASS: long (snake) [T; 04:36.9]



(c) SASS: short (brush) [D; 02:25.8]

Figure 3.28. RSL SASSes with handshape ☝ (III) '1D objects'

This handshape has four variants in all three FMUs. These variants differ in the base joint configuration of the selected finger (whether the index is stretched or bent) and in the position of the thumb (whether it crosses non-selected fingers or is positioned along the palm). Both variations have been identified by Kooij (2002) for NGT and argued to be subject to phonetic implementation rules.

Handshape	Textual description	№ of entries
	Index stretched, thumb across non-selected fingers	60
	Index stretched, thumb along the palm	31
	Index bent, thumb across non-selected fingers	8
	Index bent, thumb along the palm	7
Overall		106

Table 3.9. Variants of handshape 

The forms with the thumb positioned along the palm versus across the non-selected fingers (rows 1 and 2 in Table 3.9) both can occur in lexicalized SASSes. As the latter occurs twice as frequently as the former in my data, it is the primary candidate for the default form.



(a) lexSASS:BRANCH [R; 10:45.8]



(b) lexSASS:PAINTING [D; 02:30.4]

Figure 3.29. RSL lexicalized SASSes with different forms of the handshape 

Handshape : surfaces and three-dimensional objects

This is the most frequent handshape in my data. It occurs in 206 out of 695 SASSes. As well as the  handshape,  can be used in tracing and static SASSes. In the first case, the whole inner side of the hand is profiled, and the handshape describes flat surfaces: a floor, a roof, a wall, a table desk.



Figure 3.30. Profiling of handshape (tracing SASSes)



(a) SASS:conical-big (pile of sand) [E; 04:51.3]



(b) SASS:smooth-inner-surface (bowl) [S; 02:37.9]



(c) SASS:wide-rectangular (house) [S; 06:27.6]

Figure 3.31. RSL SASSes with handshape (tracing SASSes)

In the second case, the outer edge of the palm is profiled. Two hands are located at the ends of the object's projection, and the distance between the hands indicates the size of the object. The object can be of any form, but is prototypically three-dimensional, as a box, a hat, or a chair.



Figure 3.32. Profiling of handshape (static SASSes)



(a) SASS:wide (house) [E; 06:34.2]



(b) SASS:small (snake) [R; 04:50.3]



(c) SASS:low (table) [G; 07:12.1]

Figure 3.33. RSL SASSes with handshape (tracing SASSes)

This handshape has the largest set of variants (20 items). Most of them occur in both tracing and static SASSes. The "\" symbol between two handshapes means that the observed form is between the two configurations. For example, the third row of the table (thumb along the palm\thumb extended) contains the hand configuration with the thumb being at around 45-degree angle to the palm, as in Fig. 3.33a. For the most part, the handshapes in the table differ in configuration of the base joint (whether the fingers are bent or stretched), position of the thumb, and stretching of the fingers. Interestingly, the difference between the handshapes and (rows 4 and 7 of Table 3.10) can be meaningful in RSL. The form , but not , can denote the numeral 'five'. However, in the context of SASSes, these configurations behave like allophones.

№	Handshape	Textual description	№ of entries
1		Fingers stretched, thumb stretched along the palm	49
2		Fingers bent, thumb stretched along the palm	30
3	\	Fingers stretched, thumb half-extended	26
4		Fingers stretched, thumb extended	21
5		Fingers stretched, thumb positioned across the palm	14
6		Fingers stretched, thumb opposed	13
7		Fingers stretched and spread, thumb extended	10
8	\	Fingers stretched and half-spread, thumb opposed	7
9	\	Fingers half-bent, thumb along the palm	6

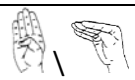
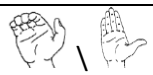
10		Fingers bent, thumb half-extended	5
11		Fingers bent,thumb extended	5
12		Fingers half-bent, thumb along the palm	4
13		Fingers half-curved, thumb along the palm	3
14		Fingers spread and stretched, middle finger half-curved, an opposed thumb half-curved	3
15		Fingers spread and half-curved, an opposed finger half-curved	2
16		Fingers half-curved, an opposed thumb stretched	2
17		Middle finger and an opposed thumb curved, non-selected fingers stretched and spread	2
18		Fingers bent and spread, middle finger half-curved, an opposed thumb half-curved	2
19		Fingers stretched and half-spread, an opposed thumb stretched	1
20		Fingers curved, thumb along the palm	1
Overall			206

Table 3.10. Variants of handshape

All handshapes that occur more than five times in my sample can be used in lexicalized SASSes (see some examples in Fig. 3.34). I consider the handshapes with the thumb extended & stretched along the palm (rows 1 and 4 in Table 3.10) to be the default ones.



(a) lexSASS:WALL [G; 05:29.3]



(b) lexSASS:HOUSE [R; 02:41.9]



(c) lexSASS:FLOOR [G; 05:49.5]

Figure 3.34. RSL lexicalized SASSes with handshape

Handshapes , , : parallel lines

These handshapes are conceptually close to the handshape , discussed earlier. They describe thin long objects ('lines'), and either the selected fingers or their tips can be profiled. In the first case, the hand moves along the object line, in the second case, it outlines its contour.

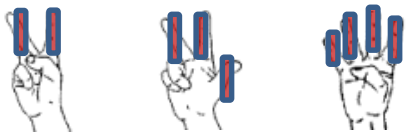


Figure 3.35. Profiling of handshapes , , and (I)



Figure 3.36. Profiling of handshapes , , and (II)



(a) SASS:two-long-straight (pipes) [R; 09:37.7]



(b) SASS:two-long-straight (planks) [E; 06:39.6]



(c) SASS: three-arcing-long (pipes) [R; 11:36.2]

Figure 3.37. RSL SASSes with handshapes , , and

Irrespectively to the profiling, these handshapes denote two, three, and many parallel lines, correspondingly. Table 3.11 presents the set of their variants. Neither nor hand forms occur in lexicalized SASSes. In contrast to it, both configurations occur in my data in lexicalized SASSes only (Fig. 3.38). More data is needed to establish default forms of these handshapes.

№	Handshape	Textual description	№ of entries
1		Index and middle fingers stretched and spread, thumb along the palm	2
2		Index and middle fingers stretched and spread, thumb across non-selected fingers	3
3		Index and middle fingers stretched and spread, an extended thumb stretched	2
4		Index, middle, and ring finger are stretched and spread, thumb across the non-selected finger	3
5	\	Fingers stretched and half-spread, thumb across the palm	14
6		Fingers stretched and spread, thumb across the palm	4
Overall			28

Table 3.11. Variants of handshapes , , and



(a) SASS:FENCE [T; 05:32.7]



(b) SASS:GRASS [R; 09:47.1]

Figure 3.38. RSL lexicalized SASSes with handshape

Handshape : 'sheet of paper'

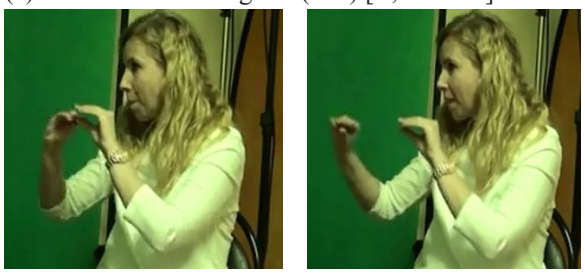
This handshape denotes flat three-dimensional objects with two dimensions significantly bigger, than the third one: a book page, a bedsheet, fabric. The hand moves along the length of the object, the inner hand side is profiled.



Figure 3.39. Profiling of handshape



(a) SASS:thin-rectangular (box) [T; 06:29.6]



(b) SASS:thin-long-straight (plank) [E; 03:39.5]

Figure 3.40. RSL SASSes with handshape

This handshape has two variants. I assign the status of the default form to the configuration where the thumb touches the fingers (row 1 in Table 3.12), as it is more frequent and it occurs in lexicalized SASSes (Fig. 3.41).

№	Handshape	Textual description	№ of entries
1		Fingers and thumb bent, in contact	20
2		Fingers bent, an opposed thumb bent, small aperture	5

Overall	25

Table 3.12. of handshape



lexSASS:PLATE [S; 07:54.9]

Figure 3.41. RSL lexicalized SASS with handshape

Unanalyzed handshapes

Fifteen out of 84 hand forms are not included in the analysis (45 items). This is due to one of the following reasons:

- the configuration occurs only in changing handshapes;
- the configuration occurs only in lexicalized SASSes;
- the configuration occurs only once.

More data is needed for the correct interpretation of these handshapes.

Handshape	Textual description
	Index and middle fingers bent and spread, an opposed thumb stretched
	Index and middle fingers bent, in contact with an opposed thumb
	Index and pinky fingers stretched, an extended thumb stretched
	Fingers flexed, thumb across the fingers
	Index and middle fingers stretched, thumb along the palm
	Index and middle fingers stretched and spread, an opposed thumb stretched
	Fingers bent and spread, an opposed thumb stretched
	Index curved, thumb along the palm
	Index and pinky fingers stretched, thumb across non-selected fingers
	Index and an opposed thumb curved, non-selected fingers stretched and spread
	Pinky finger stretched, an extended thumb stretched
	Pinky finger stretched, thumb across non-selected fingers

	Index curved, thumb across non-selected fingers
	Index bent, an opposed thumb stretched, large aperture
	Index and middle fingers stretched, thumb across non-selected fingers

Table 3.13. Unanalyzed handshapes

3.1.3. Discussion

The analysis of hand configurations occurring in RSL SASSes resulted in an inventory that includes sixteen FMUs. For each FMU, I (1) specify the variants it has, (2) give the examples of its usage from my corpus, and (3) define its meaning. With respect to the latter, I differ from the previous accounts of SASSes. I postulate that the handshape in SASSes carries exclusively the semantics of shape. This goes against the straightforward way of interpreting these structural elements. Intuitively, iconic handshapes in these signs also give at least some information about the size of the object, as in:  describes a thick object, while  characterizes a thin one. Recall also the analysis by Eccarius (2008), according to which the base joint configuration in handshapes carries the meaning of size. However, my data shows that this is not exactly the case. In general, the same hand form can denote a big, a small, or a neutral object depending on the context. See examples with the handshape  below.



(a) SASS:**thin**-long-straight (road) [T; 01:48.3]



(b) SASS:**wide**-long-straight (plank) [E; 07:22.7]



(c) SASS:**neutral**-round (stripe on a bowl) [S; 05:37.2]

Figure 3.42. Handshape denoting different sizes

Whether the object will be perceived as big or small, depends on its type and on the object it is compared with (in case there is a comparison). For example, if the handshape  describes a vase, then it most probably will be perceived as thin. If the same handshape refers to a thread, then it will be perceived as thick. This context, however, is not necessary in order to be able to interpret the size. My data show that mouth gestures accompanying SASSes unambiguously indicate whether the object is big, neutral, or small (see a detailed analysis in Chapter 4). Nyst (2007), in her analysis of size and shape depicting sign in AdaSL, proposes to differentiate between the *relative* size denoted by mouth articulation, and *absolute* size expressed by manual components. According to this view, handshape (and location) in SASSes show the actual extent of the referent's dimensions, while the mouth articulation evaluates this size as being bigger or smaller than the norm. This analysis might be applicable to RSL SASSes. In order to test it, additional data is needed. Thus, if handshape aperture in RSL SASSes indeed indicates the *absolute* size of a referent, we expect the same referent to be depicted with the same aperture irrespectively to its surroundings. For example, a plank 10 cm wide would be depicted with the same aperture irrespectively to whether it is presented to a signer on its own, or in comparison with a 20 cm plank, or in comparison with a 5cm plank. I predict, however, that the same 10 cm plank will be described with different hand apertures depending on the context. Based on my data, I hypothesize that the status of handshape in determining the size of the referent (either absolute or relative) is fundamentally secondary and lower than this of the context together with nonmanual articulation.

Another theoretical question outlined in the literature concerns the status of a handshape in SASSes as a single morpheme. Does the handshape carry the meaning of a certain shape as a whole or should it be divided into smaller morphemes? In order to answer this question, I performed a phonological analysis of SASS handshapes. For each handshape, I specified the following phonological parameters (see the table below):

1) T: thumb is selected
2) I: index finger is selected
3) M: middle finger is selected
4) R: ring finger is selected
5) P: pinky finger is selected
6) open: selected fingers are straight
7) clsd: selected fingers touch the tip of the thumb
8) bent: selected fingers are bent in the base joint
9) crvd: selected fingers are bent in all three joints
10) sprd: selected fingers are spread
11) ext: selected fingers are extended

The value of a feature is N/A (not applicable) when the set of selected fingers does not allow for a particular joint configuration. For example, if there is only one selected finger in a handshape (as in ), the parameter 'spread' is not applicable: there should be at least two selected fingers for a possibility to be spread. In the same manner, if all fingers are selected, the feature 'extended', which targets non-selected fingers, is not applicable. The value U/S (unspecified) is set when both specifications of the feature are possible in a handshape. For example, the handshape has a variant with bent fingers (). Hence, the value of the feature 'bent' is unspecified for this handshape.

№	HS	T	I	M	R	P	open	clsd	bent	crvd	sprd	ext
1	 planks	+	+	-	-	-	U/S	-	U/S	U/S	N/A	-
2	 books	+	+	+	+	+	-	-	U/S	U/S	-	N/A
3	 pipes	+	+	+	+	+	-	-	-	+	-	N/A
4	 pipes	+	+	-	-	-	-	+	-	+	N/A	+
5	 lines	+	+	-	-	-	-	+	U/S	U/S	N/A	U/S
6	 pipes	+	+	+	+	+	-	+	-	+	N/A	N/A
7	 plates	+	+	+	+	+	-	+	+	-	N/A	N/A
8	 ropes	-	+	-	-	-	U/S	-	U/S	-	N/A	-
9	 mirrors	-	+	-	-	-	U/S	-	U/S	-	N/A	-
10	 1D (size)	-	+	-	-	-	U/S	-	U/S	-	N/A	-
11	 surface	+	+	+	+	+	U/S	-	U/S	-	U/S	N/A
12	 2D-3D (size)	+	+	+	+	+	U/S	-	U/S	-	U/S	N/A
13	 spheres	+	+	+	+	+	-	-	-	+	+	N/A
14	 lines (two)	-	+	+	-	-	+	-	-	-	+	-
15	 lines (three)	+	+	+	-	-	+	-	-	-	+	-
16	 lines (many)	-	+	+	+	+	+	-	-	-	+	-

Table 3.14. Phonological specifications of handshape morphemes in RSL SASSes

Some handshapes have different phonological specifications depending on the meaning they express. Thus, the handshape  has the values [-bent], [+curved], [-extended] when denoting cylindrical objects, but is unspecified for these parameters when denoting lines.

The analysis showed that according to their phonological form, the SASS handshapes can be divided into two groups. The first thirteen rows in the table contain handshapes with one of the following selected finger sets:

- index;
- index, thumb;
- all digits.

These handshapes have either negative or unspecified value of the [open] feature. The last three rows have different sets of selected fingers (IM; TIM; IMPR, respectively) and a positive value of the [open] feature. Semantically, the first thirteen FMUs denote one object, while the last three – two, three, and several objects, respectively. I argue that the first thirteen FMUs are primary, and the last three – secondary. Conceptually, they are derived from the handshape , which describes one object perceived as a line. The secondary hand forms describe several objects perceived as parallel lines.

Table 3.14 also shows the unequal status of phonological features in defining the handshape. Thus, apart from selected fingers, the only feature which is always applicable and specified, is [+/- closed], i.e. whether selected fingers touch the tip of the thumb. The parameters [+/- bent] and [+/- curved] tend to be unspecified, unless there is semantic motivation. For example, all morphemes which denote round or cylindrical objects (, , , ) have a negative value of the feature [bent] and a positive one of the feature [curved]. This is logical, since [+bent] handshapes occlude this interpretation. On the contrary, the handshape which denotes thin flat objects () has a positive [bent] value and a negative [curved] one. Finally, all secondary handshapes are negative in both features. Parameters [+/- extended] and [+/- spread] are often not applicable, which shows their peripheral status.

Below I present a phonological specification of the handshapes with only those features which capture the contrast between them. Primary handshapes:

1) : I

2) : T, I, - closed

3) : T, I, +closed

4) : T, I, M, R, P, +closed, -bent

5) : T, I, M, R, P, +closed, +bent

6) : T, I, M, R, P, -closed, -curved

7) : T, I, M, R, P, -closed, +curved, -spread

8) : T, I, M, R, P, -closed, +curved, +spread

Secondary handshapes:

1) : I, M

2) : T, I, M

3) : I, M, R, P

Here the unequal status of the features can be clearly seen. Thus, if there is only one joint configuration specification in a handshape, it is [+/- closed]. The second one is either [+/-bent] or

[+/-curved]. The third one is [+/-spread]. Parameters [+/-open] and [+/- extended] are not necessary at all in order to distinguish between the handshapes. This hierarchy is illustrated in the decision tree below:

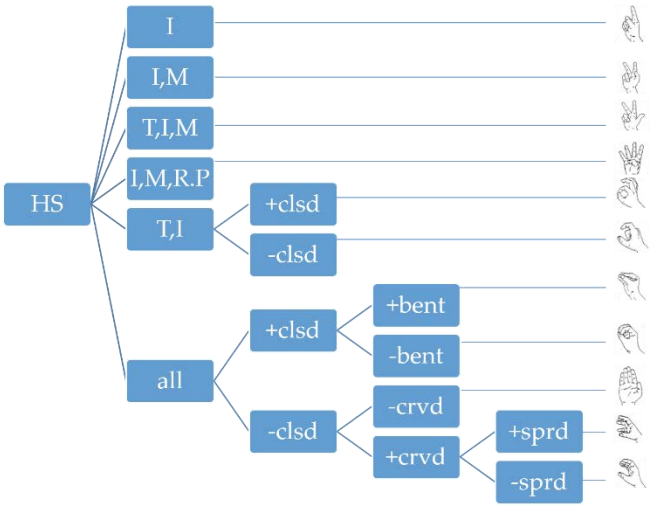


Figure 3.43. Phonological specification of SASS handshapes: decision tree

Despite unequal roles the phonological parameters play in the specification of handshapes, there is no single parameter which appears only in one handshape and is obligatorily absent in others. Moreover, none of the handshape's subcomponents bear any semantics different from the one postulated for the whole handshape. Therefore, I do not see any theoretical advantages in assigning the morphemic status to smaller structural elements of handshapes. Instead, I treat SASS handshapes as morphemes that contribute to the meaning of the whole sign by indicating the general shape of the object.

3.2. Movement

This section describes the movement component in RSL SASSes. The analysis of this component in peripheral signs poses a major challenge, since it has been argued to be (at least, partially) gradient in nature. Liddell (2003) claims that depicting signs in ASL are composed of lexically fixed features combined with additional meaningful, gradient aspects of the form. These gradient aspects of the form include, among other things, the orientation of the palm, the initial & final placements of the hand, and the direction of the movement. The presence of gradient aspects in the sign structure raises a problem of lemmatization. How many forms of depicting signs exist? If the list of potential sign forms in this domain of the sign language lexicon is unlimited, then how do we know whether two given sign instances belong to one lexeme? And can we even use the notion of the 'word' when describing these signs? All these questions are still debated over.

A contrasting line of thought on peripheral signs, including SASSes, stems from the morphological analysis proposed by Supalla (1982, 1986). According to Supalla, these signs are componential and made up of discrete parts. The movement component in these signs is composed of the movement root (general type of movement) and a number of movement affixes, such as a maximal or minimal morpheme (size of the movement); a unidirectional, bi-directional, or contra-directional morpheme (direction of the movement); a single or repeated morpheme (reduplication of the movement), etc. This approach denies peripheral signs in any graduality, thus making them listable members of the sign language lexicon. In this framework, there is no issue with

lemmatization: two sign forms represent one lexeme if they consist of the same set of morphemes. However, this approach has been criticized for making simple signs into highly complex grammatical structures, often resulting in over 10 to 20 morphemes being used in one sign. It also ignores the similarity between these signs and co-speech gestures of hearing non-signers. See a detailed discussion of the categorical versus gradient representation of the real word by sign language signs in Chapter 1 (§1.2.3).

This section contributes to these debates by analyzing the movement component in RSL SASSes. Section 3.2.1 describes the coding procedure I followed, Section 3.2.2 presents the analysis of the movement subcomponents (aperture, wrist movement, trajectory of movement, direction of movement, repetition of movement, and size of movement). Section 3.2.3 is the discussion which summarizes the presented data and gives my point of view on the aforementioned debates.

3.2.1. Data processing

I used the Hamburg Notation System to perform an initial transcription of the movement component in RSL SASSes. A systematic analysis of this component requires addressing its smaller structural blocks separately. For this reason, I build on the HamNoSys transcription to perform an additional layer of notation. In this layer, I provide transcription for separate articulators (fingers, wrist, elbow) as well as for widely acknowledged subcomponents of the movement, i.e. size and repetition. The choice of subcomponents to annotate is guided by Brentari's model of sign language phonology (2011) as well as by studies addressing the movement in the peripheral signs (Liddell, 2003; Schembri et al., 2005)

The table below shows the parameters I coded for and their values:

Fingers	no closing opening flexing extending spreading
Wrist	no abduction adduction flexion extension supination pronation pivoting side movement vertical movement rotation
Elbow-trajectory	no arch-[direction] straight circle wiggly
Elbow-direction	no down up

	left right out in …
Repetition	no same alternating down right left up
Size	no large normal small

Table 3.15 Parameters of the movement component in RSL SASSes

The **movement of the fingers** in SASSes is either the change of aperture (closing or opening of the hand) or the change in the base joint configuration (flexing or extending). The former type is exemplified in Figure 3.44. In (3.44a), the hands draw a contour of a conical vase. Initially, they are in the configuration . As the arms move down, the hands open into the configuration . In (3.44b), the sign describes pointed tops of mountains. The hands are initially open, but as the arms move up, the thumb touches the fingers.



(a) SASS:conical_tall (vase) [S; 01:27.3]



(b) SASS: pointed (mountains) [D; 04:14.4]

Figure 3.44. Change of aperture in RSL SASSes

Figure 3.45 shows the change in the base joint configuration. Both (3.45a) and (3.45b) represent signs describing rectangular objects. In (3.45a), the hand straightens while the arms move away from each other and then downwards, thus drawing the contour of a rectangular building. In

(3.45b), the hands change the position in space and simultaneously flex the base joints. The resulting sign depicts a rectangular object, which in a given example is a football field.



(a) SASS:wide_rectangular (house) [S; 08:13.7]



(b) SASS: rectangular (field) [T; 03:01.2]

Figure 3.45 Change of base joint configuration in RSL SASSes

An additional type of finger movement in SASSes is the spreading of the fingers. This movement is quite rare, it occurs only four times in my data. For example, in Figure 3.46, the signer describes a tree with two branches. In the initial position (near the tree trunk), the hand is in the configuration . While moving along the branches, the hand spreads the selected fingers and ends up in the configuration .



SASS: long_branching (tree branch) [R; 06:48.5]

Figure 3.46. Spreading of fingers in RSL SASSes

The wrist movement results in the change of hand orientation. This movement can be either straight or rounded. In the first case, four patterns are possible: (1) the hand moves to the outer side (adduction), (2) the hand moves to the inner side (abduction), (3) the wrist is flexing, or (4) the wrist

is extending. These movements can be single or repetitive. The repetitive abduction-adduction is marked in my data as a side-to-side movement, the repetitive flexion-extension is marked as a vertical movement. See some examples below.



(a) SASS:long_thin (branch) [R; 02:50.5]



(b) SASS: narrow_long_straight (plank) [D; 06:36.4]



(c) SASS: long_straight-three (shelves) [G; 02:48.5]

Figure 3.47. Straight wrist movements in SASSes: (a) adduction; (b) flexing; (c) extending

The rounded movement consists in the hand moving to either supine or prone position (the tags ‘supination’ and ‘pronation’, respectively; see Fig. 3.48). Rounded movements back and forth get the tag ‘pivoting’. Single or repetitive movements of the wrist resulting in the hand drawing a full circle get assigned the tag ‘rotation’.



(a) SASS:flat-rounded (skein) [D; 01:33.7]



(b) SASS: flat-rounded (outer surface of a bowl) [G; 03:05.6]

Figure 3.48. Rounded wrist movement in SASSes: (a) supination; (b) pronation

The elbow movement parameters correspond to the basic movement features, namely, trajectory and direction of movement. I encountered four different **movement trajectories** in my data: straight, arcing, circular, and wiggly, see examples below. For arcing movements, I additionally marked the direction of the arch (up, down, left, right, in, out).



(a) SASS:wide-long-straight (plank) [E; 06:13.7]



(b) SASS:big-rounded (pile of sand) [S; 08:55.0]



(c) SASS:rounded-flat (mirror) [D; 04:43.9]



(d) SASS:wiggly-wide-long (small path) [T; 04:12.7]

Figure 3.49. Movement trajectories in RSL SASSes: (a) straight; (b) arch{-up}; (c) circular; (d) wiggly

The second elbow parameter is **the direction of movement**. All movement directions represented in the HamNoSys notation occurred in my data, namely eight directions on the vertical frontal plane, six directions on the horizontal plane, and four additional directions on the midsaggital plane (see the illustration below).

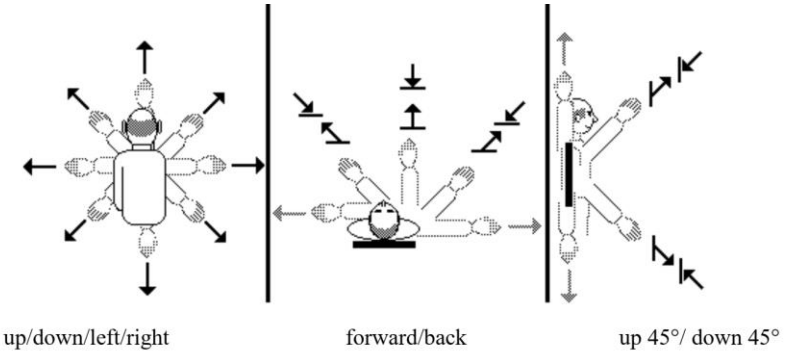


Figure 3.50. Notation signs for the direction of movement in HamNoSys
(Smith, 2013: 24)

In case a SASS consists of more than one distinct movement, I indicate the directions in the consecutive order.



SASS: square (shovel) [G; 03:54.0]

Figure 3.51. RSL SASS with several distinct movements: down – left – up

The repetition parameter of the transcription marks whether the movement is performed more than once. The movement can be repeated with identical values of all components or with slight changes in the relative location of the hand. In the latter case, the repeated movement can be performed below the original one (for example, when describing shelves of a cabinet), on top of it, to the left, or to the right of it (for example, when describing planks of a fence). These SASSes get assigned the tags 'repetition-down', 'repetition-up', 'repetition-left', and 'repetition-right', respectively. The alternating movements by the right and the left hands get the tag 'repetition-alternating'. See some examples of the repeated movements in SASSes below.



(a) SASS:smooth (trunk of a tree) [R; 07:10.7]



(b) SASS:straight-long-flat (shelves of a cabinet) [D; 04:36.9]

Figure 3.52. Repeated movements in RSL SASSes: (a) repeated-same; (b) repeated-down.

The final parameter of the transcription is **the size**. I distinguish three possible sizes of the movement: large, normal, and small. See an example of all three sizes in SASSes with the identical parameters of handshape (), trajectory (straight), and direction of movement (down):



(a) SASS:narrow-tall (scythe) [E; 07:52.4]



(b) SASS:wide-long-straight (plank) [E; 06:11.5]



(c) SASS: wide-long-straight (plank) [T; 11:08.0]

Figure 3.53. Different sizes of movements in RSL SASSes: (a) normal; (b) small; (c) large

The table below gives an example of the full movement transcription for a sign. This systematic and detailed description allowed an in-depth analysis that is presented in the next section.



Figure 3.54. RSL SASS: pointed-flat-arcing (scythe blade)
[S; 07:21.3]

Parameter	Value
fingers	closing
wrist	no
elbow-trajectory	arch-down
elbow-direction	right
repetition	no
size	normal

Table 3.16. Movement notation for the SASS presented in Figure 3.54.

3.2.2. Data analysis.

The movement parameter performs a wide range of functions in SASSes. The main function of this component is semantic: it adds to the meaning of the sign, i.e. specifies its shape, size, and orientation in space. However, the role of this structural element is by no means limited by semantics. Additionally, it can contribute to the sign's morphological form (singular versus plural), indicate its syntactic position (predicate versus non-predicate), and show its discourse status (given versus new). This chapter presents a detailed analysis of the movement's subcomponents introduced above.

The movement of the fingers

The movement of the fingers occurs in 60 SASSes in my data, which is a little less than one-tenth of all signs (the overall sample contains 622 SASSes). The most frequent finger movement type is the closing of the hand; the hand extending holds the second place. See the full diagram below:

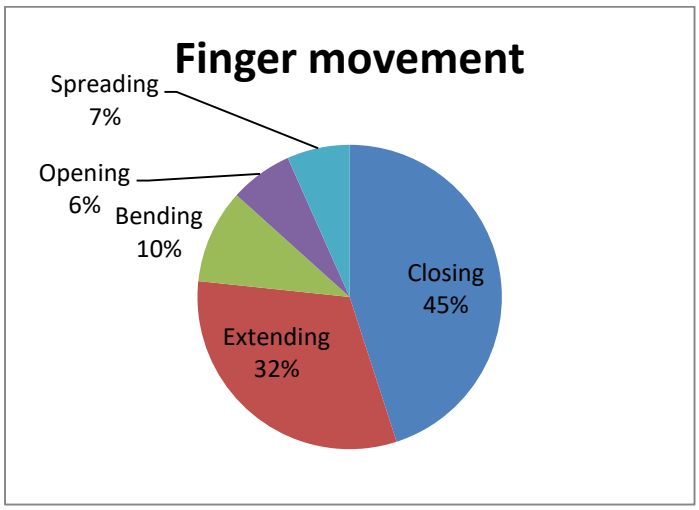


Figure 3.55. Distribution of different finger movements in RSL SASSes

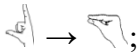
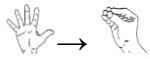
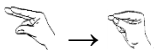
The finger movement performs the semantic function in SASSes, i.e. it contributes to the meaning of the sign. **The closing of the hand** during the sign production indicates that the object is **pointed**. This movement is often accompanied by the echo-phonological mouth gesture /ap/ (see Chapter 4 on mouth actions), as in the example below. The use of this mouth gesture, however, is not obligatory with SASSes: out of 27 signs with the hand closing, only 11 are accompanied by the echo-phonology.



SASS: pointed-flat (spade) [D; 03:44.5]

Figure 3.56. Closing of the hand in SASSes accompanied by the echo-phonological mouth gesture /ap/

The change of the handshape from open to closed signifies that the object is bigger/thicker in the center, and gradually gets smaller/thinner towards the end-point. The handshapes attested in this group of signs are:

1)  ;
2)  ;
3)  ;
4)  .

The pairs 1 and 2 are the most frequent ones, they denote the pointedness of flat objects (such as a scythe blade) and three-dimensional objects (such as a birthday cap), respectively. The pairs 3 and 4 are very rare: the pair 3 is occasionally used with cylindrical objects (such as a horn); the pair 4 has been attested in SASSes describing thin pointed sticks. Interestingly, some of these handshapes are limited by SASSes with the aperture change. Thus, neither the fist (the final handshape of the pair number 3) nor the handshapes with the index and the middle selected fingers (pair number 4) are used in SASSes with static hand configurations.

The opening of the hand is the opposite type of aperture change. As well as the hand closing, it indicates that the object is **pointed**. However, in this case, the hand moves away from the pointed end of the object to its base. See the example below.



SASS: conical-tall (vase) [S; 01:20.8]

Figure 3.57. opening of the hand in RSL SASSes

This type of aperture change is much rarer in my data and is limited by vertical conical objects. Therefore, the only direction of movement that accompanies SASSes with the hand opening in my sample is downward. Two hands move simultaneously down and away from each other. The final position of the hands indicates the width of the object's base.

The only pair of handshapes attested in this group of signs is:

1)  →

This is one of many examples of the asymmetry in describing the object's shape. Although there exist two ways to indicate the pointedness (from the base of the object to the end point, and from the end point to the base), one way is strongly preferred over the other. More research is needed to fully explore the distribution and semantic distinctions of these two aperture change types.

The flexing and the extending of the hand is another pair of opposite finger movements with the same semantics. They indicate **rectangular objects**. The default handshapes participating in these movements are  (flat hand) and  (bent flat hand).



(a) SASS: small-rectangular (box) [G; 08:42.8]



(b) SASS: rectangular (field) [T; 02:59.7]

Figure 3.58. Extending (a) and flexing (b) of the hand in RSL SASSes

In Fig. 3.58a, the two hands in the hand configuration  are located at the corners of the object and then simultaneously move to the object's sides. Fig. 3.58b shows an opposite pattern: the hands in the configuration  are located at the object's sides and then move to its corners. As the diagram in the beginning of this section shows, the latter pattern is quite rare in my data: it occurs only 6 times (as opposed to 17 times of the hand extending cases).

The last finger movement type attested in my data is **the spreading of fingers**. The handshapes participating in this movement are  (the initial handshape) and  (the final handshape). This movement has a very specific meaning in my corpus: it indicates that a long thin object is **splitting in two**. The stimulus which elicited this movement is a tree branch which is undivided at the tree trunk but then splits in two at the end.



SASS: long-thin-splitting (tree branch) [R; 06:48.5]

Figure 3.59. Spreading of fingers in RSL SASSes

As this subsection shows, all the finger movement types occurring in SASSes have a semantic function. They express information about the shape of the object: whether it is pointed, rectangular, or splitting. An important side note is that these movements are not necessarily used to express this information. There are other ways to describe a pointed or rectangular outline of the object. See an in-depth analysis of different strategies used to depict the visual characteristics of objects in Chapter 5.

The wrist movement

The movement of the wrist accompanies almost one-third of the SASSes in my sample (198 out of 622 signs). The diagram above shows the distribution of different wrist movement types.

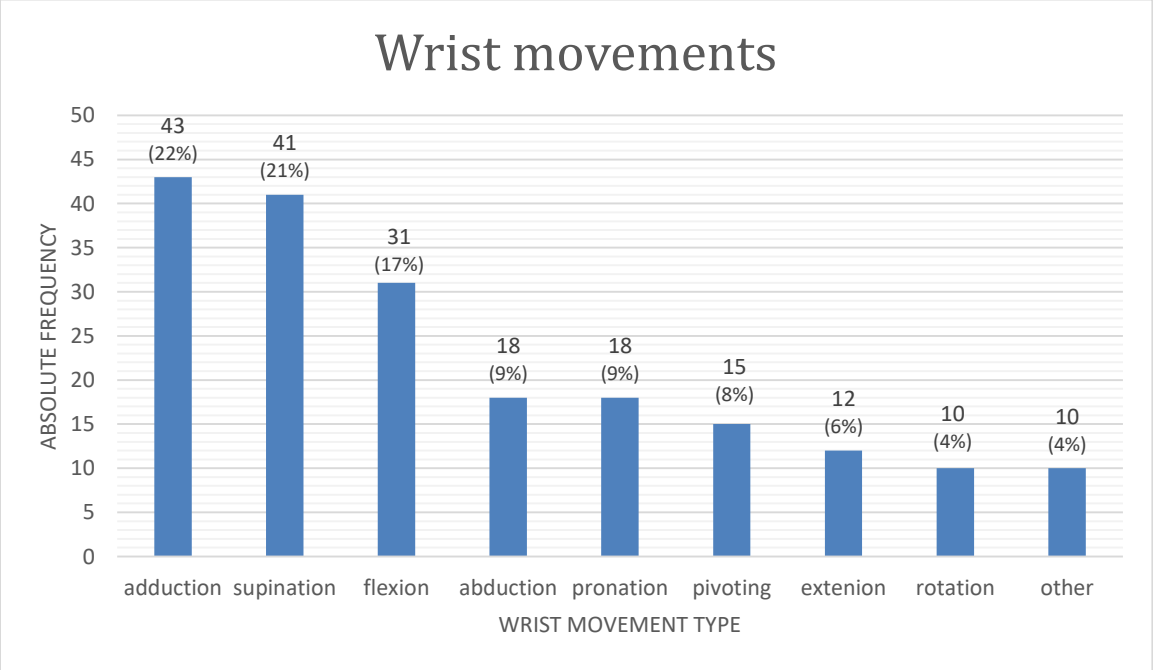


Figure 3.60. Distribution of different wrist movement patterns in RSL SASSes

Unlike the finger movement, the movement of the wrist does not seem to have a specific function. In the majority of cases, the use of the wrist can be explained by physiological reasons: the signers engage this part of the arm to extend the movement of the elbow. Thus, the straight movement of the arm to the dominant hand side can be accompanied by the wrist adduction (Fig. 3.61a), while the circular movement of the arm can be produced together with the wrist rotation (Fig. 3.61b).



(a) SASS: long_straight_even (a cabinet shelf) [D; 04:36.9]



(b) SASS: round-flat (window) [E; 08:41.4]

Figure 3.61. Wrist movements in RSL SASSes: (a) adduction accompanying straight movement of the elbow; (b) rotation accompanying circular movement of the elbow

The cases where the wrist movement is significantly different from the movement of the elbow are rare and are limited by the combinations 'straight elbow movement' + 'wrist rotation' and 'straight elbow movement' + 'wrist side-to-side movement'. The first combination describes a spiral-like shape (for example, a thread hanging down from a table, Fig. 3.62a), the second combination is occasionally used to describe wiggly objects (for example, a wiggly small path, Fig. 3.62b). In both cases, the wrist trajectory shows the curved aspects of the object's shape, while the straight movement of the elbow indicates that the object is elongated.



(a) SASS: thin-long-spiraling (a thread) [D; 01:42.8]



(b) SASS: narrow-long-wiggly (a small path) [S; 07:35.0]

Figure 3.62. Wrist movement which is significantly different from the elbow movement in RSL SASSes: (a) wrist rotation accompanying straight elbow trajectory; (b) wrist side-to-side movement accompanying straight elbow trajectory

In 19 cases out of 198, the wrist movement is the only movement in the sign. In these cases, it indicates the small size of the movement. For example, if a signer describes a round hat box, by default he/she moves the hands away from each other and back in the arcing trajectory and rotates the wrists at the same time (Fig. 3.63a). If the box in question is small, the signer can either make the arcing elbow movement small or remove it at all. In the latter case, the hands remain in one location, with the only movement being the rotation of the wrists (Fig. 3.63b).



(a) SASS: round-3D (box) [D; 03:01.0]



(b) SASS: small-round (box) [D; 01:33.7]

Figure 3.63. Wrist movement in SASSes (a) accompanying elbow movement, and (b) on its own

In the same way, if a signer wishes to perform a small downward movement with a hand pointing away from him/her, as in Fig. 3.64, he/she can either make a small movement in the elbow joint or keep the elbow static while adducting the wrist.



Figure 3.64. Downward movement with hands pointing away from the signer in RSL SASSes

When the wrist is the only joint performing the movement, it has the same set of functions as the parameter 'small movement' does.

The elbow movement: trajectory

The trajectory of the movement in SASSes shows the general shape of the described object and, thus, has a semantic function. Four main trajectories, observed in my data, are: straight, arcing, circular, and wiggly. See their distribution below:

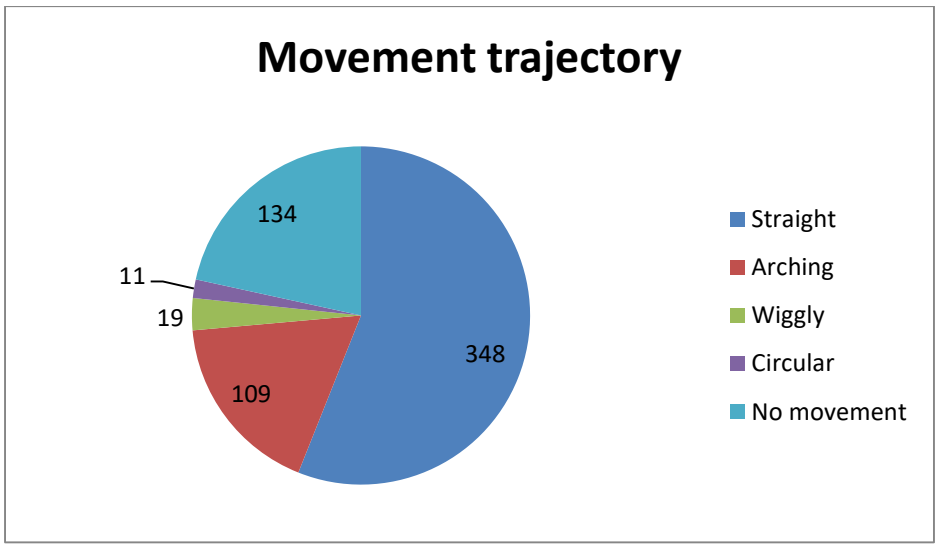
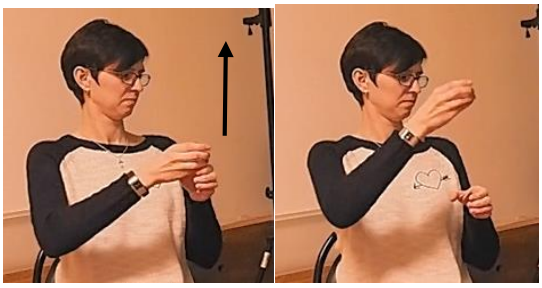


Figure 3.65. Distribution of different movement trajectories in RSL SASSes

The straight movement occurs in more than 50% of SASSes in my sample. Combined with the handshapes , , , and , this movement indicates that the object in question is **straight**. Combined with the handshapes  and , it means that the object is **flat**, see examples below.



(a) SASS: long-straight-thin (window bar) [T; 07:42.6]



(b) SASS: tall-straight-vertical (vase) [D; 00:28.4]



(c) SASS: long-flat (book shelf) [G; 02:04.9]

Figure 3.66. Straight movement in SASSes: (a) combined with handshape ; (b) combined with handshape ; (c) combined with handshape 

If the straight movement is performed by both hands facing each other, and the hands are moving either towards or away from each other, then the SASS in question does not indicate the shape of the object, but shows its size instead. The handshapes occurring in these SASSes are , , and .



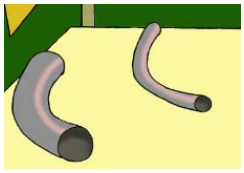
SASS: wide (house) [E; 08:10.3]

Figure 3.67. Straight movement in RSL SASSes indicating size

The arcing movement can indicate different shapes, depending on the number of active hands and the focus of the signer's attention. It can depict long **arcing** objects (like a pipe, a line or a small path, Fig. 3.68a-c), **round/spherical** and **half-spherical** objects (like a cake, a ball, or a pile of sand, Fig. 3.68d-f), or **angular-shaped** objects (like a box, a painting, or a building, Fig. 3.68g-i).



(a) small path



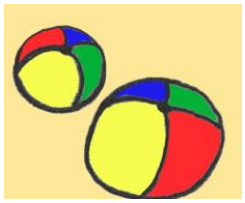
(b) pipe



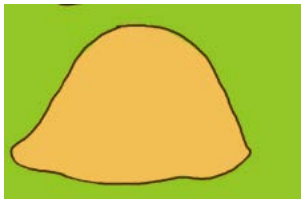
(c) line



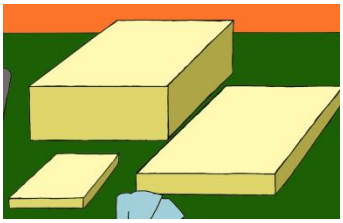
(d) cake



(e) ball



(f) pile of sand



(g) box



(h) painting



(i) house

Figure 3.68. Examples of objects described with arcing trajectory of movement: (a-c) objects of the arcing shape; (d-f) objects of the round/spherical shape; (g-i) objects of the angular shape

Arcing objects are depicted with one active hand drawing an arch in the air. The typical handshapes in these SASSes are  if the object is linear (as in Fig. 3.68c),  if the object is long and narrow (Fig. 3.68a), and  if the object is cylindrical (Fig. 3.68b).



(a) SASS: arcing-long-narrow (small path) [D; 07:10.6]



(b) SASS: arcing-cylindrical-thin-long (pipe) [G; 07:52.9]

Figure 3.69. RSL SASSes depicting arcing objects

Round or spherical objects (Fig. 3.68d-e) are depicted with two hands moving away from each other and then back in an arch. In these SASSes, each hand draws a contour of one half of the object. The handshapes used in these signs are , , , and .



SASS:flat-round (hat box) [S; 00:59.2]

Figure 3.70. RSL SASS denoting round shape with arcing trajectory of movement

Half-spherical (dome-shaped) objects, like a pile of sand (Fig. 3.68f), a birdcage or a bowl, can be described either with one active hand moving in the arcing trajectory or with two active hands. In the first case, the active hand is either the sole hand of the sign or it is initially in contact with the passive hand and is moving away from it during the sign production (Fig. 3.71a). In the second case, the two hands are initially in contact with each other at the location, which corresponds to the conceptual top of the half-sphere, and then are moving away from each other in an arcing line (Fig. 3.71b).



(a) SASS: big-half-sphere (pile of sand) [S; 08:55.0]



(b) SASS: half-sphere (bird cage) [S; 03:59.5]

Figure 3.71. RSL SASSes denoting a half-sphere with the arcing trajectory of movement: (a) one active hand; (2) two active hands

There is an interesting asymmetry in the description of half-spherical objects. Compare the items in the figure below. Both objects have the shape of a dome. But while the birdcage is oriented with the top of the dome up, the bowl has an opposite orientation.



(a) cage



(b) bowl

Figure 3.72. Half-spherical objects with different orientations

In RSL, only the objects of the cage type can be described using both one- and two-hand strategies. The objects like a bowl can be depicted only with two active hands (Fig. 3.73a). The one-hand strategy with bowl-like objects can only be used to describe the internal surface of the bowl, but not the whole object. Thus, the sign in Fig. 3.73b appears in the following context:

(3.1) SASS:INNER-SURFACE-HALF-SPHERICAL DARK ALL-RIGHT
'The inner surface [of the bowl] is dark, ok.'



(a) SASS: dome-shaped (bowl) [S; 02:01.4]



(b) SASS: inner-surface-half-spherical (bowl) [E; 02:31.9]

Figure 3.73. Depiction of upside-down dome-shaped objects in RSL SASSes

The last shape which can be described by the arcing movement is **angular**. In my data, SASSes with this trajectory are occasionally used to depict a cabinet, a painting, a rectangular frame, a rectangular box, stairs, and mountains, see examples below.



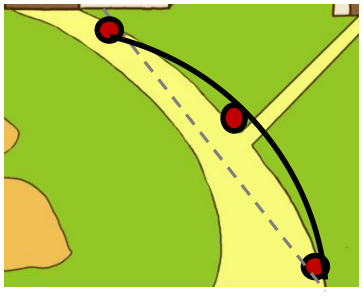
(a) SASS: thin-rectangular (picture frame) [D; 04:26.4]



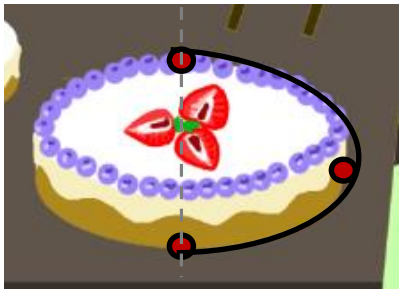
(b) SASS: thick-rectangular-3D (a box) [D; 08:44.5]

Figure 3.74. Use of arcing trajectory in depiction of rectangular objects in RSL SASSes

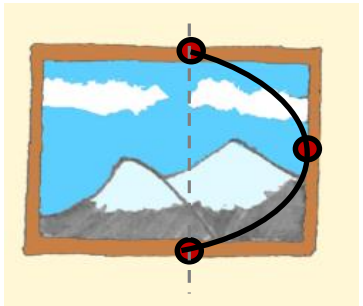
Geometrically, these objects have a common feature with arcing and round items: their contour can be roughly outlined by connecting two dots on the opposite sides of the object with the third dot located outside the straight line formed by the first two. This differentiates these objects from wavy and straight items.



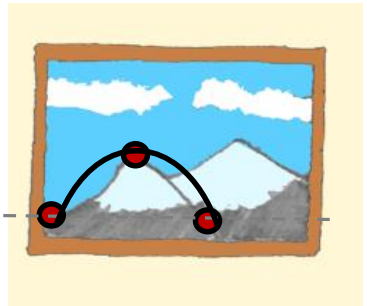
(a) small path



(b) cake



(c) frame



(d) mountains

Figure 3.75. Geometrical similarity of rectangular and round-shaped objects

The use of the arcing trajectory for describing the angular shape seems counter-intuitive, since in this case, signers choose to ignore the existence of clear angles in the object. The motivation behind these forms becomes clear once we analyze semantic characteristics of the SASSes in

question. Most SASSes depicting angular-shaped objects with the arcing movement trajectory are in fact lexicalized words. Recall that I divide RSL SASSes into lexicalized and productive forms depending on the type of meaning they express. As Section 2.2.1 'General tiers and working definitions' explains, lexicalized SASSes have an iconic form that shows aspects of the object's size and shape, but their meaning is not fully composed from the meanings of their parts. Instead, lexicalized forms usually denote concrete objects. An important feature of lexicalized SASSes is the absence of the focus on the object's shape. For example, the lexicalized SASS MOUNTAIN will have the same trajectory of movement irrespectively to the actual shape of the mountain in question. It is not surprising, therefore, that these SASSes allow for an unaccurate trajectory in outlining the shape of the object.

The second, smaller, group of SASSes that use an arcing trajectory to depict angular referents consists of the signs that denote the object's size. Consider the example in Figure 3.74b. The SASS:THICK-RECTANGULAR-3D occurs in the following context:

(3.2) P1: 'Behind the bags, there are three boxes'
P2: 'I have only two boxes'
P1: 'My boxes are: a big one, a wide flat one, and a small one'
P2: 'Ah ok, I have a thick (SASS:THICK-RECTANGULAR-3D) and a thin box'

It is clear that the signers are comparing different sizes of the boxes in their respective pictures, and are not talking about their shapes. This is due to the design of the stimuli: the boxes in the pictures have the same shape, but different sizes.

Therefore, when the signers in my corpus use a SASS with the arcing trajectory to refer to a rectangular object, they are never actually talking about the object's shape. They either simply name / refer to the object (in case of lexicalized SASSes) or discuss its size. When the shape is not the focus of the conversation, the need to provide its accurate outline disappears. This is when RSL signers can decide to make use of the arcing trajectory of movement. It is more economical articulation-wise and more time-efficient than the use of two or three separate straight movements, which would be necessary to depict an angular shape. This is one of the numerous examples of the non-literal use of a SASS (sub)-component. More examples of this sort are discussed later in this chapter.

The use of the arcing trajectory in depicting angular objects is also reported for ASL (Ferrara & Napoli, 2019), SSL (Bergman & Wallin, 2001), and AdaSL (Nyst, 2007). Ferrara and Napoli investigate the one- versus two-dominant-hand strategies used for the description of iconic shapes in ASL. The survey where the participants were asked to depict different shapes and the analysis of ASL dictionaries showed that the two-hand strategy is favored when the shape is symmetrical across the Y-axis and does not have curves (i.e., is angular), see some examples below:



(a) rectangle (b) triangle-down (c) triangle-unfinished

Figure 3.76. Shapes that tend to be described with two active hands in ASL
(Ferrara & Napoli, 2019: 14)

Ferrara and Napoli further argue that since the use of two active hands already carries the semantic component [-curve], i.e. 'angular', then even if a signer produces the sign rapidly and rounds the corners of the intended shape, this does not occlude the meaning. Indeed, the cases of such rapid signing with rounded corners (or, in other words, the arcing movement trajectory) in a description of a rectangle are reported in their data.

With respect to one- versus two-handedness of the sign, my data conforms to Ferrara and Napoli's results only partially. The SASSes produced with the handshape , indeed, have the tendency to be one-handed if the object has curves, and two-handed if the object is angular and symmetrical across the Y-axis. For example, a rectangular painting (Fig. 3.68h) is never produced with one active hand in my sample, but on the contrary, it is depicted with two active hands moving away from each other and then back. However, once we go beyond this handshape, the pattern breaks. Thus, a curved birdcage is often described with two active hands in the configuration  (Fig. 3.71b), whereas an angular box can be described with one active hand in the configuration  (Fig. 3.74b). Ferrara and Napoli mention that the generalization they propose does not hold well in the zone of the signs with meaningful handshapes, and therefore the aforementioned discrepancies are expected. For the purposes of my argument, it is important that the use of the arcing trajectory in the depiction of angular objects is found in languages other than RSL.

The two remaining trajectories occurring in my data are the **circular** and the **wavy** trajectory. Both of them are considerably less frequent than the straight and the arcing movements: the first one appears 11 times, and the second one – 19 times. The **circular** movement in combination with the handshape  denotes **round flat objects**, for example, a round mirror or a round window.



SASS:round-2D (mirror) [D; 04:43.9]

Figure 3.77. Use of circular movement trajectory to depict round objects in RSL SASSes

In combination with the handshape , the circular movement expresses an abstract idea of space or unlimited surface, such as a big field or a wall in front of the signer. In these SASSes, the movement tends to be repeated several times.



SASS: surface-flat (floor in the room) [S; 00:08.0]

Figure 3.78. Use of circular trajectory to depict unlimited space in RSL SASSes

The wavy elbow trajectory, which often coincides with the pivoting or side-to-side movement of the wrist, depicts wavy objects (a thread hanging from a table, a wavy small path, a wavy mirror, etc.).



SASS: narrow-wiggly-long (small path) [S; 07:55.4]

Figure 3.79. Use of wavy trajectory to depict a wavy object in RSL SASSes

In combination with the handshapes and , the wiggly trajectory denotes a bumpy surface.



SASS: bumpy (road) [R; 06:04.9]

Figure 3.80. Use of wavy trajectory to depict bumpy surface in RSL SASSes

To sum up, my data show that the movement trajectory in SASSes has the semantic function. It adds to the meaning of the sign by outlining the general shape of the object. Sometimes, however, this component should not be interpreted literally (as in the case with the arcing trajectory depicting angular objects). Often, the trajectory of the movement expresses a meaning not by itself, but in combination with other structural elements of the sign. For example, the straight trajectory with a particular orientation of the hand signifies the object's size, the circle trajectory with a particular handshape denotes flat surface, etc. This shows that although the meaning of the SASS can be to a certain extent decomposed into the meanings of its components, they do not act independently. On the contrary, sign components tend to cluster together to express certain meanings. See a detailed discussion of this mechanism in Chapter 5.

The elbow movement: direction

The direction of the movement in combination with the hand orientation shows the orientation of the object. This sub-component has traditionally been placed among gradient gesture-like elements, since physically it is possible to draw a line in any direction. According to this view, the

direction of the movement depicts the objects' position in an analogue manner, i.e. even a small change in this component is meaningful. My data shows, however, that this is not always the case. In some SASSes, the direction of the movement does not provide a 100% accurate representation of the object's orientation. For example, planks leaning against a wall at an angle are typically described with a vertical movement. Sometimes, the direction of the movement does not reflect the object's orientation at all. Thus, there are examples in my data, where the signer is producing a vertical movement to describe a garden bed, which is oriented horizontally.

My corpus shows that by default RSL signers treat the movement's direction categorically, differentiating between functionally significant and visually distinct orientations of objects. For example, is a tree standing or lying? If it is lying, is it lying on the way of the signer and, therefore, creates an obstacle, or not? The set of possible orientations is different for different types of objects: a ball can have only one orientation, a box has three potential positions in space, and a long thin object (like a plank or a pipe) can have seven functionally and visually distinctive orientations. This section describes orientation sets for different types of referents. My stimuli were not designed to elicit all possible orientations of objects. Therefore, this list is bound to be incomplete. It provides initial generalizations that can be taken as a basis for further research. The distinction between the categorical versus gradient coding of the objects' characteristics with respect to the movement parameters is approached in the discussion section of this chapter.

The list of different object types is initially created on the basis of the SASS handshapes which are used to describe them, and then is modified based on the movement direction patterns. The list is:

- long thin objects (a small path, a ribbon, a plank, a string, a pipe, a vase, etc.);
- flat objects (a mirror, a painting, a book, a flat box, a cake);
- limited surfaces (bookshelf, a stripe on clothing);
- unlimited surfaces (floor, field, wall);
- three-dimensional objects with all three dimensions being roughly the same (a ball, a square box, a pile of sand, a bowl).

One object can belong to more than one shape type. This is determined by its spatial arrangement and the described dimension. For example, a plank is usually treated as a long thin object, but can also belong to the limited surface group if it's oriented horizontally and the signer describes its wide part. A wall can be interpreted as an unlimited surface or as a flat object, depending on its orientation and the position in space relatively to other objects.

Long thing objects are either two- or three-dimensional objects with one dimension being significantly bigger than the other two (or the other one). They include:

- narrow long flat objects (topological class 'stripes'): a stripe, a ribbon, a small path, a plank, etc. These objects are referred to by the handshape  and are perceived as having only two dimensions, one of which is significantly bigger than the other;
- long cylindrical objects (topological class 'pipes'): a pipe, a vase, a street lamp, etc. These objects are referred to by the handshapes , , .
- long thin cylindrical objects (topological class 'thread'): a string, a branch, thread, a cat's tail. These objects are referred to by the handshape . They are perceived as intrinsically thin: the handshape cannot be modified in order to reflect the variations in thickness (unlike the handshapes and);

- long three-dimensional objects with one dimension significantly bigger than the other two: a thick plank, a brick. These objects are referred to by the handshape .

These objects have one common feature: their small dimensions are delimited by the handshape, whereas the big dimension is depicted by the hand movement. The set of typical orientations for these objects is accounted by three parameters:

a) the object is vertical vs. horizontal;
b) the object is parallel or perpendicular to the signer's body;
c) the object is aligned vs. not aligned with the signer's body.

The diagram below lists the possible orientations. The black arrows show the movement directions which express these orientations. Following the HamNoSys convention, the bar at the end of the arrow indicates that the movement is happening in the horizontal plane.

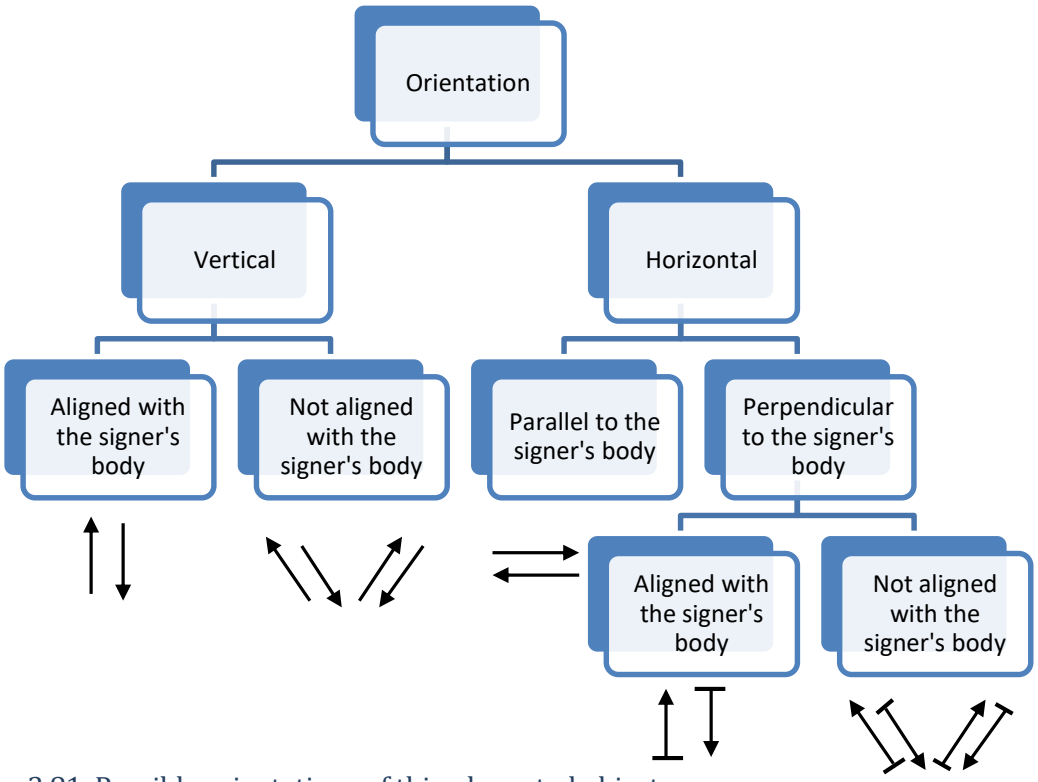
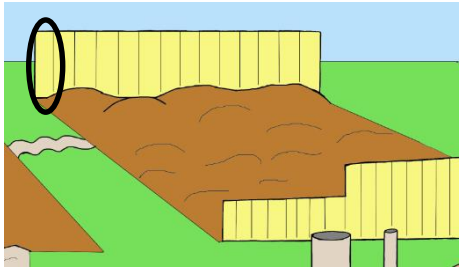


Figure 3.81. Possible orientations of thin elongated objects

The figure below shows examples of different orientations. Fig. 3.82a depicts a vertical plank aligned with the signer's body, Fig. 3.82b represents a horizontal small path which is located perpendicularly to the signer's body and is not aligned with it. Finally, Fig. 3.82c shows a wiggly small path which is located horizontally in parallel to the signer's body.

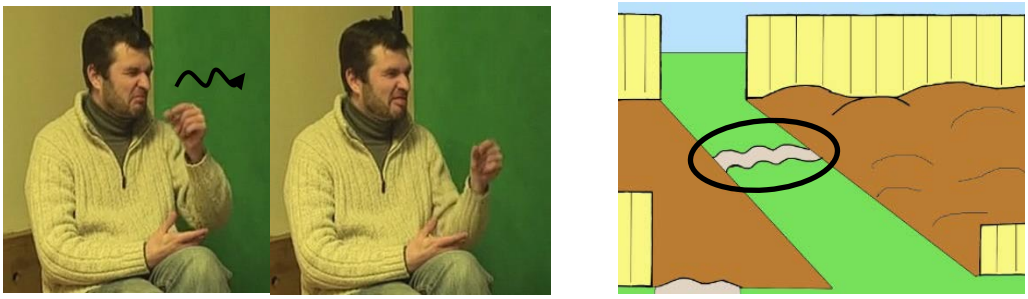




(a) SASS: thick-tall-straight (plank) [T; 04:35.5]



(b) SASS: narrow-long-straight (small path) [E; 07:32.9]



(c) SASS:wiggly-thin-long (small path) [R; 04:02.8]

Figure 3.82. Different orientations of long thin objects depicted by RSL SASSes

Choice of the movement direction in describing the object's orientation

The object's orientation can be potentially depicted with two opposite directions of the movement. For example, the vertical orientation can be expressed with either an upward or a downward movement; the horizontal orientation of a long object lying parallel to the signer's body can be depicted with either a leftward or a rightward movement of the hand. That is why all orientations on the scheme above are provided with two arrows. However, not both arrows in each pair are equally frequent. The preference for a particular direction of movement is dependent on the following factors:

- physiological factor;
- number of hands;
- spatial arrangement of objects.

The physiological factor is responsible for eliminating the directions of movement which are uncomfortable to produce due to the structure of the human body and general laws of physics. For example, thanks to the gravitation, the vertical downward movement is easier to produce than the upward one. In my data, there are 208 items with a downward movement and only 26 items with the upward direction. Sometimes, the choice of the particular direction in the sign production is affected by the number of hands involved. Thus, a horizontal object parallel to the signer can be described with both rightward and leftward movements. Indeed, I encounter both directions in my data (Fig. 3.83). However, if a SASS depicting the object is two-handed with one hand being passive and the other one active, the active hand will move away from the passive hand, and not towards it. Since all the signers who participated in data collection for this project are right-handed, the only attested direction of movement in the SASSes in question is rightward.



(a) SASS: straight-horizontal-long (road) [T; 00:23.9]



(b) SASS: wiggly-horizontal-long (small path) [T; 03:59.5]

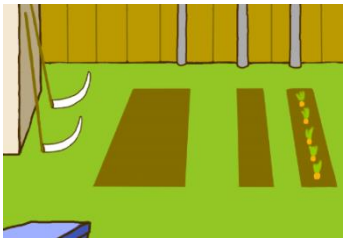
Figure 3.83. SASSes expressing horizontal orientation of the object: (a) the hand is moving rightward; (b) the hand is moving leftward



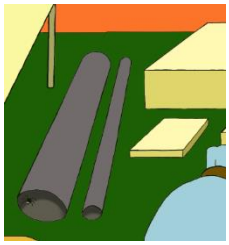
SASS: long-straight-two (planks) [E; 03:39.0]

Figure 3.84. RSL SASS with one active and one passive hand

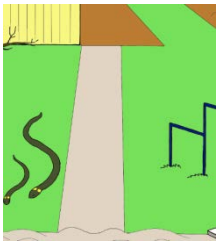
Finally, the direction of the movement can be affected by the spatial arrangement of objects and the structure of the discourse that is formed by this spatial arrangement. For example, an object located horizontally perpendicular to the signer's body can be depicted with two opposite directions: towards and away from the signer. Figure 3.85 gives examples of referents with this orientation in my stimuli.



(a) garden beds



(b) pipes



(c) road

Figure 3.85. Objects with horizontal perpendicular to the signer orientation

Although, potentially these objects can be described with either of the two directions, sometimes there is a strong preference towards one of them. For example, the road in Fig. 3.85c is leading towards a field (see the full picture in Fig. 3.86a). When the signers describe this picture, they typically start with the main road at the bottom. The road in question is then introduced as 'another road, which starts at the main road and then leads to the field'. Such a discourse influences the movement which is produced in the direction away from the signer's body: from the main road to the field.



(a) 'spot-the-difference' picture



SASS:straight (main road) street SASS: straight-long-horizontal (road)

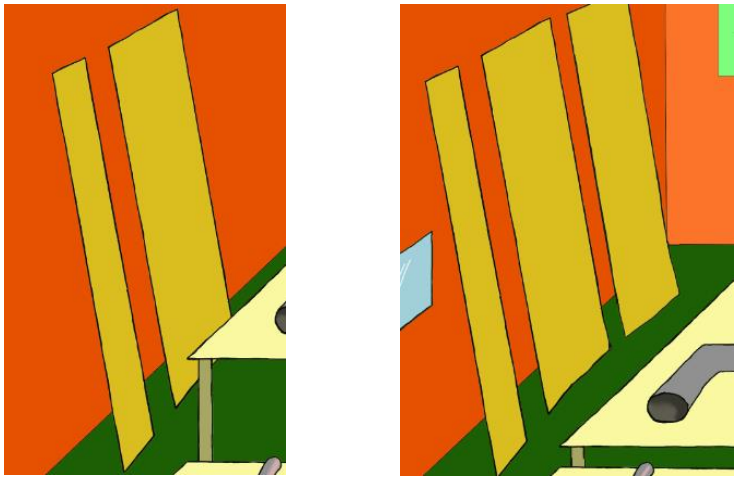
'There is another road which leads from the main road [to the field]'

[T; 00:35.3 – 00:39.7]

Figure 3.86. Motivation of the movement direction by spatial arrangement of objects in RSL SASSes

Non-literal use of the movement direction

As I mentioned in the beginning of this section, sometimes the direction of the movement does not 100% accurately depict the orientation of the object. The domain of the long thin objects provides some examples of this. Consider the planks depicted in Figure below. These planks are leaning against the wall at an angle and, therefore, are not exactly vertical. However, every time the signers describe these planks, they choose to ignore this feature and use a straight vertical movement. They approximate the position of these planks to the vertical one, because the exact angle is not important for the description. It is the functional distinction between a standing versus a lying plank that plays the role and that the signers encode.



(a) two planks (b) three planks

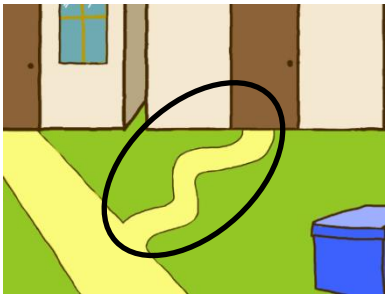
Figure 3.87. Planks leaning against the wall in spot-the-difference pictures



SASS: wide-straight-vertical (plank) (from Fig. 3.87a) [G; 06:33.8]

Figure 3.86. Approximate reflection of the object's orientation in RSL SASSes

In some cases, the direction of the movement does not reflect the object's orientation at all. Such 'inaccuracies' can occur only when the object has already been introduced in the discourse, and when an aspect of its visual characteristics other than the orientation is discussed. A frequent strategy, in this case, is to project the object to the vertical plane, i.e. to show it as if it was 'standing'. The benefit of this projection is a clearer view of the object for the addressee. For example, in Fig. 3.89, the signer depicts a wiggly small path. Its wiggly shape is the topic of the discussion, since it is there where one of the differences between the two spot-the-difference pictures lies (in the other picture, the small path in question is straight).



(a) wiggly small path

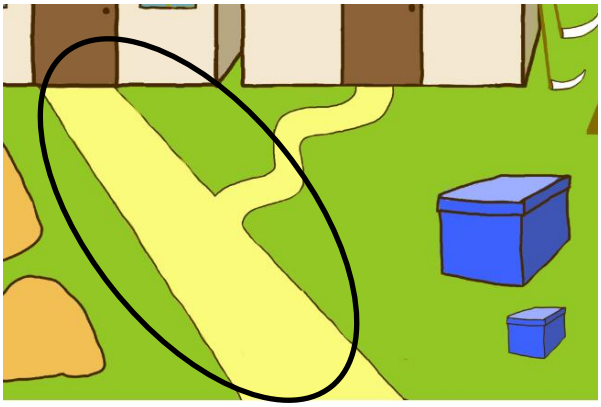


(b) SASS: wiggly-narrow-long (small path) [S; 07:35.0]

Figure 3.89. Projection of the object to the vertical plane in RSL SASSes

As the figure demonstrates, the wiggly path, which is located horizontally, perpendicularly to the signer's body and not aligned with it, is depicted with a vertical movement of the hand. The signer ignores all the aspects of the object's orientation and 'puts' it in the most comfortable position for the addressee to observe its shape.

Sometimes, the signers keep the alignment characteristics of the object's orientation, while projecting it to the vertical plane. For example, in Figure 3.90 the signer asks the question about the width of the straight small path. The hand in the SASS is moving from the top left to the bottom right on the vertical plane. Thus, in this sign, the object's non-alignment is preserved, while its horizontal orientation is ignored.



(a) straight small path

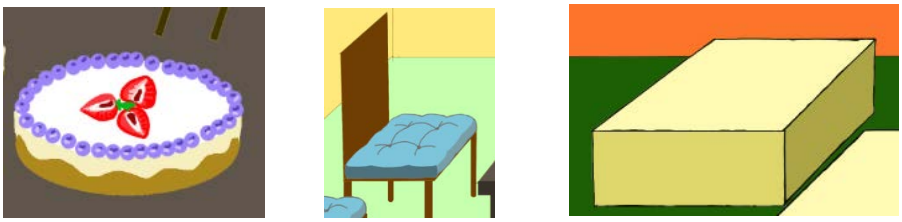


(b) SASS: wide-long-straight (small path) [S; 07:44.9]

Figure 3.90. Projection of the object to the vertical plane with the preservation of the alignment in RSL SASSes

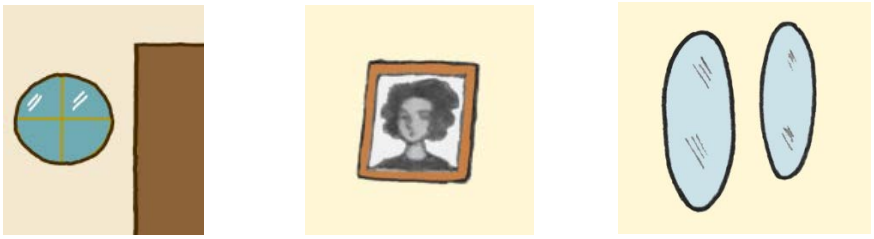
Flat objects are referents with one dimension being significantly smaller than the other two. If this dimension is small, but yet clearly distinguishable, then the SASS that describes it has the

handshape , the distance between the thumb and the finger indicates the size of this dimension. See examples of the referents of this type in Figure 3.91. If the third dimension is so small that the whole object as perceived as two-dimensional (as if it did not have thickness at all), then the SASS has the handshape . The objects of this type include a mirror, a window, a painting, etc. (see Fig. 3.92). For example, although a mirror can objectively be more or less thick, in RSL it is conceptualized the same way as a circle drawn on a piece of paper, with the only dimensions being the height and the width. The overall shape of objects in this group is not important: they can be angular (a book, a flat box, a painting, a window) or curved (a cake, a hatbox, a round mirror).



(a) cake (b) cushion (c) box

Figure 3.91. Flat objects conceptualized three-dimensionally in RSL



(a) window (b) portrait (c) mirrors

Figure 3.92. Flat objects conceptualized two-dimensionally in RSL

With respect to the orientation of these objects, the signers mainly differentiate between the horizontal vs. the vertical position. The horizontal orientation of a flat object is depicted with the movement directed either away or (much rarer) towards the signer. The exact trajectory depends on the object's shape and the number of active hands. Thus, curved flat objects, like a hatbox or a cake, are typically described with two hands moving in an arch trajectory.



SASS: flat-round-horizontal (hat box) [D; 03:01.0]

Figure 3.93. Encoding horizontal orientation of a flat curved object in RSL SASSes

As the previous section argues, the arcing trajectory performed by one or two active hands is also acceptable in the depiction of angular objects. Another option for non-curved referents is two

hands moving away from each other and then away from the signer at a straight angle. I analyze this case a two-syllabic SASS with two straight movements (Fig. 3.94).



SASS: flat-rectangular-horizontal (flat box) [R; 12:08.0]

Figure 3.94. Encoding horizontal orientation of a flat angular object in RSL SASSes

If a flat object is vertical, it can either face the signer and, therefore, create a conceptual obstacle (as a wall standing on the way of a person; Fig. 3.95a) or be oriented with its edge to the signer and, this way, not interfere with the signer's potential path (as a wall standing along the person's way; Fig. 3.95b).



(a) wall as an obstacle



(b) wall extending along the way

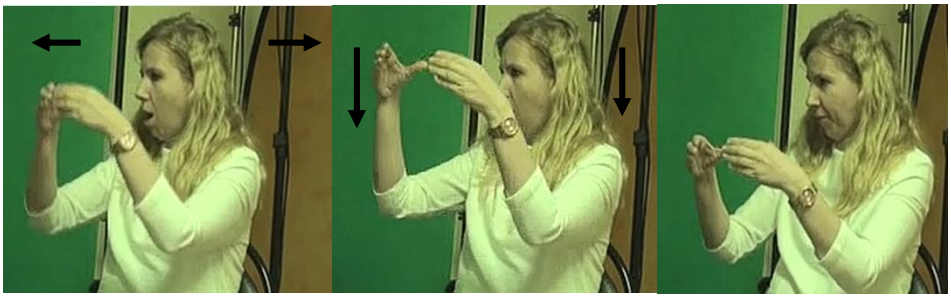
Figure 3.95. Different positions of a vertical flat object with respect to the signer[16]

In both cases, the general direction of the movement is downward (much rarer, upward). If the object faces the signer, two hands are moving down either in an arch or in two straight movements at a 90-degree angle. Rounded two-dimensional objects are depicted with one hand drawing a circle in the vertical plane.



(a) SASS: wide-rectangular-2D (painting) [D; 04:00.7]

[16](a) https://www.meme-arsenal.com/create/template/960479
(b) https://focusedcollection.com/ru/185127168/stock-photo-man-walking-yellow-wall.html



(b) SASS: wide-flat-rectangular (cabin) [E; 07:47.0]

Figure 3.96. Depiction of flat vertical objects facing the signer in RSL SASS

If a flat object is oriented vertically with its edge towards the signer, then it is described with one or two hands oriented towards the midsagittal plane and moving downward. The scheme below provides a summary of the orientations that are encoded in RSL SASSes depicting flat objects. This set is less numerous than the one for the long thin objects. It preserves, however, the main functional distinctions in the orientation: horizontal vs. vertical; facing the signer vs. oriented to the signer with its narrow side.

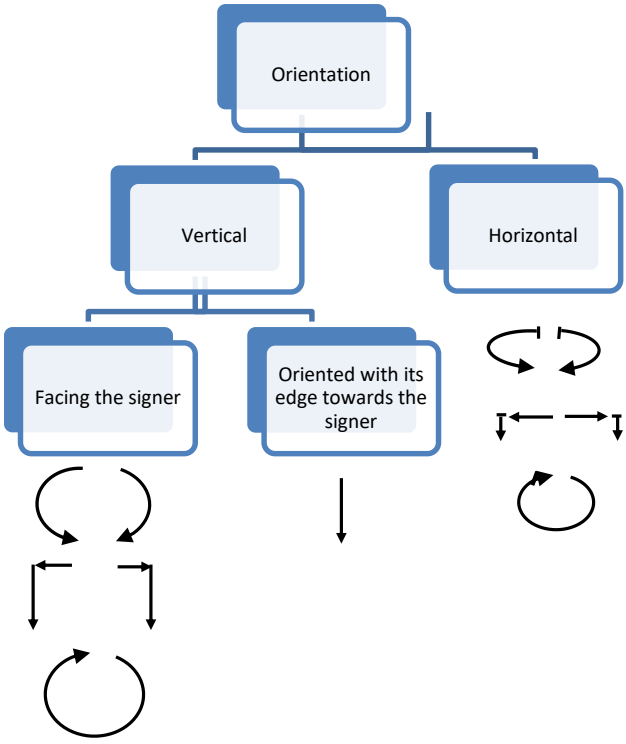


Figure 3.97. Possible orientations of flat objects marked in RSL SASSes

Surfaces are objects that are conceptualized as two-dimensional planes. RSL SASSes distinguish between two types of surfaces: **limited and unlimited**. Both types are depicted with the handshape . Unlimited surfaces can be exemplified by such referents as a floor, a roof, a field, a wall, a ceiling. The SASS with the -handshape does not show the boundaries of these objects, instead, it defines their orientation and the shape of the surface (smooth vs. bumpy). Four distinct orientations of unlimited surfaces are found in my data: horizontal, vertical facing the signer,

vertical to the side of the signer, and diagonal (as a house roof or a steep river bank). All these orientations are unambiguously defined by the orientation of the hand in a SASS, with the direction of movement playing a secondary role.

The horizontal orientation is expressed with the hand oriented palm down. The movement can be produced with a diverse set of directions, as long as it stays in the horizontal plane: away from the signer, towards the signer, diagonal, leftward, rightward, or circular.



(a) SASS: surface-horizontal (floor) [D; 00:09.4]



(b) SASS: surface-horizontal (space) [S; 00:08.0]

Figure 3.98. Depiction of horizontal unlimited surfaces in RSL SASSes

If the object is vertical and is facing the signer, the hand in the SASS is oriented palm towards or away from the signer. The movement can be upward, downward, leftward, rightward, or circular in the vertical plane.



(a) SASS: surface-vertical-facing.the.signer (wall) [G; 04:00.6]



(b) SASS: surface-vertical-facing.the.signer (wall) [G; 06:41.8]

Figure 3.99. Depiction of vertical surfaces facing the signer in RSL SASSes

The vertical position of the surface to the side of the signer is typically expressed with the hand oriented palm to the left if the dominant hand is right and to the right if the dominant hand is left. The direction can be upward, downward, away, or towards the signer.



SASS: surface-vertical-to.the.signer's.side (wall) [G; 06:19.6]

Figure 3.100. Depiction of vertical surfaces located to the side of the signer in RSL SASSes

Finally, diagonally oriented surfaces are described with either one or two hands moving diagonally in the vertical or midsagittal plane with the palm facing the surface. There are four prototypical diagonal orientations of the unlimited surfaces: top left to bottom right, top right to bottom left, top far to bottom close, and top close to bottom far. The first two can be exemplified with a house roof (Fig. 3.101b), the orientation from top far to bottom close is shown in Fig. 3.101a (the referent is a mountain slope).



(a) SASS: surface-diagonal (slope) [D; 04:17.6]



(b) SASS: surface-diagonal (roof) [G; 06:47.1]

Figure 3.101. Depiction of diagonal surfaces in RSL SASSes

The diagram below summarizes the data.

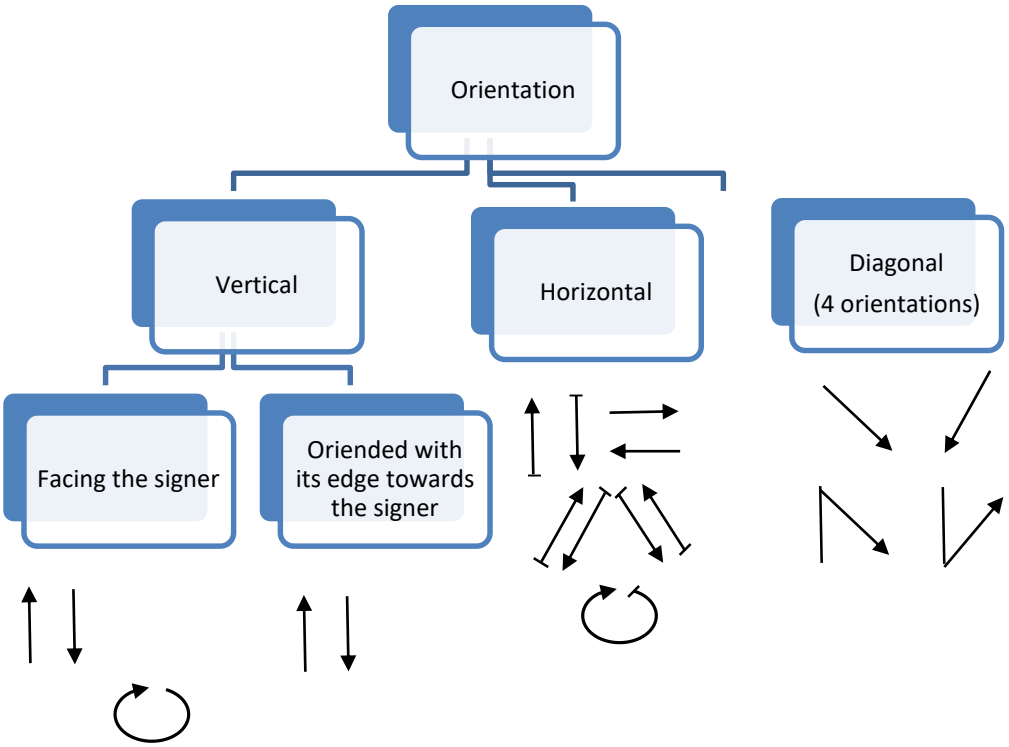


Figure 3.102. Possible orientations of surfaces marked in RSL SASSes

In limited surfaces, one of the two dimensions is delimited by the hand (either by the distance between the tips of the fingers and the wrist or by the distance between the right and the left side of the palm). Examples found in my data include a bookshelf, a cabinet shelf, a road, a stripe on a ball, a fence.



(a) cabinet shelves (b) ball stripes (c) fence

Figure 3.103. Limited surfaces in 'spot-the-difference' stimuli



SASS: straight-long-horizontal (cabinet shelf) [D; 02:43.4]

Figure 3.104. RSL SASS describing an object of the type 'limited surface'

I distinguish a separate class of limited surfaces as opposed to unlimited surfaces, because they have a different set of orientations. For example, such unlimited surfaces as a floor or a field have

only one possible horizontal orientation. It is expressed with the downward palm orientation and a movement in the horizontal plane. The change of the movement direction (for example, rightward versus away from the signer) does not affect the meaning. In the limited surfaces, such as a bookshelf, the direction of movement is important for the meaning of the sign. At least four different horizontal orientations are possible: parallel to the signer's body (rightward / leftward movement), perpendicular to the signer's body (movement away / towards the signer), and two diagonal orientations: from far left to close right and from far right to close left. Two of them are encountered in my corpus. Compare Figure 3.104 and Figure 3.105b. In Figure 3.104, the signer depicts a shelf of a cabinet which is positioned at an angle (Fig. 3.103a). To reflect this orientation, the signer moves the hand diagonally away from the body. In Figure 3.105b, the signer describes the smooth surface of a road (Figure 3.105a). Since the road is located parallel to the signer's body, the hand moves straight to the right.



(a) straight road



(b) SASS:surface-smooth (road) [T; 06:15.4]

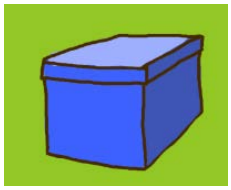
Figure 3.105. Limited surface parallel to the signer's body and its depiction by RSL SASS

As my corpus was not designed to account for all orientations of all object types, the data it provides in this domain is not enough to form a full list of orientations. Additional corpus-based or elicited data is necessary in order to create this list.

The last type of referents with a distinct set of orientations is **three-dimensional objects with all three dimensions being roughly the same**. Examples in my stimuli include a ball, a bag, a square box, a bowl, a birthday cap, a birdcage, a shoe.



(a) birthday cap



(b) box



(c) bag



(d) bowl

Figure 3.106. Referents with roughly same dimensions in 'spot-the-difference' stimuli

The spot-the-difference pictures I used for the data collection do not contain instances of the same three-dimensional object positioned differently, since their main purpose was to collect descriptions of different objects and not orientations. Therefore, for this discussion, I will use the

data collected with a different set of stimuli, i.e. the 'stacks and squares' task. In this task, the signer sees a picture with a number of objects located in a specific way on a set of square cloths. The signer's task is to explain the locations and exact positions of the object to his/her partner. The partner needs to follow the instructions and to place the actual objects on the squares exactly as in the picture (without being able to see the picture). The full description of this task is given in the methodology section, the stimuli can be accessed in the appendix. The stimuli for this task are designed specifically for getting descriptions of different objects' orientations. Compare, for example, different positions of the boxes and the bowl in the 'stacks and squares' pictures.



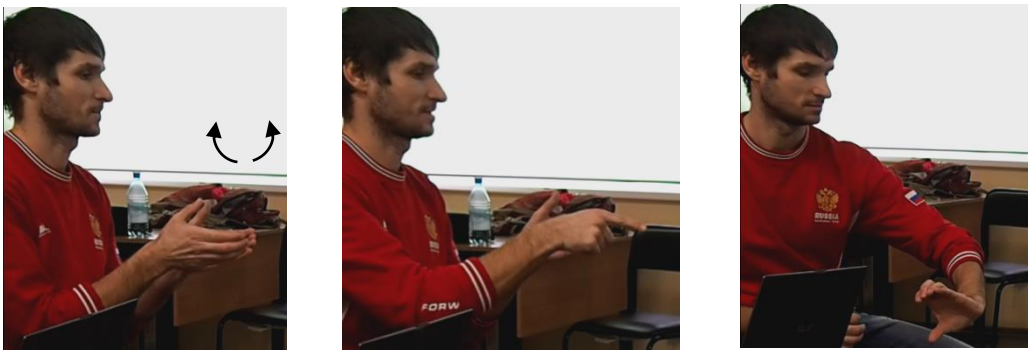
(a) boxes



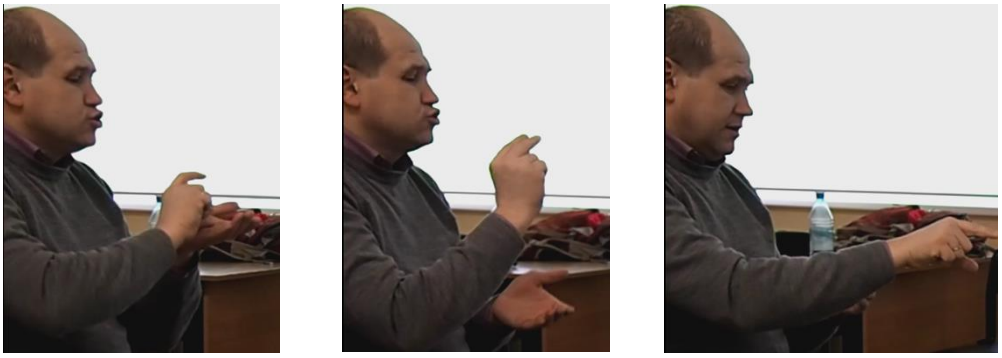
(b) bowl

Figure 3.107. Different objects' orientations in 'stacks and squares' pictures

The analysis of the descriptions given by four signers shows a very clear pattern. SASSes can only express a prototypical orientation of a three-dimensional object, i.e. for a box – horizontal, lid up (if there is a lid), for a bowl – horizontal, bottom down. Non-prototypical positions of referents are described using classifier constructions. See examples below:



(a) SASS:bowl [A; 03:12] | INDX | CL:cylinder-located-on.the.side



(b) cup | CH-A-SH | INDX



CL-round-located-upside.down [I; 09:29]

Figure 3.108. Use of classifier constructions in describing objects' orientations in RSL

In Figure 3.108a, the signer describes the bowl located on its side (Fig. 3.107b-1). In the beginning of the phrase, he uses a lexicalized SASS to name the object. This SASS depicts a bowl in its prototypical position, i.e. bottom down. Then he points to the square the object is located on, and in the end, he uses a classifier construction to show the object's orientation. The rough translation of this sentence is: 'The bowl is here, lying like that'. In Figure 3.108b, the signer is describing the same bowl located upside-down on a red square (Fig. 3.107b-2). Here there are no occurrences of SASSes at all. To name the object, the signer uses a lexical sign CUP followed by the fingerspelling CH-A-SH (the beginning of the Russian word *chashka* 'cup'). Then he points to the location in space and shows the upside-down orientation of the bowl with a classifier construction.

These examples show that SASSes are not designed to depict orientations. For these signs, the object's orientation is a secondary aspect, the primary visual characteristics being the shape and the size. Therefore, the only orientations SASSes can differentiate between are the prototypical ones. Since three-dimensional objects have only one prototypical orientation, SASSes that describe them are limited by it.

Repetition of the movement

The movement features discussed so far either do not have a distinguishable function at all (as the wrist movement) or carry the semantic function: they contribute to the meaning of the sign. Thus, the finger movement shows certain aspects of the object's shape (pointedness, rectangular shape, or splitting), the movement trajectory outlines the general shape of the referent (straight, arcing, round, or wiggly), and the movement direction expresses the object's orientation (with the caveats discussed above).

The movement repetition is the first parameter that has a non-semantic function. It occurs in my data quite rarely: out of 622 SASSes, only 22 are produced with a repeated movement. Out of those, the only two types of repetition which are encountered more than once are the repetition of the sign at the same location and the repetition with the shift to the right.

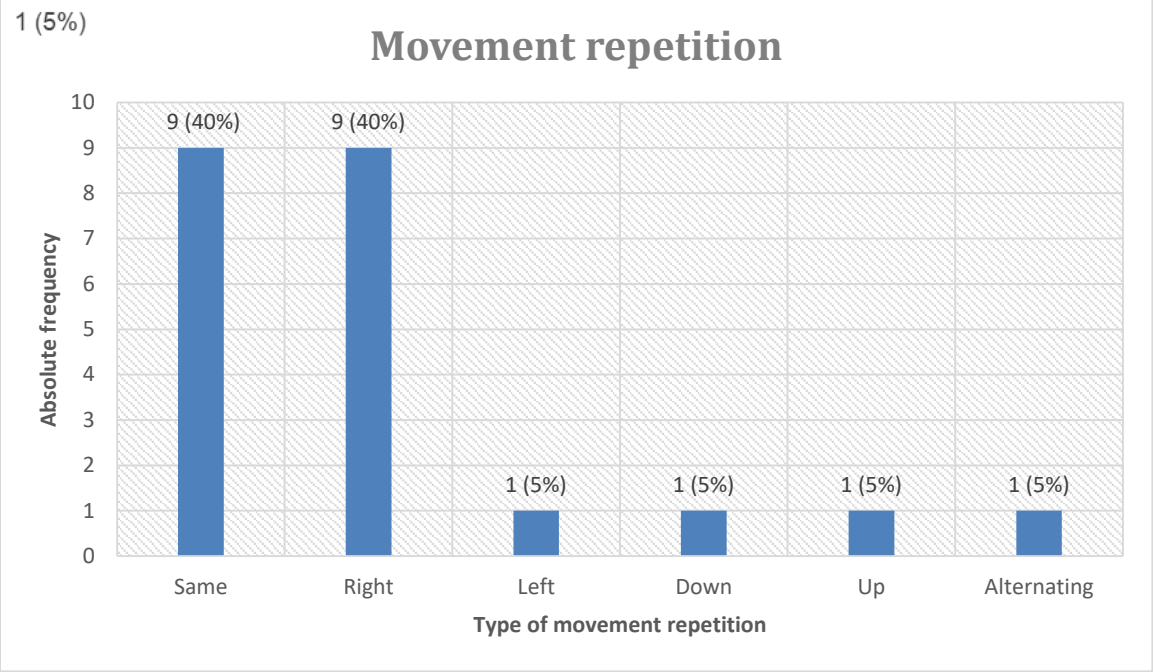


Figure 3.109. Distribution of different movement repetition patterns in RSL SASSes

Although such a small sample of signs with the movement repetition is not enough to state definite claims about the function of this parameter, some generalizations still can be made. Thus, the repetition of the sign at the same location co-occurs almost exclusively with lexicalized SASSes in the syntactic role of a noun at the end of the phrase. For example, the sign in Figure 3.110 occurs in the following context:

(3.3) lexSASS:HOUSE-loc RED **lexSASS:HOUSE-loc**
'There is a red house over there.'

ROAD NEXT.TO ROAD SASS:bumpy
'The road next to the house is bumpy.' [R; 06:08.8]

The signer describes a red house and a road the house is located at. In the first sentence, he uses the same lexicalized SASS to refer to the house twice, but only the second time, when the sign is at the end of the clause, he produces it with the repeated movement.



lexSASS:HOUSE-loc [R; 06:10.5]

Figure 3.110. The repetition of the movement at the same location in a SASS

Other lexicalized nouns with the movement repetition at the same location in my data include lexSASS:SPACE, lexSASS:GRASS, lexSASS:PLANK, lexSASS:SURFACE. See some examples below (the SASS with a repeated movement is marked with the bold font):

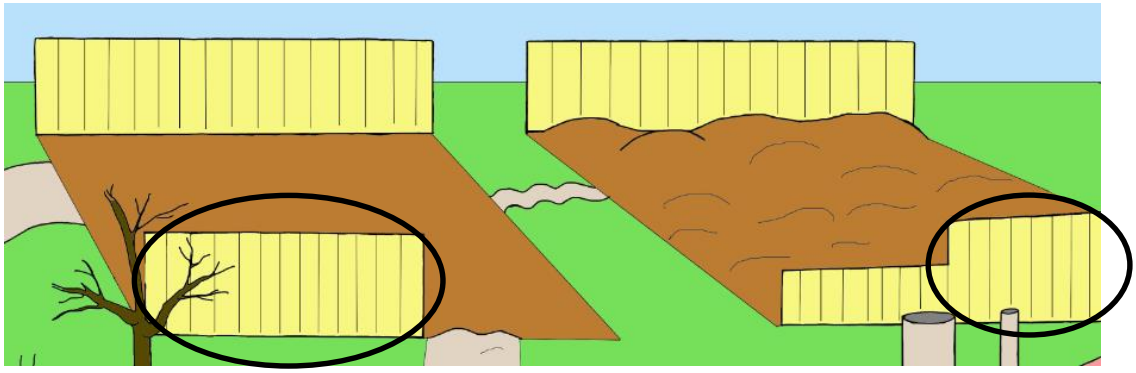
(3.4) SASS:rectangular CHIN-UP.BAR SASS:rectangular lexSASS:GRASS-loc
'Under the rectangular chin-up bar, there is grass'
INDX-2 DON'T.HAVE INDX-2 **lexSASS:GRASS-loc**
'You don't have it? And I've got grass (on my picture)' [R; 05:23.6]

(3.5) BELOW TABLE UNDER CL:located-thin.object-two **lexSASS:PLANK**
'Below under the table, there are two planks' [D; 02:16.2]

In (3.4), the signer uses the same lexicalized SASS with the meaning 'grass' twice, but repeats the movement only in the second occurrence at the end of the whole utterance. In (3.5), the signer describes planks lying under the table. When she produces the lexicalized SASS with the meaning 'plank', she repeats the movement several times. This example shows that the sign does not have to be introduced earlier in the conversation to be repeated.

The repetition of the sign with a shift to the right carries a different function: it denotes plurality. This type of repetition occurs in my corpus nine times. Most frequently, it is used in the description of planks in a fence. For example, Figure 3.111b-c shows the signer describing the width of the planks surrounding two fields (the planks in question are indicated with circles in Fig. 3.111a). I provide the whole utterance below.

(3.6) WAIT NOTICE lexSASS:FENCE-loc **SASS:thin-tall-PL**
DIFFERENT lexSASS:FENCE-loc **SASS:thick-tall-PL**
'Wait, I noticed something: the planks in the fence to the left are thin, and the planks in the fence to the right are thick' [T; 04:29.6]



(a) fences surrounding the fields



(b) SASS:thin-tall-PL [T; 04:33.3]



(b) SASS:thick-tall-PL [T; 04:35.5]

Figure 3.111. The repetition of the movement with a shift to the right in a SASS

The signer expresses the idea that the planks surrounding the right field are thinner than those surrounding the left field (which is not strictly true, but this is not relevant for the discussion). When she describes both types of planks, she uses a repeated movement with a shift to the right. The repetition denotes plurality, while the shift to the right iconically shows the position of the planks with respect to each other. Note that the number of reduplicants (three in the first sign and four in the second sign) does not correspond to the number of planks on the picture (thirteen in the first picture and eight in the second picture). Moreover, each reduplicant is performed with a shorter movement. This is an example of a sign in the plural form marked by a sideward partial reduplication and not a sequence of separate signs.

To sum up, the movement repetition functions at the morphological level: it either denotes plurality or marks a noun. Both functions have been reported for sign languages of the world. For example, in (Steinbach, 2012), the sign full reduplication and sideward partial reduplication are indicated as plural marker strategies applied to non-body anchored signs in DGS. The same has been stated for Auslan (Johnston & Schembri, 2007), BSL (Sutton-Spence & Woll, 1999), LIS (Pizzuto & Corazza, 1996). In ASL (Wilbur, 1987) and DGS (Nijhof & Zwitserlood, 1999), reduplication is less constrained and can be applied also to at least some body-anchored signs to indicate plurality. The movement repetition has been listed among factors differentiating between verbal and nominal signs in ASL (Klima & Bellugi, 1979), Auslan (Johnston & Schembri, 2007), RSL (Kimmelman, 2009). The fact that in my data the repetition of the movement at the same location occurs in the end of the sentence is quite interesting and means that potentially this subcomponent also has a syntactic or discourse role in RSL. The limited number of examples, however, is not sufficient to make claims, and more research is needed to clarify this issue.

Size of the movement

I differentiate between three possible movement sizes: large, normal, and small. The pie chart below shows the distribution of these values in my corpus.

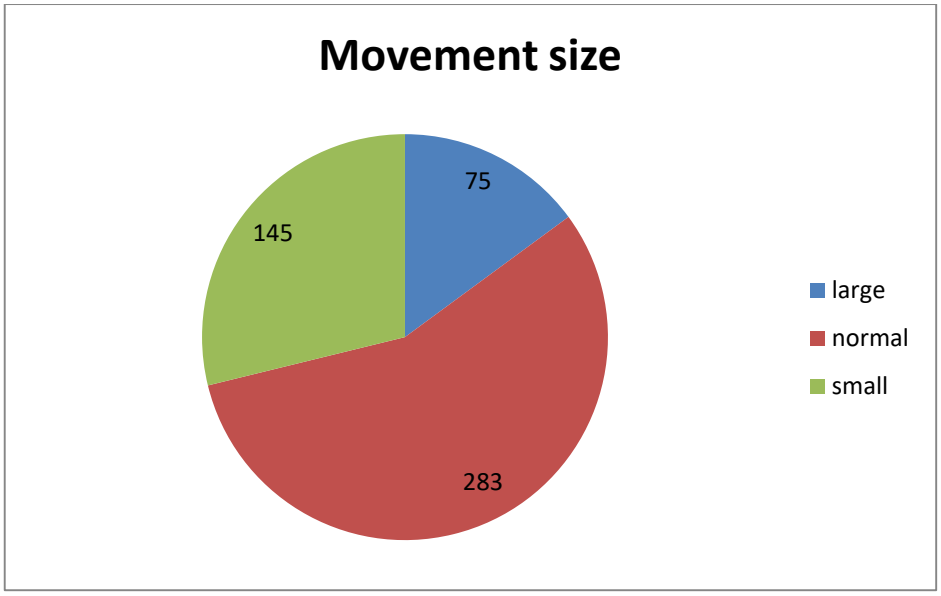


Figure 3.112. Distribution of different movement sizes in RSL SASSes

As the chart shows, the majority of SASSes in my sample are normally sized. I treat this value as the default value and will below discuss functions of the large and small size values only. The large size of the movement can perform one of two roles: it either indicates a large size of an object (semantic function) or marks the emphatic use of the sign (discourse function). The first usage is much more frequent: out of 75 signs with a large movement, 69 signs denote long, big, tall, or wide objects:



(a) SASS: long-wide-arcing (road) [E; 07:58.1]



(b) SASS: thick-long-cylindrical (pipe) [T; 12:34.2]

Figure 3.113. Semantic function of large movement in RSL SASSes

Sometimes, the SASS is performed with a large movement to draw the addressee's attention to it. This might be useful when the described object has a non-traditional shape, and the signer needs the addressee to watch the sign closely. In these SASSes, the movement is large and slow irrespectively to the object's size. I refer to this function of the large movement as the emphatic one since its purpose is to make the sign more prominent.



SASS:crooked (pipe) [G; 07:36.3]

Figure 3.114. Emphatic use of the large movement in RSL SASSes

The small size of the movement occurs in 145 signs of the sample. Its main functions are:

- semantic function;
- discourse function;
- function of distinguishing between static and tracing SASSes.

The first function is the indication that the object is small. For example, in Fig. 3.115-a, the small size of the movement marks the small size of the hatbox, and in Fig. 3.115-b, it indicates that the line in question is short.



(a) SASS:small-flat-round (hat box) [S; 01:3.9]



(b) SASS:thin-short (line) [T; 09:10.7]

Figure 3.115. Use of small movement in the semantic function in RSL SASSes

When the small movement has the discourse function, it indicates that the length of the object is not in the focus of the statement. This use is to a certain extent antonymous to the emphatic meaning of the large movement. It is possible only for objects that have already been introduced in the conversation. In these SASSes, the length of the movement should not be interpreted literally. For example, in Fig. 3.116a, the signer refers to a long pipe by a SASS with a short movement. See a wider context for this sign below:

(3.7) 1: *Near the tables, there are two* ***pipes*** (Fig. 3.116b).
2: *They are of the same length, but one is thick and the other is thin.* (…)
3: *In front of the* ***pipes*** (Fig. 3.116a)*, there are two piles of sand.* [G; 08:02.5]

As the narrative shows, the sign in question (line 3) is the second mention of the referent. The first mention (line 1) is expressed with a SASS with a long movement, which properly shows the length of the object; see Fig. 3.116b. Since at the second mention, the length of the object is not important for the message, the signer chooses to save the energy and time in producing the sign and to reduce the movement's size.



(a) SASS:long-straight-circular (pipe) [G; 08:13.2]



(b) SASS:long-straight-circular (pipe) [G; 08:06.5]

Figure 3.116. Discourse use of small movement in RSL SASSes

Finally, in a number of cases, the small movement indicates that the SASS in question is not tracing, i.e. the movement does not outline the contour. On the contrary, it is responsible for locating the two hands at the ends of the object. In these signs, the movement has a solely epenthetic use. I refer to these SASSes as static, thus adopting Supalla's terminology (static versus tracing SASSes), but using it in a slightly different sense.



SASS: short (brush) [D; 01:26.3]

Figure 3.117. Epenthetic use of small movement in RSL SASSes

3.2.3. Discussion

This chapter provides a detailed description of the movement component in RSL SASSes. It discusses the following sub-components: aperture change, wrist movement, direction of movement, trajectory of movement, repetition of movement, and size of movement. For each sub-component, I describe a range of expressed values and performed functions. As my data shows, different sub-components of the movement component have different ways of contributing to the meaning and linguistic shape of SASSes. For example, the aperture change shows specific aspects of the object's form (pointedness, angular shape), the trajectory of movement outlines the general shape of the object (straight, round, arcing, wiggly), the direction of movement shows the object's orientation, and the movement's size defines whether the object is normal, big, or small. The role of the movement component is not limited by lexical semantics: certain parts of this structural element can also contribute to the meaning of SASSes on other language levels. For example, the repetition of movement (i.e. sign reduplication) marks plurality, and the large movement size can mark the emphatic use of the sign.

The main theoretical question with respect to the movement component in SASSes concerns its categorical versus gradient status. As the introduction section of this chapter discusses, there are different approaches to this issue. While some sign linguists propose a fully morphemic, i.e. categorical, account of the movement in these signs, others claim that SASSes (as a part of the larger group of classifier predicates) are at least partly gradient in nature. This chapter provides a unique perspective on the debates, stemming from an in-depth analysis of the RSL corpus data.

Based on the analysis of 625 RSL SASSes describing different types of objects, orientations, and locations, I propose an account aiming to reconcile the strictly morphemic and the gestural/gradient interpretation of the movement component in these signs. In accordance with the morphemic analysis by Supalla (1978) , I claim that all subcomponents of the movement component can be used categorically. This means that by default the movement's trajectory, direction, size, and other sub-components choose values from a closed list. Conceptually, therefore, SASSes do not encode every aspect of the object's form in an analogue manner. On the contrary, they classify the object by common shapes (angular versus curved, flat versus three-dimensional, limited surface versus unlimited surface), sizes (normal, more than normal, less than normal), and orientations (vertical, horizontal parallel to the signer, horizontal perpendicular to the signer), etc.

An important difference with Supalla's account concerns the way the values of the movement component are combined with each other and with other components. The set of all possible SASSes is not defined by a simple multiplication of the (sub-)components' parameters. Instead, structural elements of the sign tend to cluster in recurrent combinations to describe common shaped objects.

The direction of movement provides a good example of this. Although potentially there can be a rather large choice of directions in a SASS, the set of possible values to choose from in each case is defined by the type of the object, and therefore by other sign components.

The categorical use is not the only possible use of the movement's structural elements. Certain sub-components have the potential to be used in an analogue manner. These sub-components include the movement's trajectory, direction, and size. The analogue use of a structural element is possible when the meaning it expresses is in the focus of the signer's attention. Compare the following phrases:

(3.8) a. *There is a big round box on the table.*
b. *The big box on the table has this shape.*
c. *The round box on the table is this big.*

The sentences above refer to the same object, i.e. a big round box. However, this object will be described in RSL with different SASSes, depending on what part of the description is in focus. Thus, (3.8a) simply states the fact of the existence of a big round box. All movement's sub-components in this sentence will be used categorically. The example (3.8b) brings attention to the shape of the box. Here the movement's trajectory can be used in a more analogue manner to outline the exact form of the object. In (3.8c), this is the size of the referent that is under discussion. Therefore, in this sentence, the size of the movement will have gradient features.

The same account, but for the handshape aperture in classifiers, is proposed in (Eccarius, 2008). Based on the analysis of handshapes in several sign languages, Eccarius claims that the aperture is a categorical feature which can be manipulated gradually to indicate gradient variations in size. She proposes to see this gradient variation as a gestural overlay on a morphemic representation. This analysis can be also compared to Okrent's modality-free notion of gesture (Okrent, 2002). In her article, Okrent gives examples of spoken language elements being used in a gestural manner. Among these examples is meaningful manipulation of the vowel length, as in:

(3.9) *It was looooooooooong time ago* [Okrent, 2002: 187]

All spoken language sounds have length. The length of all vowels and some consonants can be manipulated to express certain imagery. It does not have to happen, but it happens in the example above where the vowel [o] of the word *long* is lengthened in order to express temporal extension. In a similar fashion, the direction, trajectory, and size of the movement in SASSes do not have to be used in an analogue manner, but they can be manipulated to depict certain features of the object in the gradient manner when needed.

Finally, the proposed interpretation of the movement component in SASSes goes in line with three ways of encoding a message by Ferrara and Hodge (2018), discussed in Section 1.2.3. The strategies in question are (a) describing, i.e. using fully conventionalized 'pre-agreed' form-meaning pairings; (b) indicating, i.e. using forms that anchor communicative events to a specific time and place; (c) depicting, i.e. expressing meaning through perceptual resemblances that are not necessarily conventionalized in the community. These encoding strategies can be used alone or in combination with others during the joint creation of multimodal 'composite utterances'. In this framework, SASSes are examples of composite utterances: they combine fully conventionalized symbolic and highly dynamic depicting aspects. However, as my data show, in these signs, the descriptive versus depicting status is not permanently assigned to sub-components. Instead, these

strategies dynamically 'travel' across SASS sub-sign elements during the course of the conversation and depend on the focus of the signer's attention.

3.3. Location

This section describes the location component in RSL SASSes. The two main issues I discuss with respect to this structural element are: (1) categorical versus gradient status of the location component in SASSes; (2) morphological, syntactic, and semantic differences between the SASSes produced in the neutral space versus on the body. I address the first issue by analyzing the articulation places of the RSL SASSes from the 'spot-the-difference' dataset. In order to address the second issue, I need a sample with both neutral space and body signs to be sufficiently present. Due to the nature of the 'spot-the-difference' stimuli, the absolute majority of the signs in the sample are produced in the neutral space. In order to enable an adequate comparison of the two types of signs, I increased the sample by adding another dataset. It contains 112 SASSes produced by two native signers performing the 'man and dog' task. This task involves describing parts of the body, pieces of clothing and accessories and, therefore, encourages using body-placed SASSes.

The section is organized as follows. Section 3.3.1 discusses the categorical versus gradient distinction with respect to the location component in SASSes. It starts with presenting an additional layer of annotation I performed in order to facilitate the analysis (§3.3.1.1), continues with the analysis of different places of articulation observed in my sample (§3.3.1.2) and ends with a brief discussion of the role of the object's location in the overall form of the SASS (§3.3.1.3). Section 3.3.2 deals with SASSes produced on the body. In the beginning, it presents the 'man and dog' dataset (§3.3.2.1); then, it discusses morphological properties of body-part SASSes (§3.3.2.2); this is followed by the analysis of syntactic properties of these signs (§3.3.2.3). In the final section (§3.3.2.4), RSL body-part SASSes are compared to body-part size and shape constructions in two village sign languages of Africa, i.e. Adamarobe Sign Language (AdaSL) and the emerging sign language of Bouakako (Côte d'Ivoire), described in the works by Nyst and Tano (Nyst, 2016; Nyst & Tano, 2018).

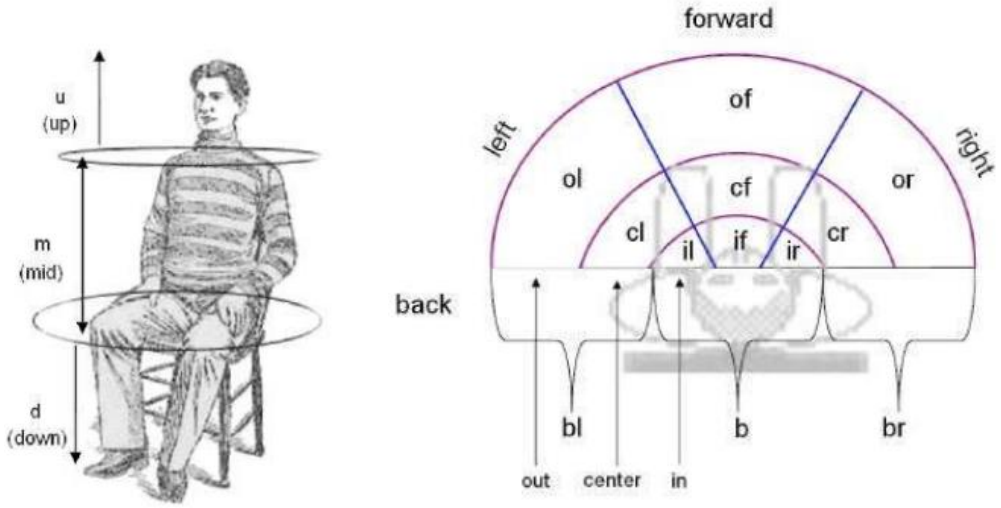
3.3.1. SASSes produced in the neutral space

The research question addressed in this section is very similar to the one discussed with respect to the movement component in the previous section of this chapter. Accounts arguing for, at least, partial graduality of peripheral signs, usually treat the start and end point location in these signs as gradient in nature (as opposed to the handshape, some aspects of the movement, and non-manual features, see, for example, (Liddell, 2003; Schembri et al., 2005)). In these signs, the place of articulation denotes a relative position of the object. Since, potentially, there is an infinite number of points in the neutral space in front of the signer, there is claimed to be an infinite number of possible locations for these signs. More importantly, the slightest change of the location value in the sign is argued to be meaningful and to reflect the positioning of the referent. I test this assumption by conducting a thorough analysis of the location component in RSL SASSes.

3.3.1.1. Data annotation

For this analysis, I transcribed the location component in 621 RSL SASSes from the 'spot-the-difference' sample. I extended the HamNoSys notation by the tags introduced in (Zwitserlood et al., 2008). The annotation system presented in this article is easily machine-readable and is applicable for both gesture and sign coding. It allows us to describe signs/expressions in terms of

their phonetic form with a sufficient level of detail. The location of a sign, according to this system is described with respect to a three-dimensional grid. Overall, three tags are assigned: (1) the position on the vertical plane, which can be above the shoulders ('u' -- *up*), at the chest level ('m' -- *middle*), and below the waist ('d' -- *down*); (2) the position on the horizontal plane, which can be central ('f' -- *forward*), left ('l'), or right ('r'); (3) and the position on the midsagittal plane: close to the body ('i' -- *in*), neutral ('c' -- *central*), away from the body ('o' -- *out*), behind the body ('b'), see the schemes below.



(a) vertical plane (b) horizontal and midsagittal planes

Figure 3.118. Location grid
(Zwitserlood et al., 2008:188)

If the sign changes its location during the sign production, then both, the initial and the end point locations, are marked. In one-handed signs and in two-handed signs with one hand active and one hand passive, I mark the location of the active hand only. In two-handed signs with both hands moving, I transcribe the both hands. See some examples of the transcription below:



(a) SASS:even-surface (floor) [D; 00:09.4]
LOC: cfm>ofm



(b) SASS: long (brush) [D; 01:24.8]
LOC: RH: irm; LH:ilm



(c) SASS:straight-long (plank) [G; 02:31.3]
LOC: RH:cfm>orm; LH:cfm>blm

Figure 3.119. Location transcription

Whenever a more fine-grained distinction is necessary, I introduce tags with the '/' symbol, as in the example below. In Figure 3.120, the signer describes two vases, one is taller than the other. In Figure 3.120a, the active hand starts at the chest level and ends in front of the signer's face. The sign gets the tag cfm>cfu (i.e. 'central, forward, medium' -> 'central, forward, up'). In Figure 3.120b, the active hand has the same upward direction, but the movement is smaller. To indicate that the hand changes its location but ends up lower than in Figure 3.120a, I mark this sign with the tag cfm>cfm/cfu.



(a) SASS:tall_thick_cylindrical (vase) [D; 00:28.4]
LOC: cfm>cfu



(b) SASS: low_thin_cylindrical (vase) [D; 00:38.5]
LOC: cfm>cfm/cfu

Figure 3.120 Interim locations in RSL SASSes

3.3.1.2. Data analysis

The analysis of the data shows that SASSes tend to locate objects at the central position in front of the signer. Overall, 48% of SASSes in my data change the location. Out of those, 64% of signs are with one active hand. The most frequent tag for the location is 'cfm'. This tag represents the neutral position of the object in front of the signer ('c' stands for *central* in the horizontal plane, 'f' stands for *forward* in the midsagittal plane, and 'm' stands for *medium* in the vertical plane). Sometimes, the central positioning of the object is indicated by tags other than 'cfm'. For example, a very tall object can be described with a hand moving from the point in front of the signer's face ('cfu') to the point at the level of their waist ('cfd'). If a central object is referred to with a static sign (i.e., the two hands are located at the ends of the object), then the right hand receives the tag 'crm' ('r' stands for the right side of the signer in the horizontal plane), and the left hand gets the label 'clm'. Taking these tags into account, 82% of SASSes in my sample are located in the neutral space right in front of the signer. This means that there is a very strong preference for SASSes to locate the described objects centrally.

The deviation from this default strategy can happen due to a number of reasons. The most significant are (1) the syntactic, (2) the discourse, and (3) the contextual factors. The syntactic factor deals with the syntactic role of the SASS in a sentence. The prototypical syntactic role for a SASS is an adjective/adjectival predicate. In this role, the SASS describes visual characteristics of an object overtly expressed by another sign (as in 'the table is long', where the quality 'long' is denoted by a SASS and the object 'table' is denoted by the lexical sign TABLE). Sometimes, however, the object and the quality are merged in one sign. For example, the SASS in the figure below stands for the phrase 'There is a long thin small path over there'. In this example, there is no separate sign denoting the object 'small path'. These SASSes tend to have a non-default location to the right, to the left, or away from the signer's body. I treat these signs as localized nouns. Quite often, they are accompanied by pointing signs. This topographic use of space has also been reported for signs other than SASSes and in languages other than RSL, see for example (Johnston & Schembri, 2007).



SASS:long_narrow_road [T; 00:36.5]

Figure 3.121 Topographic use of space in RSL SASSes

The discourse factor is responsible for articulating a SASS higher than at the chest level in order to draw the addressee's attention to the shape or size of the object. In these SASSes, the position of the sign does not reflect the location of the actual referent. Instead, it makes the sign more visible to the addressee whose gaze is by default directed more to the signer's face than the chest. In Figure 3.122, the signer describes the spherical shape of a ball of thread. This shape is important, since in the picture of the second participant the correspondent object is flat. To make the sign more prominent, the signer articulates it higher than usual.



SASS:spherical (ball of thread) [G; 01:55.0]

Figure 3.122 Locating SASS at the face level in RSL

Finally, a SASS in the adjectival predicate role in a neutral discourse position can be articulated in a non-central location if it is signed in the context of other SASSes. This is the contextual factor of the sign placement. Consider the following example:

'brush'

(3.10) **BRUSH** K-I-S-T-O-CH CL:long_horizontal-three SASS:long SASS:long SASS:short

'[Near one of the vases] there are three brushes, two big ones and a small one.'

[D; 01:12.1]

In this example, three SASSes denoting three different objects are signed one after another. In order to indicate that these three signs refer to three different objects, the signer articulates them in three different locations (close to the body, in a central location, and away from the body).

Crucially, the place of articulation of the signs in these sentences does not necessarily reflect the actual positioning of the objects. For example, while describing the three brushes in question, one of the signers articulated the SASS for the shortest brush higher than the other two, although all three brushes in the described pictures lie on the table. Different locations of signs here do not reflect their positions in an analogue manner. Instead, they serve the main purpose of the differentiation between the objects.

3.3.1.3. Discussion

These data show that the location component in RSL SASSes does not always reflect the position of the described object in the analogous manner. On the contrary, by default SASSes are articulated in the neutral position in front of the signer. I argue that the reason for this lies in the nature of SASSes. These signs are not designed to denote the object's location (just like they are not designed to denote the object's orientation). For this, classifier constructions are usually used instead. When a signer uses a SASS, they most often want to describe the referent's size and/or shape, its orientation and location being somewhat secondary. The place of articulation of the sign comes to the foreground when the signer use lexicalized noun-like SASSes to set the scene and when more than one object is being described in one phrase. These are the only cases when the location component should be interpreted in a gradient manner. In other uses, it is treated categorically with the main distinction being between neutral space SASSes versus SASSes produced on the body. I turn to this distinction in the following section.

3.3.2. SASSes produced on the body

The signs produced on the body (also called 'body-anchored signs') have been studied in various sign languages. They were reported to exhibit certain peculiarities with respect to the morphology, syntax, and sign production. For example, Emmorey et al. (2016) show that the production of body-anchored signs in ASL engages the bilateral superior parietal cortex to a greater extent compared to neutral space signs. Pfau and Steinbach (2006) argue that despite reduplication being a frequent pluralization strategy in DGS, signs articulated on the body cannot be reduplicated. Oomen and Kimmelman (2019) provide evidence that body-anchored verbs show a unique PRO drop pattern in DGS and RSL: in clauses with these predicates, only the first-person subject can be non-overt.

The reasons behind these peculiarities lie in the unique perspective the body of the signer provides when it is actively engaged in the production of the sign. This perspective encompasses, at least, three aspects: physiological, perceptual, and iconic. The physiological factor is simply the fact that some movements and hand positions can be more or less comfortable to produce when the hand is touching the body. Due to the perceptual factor, some hand orientations and movements are more visible when they are articulated the body. Finally, the iconic factor concerns the iconic conceptual basis the body provides for the semantic interpretation of the sign. For example, Meir et al. (2007) state that some aspects of the linguistic behavior of the body-anchored verbs can be explained by the default iconic interpretation of the body as a subject of these verbs.

Despite a wide interest linguists take in body-anchored signs, the effects of the body being used as the sign's place of articulation have not been studied with respect to SASSes. The only exception is the research by Nyst and Tano (2018) which focuses on body part size and shape signs in AdaSL and Bouakako Sign Language (see the comparison Nyst & Tano's data with my data in the end of

this section). This section discusses the manifestation of the aforementioned factors in the form of RSL body SASSes.

3.3.2.1. Data collection and processing

As I already mentioned in the beginning of this section, a comparative analysis of the RSL SASSes produced in the neutral space versus on the body required extending the existing sample. The additional dataset for this analysis comes from a 6-minute video of two native Russian signers performing the 'man and dog' task. The detailed description of the stimuli and the data collection procedure is provided in Chapter 2 of this dissertation. Below I give a brief recapitulation of the main points.

For this task, two native signers are presented with the same set of 12 pictures, each representing a man and a dog standing next to each other. The pictures differ in the size and shape of the characters' clothes and body parts, see examples below:

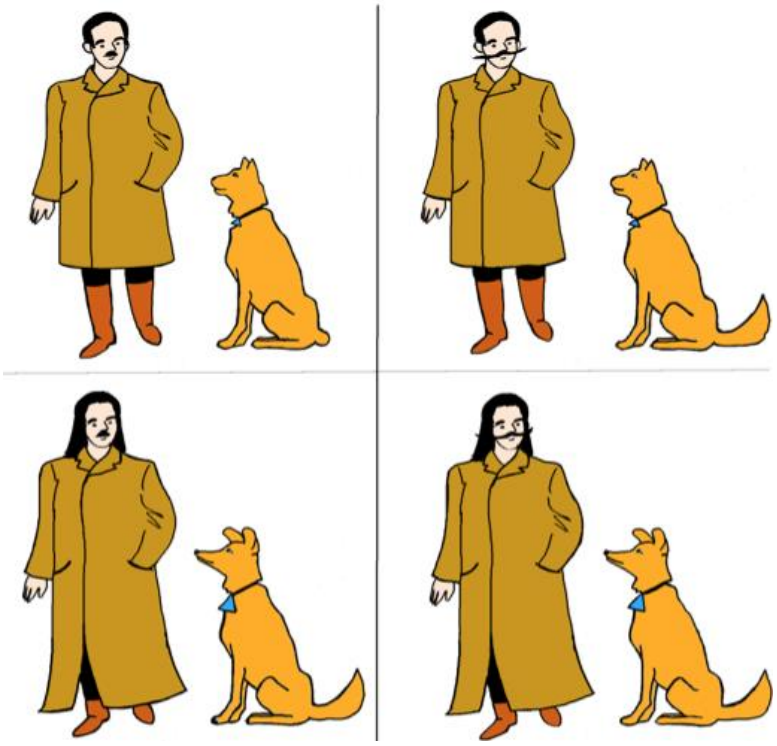


Figure 3.123. 'Man and dog' stimuli

Before the game, the two packs of pictures are shuffled and laid in front of the signers. The signers can see their sets of pictures, but cannot see the pictures of the opponent. The goal is to achieve the same order of the pictures in both packs. To do this, one of the signers ('the director') describes his/her pictures one by one, and the other signer ('the matcher') changes the order of his/her pictures according to the instructions. The matcher is allowed to ask questions.

Due to the nature of the stimuli, the signers produce a lot of signs describing the size and shape of body parts and pieces of clothing. These result in a large number of SASSes articulated on the body. The table below summarises the data in the 'man-and-dog' dataset. The SASSes in this sample describe five objects related to the man (three pieces of clothing and two parts of the face) and three objects related to the dog (two body parts and one accessory). Seven out of eight referents have a place of articulation on the body associated with them (the exception is the tail which is always articulated in the neutral space in fronts of the signer). For example, the signs describing the hair

are usually produced on the head, the signs showing the shape of the mustache are generally articulated on the lower face, etc.

Object	Place of articulation	Num of tokens
hair (18)	head-shoulders	14
	near head	2
	neutral space	2
moustache (18)	lower face	16
	neutral space	2
cap (11)	head	11
coat (15)	below knee	4
	above knee	6
	neutral space	5
boots (15)	wrist	7
	elbow	8
dog ears (11)	head	9
	near head	2
dog bell (17)	upper chest	16
	neutral space	1
dog tail (7)	neutral space	7

Table 3.17 'Man and dog' task dataset

The next section discusses differences in the manual form of the SASSes produced in the neutral space versus on the body. Since the samples for the two types of signs are coming from different datasets, some of the observed differences should be attributed to the differences in the stimuli and the data collection conditions. For example, an obvious limitation is a disparity in sizes of the samples: the 'spot-the-difference' sample, which is the main source of the SASSes located in the neutral space, consists of over 600 SASSes, while the 'man-and-dog' sample has only 112 size and shape signs. Another factor to consider is the difference in objects: in majority, differently located SASSes in my data refer to different objects. The only object which appears in the both types of stimuli is a birthday cap. In the 'spot-the-difference' stimuli, two birthday caps are placed on the table, while in the 'man-and-dog' task a cap is located on the man's head. The remaining objects are different in the two tasks. Consequently, some of the observed differences in the linguistic shape of these two groups of SASSes might be due to different referents rather than to the difference in the place of articulation. However, even with these limitations in mind, some interesting observations can be made.

3.3.2.2. Data analysis: manual form of body-part SASSes

This section discusses the effects of the body being used as the place of articulation in RSL SASSes with respect to the three factors outlined above: the physiological factor, the perceptual factor, and the iconic factor.

Physiological factor

The physiological factor explains a more limited set of handshape configurations attested in body SASSes in RSL. In Section 3.1, I divide the handshapes which occur in neutral space SASSes into the primary and the secondary ones. The primary handshapes, such as , , and , denote geometrical properties of one object. The secondary handshapes refer to more than one object. For

example, the handshape was used in my corpus by a signer to denote two straight parallel pipes. Another example of a secondary handshape is , which was used to refer to three arcing parallel pipes. I call these handshapes 'secondary', because conceptually they are derived from the handshape , which denotes one thin long object.

Neither the configuration nor has been attested in my corpus of RSL SASSes located on the body. I hypothesize that the reason behind this is that orienting the hand in these configurations towards the body and moving it to produce a sign is time- and energy-consuming.

Perceptual factor

The perceptual factor deals with some hand configurations and movements being more or less visible when the sign is performed on the body. In Section 3.1, I discuss two handshapes which are used in SASSes describing the size of an object. These handshapes are and . In these SASSes, the information about the size comes from two reference points. In neutral space signs, these points are either the two hands or the active hand and the ground. For example, a signer can show the size of a dog by locating two hands in the configuration with the palms oriented towards each other at the imaginary ends of the dog. The example of the active hand and the ground being used as reference points is showing the height of a child. In these SASSes, the information about the shape of the object is very poor. It is limited by the dimensionality of the object shown with the help of the handshapes. The configuration denotes three-dimensional objects, while the configuration is used for flat things perceived two-dimensionally, thin cylindrical things perceived unidimensionally, and very small objects.

The body SASSes in my sample deviate from these generalizations in two ways. First, the two hands are never used as the reference points. The reference points are always the active hand and a body extremity, i.e. the top of the head, a shoulder, fingertips. In these SASSes, the active hand moves from the body extremity to another location on the body which indicates the opposite end of the object. Second, and more importantly, the configuration is never used in these SASSes. The size of an object on the body is always shown with (a variant) of the handshape irrespectively to the object's shape. See, for example, the SASS describing long boots in the figure below.



(a) SASS: long (boot) [mE; 02:50.9]

Figure 3.124. Use of handshape in body SASSes denoting size in RSL

In this SASS, the active hand moves from the passive hand, which represents the foot, towards the elbow. Despite the fact that a boot stretched on the foot has a flat shape, the handshape used in

this SASS is . I argue that this is due to the enhanced perceptive power the handshape has in comparison with when located on the body. The delimitation of the object's length on the body with the index finger is not as clearly visible as with the whole hand. This is why only the flat handshape is used to produce these constructions in body SASSes.

Iconic factor

The iconic factor is responsible, first of all, for the choice of objects to which the body SASSes refer. These are mainly parts of the body, pieces of clothing, and accessories, i.e. things which are usually located on the body. Thus, the articulation of SASSes on the body in RSL is always iconically motivated. This is different from some lexicalized body-anchored signs. For example, the RSL sign GREEN, which is performed on the cheek, does not have any iconic basis for this place of articulation.



Figure 3.125. RSL sign GREEN (www.spreadthesign.com)

The iconicity also explains a non-prototypical interpretation of some movement directions in SASSes. As I discuss in Section 3.2 'Movement', sometimes the straight or arcing movement can occur in SASSes which denote size only. For example, two hands in the configuration oriented palms towards each other express the meaning 'small' when they move towards each other and the meaning 'big' when they move away from each other. In case only one hand performs the movement on the vertical plane, the downward direction expresses the idea 'small'/ 'low' (for example, a small child or a low fence), and the upward direction has the meaning 'big'/ 'tall' (for example, a grown-up person or a tall fence). These form-meaning pairs can be reversed in body SASSes: the downward movement of the hand can have the meaning 'big'/ 'long', and the upward movement can express the opposite quality, see examples below.



(a) SASS:long (coat) [mE; 00:35.2]



(b) SASS:short (coat) [mE; 02:04.0]

Figure 3.126. Expression of size in RSL SASSes located on the body

The opposite interpretation of the movement direction compared to neutral space SASSes is motivated by the described objects. Such referents as hair, coat, and sweater, which are typically described using a body SASS, 'grow downwards': a long coat ends below a short coat, long hair spreads further down compared to short hair, etc.

The iconic factor also plays a role in the different use of some handshapes. In Section 3.1, I argue that SASS handshapes describe the dimensionality of objects among other things. For example, the configuration  typically describes flat referents that are perceived as two-dimensional: a small path, a ribbon, a thin plank. The handshape , on the contrary, characterizes three-dimensional objects, such as a book, a wall, a duvet. In the neutral space SASSes, this distinction is very clear with very few objects allowing the use of both handshapes. In body SASSes, however, the dimensionality seems to be less important. Compare, for example, two different sign forms used by a signer to refer to the same object (the man's mustache, as in the top right and the bottom right pictures in Fig.3.123):



(a) SASS: long (moustache) [mE; 00:11.0]



(b) SASS: long (moustache) [mE; 02:40.2]

Figure 3.127 Handshapes used for description of mustache in RSL SASSes

While the combination of handshapes in Figure 3.127a usually refers to three-dimensional objects, the hand configurations in 3.127b, on the contrary, are used to describe flat things that are perceived two-dimensionally. Such inconsistency in the choice of handshape can be explained by the iconicity. Since the mustache is fixed on the face, it is usually seen only from one angle. Consequently, two its dimensions are always clearly visible, while the third one is less so and, hence, can sometimes be neglected – especially when the thickness of the mustache is not in the focus of the proposition.

Finally, the iconic factor manifests itself in the movement trajectory. A new type of movement trajectory has been attested in the extended sample. This trajectory is a loop, see the figure below:

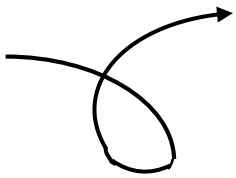


Figure 3.128. Loop trajectory RSL body SASSes

This loop trajectory appears in some SASSes, describing the hair, the boots, and the coat. Thus, in Figure 3.129a, the signer describes long boots. In contrast to the SASS in Fig. 3.124 with the same meaning, here the active hand first moves along the surface of the passive hand from the fingers towards the elbow, then it detaches from the elbow, draws a vertical loop in the air and returns back to the contact with the passive hand marking a specific location where the boots end.

In 3.129b, the long hair is described, first, by the hands moving along the surface of the head, and then by showing a specific location on the head with the loop trajectory.



(a) SASS: long (boot) [mE; 02:06.1]



(b) SASS: long (hair) [mE; 03:06.6]

Figure 3.129. Loop trajectory in RSL body SASSes

Conceptually, this trajectory can be decomposed into two parts: the tracing part and the delimiting part. The tracing part is the moving along the head in Fig. 3.129b and along the surface of the passive hand in Fig. 3.129a, right until the break of the contact. The delimiting part is the touching of a specific place on the body at the end of the sign production to show the limits of the object. The change between these two parts is always marked by the change of the hand orientation and can sometimes be accentuated by flexing the fingers (as in Fig. 3.129b). If we consider these two parts of the sign separately, the first one looks like an ordinary tracing SASS outlining the surface of the object, and the second one is a static SASS showing the size of the object. The 'loop' stage of the trajectory is just an epenthetic movement connecting the 'tracing' and the 'static' parts of the SASS.

Since such combinations do not appear in neutral space SASSes, I argue that using the body as a place of articulation makes the merge of the two types of SASSes possible, thus creating a new SASS type. In body SASSes, the body is never a mere place of articulation, it always constitutes part of the iconic imagery of the sign. For example, when a signer describes the length of the hair by moving the hands along the sides of their head, the head of the signer stands for an imaginary head of the person whose hair is being described. An important advantage of the body as a place of articulation in comparison with the neutral space is that the body is clearly visible. The addressee does not have to keep in his random access memory the outline of the object, they can clearly see it the whole time. This makes possible the use of complex SASSes which give multi-aspect information about the visual characteristics of the object by gradually building up the full image of it.

3.3.2.3. Data analysis: syntactic characteristics of body-part SASSes

The previous section discussed the manual form of the body SASSes with respect to neutral space signs. This section deals with the syntactic characteristics of these signs. Since semantically SASSes describe visual qualities of objects, their default syntactic role is a predicate adjective. They prototypically occur in such sentences as 'this fence is long', 'this pillow is round', etc. Therefore, usually, a sentence with a SASS also contains a noun referring to a described object. Indeed, I have numerous examples of this in my sample:

'brush'

(3.11) **BRUSH** K-I-S-T-O-CH CL:long-horizontal-three SASS:long SASS:long SASS:short

'[Near one of the vases] there are three brushes, two big ones and a small one.'
[D; 01:12.1]

(3.12) ROAD … LOC TWO **SNAKE** TWO CL:thin-horizontal-moving TWO SASS:big SECOND SASS:small

'On the other side of the road two snakes are crawling, a big one and a small one'
[T; 00:56.0]

(3.13) TWO WINDOW WINDOW **CURTAIN** SASS:long **CURTAIN** SASS:short

'There are two windows: one has long curtains and the other has short curtains'
[S; 00:10.0]

In the example (3.11), the signer describes three brushes lying on the table. To do it, she, first, produces the RSL sign BRUSH followed by the fingerspelling of the Russian word *kistochka* 'brush', then she uses an entity classifier showing the position, quantity, and orientation of the brushes, and, finally, she produces three static SASSes describing the length of the brushes. In the example (3.12), the signer depicts two snakes crawling on the side of a road. First, she localizes the snakes in space with the help of a locative pointing sign, then she produces a lexical sign SNAKE accompanied by the numeral TWO from both sides, then she shows the movement of the snakes with the help of a classifier construction and, finally, after repeating the numeral TWO again, she depicts the length of the snakes with SASSes. In the last example, the signer depicts two pairs of curtains, a long one and a short one. Again, the SASSes describing the length of the objects follow the nouns referring to these objects. I mark the nouns in all three examples with the bold font.

Sometimes, however, a SASS can be used in a sentence without an explicitly expressed noun. The whole range of conditions that make this possible requires separate research which is beyond the scope of this dissertation. This section discusses one of the factors, namely, the location of a SASS on the body. Indeed, the vast majority of body SASSes (82 out of 95) in my sample are produced without a preceding noun, see examples below:

(3.14) NEXT DOG TAIL SASS:small **SASS:ears-pointed** **SASS:bell-small**

'Next, let's discuss the dog. Its tail is small, its ears are pointed, it has a small bell on the chest' [mE; 02:09.0]

(3.15) FOURTH LOC MAN **SASS:long-hair**

'In the fourth picture, the man has long hair' [mE; 03:07.9]

(3.16) **SASS:boot-short**

'His boots are short' [mE; 03:42.4]

In (3.14), the signer describes the dog that has a small tail, pointed ears, and a small bell on the chest. The first SASS in the sentence, 'small', is a neutral space static SASS of size. It refers to the tail, which is overtly expressed in the preceding sign. The second and the third SASSes, however, do not have overt nouns before them. One of them describes small pointed ears (Fig. 3.130) and the other – a small bell (Fig. 3.131). In (3.15), the long hair of the man is described in one sign (Fig. 3.132) without an over noun 'hair' being present in the sentence. Finally, the example (3.16) shows a one-sign clause meaning 'the boots are short' (Fig. 3.133). I mark the SASSes without a separate noun with the bold font.



Figure 3.130. RSL SASS:ears-pointed
[mE; 02:13.5]



Figure 3.131. RSL SASS:bell-small
[mE; 02:15.7]



Figure 3.132. RSL SASS:hair-long
[mE; 03:06.6]



Figure 3.133. SASS:boot-short
[mE; 03:44.43]

These examples differ with respect to the manual similarity of the SASS to the noun denoting the object it describes. For example, the SASS:boot-short in Figure 3.133 is very similar to the lexical sign BOOT with the only difference, i.e. the end point location. The default end point location of the lexical sign is closer to the elbow. On the other hand, the SASS in Figure 3.132 has nothing in common with the lexical sign HAIR. In the latter, the hand in the configuration  touches the head several times (see Fig. 3.134). Thus, the manual similarity does not define the possibility for a SASS to be used without an overtly expressed noun.



Figure 3.134. RSL sign HAIR
(www.spreadthesign.com)

Such a different rate of signs without a noun in body SASSes with respect to neutral space SASSes (where only 64% of the signs do not have overt objects) is again due to the iconic conceptualization of the signer's body in these signs. Since a SASS produced on the body necessarily depicts a body part or a piece of clothing, its sole location contains a lot of information about the object the SASS in question refers to. For example, a SASS located on the head designates hair, ears, or headwear. Therefore, it is not necessary to articulate a separate sign for the object to be clear.

The body SASSes without overtly expressed nouns can be analyzed in at least two different ways. The first way is to postulate the noun omission in the sentences in question. According to this analysis, the discussed body SASSes are adjectives (or adjectival predicates), and they are used without a noun due to the reasons outlined above. The second interpretation is the merge of the noun and the adjective in a SASS, by means of which the resulting sign acquires the status of a

simultaneous compound. In this compound, the place of articulation is preserved from the noun, and the remaining manual components are from the adjective. See a scheme exemplifying the process for the SASS:hair-long below. I mark the component values which end up in the compound with green.

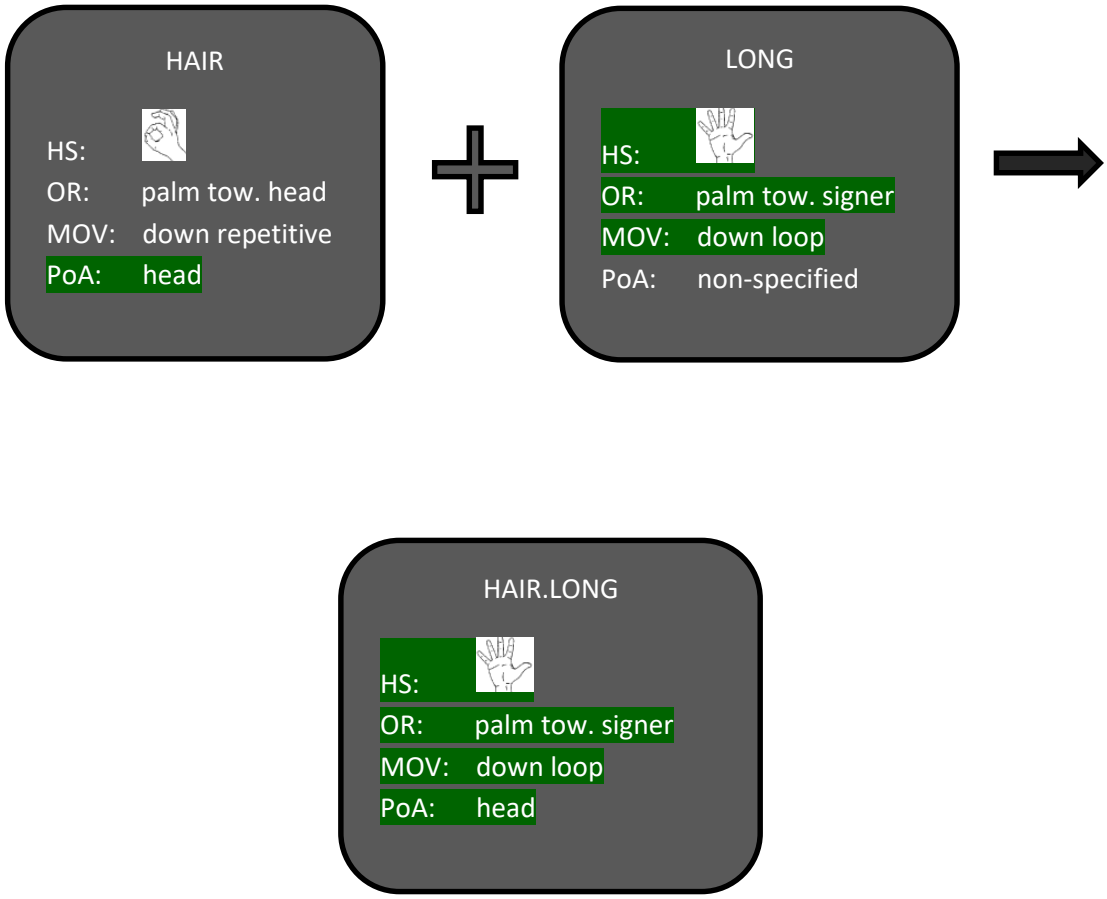


Figure 3.135. Merge of the simultaneous compound SASS:hair-long in RSL

The choice between the two interpretations of this phenomenon requires further research. However, one observation supporting the compound analysis of body SASSes without overtly expressed noun can already be made. This observation concerns the non-manual component in these signs. A detailed discussion of the non-manual articulation in RSL SASSes is presented in Chapter 4. Here I am going to briefly outline the main tendencies. Thus, the SASSes which perform the role of adjectival predicates (with an overt noun) in my sample are usually accompanied by mouth gestures (sign language internal articulation). They are never co-articulated with mouthing (silent articulation of a spoken language word). The latter, on the contrary, is quite frequent with nouns. See an example below (an extended ex. (3.11)):

		‘brush’			
NMM:		*kistoch(ka)*_____	corner.lips.down_____	MG /af/____	MG /af/____
(3.17)	**BRUSH**	K-I-S-T-O-CH	CL:long_horizontal-three	SASS:long	SASS:long

MG /peeh/__
SASS:short
‘[Near one of the vases] there are three brushes, two big ones and a small one.’
[D; 01:12.1]

In this example, the fingerspelled version of the noun 'brush' is accompanied by the mouthing *kistoch* (incomplete Russian word *kistochka* 'brush'), and the SASSes are co-articulated with the adverbial mouth gestures /af/ 'big' and /peeh/ 'small', respectively. The body SASSes without overtly expressed nouns are also usually accompanied by mouth gestures. However, there are examples of such SASSes being co-articulated with both the mouthing and the mouth gesture one after the other. For example, the SASS:boot-short in Figure 3.133, Example (3.16), is coarticulated with the following lip movement: *sapogi peeh.* The first part is the Russian word *sapogi* 'boots', the second part is the mouth gesture /peeh/ 'small'. These examples are not numerous in my sample (9 items out of 95). At the same time, they are consistent with the compound analysis of these SASSes, since we can assume that in the merging process both lip articulations – this of the noun and this of the adjective – can be preserved in the compound. If we adopt the noun omission analysis, it becomes unclear where the mouthing part of the non-manuals accompanying these body SASSes comes from.

3.3.2.4. Discussion

This chapter analyses the location component in RSL SASSes produced in the neutral space in front of the signer and on the signer's body. With respect to the former group, it argues that the differences between different points in the neutral space in RSL SASSes have limited significance. My data show that when a SASS is produced in the neutral space, it is usually located centrally. This is because SASSes are designed to depict the size and shape of objects. The object's location constitutes a secondary feature for these signs. It is reflected in the sign in an analogue manner only when it is in the focus of the signer's attention. This happens either when the SASS in question is a localized noun or when more than one object is described in one sentence.

The distinction between the body and the neutral space, on the contrary, is fundamental, and it leads to differences between the corresponding groups of signs on multiple levels. Phonologically, the signs produced on the body choose handshapes and movement trajectories from a different set compared to the neutral space signs. Morphologically, some handshapes have different meanings and usages when they occur in body SASSes. Syntactically, body SASSes denoting the quality of an object can merge with the signs denoting the object, which results in a simultaneous compound (according to one possible interpretation of the phenomenon). Finally, semantically, body SASSes refer to a specific group of objects. These differences are due to the powerful iconic basis the body provides for the sign formation.

It is interesting to compare RSL body SASSes with body-part size and shape constructions in two village sign languages of Africa, i.e. AdaSL and the emerging sign language of Bouakako (Côte d'Ivoire). These constructions are described in the works by Nyst and Tano (Nyst, 2016; Nyst & Tano, 2018). To my knowledge, this is the only research focusing on size and shape signs produced on the body in languages other than RSL. For both languages, Nyst and Tano report the use of signs expressing a size and shape meaning through delimiting the relevant body part. For example, in Figure 3.136a a Bouakako SL signer equals the size and shape of an object to the forearm with a clenched fist. Figure 3.136b illustrates an Adamarobe SL sign approximating an object to an extended arm.



(a)



(b)

Figure 3.136. Examples of body part size and shape signs in Adamarobe SL (a) and Bouakako SL (b)
(Nyst & Tano, 2018: 3)

These signs are mainly used to describe the size and shape of natural objects, such as food items and small animals (pepper, melon, yam, stick, fish, snake, etc.). They indeed exhibit some degree of similarity to RSL body SASSes. Besides an obvious commonality in the place of articulation, these signs are also very iconic in their expression. The difference between village sign language body part signs and RSL body SASSes lies in the iconic imagery which is used in the sign form. In the examples above, the passive hand represents the object. The information about the shape of the referent comes from it. The active hand is just used to delimit the extent of the object's size. Its configuration does not carry any semantic information. This iconic mapping defines the range of objects which can be described. In village SL size and shape constructions, an object does not have to be on the body, but its shape has to be similar to the signer's body part used as the basis of the sign (usually, the passive hand). In RSL SASSes, the object, on the contrary, has to be on the body (or part of the body), but its shape can vary quite a lot. Whatever the shape is, the active hand can just draw it.

In their work, Nyst and Tano compare Adamarobe SL and Bouakako SL size and shape signs to similar co-speech gestures used by speakers of Anyi, the dominant language of the area. They claim that since body part gestures of Anyi speakers resemble the analyzed SL signs in form and function but show a lesser degree of conventionalization, they served as a source for respective signs. This opens a new perspective on RSL SASSes, which might also be historically connected with Russian co-speech iconic gestures describing the size and shape of objects. In order to establish the connection, a comparative study of RSL SASSes versus Russian gestures is needed.

Chapter 4: Mouth articulation accompanying RSL SASSes

The previous chapter gives an account of manual components in RSL SASSes. This chapter describes mouth articulation that accompanies these signs. As section 1.2.2 of the Introduction states, mouth articulation has been observed to participate in the semantics of SASSes in other sign languages (see (Fornasiero, 2020) for LIS, (Nyst, 2007) for AdaSL). Such an analysis has never been performed for RSL before.

Although the mouth is not the only non-manual articulator that has been reported to be used in SASSes, I limit my analysis by mouth movements because I consider them to play the fundamental role in the structure of SASSes. This is motivated by the widespread division of the facial movements into two types, i.e. the movements of the upper part of the face and the movements of the lower part of the face. While the upper part is more prominent on syntactic and discourse levels, the lower part is usually associated with separate signs and can contain adjectival and adverbial information (Crasborn, 2006; Wilbur, 2000); see also (Bross, 2020) who shows that the upper face articulators express higher CP categories than the lower face articulators. I acknowledge that the eye gaze, the eyebrow movements, and, potentially, some other non-manual articulators can contribute to the meaning and/or classification of SASSes in RSL, but I leave this topic for future research.

The account presented in this chapter is based on the analysis of 631 SASSes produced by RSL signers playing 'spot-the-difference' task. For all these items, the movements of the mouth are coded. The detailed description of the transcription is given in the Methodology chapter. Let me briefly remind you of the main notation conventions I follow. In transcribing the mouth articulation, I adopt the widely accepted distinction between mouthings and mouth gestures. Mouthings are mouth patterns derived from the surrounding spoken language, they have the form of silently mouthed spoken words (Bank et al., 2011; Sutton-Spence & Day, 2001). Mouth gestures, on the other hand, are defined as features inherent in the sign language. The notation of the former consists in indicating the corresponding Russian word with the omitted parts in brackets. See some examples in (4.1):

(4.1) DOSKA 'plank'
TA(relka) 'plate'
(tr)U(ba) 'pipe'

Mouth gestures are coded according to the notation system developed specifically for this project. In this notation, different parts of the lower face (cheeks, lips, tongue) are coded separately. See some examples below:



(a) mcl, lc, chp (mouth closed, lips contracted, cheeks puffed)



(b) mcr, ls, tt (mouth crack, lips stretched, tongue protruded)




(c) mcl, ldn; mcl, ldn, tt (1st position: mouth closed, lip corners down; 2nd position: mouth closed, lip corners down, tongue protruded)

Figure 4.1. Notation of mouth gestures

The chapter is organized as follows. Section 4.1 gives the account of mouthing in RSL SASSes. It starts with presenting the general distribution of mouth actions in my data and the overview of attested mouthing types (§4.1.1). The next section draws the connection between mouthing and syntactic functions of SASSes (§4.1.2). Section 4.1.3 is devoted to the role of mouthing in distinguishing between lexicalized versus productive SASSes. Section 4.2 describes mouth gestures occurring with size and shape signs in my data. It starts with the general overview of mouth gestures and the methodological issues (§4.2.1); then the inventory of mouth gestures associated with SASS meanings is presented (§4.2.2); this is followed by the discussion of non-associated mouth gestures (§4.2.3). The chapter ends with the discussion, where the classification of mouth articulation accompanying RSL SASSes is presented and ideas for further research are discussed (§4.3).

4.1. Mouthing in RSL SASSes

4.1.1. General overview

As Figure 4.2 illustrates, 113 SASSes in my data are accompanied by mouthings, which stands for 18% of the sample. The majority of SASSes (more than two thirds) are co-articulated with mouth gestures, and 9% of the signs are not accompanied by any mouth articulation. The light blue stripe labeled ‘mixed’ in the chart represents the cases where the articulation of a mouthing is followed by a mouth gesture.

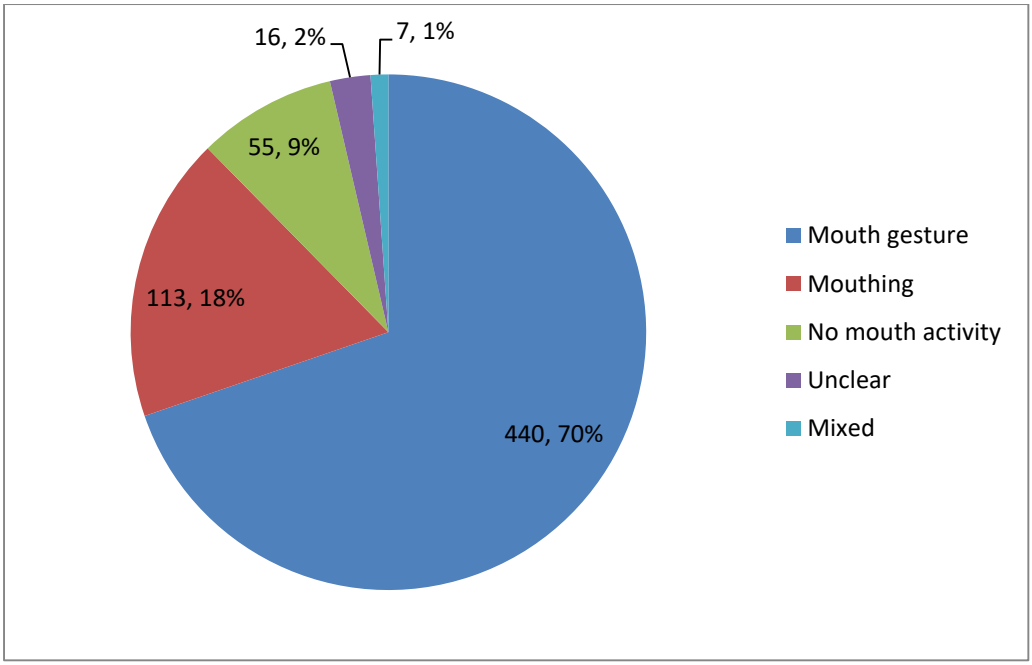


Figure 4.2. Distribution of mouth actions in RSL SASSes

113 instances of mouthing in my data cluster into 39 mouthing types, see Table 4.1.

№	Mouthing	Translation	Frequency
1	ZABOR	fence	14
2	DOM	house	9
3	TRUBA	pipe	9
4	KARTINA	painting	6
5	DOROGA	path	6
6	BUDKA	cabin	5
7	OKNO	window	5
8	KOROBKA	box	5
9	KRASNŸI	red	4
10	STENA	wall	3
11	PRYAMOUGOL'NŸI	rectangular	3
12	KRUG	circle	3
13	STUPEN'	step	3
14	STOL	table	3
15	?		3
16	DOSKA	plank	2
17	MYACH'	ball	2
18	RAMA	frame	2
19	ZANAVESKA	curtains	2
20	DVA	two	2
21	KRŸSHA	roof	2
22	ZHELTŸI	yellow	2
23	ZELENŸI	green	2
24	GORŸ	mountains	1
25	MISKA	bowl	1

26	SHIRE	wider	1
27	KLUBOK	clew	1
28	SINII	blue	1
29	ORANZHEVŸI	orange	1
30	TROPA	small path	1
31	PESOK	sand	1
32	MESHOK	bag	1
33	KOMNATA	room	1
34	KVADRAT	square	1
35	PALKA	stick	1
36	TARELKA	plate	1
37	VTOROI	second	1
38	ODIN	one	1
39	NO	but	1

Table 4.1. Mouthings co-occuring with RSL SASSes

Examination of the mouthings in the sample allows us to reveal an interesting tendency. Although SASSes are signs that are prototypically used to depict the size and shape of a referent, very few mouthings co-articulated with SASSes represent Russian adjectives of size or shape. Instead, 27 out of 39 mouthing types are names of concrete objects, such as 'fence', 'house', or 'pipe'. Only 7 mouthings in the sample are silent articulations of Russian adjectives, and most of them are names of colors, such as 'yellow', 'green', 'blue'. The next section explores this tendency.

4.1.2. Mouthing and syntactic functions of SASSes

A detailed analysis of the data shows that the reason behind the discrepancy stated in the previous section lies in patterns of distribution of mouthing versus mouth gesture articulation in the sample. Although both types of mouth activities are used by all the individuals with SASSes, they tend to correlate with different syntactic functions of the signs. Before I present my argumentation, let me briefly remind you syntactic roles SASSes have in my data.

For the purposes of my project, I relied on semantic factors in attributing a syntactic function to a sign. In my sample, SASSes almost exclusively have either the nominal or the adjectival role. In the case of the nominal, a size and shape sign refers to an object, see examples below:

(4.2)



LEFT LOC WOOD **SASS:thin-cylinder** TWO

'To the left, two sticks are lying' [T; 1:12.3]

(4.3) 

‘floor’

lexSASS:surface P-O-L APPROXIMATE LIGHT BROWN

‘The floor is light brown’ [D; 0:09.4]

(4.4) 

lexSASS:plank table CL-lie-crossed lex**SASS:plank**

‘The planks under the table are crossing each other’ [D; 02:24.3]

In the example (4.2), the SASS ‘thin cylinder’ refers to a stick as a part of the compound WOODEN+SASS:thin_cylinder. In (4.3), the SASS ‘surface’ indicates the floor. To make the reference absolutely clear, the signer fingerspells the Russian word *pol* ‘floor’ after showing the SASS. Finally, in (4.4) the sign repeated in the beginning and the end of the sentence means ‘plank’.

While some SASSes from this group are produced in the neutral space right in front of the signer (like in 4.3), the location of other size and shape signs is modified with respect to the relative disposition of the object in question. For example, in (4.2), SASS:thin_cylinder is articulated to the left of the signer, since the sticks which are being described are drawn on the left side of the picture (see below).

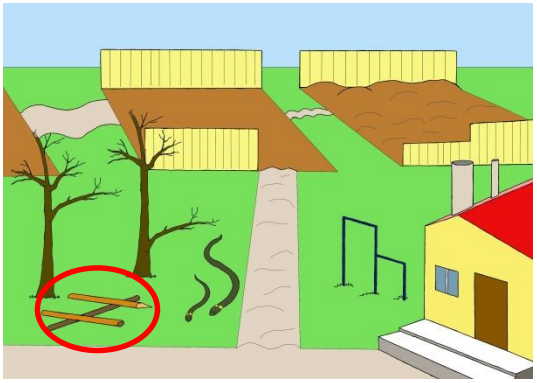


Figure 4.3. ‘Spot-the-difference’ stimulus

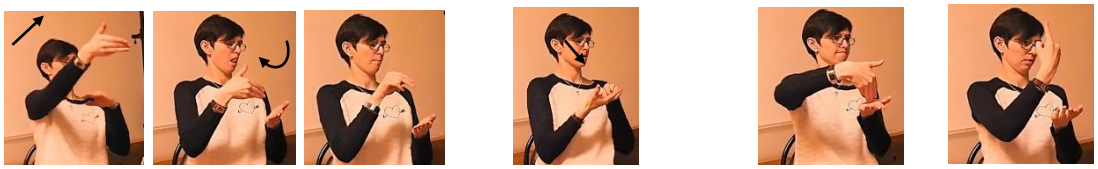
I define these cases as instances of nouns with locative modification. This modification is not exclusive to SASSes, but has morphological motivation: it can occur in iconic signs if their location is not fixed on a body part (Johnston & Schembri, 2007).

I assign the adjectival function to a SASS when it describes an object which has been openly introduced earlier: either in the same sentence (as in 4.5), or in the previous phrase (as in 4.6).

(4.5) CHIN.UP.BAR YES **SASS:big-rectangular** SECOND **SASS:small-rectangular**
'Yes these are chin-up bars, the first one is big rectangular and the second one is small rectangular' [T; 0:45.8]

(4.6) S1: STAIRS TWO STAIRS
S2: INDX SIMILAR
INDX-1 **SASS:thick** **SASS:tall-wide-rectangular**
SECOND **SASS:low-wide-rectangular** **SASS:thin-long-straight**
S1: 'I have two stairs'. S2: 'Yours are of the same size? Mine are the tall and the low one' [T; 07:51.8]

In (4.5), the two SASSes describe the shape of the chin-up bars which were introduced by a lexical sign in the beginning of the sentence. In (4.6), the described object is the stairs. The sign 'stairs' is produced not in the sentence with the SASSes in question, but in the sentence before, by an interlocutor. In both (4.5) and (4.6), the SASSes have the function of the adjectival predicate. Examples like these are the most common in my sample. Sometimes, however, there is a verb presented in the sentence, and in this case, the SASS stands as a nominal adjective, and not a predicate. Thus, in (4.7), the entity classifier construction has the verbal function, hence SASS:pointed has the role of an adjective.

(4.7) 
'spade'
BACK SPADE L-O-P-A-T-A **SASS:pointed** CL-stand ON
'At the back, one pointed spade is standing' [D; 03:41.5]

As Section 3.3 'Location' of this thesis discusses, some SASSes represent intermediate instances between an adjective and a noun. In these signs, both the object and the quality are expressed in one sign. I leave these signs out of the scope of the current discussion.

My data show that the two groups of SASSes, i.e. the nouns versus the adjectives, attract different types of mouth articulation. Mouthing co-occurs almost exclusively with nouns. Mouth gestures can accompany both groups, but are much more frequent with adjectives, see the chart below:

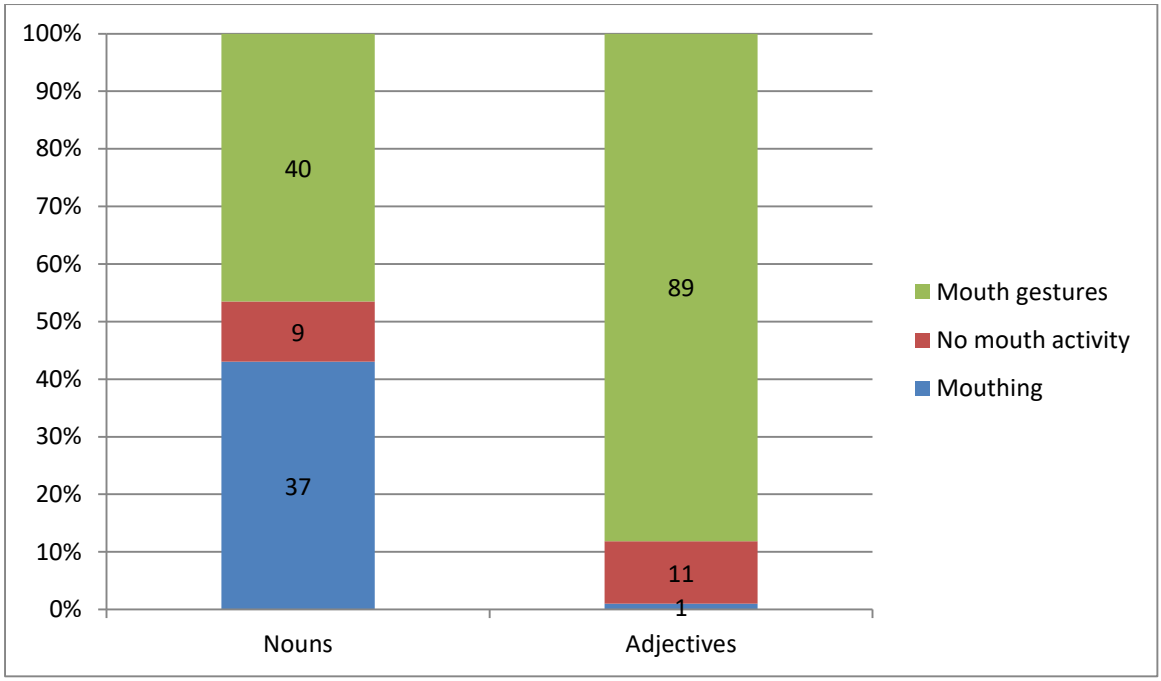


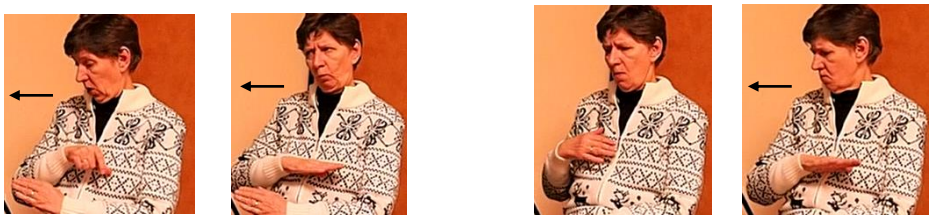
Figure 4.4. Rate of different types of mouth activity with nominal vs. adjectival SASSes in RSL

This opposition becomes even more evident in RSL sentences with several SASSes. Due to the nature of the stimuli, descriptive constructions of the type '**X** is of **that size/shape**' are quite frequent in my corpus ('**One pipe** is **big**, **another one** is **small**'; '**The field** is **flat**', '**The fence** goes **low**, and then turns **high**'). If both the object itself and the size/shape characteristics are expressed with SASSes, then the former (the noun) will most probably be co-articulated with a mouthing, while the latter (the predicative adjective) – with a mouth gesture, see some examples below:

(4.8) 

'two'	'pipe'		'second'	
*dva*_	*truba*_____	mg:/ef/_____	vtor(oj)_	mg:/fu/_____
TWO	**SASS:pipe**	**SASS:thick-cylindrical**	SECOND	**SASS:thin-cylindrical**

'There are two pipes: a thick pipe and a thin pipe' [T: 0:51.0]

(4.9) 

'road'				
do(roga)___	mg /u/_____			mg /u/_____
SASS:road	**SASS:smooth**		POSS-1	**SASS:smooth**

'On my picture, the road is smooth' [T; 06:13.4]

In (4.8), the nominal SASS ‘pipe’ is co-articulated with the silent Russian word *truba* ‘pipe’, while the adjectival SASSes ‘thick’ and ‘thin’ are accompanied by mouth gestures: /ef/ and /fu/[17], respectively. In (4.9), the nominal SASS ‘road’ is produced simultaneously with the mouthing *do*(*roga*) ‘road’, while the adjective SASS:smooth, repeated twice, co-occurs with the mouth gesture /u/[18].

The tendency of mouthing to co-occur with SASSes functioning as nouns explains the abundance of Russian nouns among the mouthing types. As Section 4.1.1 states, 29 out of 37 mouthing types are articulations of nouns. The silent articulation of a Russian adjective with SASSes is much rarer, it occurs only 14 times (7 mouthing types). Interestingly, however, even if a SASS is co-articulated with an adjectival mouthing, this does not necessarily mean that the sign in question is an adjective. Quite often the articulation of a Russian adjective happens due to spreading from the previous sign, see the examples below:

(4.10) ‘green’
*zele(nȳi)*_____
GREEN SASS:floor
‘The floor is green’ [G; 06:07.4]

(4.11) ‘house’ ‘red’
*dom*_____ *kras(nȳi)*_____
SASS:house RED SASS:house
‘The house is red’ [R: 06:15]

(4.12) ‘yellow’ ‘red’
*zhel(tȳi)*_____ *kr(asnȳi)*_____
INDX-1 SASS:ball YELLOW SASS:stripe RED SASS:stripe
‘green’ ‘blue’
*zele(nȳi)*_____ *si(nii)*_____
GREEN SASS:stripe BLUE SASS:stripe
‘I have a ball with a yellow, a red, a green, and a blue stripes’ [G; 03:31.7]

In all these utterances, the mouth articulation of a color starts together with a sign denoting this color, and then spreads to the SASS next to it. This SASS is therefore interpreted as a noun denoting an object whose color is being described. Hence, the overwhelming majority of SASSes co-articulated with mouthings function as nouns, just as the bar chart above shows (Fig. 4.4).

This is in line with findings in other sign languages. For example, Crasborn et al. (2008) give a percentage of signs of different grammatical classes co-occurring with mouthing in three sign languages: BSL, NGT, and SSL. The numbers for nouns and adjectives are cited in the table below

Language	Noun	Adjective
BSL	220 (40%)	67 (12%)
NGT	85 (39%)	12 (6%)
SSL	311 (43%)	82 (11%)

Table 4.2. Number (percentage of total) of nouns versus adjectives co-occurring with mouthings

[17] /ef/: 1st position: mouth open, lips stretched; 2nd position: mouth crack, lower lip bitten, air exhalation; /fu/: mouth crack, lips stretched, air exhalation

[18] /u/: mouth crack, lips protruded, lips contracted, air exhalation

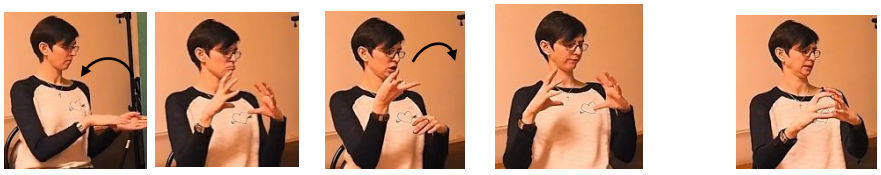
In all three languages, around 40% of mouthings are co-articulated with nouns, whereas the number of adjectives produced with this type of mouth articulation is approximately four times fewer.

4.1.3. Mouthing and lexicalization continuum

The role of mouthing spreads beyond differentiating between nominal versus adjectival SASSes. This mouth articulation also sheds light on another distinction observed in the group of size and shape signs, i.e. the position on the lexicalization continuum. The lexicalization continuum, introduced in Section 1.2.3 and discussed in Section 3.2.2 with respect to the movement trajectory, arranges signs of the sign language lexicon with respect to the degree of their conventionalization, or entrenchment. One pole of this continuum is occupied by fully-lexicalized signs that represent established form-meaning pairs and constitute the listable lexicon of a sign language. The other pole is occupied by partly-lexicalized signs that change their form depending on the context and are, potentially, created in the process of the conversation.

With respect to the degree of lexicalization, RSL SASSes do not represent a homogenous group. Instead, members of this group can occupy either pole of the continuum. Irrespectively to the position on the continuum, manual components of SASSes iconically depict visual characteristics of objects. The difference between fully- versus partly-lexicalized SASSes lies in the meaning they express. While the meaning of partly-lexicalized, or productive, SASSes is compositionally formed out of the meanings of their sub-sign elements, fully-lexicalized SASSes have a non-compositional semantics. Most often, they denote concrete objects, such as a pipe, a painting, a box, a road, etc. Lexicalized SASSes are not completely 'frozen' in the sense that they can modify some of the components to reflect certain features of the referent (primarily, relative location and orientation). However, they are not expressive to the same extent as prototypical adjectival SASSes. This can be seen in the example below:

(4.13)



'ball' 'two'

*myach'*_____ *dva*_ mg: /af/_____ mg: /peeh/_____

other.side **SASS:ball** two **SASS:big_round** **SASS:small_round**

'On the other side, there are two balls: a big one and a small one' [D; 03:10.07]

In (4.10), there are three SASSes: the nominal SASS 'ball' and the adjectival SASSes 'big_round' and 'small_round'. While all of them iconically show the round shape of the balls (with the claw handshapes), only the adjectival SASSes modify the distance between the hands to express the size. With respect to the non-manual component, the nominal SASS in this example is co-articulated with the mouthing *myach'* (Russian 'ball'), while the adjectival signs are accompanied by the mouth gestures /af/ and /peeh/[19], respectively.

The analysis of mouth articulation accompanying SASSes shows that different types of SASSes with respect to their position on the lexicalization continuum attract different mouth actions. While

[19] /af/: 1st position: mouth open, lips neutral; 2nd position: mouth crack, lower lip bitten, lips stretched, air exhalation; /peeh/: 1st position: mouth closed, lips pressed; 2nd position: mouth crack, lips stretched, air exhalation

productive SASSes tend to be co-articulated with mouth gestures (see a detailed account in the next section), lexicalized signs are very often accompanied by mouthing. The mouthing articulates the name of a concrete object denoted by the sign in question. For example, if a lexicalized SASS refers to a pipe, it is often co-articulated with the mouthing *truba*, which is a Russian word for 'pipe'.

The position of a SASS on the lexicalization continuum is connected with its syntactic function. Lexicalized SASSes, which usually denote concrete objects, quite naturally act as nouns in sentences, while productive SASSes, which describe physical qualities, are usually realized as adjectival predicates. Therefore, my data show that mouthing is drawn to more conventionalized units which tend to have the role of the noun in the sentence, whereas mouth gestures are more frequent with truly polycomponential adjectival SASSes.

4.2. Mouth gestures in RSL SASSes

4.2.1. General overview.

In my data, 440 SASSes are accompanied by a mouth gesture. Out of these, 180 mouth patterns are dynamic, i.e. they change their form during the sign production, and 260 tokens are static, i.e. they remain constant throughout the sign production. I annotated all these mouth articulations using a notation developed specifically for this project (see the introduction to this chapter). Overall, there are 140 distinct notation labels, out of which 21 forms occur 5 times and more. Figure 4.5 illustrates the five most frequent mouth gesture forms. Out of these, three forms are static, and the two remaining are dynamic. The latter (4.5c and 4.5e) are almost identical with the only difference: in (4.5e), the lips in the final position are stretched.



(a) mcr, ls [S; 9:13.7]
SASS:small (a box)



(b) mcl, ls [R; 6:13.9]
SASS:road



(c) mo, ln; mcr, lbt, mbl [E; 1:38.8]
SASS: big_round_3D (a flower)



(d) mcl, ldn [R; 2:32.2]
SASS: long_thin_straight (a stick)



(e) mo, ln; mcr, ls, lbt, mbl [G; 7:14.1]
SASS:wide_long_arcing (a small path)

Figure 4.5. Five most frequent mouth gesture forms in my data [20]

The high number of mouth gesture labels in my data is caused by the very detailed nature of the notation system. Even a preliminary observation shows that not all 140 mouth gestures act as semantically distinct units. For example, the mouth gestures represented in the figure below differ in one formal component (lips pressed vs. lips neutral in the initial position). However, they occur in very similar contexts and seem to perform the same function. Therefore, I argue that they belong to the same mouth gesture.



(a) mcl, lpr; mcr, ls, mbl [D; 0:38.5]
SASS: thin_cylindrical (vase)



(b) mcl, ln; mcr, ls, mbl [D; 9:01.7]
SASS: low (fence)

Figure 4.6. Different variants of the same mouth gesture in RSL [21]

[20] (a) mouth crack, lips stretched; (b) mouth closed, lips stretched; (c) mouth open, lips neutral; mouth crack, lower lip bitten, air exhalation; (d) mouth closed, edges of the lips down; (e) mouth open, lips neutral; mouth crack, lips stretched, lower lip bitten, air exhalation

[21] (a) mouth closed, lips pressed; mouth crack, lips stretched, air exhalation; (b) mouth closed, lips neutral; mouth crack, lips stretched, air exhalation

In clustering mouth gestures, I followed the steps similar to the ones I used in defining the list of handshapes in SASSes. For each mouth action form, I compiled a list of SASSes it occurs with (step I). Then, I analyzed these SASSes and extracted a common semantic component (step II). I attributed this meaning to the mouth action in question. If two or more mouth gesture forms have the same meaning and share clearly visible formal features, I combined them in one mouth gesture FMU (step III). The following example illustrates this procedure. Consider the mouth action below:



Figure 4.7. Mouth gesture /pl/ in RSL [22]
[G; 1:28.7]

This mouth action is dynamic in the sense that the mouth changes its form during the articulation. In the initial position, it is closed with the lips stretched. The change consists in the tongue protrusion. This movement is similar to the silent articulation of the consonants [**pl**]. This mouth gesture form occurs in my data eight times in the following SASSes:

1. SASS: short (about a brush); static
2. SASS: short (about a plank); static
3. SASS: narrow_long_straight (about a plank); tracing
4. SASS: narrow_long_arcing (about a small path); tracing
5. SASS: narrow_long_arcing (about a small path); tracing
6. SASS: small (about a mirror); static
7. SASS: small_rectangular_3D (about a box); static
8. SASS: thin_long_straight (about a step); tracing

These signs are produced with different handshapes and different movement patterns (static versus tracing; straight versus arcing). They refer to objects of different forms and topology (flat versus three-dimensional; round versus square; long versus short). The only semantic feature they have in common is this of a small size: all the objects depicted by these SASSes are small in at least one dimension. Hence, I attribute this meaning to the mouth gesture form in question.

The third step is the search for mouth gesture forms with the same contextual distribution and the same visual formal features. I found eight mouth articulations exhibiting these qualities:

Mouth gesture form	Long notation
mcl, ls, lpr; mcl, ls, lpr, tt	mouth closed, lips stretched, lips pressed; mouth closed, lips stretched, lips pressed, tongue protruded
mcl, ls, ldn; mcl, ls, ldn, tt	mouth closed, lips stretched, edges of the lips down;

[22] mouth closed, lips stretched; mouth closed, lips stretched, tongue protruded

	mouth closed, lips stretched, edges of the lips down, tongue protruded
mcl, lpr; mcl, ls, tt	mouth closed, lips pressed; mouth closed, lips stretched, tongue protruded
mcl, lpr; mcl, ls, lpr, tt	mouth closed, lips pressed; mouth closed, lips stretched, lips pressed, tongue protruded
mcl, lpr; mcl, lpr, tt	mouth closed, lips pressed; mouth closed, lips pressed, tongue protruded
mcl, lpr, ldn; mcl, lpr, ldn, tt	mouth closed, lips pressed, edges of the lips down; mouth closed, lips pressed, edges of the lips down, tongue protruded
mcl, ldn; mcl, ldn, tt	mouth closed, edges of the lips down; mouth closed, edges of the lips down, tongue protruded
mcl, ln; mcl, ldn, llpd, tt	mouth closed lips neutral; mouth closed, edges of the lips down, lower lip protruded, tongue protruded

Table 4.3. Variants of mouth gesture /pl/

All these mouth patterns involve a change in the form of the tongue protrusion, the mouth remains closed. The differences between the variants mainly concern the position of the lips: they can be stretched, pressed, or have the edges down. Hence, the defining features of this mouth gesture are:

mcl; mcl, tt

This mouth pattern is the only formal feature common for the SASSes it occurs with: all the remaining sign components, such as the handshape, the orientation, the location, and the movement, vary. Therefore, I analyze this mouth gesture as the sole carrier of the meaning ‘small size’, thus placing it among morphemic non-manuals.

There are examples in my sample, however, where the mouth gesture is not the only formal feature uniting the mouth gestures it accompanies. Consider the following articulation:



lesSASS:BALL

Figure 4.8: MG /mouth closed, lips contracted, cheeks puffed/ in RSL

[G; 1:55.0]

This mouth pattern (I refer to it by the label ‘cheeks puffed’) always co-occurs with a bent or curved handshape (, , or ). The SASSes with which it is used always denote a round three-

dimensional object (a ball, a bag, a hill, a ball of thread). Without additional experiments, I cannot attribute this meaning solely to a mouth gesture or a handshape. Traditionally, however, such mouth patterns are considered to be iconic mouth gestures which 'copy' some features of the manual sign (see, for example, Sandler, 2009). I do not analyze such items as morphemic non-manuals. I place them among echo-phonological mouth gestures instead.

Overall, 97 out of 140 mouth patterns were grouped into a small set of SASS-associated mouth gestures. By 'SASS-associated mouth gestures' I mean mouth patterns that express a meaning constituting a part of the meaning of the sign, i. e depiction of the referent's size and/or shape. The remaining 47 tokens either have a meaning that is not associated with SASSes or are too few in number to allow for a reliable interpretation. The rest of the chapter is organized as follows: Section 4.3.2 presents an inventory of SASS-associated mouth gestures; and Section 4.3.3 discusses non-associated mouth gestures observed in my data. Section 4.4 discusses the role of the mouth articulation in SASSes and brings up questions for further research that arise from my analysis.

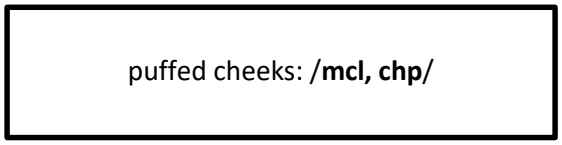
4.3.2. SASS-associated mouth gestures

The analysis of my data resulted in distinguishing nine SASS-associated mouth gestures, five of which express the meaning of size, and four are associated with the shape. This section presents an inventory of these articulations. Every mouth gesture is described according to the following template:

1) the label of the mouth gesture
2) defining the formal features of the mouth gestures
3) list of mouth gesture variants
4) examples
5) manual components the mouth gesture occurs with
6) SASS types the mouth gesture occurs with (tracing vs. static; size vs. shape)
7) summary (semantic component common for the SASSes the MG co-occurs with, type of the MG)

MG: 'puffed cheeks'

This is a static mouth articulation: it remains consistent throughout the articulation of the manual sign. The defining features of this mouth pattern are the closed lips and the puffed cheeks:



This mouth gesture has three variants, which differ in the position of the lips. Figure 4.9 exemplifies each of the allomorphs.

- **mcl**, ln, **chp** 'mouth closed, lips neutral, cheeks puffed'
- **mcl**, lc, **chp** 'mouth closed, lips contracted, cheeks puffed'
- **mcl**, lpd, **chp** 'mouth closed, lips protruded, cheeks puffed'



mcl, ln, chp
SASS: round (shoe toe)
[S; 3:38.3]



mcl, lc, chp
SASS: hilly (road)
[T; 3:21.6]



mcl, lpd, chp
lexSASS:BALL
[D; 1:57.4]

Figure 4.9: MG 'puffed cheeks' in RSL

The MG 'puffed cheeks' co-occurs with different movement shapes and two out of three movement sizes: normal and large. Sometimes it accompanies a SASS that has no movement at all. A SASS with this mouth articulation can have one of three handshapes: , , or . The handshape obligatorily has the [+curved] or [+bent] feature.

Handshape	**Movement shape**:	**Movement size**:	**Movement repetition**
	straight	normal	no repetition
	arcing	large	
	circular	no movement	
	wavy		
	no movement		

Table 4.4. Manual components with which mouth gesture 'puffed cheeks' co-occurs

The MG 'puffed cheeks' accompanies both static (Fig 4.8) and tracing (Fig 4.10) SASSes. In the former case, the SASS denotes shape.



mcl, ln, chp
SASS: round_3D (pile of sand) [E; 06:31.2]

Figure 4.10. The MG 'puffed cheeks' with a tracing SASS in RSL

Summary:

The SASSes with which the MG 'puffed cheeks' occurs denote a round three-dimensional object: a ball, a pile of sand, a bag, a ball of thread, etc. Structurally, however, this MG is not the only feature which is common for all the SASSes in question: they also share the manual handshape feature [+curved]/[+bent]. Hence, although this mouth gesture is clearly associated with the meaning 'round', it does not have a morphemic status.

MG: 'protruded tongue' /th/

This is a static mouth articulation: it remains consistent throughout the articulation of the manual sign. The defining features of this mouth pattern are the open mouth (either a large opening or a crack), tongue protrusion and air exhalation:

protruded tongue: **/mo | mcr, tt, mbl/**

This MG has five variants which differ in the degree of the mouth opening and in various aspects of the lips position (corners: neutral or down; tenseness on the horizontal plane: neutral vs. stretched). Figure 4.11 shows some of the variants.

- mcr, ldn, **tt, mbl** 'mouth crack, lip corners down, tongue, exhalation'
- mcr, ln, **tt, mbl** 'mouth crack, lips neutral, tongue, exhalation'
- mcr, ls, **tt, mbl** 'mouth crack, lips stretched, tongue, exhalation'
- mo, ln, **tt, mbl** 'mouth open, lips neutral, tongue, exhalation'



mcr, ln, tt, mbl
SASS: wiggly_thin_long (a thread)
[G; 1:59.7]



mcr, ldn, tt, mbl
SASS: wiggly_narrow_long (a small path)
[R; 4:02.8]

Figure 4.11. MG 'protruded tongue' in RSL

The MG 'protruded tongue' co-occurs with different handshapes: , , or . The movement shape the SASSes can have is limited to arcing, circular, and wavy, i.e. it must have a rounded trajectory. The size of the movement in my data is either normal or large. Both repetitive and non-repetitive movements are found in this set. This MG accompanies tracing SASSes only, see Figure 4.11.

Handshape	**Movement shape**:	**Movement size**:	**Movement repetition**
	arcing	normal	repetition
	circular	large	no repetition
	wavy		

Table 4.5. Manual components with which mouth gesture 'protruded tongue' co-occurs

Summary:

The SASSes which are accompanied by the MG ‘protruded tongue’ have a common semantic component: they all refer to objects with a wiggly or rounded form (wavy small path, curling ribbon, arcing pipe). This meaning is also expressed by the shape of the movement: it can be arcing, circular, or wavy, but never straight. The mouth gesture, therefore, belongs to non-morphemic mouth gestures.

MG: ‘ inhaled air’

This is a static mouth articulation: it remains consistent throughout the articulation of the manual sign. The defining features of this mouth pattern are the small opening of the mouth and air inhalation:

inhaled air: **/mcr, msc/**

This MG has five variants which differ in various aspects of the lips position (stretched vs. contracted; protruded vs. neutral) and presence / absence of the feature ‘cheeks sucked in’, see examples in Fig. 4.12.

- **mcr**, lc, chs, **msc** ‘mouth cracked, lips contracted, cheeks sucked in, air inhalation’
- **mcr**, ls, **msc** ‘mouth cracked, lips stretched, air inhalation’
- **mcr**, lc, lpd, **msc** ‘mouth cracked, lips contracted, lips protruded, air inhalation’
- **mcr**, lc, lpd, chs, **msc** ‘mouth cracked, lips contracted, lips protruded, cheeks sucked in, air inhalation’
- **mcr**, lc, llp, **msc** ‘mouth cracked, lips contracted, lower lip protruded, air inhalation’



mcr, lc, lpd, chs, msc
SASS: round_2D (mirror)
[D; 04:43.9]



mcr, lc, chs, msc
SASS: smooth (road)
[T; 03:23.1]



mcr, ls, msc
SASS: smooth (bowl surface)
[S; 03:59.5]

Figure 4.12. MG ‘inhaled air’ in RSL

The MG ‘inhaled air’ accompanies SASSes with different handshapes, movement shapes, and movement types. The presence of the movement itself, however, is necessary: this mouth pattern occurs only in tracing SASSes (see examples above).

Handshape	**Movement shape**:	**Movement size**:	**Movement repetition**
	arcing	normal	repetition

	circular	large	no repetition
	straight	small	
			
			

Table 4.6. Manual components with which mouth gesture 'inhaled air' co-occurs

Summary:

The mouth gesture 'inhaled air' is associated with the meaning smooth/rounded: it co-occurs with SASSes that denote objects without sharp angles (such as a round mirror, a curved cage handle) or with a smooth surface (smooth bowl, flat road). Whatever the exact meaning in a given context is, it is always expressed in the movement as well. Moreover, the presence of the mouth gesture is not necessary to unambiguously interpret this meaning. Therefore, I place this articulation among mouth gestures that do not have morphemic status.

MG: /ap/

As opposed to the mouth gestures described above, this articulation is dynamic: it involves the change of the mouth position. The defining feature is the change of the mouth opening (from open to closed):

ap: **/mo | mcr; mcl/**

This MG has quite a large number of variants. Some of them have the tongue protrusion in the initial position, while others do not. The use of air can be present or absent. Signers articulate silent versions of the following syllables: /ap/, /asch'/, /of/, /lm/, /om/, /fup/. The only feature that unites these instances is the change of the mouth opening.

- **mo**, ln; **mcl**, ln 'mouth open, lips neutral; mouth closed, lips neutral'
- **mo**, ln, tt; **mcl**, ln 'mouth open, lips neutral, tongue protruded; mouth closed, lips neutral'
- **mcr**, ln, tt; **mcl**, ln 'mouth cracked, lips neutral, tongue protruded; mouth closed, lips neutral'
- **mo**, ln; **mcl**, lpr, ldn 'mouth open, lips neutral; mouth closed, lips protruded, edges of the lips down'
- **mo**, ln; **mcr**, ls, lpd, mbl 'mouth open, lips neutral; mouth cracked, lips stretched, lips protruded, air exhalation'
- **mo**, lpd, lc, chs, msc; **mcl**, ln 'mouth open, lips protruded, lips contracted, cheeks sucked in, air inhalation; mouth closed, lips neutral'
- **mo**, lc; **mcr**, ls, lbt 'mouth open, lips contracted; mouth cracked, lips stretched, lower lip bitten'



mo, ln; mcl, lpr, ldn /am/
SASS: pointed (spade) [D; 03:44.5]



mo, lpd, lc, chs, msc; mcl, ln /fup/
SASS: pointed-3D (pile of sand) [E; 8:59.7]



mo, ln, tt; mcl, ln /lm/
SASS: pointed-3D (mountain) [D; 04:19.8]
Figure 4.13. MG /ap/ in RSL

The variety of variants this MG has contrasts with a relatively low set of manual values it can be combined with. The SASSes typically choose between the two handshape changes: from  to  or from  to . The presence of movement is obligatory, and it can be either straight or arcing. Prototypically, the movement is fast, non-repetitive. In my data, it is either large or neutral in size.

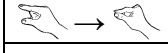
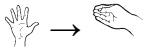
Handshape	**Movement shape**:	**Movement size**:	**Movement repetition**
	straight	normal	no repetition
	arcing	large	

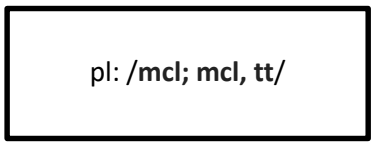
Table 4.7. Manual components with which mouth gesture /ap/ co-occurs

Summary:

The MG /ap/ co-occurs with SASSes describing a specific form of an object: pointed end. It can be either flat (as a spade) or three-dimensional (as a pile of sand), but it is necessarily bigger at the bottom and smaller at the end. This change is structurally expressed in the closing of the hand: the selected fingers are stretched in the initial position of the sign and touch the thumb at the final position. The closing of the hand is coordinated with the closing of the mouth. Thus, the MG /ap/ is a typical example of echo-phonology: the mouth 'echoes' the movement of the hands.

MG /pl/

Similarly to the mouth gesture described above, this articulation is dynamic: the mouth changes its position during the sign production. The defining feature is the protrusion of the tongue, while the mouth remains closed.



This is one of the most frequent mouth gestures in my sample. It is not surprising, therefore, that it has a large number of variants. They differ in the lips position during the initial and/or the final stages of the MG production.

- **mcl**, ls; **mcl**, ls, **tt** 'mouth closed, lips stretched; mouth closed, lips stretched, tongue protruded'
- **mcl**, ls, lpr; **mcl**, ls, lpr, **tt** 'mouth closed, lips stretched, lips pressed; mouth closed, lips stretched, lips pressed, tongue protruded'
- **mcl**, ls, ldn; **mcl**, ls, ldn, tt 'mouth closed, lips stretched, edges of the lips down; mouth closed, lips stretched, edges of the lips down, tongue protruded'
- **mcl**, lpr; **mcl**, ls, **tt** 'mouth closed, lips pressed; mouth closed, lips stretched, tongue protruded'
- **mcl**, lpr; **mcl**, ls, lpr, **tt** 'mouth closed, lips pressed; mouth closed, lips stretched, lips pressed, tongue protruded'
- **mcl**, lpr; **mcl**, lpr, **tt** 'mouth closed, lips pressed; mouth closed, lips pressed, tongue protruded'
- **mcl**, lpr, ldn; **mcl**, lpr, ldn, **tt** 'mouth closed, lips pressed, edges of the lips down; mouth closed, lips pressed, edges of the lips down, tongue protruded'
- **mcl**, ldn; **mcl**, ldn, **tt** 'mouth closed, edges of the lips down; mouth closed, edges of the lips down, tongue protruded'
- **mcl**, ln; **mcl**, ldn, llpd, **tt** 'mouth closed, lips neutral; mouth closed, edges of the lips down, lower lip protruded, tongue protruded'



mcl, ls; mcl, ls, tt
SASS: short (brush) [G; 01:28.7]



mcl, ls, lpr; mcl, ls, lpr, tt
SASS: thin_long (pipe) [T; 07:56.0]
Figure 4.14. MG /pl/ in RSL

The manual components this MG co-occurs with can be quite diverse as well: in my data, there are seven different handshape morphemes, all possible movement sizes, straight and arcing movement trajectories; the movement can be present or absent.

Handshape	**Movement shape**:	**Movement size**:	**Movement repetition**
	straight	normal	no repetition
	arcing	large	
	no	small	
		no	
			
			
			

Table 4.8. Manual components with which mouth gesture /pl/ co-occurs

The SASSes this MG accompanies can be both tracing (Fig. 4.14) and static (Fig. 4.15). In the latter case, they denote size.



mcl, lpr; mcl, lpr, tt
SASS: small (table) [G: 9:00.4]
Figure 4.15. MG /pl/ with a static SASS in RSL

Summary:

The MG /pl/ co-occurs with SASSes denoting various types of objects: two-dimensional versus three-dimensional; straight versus arcing; cylindrical, square, or flat. The only characteristics common for all of them is this of a small size: the object in question has at least one dimension smaller than standard, it can be short, narrow, thin, or small in all the dimensions. Sometimes, the small size is formally expressed in the movement: for example, when the hands are moving toward each other (Fig. 4.14a). Sometimes, however, neither of the manual components carries the meaning of the small size. For example, the manual sign in Fig. 4.15 can be interpreted differently depending on the object: it is 'small' if the sign describes a table, but can be 'big', if it refers to, for example, a pack of bank-notes. In such SASSes, the non-manual is the only element expressing the meaning of size and disambiguating the interpretation. Therefore, I argue that the MG /pl/ is a morpheme with the meaning 'small'.

MG /peeh/

This is another instance of the dynamic mouth gesture. During its production, the signer opens the mouth and exhales the air. When the mouth opens fully (**mo**), the non-manual resembles the silent articulation of the syllable /**pah**/. When the mouth opens a little (**mcr**) the non-manual looks like the syllable /**peeh**/. Since the latter is much more frequent in my data, it gave the name to the mouth gesture.

peeh: **/mcl; mo | mcr, mbl | msbl/**

The MG /peeh/ has a very large amount of variants. All of them include the change of the mouth opening with the air exhalation. The differences concern the lips position and the character of the blowing (neutral versus sharp).

- **mcl**, lpr; **mcr**, ls, **mbl** 'mouth closed, lips pressed; mouth cracked, lips stretched, air exhalation'
- **mcl**, ln; **mcr**, ls, **mbl** 'mouth closed, lips neutral; mouth cracked, lips stretched, air exhalation'

- **mcl**, ls; **mcr**, ls, **mbl** ‘mouth closed, lips stretched; mouth cracked, lips stretched, air exhalation’
- **mcl**, ln; **mcr**, ls, **msbl** ‘mouth closed, lips neutral; mouth cracked, lips stretched, sharp air exhalation’
- **mcl**, ldr, ls; **mcr**, ls, **mbl** ‘mouth closed, lips drawn; lips stretched; mouth cracked, lips stretched, air exhalation’
- **mcl**, ls; **mcr**, ls, **msbl** ‘mouth closed, lips stretched; mouth cracked, lips stretched, sharp air exhalation’
- **mcl**, ls, lpr; **mo**, ln, **mbl** ‘mouth closed, lips stretched, lips pressed; mouth open, lips neutral, air exhalation’
- **mcl**, ls, ldr; **mcr**, ls, **msbl** ‘mouth closed, lips stretched, lips drawn; mouth cracked, lips stretched, sharp air exhalation’
- **mcl**, ldn; **mcr**, ls, ldn, **msbl** ‘mouth closed, edges of the lips down; mouth cracked, lips stretched edges of the lips down, sharp air exhalation’
- **mcl**, lpr, ldn; **mcr**, ldn, **msbl** ‘mouth closed, lips pressed, edges of the lips down; mouth cracked, edges of the lips down; sharp air exhalation’
- **mcl**, lpr; **mcr**, ls, **msbl** ‘mouth closed, lips pressed; mouth cracked, lips stretched, sharp air exhalation’
- **mcl**, lpr; **mo**, ln, **msbl** ‘mouth closed, lips pressed; mouth open, lips neutral, sharp air exhalation’
- **mcl**, lpr; **mo**, ln,**msbl** ‘mouth closed, lips pressed; mouth open, lips neutral, sharp air exhalation’
- **mcl**, ls; **mo**, ln, **mbl** ‘mouth closed, lips stretched; mouth open, lips neutral, air exhalation’
- **mcl**, lpr, ldn; **mo**, ls, **mbl** ‘mouth closed, lips pressed, edges of the lips down; mouth open, lips stretched, air exhalation’
- **mcl**, lpr; **mo**, ln, **mbl** ‘mouth closed, lips pressed; mouth open, lips neutral, air exhalation’
- **mcl**, ldr; **mcr**, ls, **mbl** ‘mouth closed, lips drawn; mouth cracked, lips stretched, air exhalation’



mcl, lpr, ldn; mcr, ls, mbl /**peeh**/
SASS: thin_cylindrical (vase) [D; 0:38.5]



mcl, lpr; mo, ln /**pah**/
SASS: narrow_long_straight (a plank) [D; 06:36.4]
Figure 4.16. MG /peeh/ in RSL

The MG /peeh/ co-occurs with SASSes which can have different handshapes, presence or absence of the movement. In the former case, the movement can be either straight or arcing, and take any size value. It is never repetitive, which might be the result of the coordination between the mouth and the hand movement.

Handshape	**Movement shape**:	**Movement size**:	**Movement repetition**
	straight	normal	no repetition
	arcing	large	
	no	small	
		no	
			
			

Table 4.9. Manual components with which mouth gesture /pl/ co-occurs

The MG co-occurs with both tracing (Fig. 4.16) and static (Fig. 4.17) SASSes.



mcl, lpr; mcl, ls, mbl
SASS: small_round_3D (flower) [S:01:40.8]
Figure 4.17. MG /peeh/ with a static SASS in RSL

Summary:

The MG /peeh/ shares many aspects of its distribution with the MG /pl/. Structurally, it co-occurs with the same handshapes, locations, and movement patterns. Semantically, it accompanies SASSes which refer to the same types of objects. These are objects with different geometrical forms (flat versus three-dimensional; straight versus arcing; round, angular or oblong), but with one feature in common: they all are small in at least one dimension. Therefore, just as with the MG /pl/

I assign to the MG in question a morphemic status. The mouth patterns /peeh/ and /pl/ can in reality be allomorphs of the same morpheme: an analysis focusing specifically on the comparison of these two non-manuals is required to resolve the issue.

MG /u/

This mouth gesture is static: the mouth shape remains the same throughout the gesture production. The defining features of this articulation are the small opening of the mouth and air exhalation.

u: /mcr, mbl/

The MG /u/ has five allomorphs, which differ in various aspects of the lips position.

- **mcr**, **lc**, **mbl** 'mouth cracked, lips contracted, air exhalation'
- **mcr**, **ls**, **mbl** 'mouth cracked, lips stretched, air exhalation'
- **mcr**, **ls**, **lc**, **mbl** 'mouth cracked, lips stretched, lips contracted, air exhalation'
- **mcr**, **ls**, ldr, **mbl** 'mouth cracked, lips stretched, lips drawn, air exhalation'
- **mcr**, **lc**, ldr, **mbl** 'mouth cracked, lips contracted, lips drawn, air exhalation'



mcr, ls, lc, mbl
SASS: narrow_long_straight (road)
[E; 07:32.9]



mcr, ls, ldr, mbl
SASS: thin_round (box)
[S: 0:59.9]

Figure 4.18. MG /u/ in RSL

The MG /u/ co-occurs with different handshapes and movement trajectories. The presence of the movement is necessary: the MG can accompany tracing SASSes only. The size of the movement is limited to large and neutral. The movement is usually non-repetitive. However, in one example in my data, the signer produces several downward hand movements while keeping the silent mouth articulation /u/.

Handshape	**Movement shape**:	**Movement size**:	**Movement repetition**
	straight	normal	repetition
	arcing	large	no repetition
	circular		
	wavy		

Table 4.10. Manual components with which mouth gesture /u/ co-occurs

Summary:

The MG /u/ accompanies SASSes which depict long narrow objects: planks, vases, tubes, roads. Since it co-occurs with tracing SASSes only, the meaning of the big length is always expressed in the movement. The component 'narrow', however, is expressed by the mouth articulation only. Hence, the MG acts as a morpheme.

MG /af/

This is a dynamic MG: it starts with an open mouth, which then silently articulates the sound /f/. The defining features of this mouth pattern are open mouth in the initial position; mouth cracked, lower lip bitten, and air exhalation in the final position.

af: **/mo; mcr, lbt, mbl/**

Variants of this mouth gesture differ in various aspects of the lips position as well as the degree of the mouth opening at the initial stage (open versus wide open) and the character of the air exhalation at the final stage (normal versus sharp):

- **mo**, ln; **mcr**, **lbt**, **mbl** 'mouth open, lips neutral; mouth cracked, lower lip bitten, air exhalation'
- **mo**, ln; **mcr**, ls, **lbt**, **mbl** 'mouth open, lips neutral; mouth cracked, lips stretched, lower lip bitten, air exhalation'
- **mo**, ls; **mcr**, ls, **lbt**, **mbl** 'mouth open, lips stretched; mouth cracked, lips stretched, lower lip bitten'
- **mwo**, ln; **mcr**, **lbt**, **mbl** 'mouth wide open, lips neutral; mouth cracked, lower lip bitten, air exhalation'
- **mo**, ln; **mcr**, **lbt**, ls, **mbl** 'mouth open, lips neutral; mouth cracked, lower lip bitten, lips stretched, air exhalation'
- **mwo**, ln; **mcr**, ls, **lbt**, **mbl** 'mouth wide open, lips neutral; mouth cracked, lips stretched, lower lip bitten, air exhalation'
- **mwo**, ls; **mcr**, **lbt**, **msbl** 'mouth wide open, lips stretched; mouth cracked, lower lip bitten, sharp air exhalation'
- **mo**, ln; **mcr**, **lbt**, ulup, **mbl** 'mouth open, lips neutral; mouth cracked, lower lip bitten, upper lip up, air exhalation'



mo,ln; mcr, lbt, mbl
SASS: big_round (box) [E; 01:06.6]



mwo, ln; mcr, lbt, mbl
SASS: big (mirror) [G; 4:49.3]



mo, ln; mcr, lbt, ulup, mbl
SASS: thick_long_cylindrical (pipe) [D; 08:09.9]
Figure 4.19. MG /af/ in RSL

With respect to the manual components, the mouth gesture /af/ has a very wide distribution: it co-occurs with a wide range of handshapes, different movement shapes, and sizes. The movement can be repetitive and can be absent at all. This mouth gesture is used with static (Fig. 4.19a-b) and tracing (Fig. 4.19c) SASSes.

Handshape	**Movement shape**:	**Movement size**:	**Movement repetition**
	straight	normal	repetition
	arcing	large	no repetition
	circular	small	

	wavy	no	
	no		

Table 4.11. Manual components with which mouth gesture /af/ co-occurs

Summary:

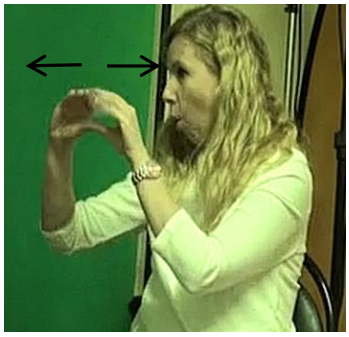
This mouth gesture co-occurs with SASSes denoting objects of different shapes and topological classes: they can be two-dimensional (as a mirror or a small path) or three-dimensional (as a ball); round (a cake), square (a box), or oblong (a pipe); straight, arcing, or wavy. The only feature these objects have in common is the size: they are large in at least one dimension. That is, the object referred to by a SASS with the MG /af/ is either wide, thick, long, or big in all three dimensions. Sometimes the big size is expressed in the movement and/or the opening of the hand. In some cases, though, neither of the manual components carries the semantics of the big size. Compare, for example, Figure 4.19a: the object denoted by this SASS can be big or small, depending on the context. In this example, the MG is the only formal feature which expresses the idea in question. Hence, I assign to this mouth pattern a morphemic status. The MG /af/ is a morpheme with the meaning antonymous to the meaning of the MGs /peeh/ and /pl/.

MG /o/

This is a static mouth gesture: the mouth retains the same shape throughout the gesture production. Its defining features are open mouth, protruded lips, and air exhalation.

o: /mo, lpd, mbl/

This is the only mouth gesture in the list which does not have any variants: it appears in my data sixteen times in one form only. See examples below:



mo, lpd, mbl
SASS:thick_long_straight (plank)
[E; 3:27.7]



mo, lpd, mbl
SASS:big_3D_round(flower)
[S; 01:40.0]



mo, lpd, mbl
SASS:arcing_wide (road)
[S; 07:59.5]

Figure 4.20. MG /o/ in RSL

This mouth gesture co-occurs with four handshape morphemes (, , , and), three movement shapes (straight, arcing, circular), and all possible movement sizes. The movement can be repetitive and can be absent. As Figure 4.27 illustrates, both static (4.27b) and tracing (4.27a,c) SASSes are possible with this mouth gesture.

Handshape	Movement shape:	Movement size:	Movement repetition
	straight	normal	repetition
	arcing	large	no repetition
	circular	small	
	no	no	

Table 4.12. Manual components with which mouth gesture /o/ co-occurs

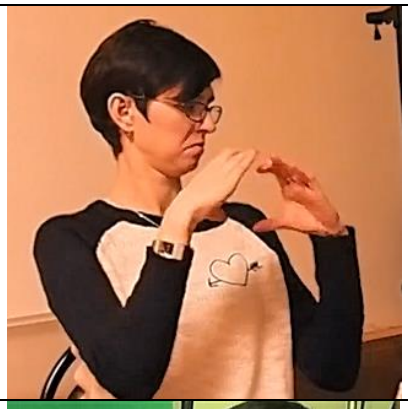
Summary:

The objects denoted by SASSes with the MG /o/ can have different shapes. In my data, they include flowers, small paths, planks, balls, vases, plates, piles of sand. Many of these objects are round or spherical. The tendency to be used with SASSes referring to round objects can be explained by the iconical nature of this mouth gesture: the rounded mouth imitates the rounded shape of the object. The fact that this is not a necessary condition (see Fig. 4.20a showing a SASS referring to a plank) and that all the objects this MG is used for are large in at least one dimension, places /o/ among morphemic mouth gestures. Synonymously to /af/, it denotes the large size. It is interesting to note, that formationally, the MG /o/ can be associated with the MG /u/ which refers to thin objects. These two mouth patterns do not behave as complete antonyms, however, as /u/ is more limited in both its semantics and distribution: it accompanies tracing SASSes only and denotes thin long objects.

4.3.3. Mouth gestures that are not associated with SASSes' semantics

A number of mouth gestures in my data are not associated with any semantic group of SASSes. The table below illustrates the mouth actions of this type that occur five times and more. The mouth actions 'mcr, ls' and 'mcl, ls' have the highest absolute frequencies in my data.

Mouth gesture	Frequency	Example
mcr, ls (mouth cracked, lips stretched)	32	
mcl, ls (mouth closed, lips stretched)	29	

mcl, ldn (mouth closed, edges of the lips down)	18	
mo, ln (mouth open, lips neutral)	14	
mcl, lpr (mouth closed, lips pressed)	8	
mcl, ls, ldn (mouth closed, lips stretched, edges of the lips down)	7	

mcl, lpr, ldn (mouth closed, lips pressed, edges of the lips down)	5	

Table 4.13. Non-lexical mouth gestures co-occuring with RSL SASSes

The analysis of the lists of SASSes with which these mouth gestures occur does not reveal any common semantic component. See, for example, the list for the MG ‘mcr, ls’:

- narrow_long_straight (garden bed)
- smooth surface (mug)
- smooth surface (plate)
- this_form (plank)
- small (box)
- curved_thin (cage handle)
- cabinet
- branch
- long_even (fence)
- fence
- high_long (fence)
- rectangular (chin-up bar)
- line
- long_straight_three (three planks)
- rectangular_flat_3D (box)
- long_straight_two (two pipes)
- long_arcing_three (three pipes)

These SASSes refer to objects of different sizes and shapes: they can be one-dimensional (a line) versus flat (a plank) versus three-dimensional (a box); straight (a garden bed) versus arcing (arcing pipes); round (a plate) versus square (a box); big in one or several dimensions (high_long) versus small (curved_thin; small). There is no semantic feature that would be shared by all these SASSes. Hence, the use of the mouth gesture ‘mcr, ls’ is not lexically motivated. This mouth articulation most probably lies outside of the SASS zone.

Defining the motivation behind the distribution of non-SASS mouth gestures is not in the scope of this thesis. We can speculate, however, that these non-manuals might be associated with discourse meanings and/or information structure of the sentence (such as given / new information; emphatic or contrastive meanings). They also sometimes express the signers’ attitude towards the content of the sentence. For example, the articulation ‘mcl, ldn’ in my data is often used when the signer is not sure of the object he/she describes. In this case, they simultaneously show this mouth pattern and shake the head, while articulating the SASS with the hands. The meaning of the non-manual component in these examples can be roughly translated as ‘I am not sure what it is’.

Note that there is a formal difference between SASS-associated versus non-associated mouth gestures in my sample. Non-associated mouth gestures consist of elements that do not function as defining features of the other group, see the table below.

Defining features of SASS-associated MGs	**Non-associated MGs**
mcl, chp	mcr, ls
mo|mcr, tt, mbl	mcl, ls
mcr, msc	mcl, ldn
mo|mcr, mcl	mcl, lpr
mcl; mcl, tt	mcl, ls, ldn
mcl; mo|mcr, mbl|msbl	mcl, lpr, ldn
mcr, lc|ls, mbl	
mo, lbt, mbl	
mo; mcr, lbt, mbl	

Table 4.14. Lexical versus non-lexical mouth gestures in RSL

The defining features of the SASS-associated mouth gestures are clearly visible elements, such as protruded tongue, puffed cheeks, bitten lower lip, or the change of the mouth opening. Differences in the lips position (stretched/pressed/corners down) usually distinguish allomorphs of the same mouth gesture morpheme. However, it is exactly these mouth features that form the only structural elements of non-associated mouth gestures (apart from the opening of the mouth, which is a basic feature). This might be another evidence of a principally different nature of these two mouth gesture groups. Further research is needed to clarify this difference.

4.4. Discussion

This chapter describes the main features of the mouth articulation accompanying RSL SASSes. This is one of the first analyses of the mouth patterns in RSL; see also (Drozdenko, 2018) on a database of RSL mouth gestures and (Bauer, 2019) on RSL mouthing. The graph below shows the types of mouth articulation attested in my data.

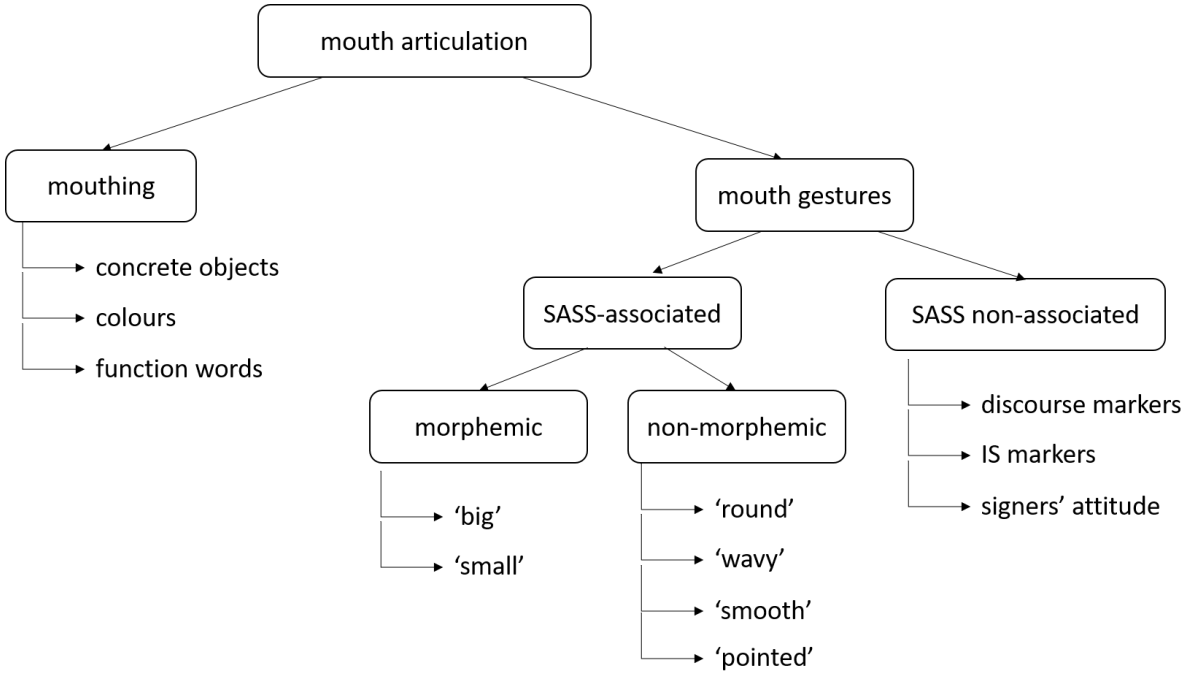


Figure 4.21. Types of mouth articulation accompanying RSL SASSes

RSL SASSes can be co-articulated with both mouthing and mouth gestures. Mouthing accompanies 18% of signs in my sample. It tends to co-occur with lexicalized SASSes that denote concrete objects and act as nouns in sentences. Mouth gestures are much more frequent in my corpus, they accompany 70% of SASSes. They are divided into two groups, i.e. mouth gestures that have semantics associated with SASSes versus mouth gestures that do not have semantics associated with SASSes. The latter group contains mouth gestures that act as discourse, information structure markers, or express signer's attitude. The former group can be further divided into morphemic and non-morphemic mouth gestures. Morphemic mouth gestures denote an idea that is not replicated by any of the manual components of the sign and, therefore, act as *morphemes* in SASSes. In my sample, morphemic mouth gestures denote meanings of size: either big or small. This mouth articulation is also referred to as 'adverbial' mouth gestures in the literature (Crasborn et al., 2008). Non-morphemic mouth gestures have a meaning that is also expressed by one of the manual components of SASSes. They describe aspects of the referent's shape: 'round', 'wavy', 'smooth', or 'pointed'. Formationally, these mouth gestures are similar to the manual components whose meanings they copy. For example, the mouth gesture /ap/ contains the closing of the mouth which is synchronized with the closing of a hand; mouth gesture 'puffed cheeks' creates a round shape of the signer's cheeks that is similar to the round shape of his/her hands. Such mouth gestures have been identified in other sign languages, they received the name 'echo-phonology'[23]. Thus, the two groups of SASS-associated mouth gestures, identified in my corpus, belong to the adverbial and the echo-phonological types, respectively.

A whole range of study questions concerns mouth gestures. These include but are not limited to: (1) Are there polyfunctional mouth gestures in RSL, i.e. mouth gestures which can have different roles in different contexts? (2) What is the nature of the difference between morphemic and non-morphemic mouth gestures? (3) Is there any difference between synonymous mouth gestures (for example, between /peeh/, /pl/, and /u/; or between /af/ and /o/)? (4) Are echo-phonological mouth gestures obligatory? (5) Are all the formational features of mouth gestures (such as open mouth, protruded lips, puffed cheeks, etc.) equally important in distinguishing between different mouth gestures? (6) Are the observed mouth gestures used equally by different signers, or is there an individual preference? Although each of these questions requires a specialized in-depth analysis, let me briefly elaborate on them below.

Polyfunctional mouth gestures

I observed several cases of polyfunctionality in my data. One of them concerns the mouth gesture 'puffed cheeks'. Although in the majority of cases, this articulation is used with round objects and iconically expresses the idea of roundness, there are sentences where it clearly performs a different function, see an example below.

[23] According to the original analysis by Woll (2001; 2009), echo-phonological mouth gestures have a dynamic structure and contain a certain movement that 'echoes' the movement of the hands. According to this definition, not all non-morphemic mouth gestures observed in my data fall into this category. For example, the MG 'puffed cheeks' does not have a movement. However, even in static non-morphemic MGs associated with SASSes, there is a clear 'copying' of manual features. Thus, the MG 'puffed cheeks' 'echoes' the round handshape of the manual sign by the round shape of the cheeks. Therefore, I consider these MGs to be echo-phonological as well.

(4.14) ‘pipe’

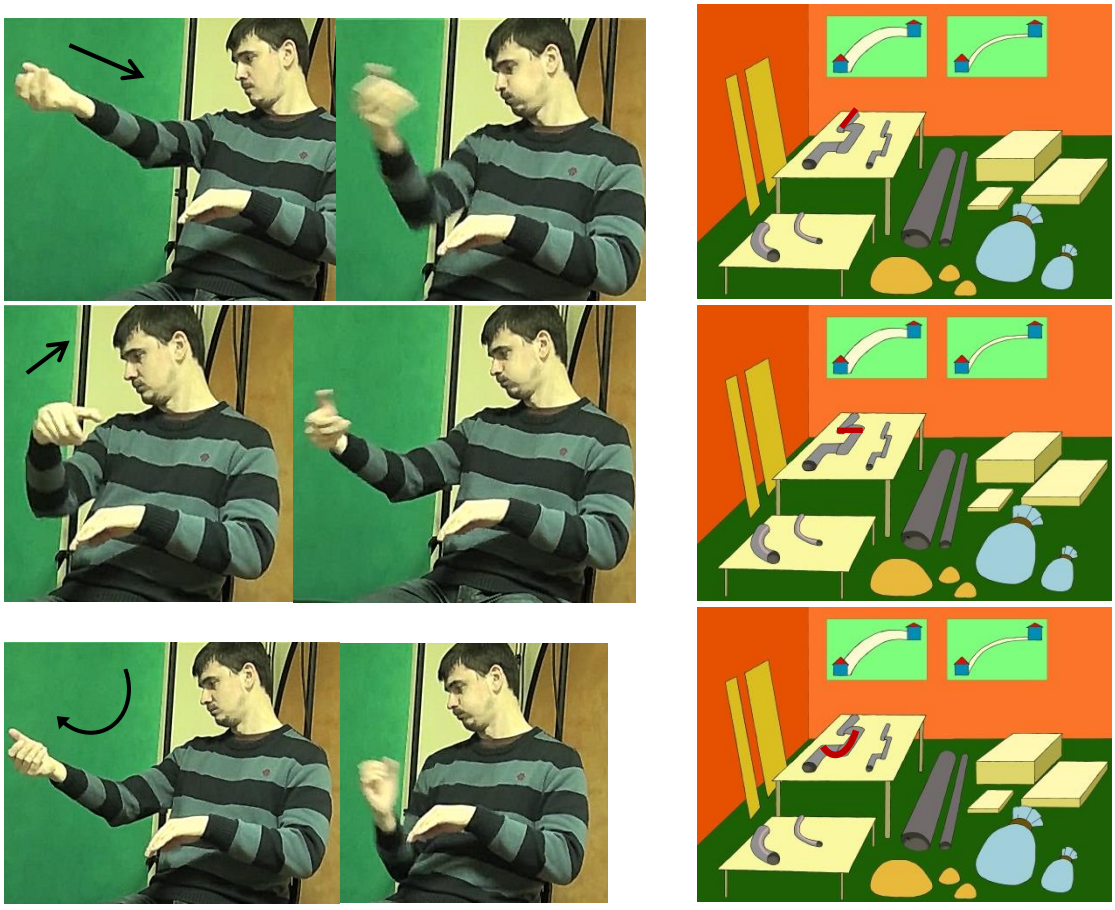
mcl,ls	*truba*	mcl, ln; mcl,ln,chp; mcl, ln; mcl,ln,chp; mcl, ln; mcl,ln,chp
LOC	T-R-U-B-A[24]	SASS-cylindrical-curved

‘There is a pipe over there curved like this’ [G; 7:33.5]

In (4.14), the signer describes a pipe of an unconventional shape, see the figure below. When producing the SASS, he moves the hand along the projection of this pipe, briefly puffing his cheeks at each joint – thus alternating between the neutral mouth and puffed cheeks:



Figure 4.22. ‘Spot-the-difference’ task picture ‘convenience store’



[24] fingerspelling ‘pipe’



Figure 4.23. The non-manual /mcl, ln, chp/ performing a non-lexical function
[G; 08:46.3]

The signer produces this SASS in four separate hand movements. Each movement is illustrated on a separate line with two photos showing the initial and the final position of the hand. The stimuli pictures in the end of each line highlight parts of the pipe that are being described. As Figure 4.23 shows, the beginning of each movement is coordinated with the neutral position of the mouth, while the end of the movement is coordinated with the puffed cheeks.

Figure 4.24 shows another example of the same function of the mouth gesture. Here the signer depicts the pointed tops of the mountain. Again, in the beginning of the movement, the mouth is in the neutral position, while in the end the cheeks are puffed.



Figure 4.24. RSL SASS: pointed_3D (mountain tops)
[G; 4:13.0]

I argue that in these examples puffed cheeks do not signify roundness. Instead, the alternating between the neutral mouth and the puffed cheeks emphasizes the end of the movement. In the example (4.14), it helps to divide the SASS into four separate movements. The use of this mouth gesture is somewhat similar to beat gestures accompanying speech. In spoken languages, these gestures have a parsing function: they chunk the verbal component into structural units, for example, syllables (Kendon, 2004).

The mouth gesture ‘protruded tongue’ provides another example of polyfunctionality. While in the majority of usages it is associated with wiggly shape, sometimes it denotes a small size. In these cases, in contrast to the ‘wiggly shape’ usages, it does not have air exhalation.



SASS: tall_narrow_straight (door)
MG: mcr, ln, tt
[R; 07:34.4]



SASS: small_thin_round (box)
MG: mcl, ln, tt
[S; 01:03.9]

Figure 4.25. Mouth gesture 'protruded tongue' denoting small size in RSL SASSes

The mouth gesture in these examples might be allomorphic to the non-manual /**pl**/, which is a morpheme with the meaning 'small'. While in its prototypical form, the non-manual involves a change in the mouth position (the mouth is closed in the initial position and the tongue is protruded in the final position), in the examples in question the mouth gesture is static: only the final position is presented.

The two examples discussed above confirm that mouth gestures in RSL can have multiple functions. The homogenous nature of my corpus allowed for uncovering only a limited amount of such instances, and examining more diverse data is necessary in order to get the full picture. It is notable, however, that both examples show the same pattern: different functions of the mouth gesture are drawn to its different forms. Thus, the non-manual 'puffed cheeks' is static when it denotes a round shape, but it alternates with the neutral position of the mouth when performing a beat function. The non-manual 'protruded tongue' is produced with air exhalation when signifies a wiggly trajectory, and without it when denotes a small size. It is quite possible, then, that the language wants to differentiate between different functions formally, thus achieving the one-to-one correspondence between the meaning and the form.

<u>The difference between morphemic and non-morphemic mouth gestures.</u>

Out of nine SASS-associated mouth gestures in my data, five have the morphemic status, and four do not. While there is no clear formal difference between these two groups, one can notice an interesting semantic pattern. All the morphemic mouth gestures denote size (either large or small), the non-morphemic ones are associated with shape (round, smooth, wiggly, or pointed). This says us something about the nature of the size and shape specifiers' semantics. The size is an abstract concept: the object is defined as large or small when compared to other objects. The shape, on the contrary, is very concrete: we do not need to compare a ball, for example, with any other object to define it as round. It is quite expected, therefore, that the shape is always expressed with the hands in such iconic signs as SASSes. And if a mouth gesture describes the shape as well, it is never the sole carrier of this meaning. The same cannot be said about the estimation of size as large or small: being more abstract and relative, this meaning can be easily 'ignored' by the hands. In this case, the

mouth is the only carrier of this semantics, and the mouth gesture, therefore, performs a morphemic function.

A similar pattern has been observed in other sign languages. Thus, Nyst (2007) reports on the use of mouth actions denoting size in AdaSL. These mouth actions can combine with both SASS and non-SASS signs and, therefore, have a morphemic function. The same, however, has not been attested for mouth actions related to shape in AdaSL. This observation made for a sign language unrelated to RSL allows us to hypothesize that the connection between the size versus shape semantics of a mouth action and its morphemic versus non-morphemic status might be not language-specific, but instead cognitively motivated. The further typological study is needed in order to clarify this issue.

Obligatoriness of echo-phonological mouth gestures

One of the distinguishing features of echo-phonological mouth gestures is their obligatoriness. As Woll (2001, 2009) argues, BSL signs which are accompanied by echo-phonological articulation are ungrammatical without it. The obligatory status of these non-manuals has been challenged in (Johnston et al., 2016), where the analysis of the Auslan corpus showed that echo-phonological mouth gestures in this sign language can be omitted.

I have analyzed from this perspective four SASS-associated non-morphemic mouth gestures co-occurring with RSL SASSes:

- /protruded tongue/;
- /puffed cheeks/;
- /cheeks sucked in/;
- /ap/.

Although neither of these mouth gestures can be a sole carrier of the meaning, all of them are associated with certain semantics: /protruded tongue/ – with the meaning ‘wiggly/curvy’, /puffed cheeks/ – with the meaning ‘round’, /cheeks sucked in/ – with the meaning ‘smooth’, and /ap/ -- with the meaning ‘pointed’. In order to test the obligatory status of these mouth patters, I performed a reverse search. I compiled four lists of SASSes describing wiggly, round, smooth, and pointed objects, respectively, and analyzed the mouth actions which accompany them. The chart below shows the results:

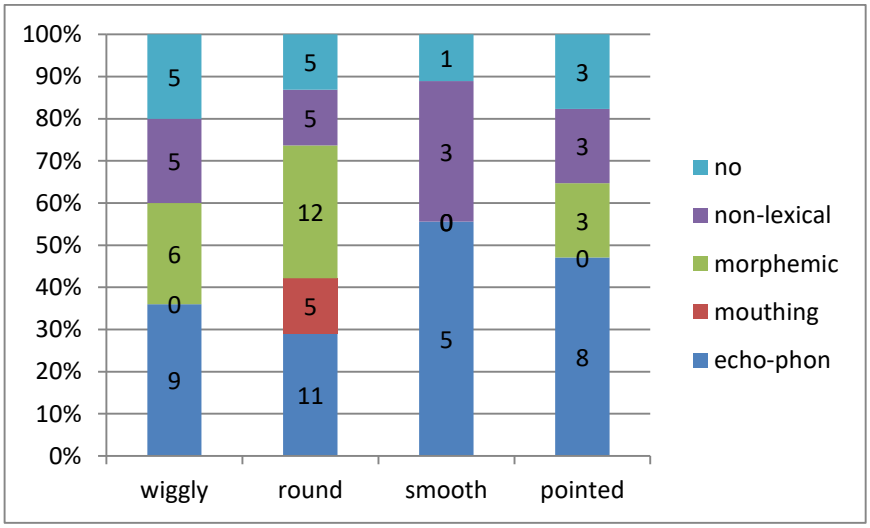


Figure 4.26. Echo-phonological mouth gestures in RSL

The bottom blue part of each bar is the echo-phonological mouth gesture associated with the meaning in question (/protruded tongue/ for 'wiggly', /puffed cheeks/ for 'round', etc.). One can clearly see that it does not constitute 100% of cases in any group of SASSes. Consequently, neither mouth gesture has the obligatory status in my data. On the contrary, all the SASSes accounted for in this analysis, can be produced without a non-manual or with a mouth gesture that is not associated with the semantics of SASSes. The SASSes depicting a round shape can also occur with the mouthing *myach* 'ball' or *krug* 'circle'. In addition to this, three out of four groups can be produced together with a morphemic non-manual (/af/, /u/, /peeh/, or /pl/), specifying a large or small size. The latter set of cases is quite interesting since it highlights a complex nature of the SASS semantics: prototypically, a SASS simultaneously describes several visual characteristics of an object: length, width/thickness, straightness, overall shape, orientation, location, etc. Signers can choose the accompanying mouth gesture to bring attention to one of these characteristics: if they describe, for example, a wide wiggly path, they can either highlight the wiggliness and use the mouth gesture /protruded tongue/, or the width – and use the mouth gesture /af/ (see a detailed discussion in Chapter 6). This explains the presence of both morphemic (size) and non-morphemic (shape) non-manuals in the four analyzed groups of SASSes.

Difference between synonymous mouth gestures

Out of five morphemic mouth gestures in my sample, two denote a big size, and three denote a small size. A logical question arises whether the synonymous mouth gestures are completely interchangeable. Although a full comparison of their semantics requires a specialized in-depth analysis involving interviewing signers and filling questionnaires, some generalizations can be drawn from my corpus.

Thus, the analysis of contexts the three 'small' mouth gestures appear in shows that they exhibit different types of linguistic behavior. The non-manuals /peeh/ and /pl/ have very similar distributions and appear to express the same semantics (which makes me assume that they might in fact be allomorphs of the same morpheme). The mouth gesture /u/, on the contrary, is used in a different type of contexts. Unlike /peeh/ or /pl/ it can accompany tracing SASSes only, and prototypically refers to long thin objects. Its usage, then, is more limited than this of its synonyms. The same part-whole relation is between the two 'big' mouth gestures: while /af/ is used with any type of SASS to describe any type of largeness, /o/ prototypically refers to large round objects, which can be explained by the iconic image the round shape of the mouth evokes. Thus, just as spoken languages, RSL tends to avoid complete synonyms, pulling apart the contexts of synonymous mouth gestures.

Formational features of mouth gestures

As Chapter 2 the 'Methodology' describes, the notation system for mouth gestures specifies the position of the lower part of the face along four parameters: the opening of the jaw, the shape of the cheeks, the use of the air and the position of the lips. The latter is further divided into six clusters of features: markedness, lip corners, lips position in the horizontal plane, lips position in the vertical plane, lips position in the midsaggital plane, and the use of air which affects the lips. Overall, there are 10 groups of features.

The analysis of SASS-associated mouth gestures shows that not all these groups of features play an equal role in their structure. Thus, while some parameters often function as clearly visible

defining features of the mouth gesture, others typically differentiate between variants of the same mouth gesture. With this respect, I have divided mouth gesture features in three groups:

- the features that always function as defining features of SASS-associated mouth gestures;
- the features that sometimes function as defining features of SASS-associated mouth gestures;
- the features that never function as defining features of SASS-associated mouth gestures; they differentiate between allomorphs of the same morpheme.

Defining	**In-between**	**Non-defining**
change in the mouth opening	protruded tongue	lips neutral
puffed cheeks	protruded lips	corners of the lips up
air exhalation		corners of the lips down
air inhalation		lips stretched
lower lip bitten		lips contracted
		lips protruded
		lips drawn
		cheeks sucked in
		sharp air exhalation

Table 4.15. Non-manual features clustered according to the role they play in the structure of the mouth gesture

Table 4.15 shows the clustering of the features. The mouth opening, the position of the cheeks, the use of air, and the biting of the lower lip act as defining features of mouth gestures and never differentiate between variants of the same mouth action. For example, the non-manual /ap/ is defined exclusively by the change of the mouth opening (from open to closed), the non-manual 'puffed cheeks' is defined by the feature /chp/ 'puffed cheeks', and the non-manual 'inhaled air' is defined by the air inhalation. The feature 'lower lip bitten' plays an important role in the non-manual /af/: it appears in the final position of the mouth gesture (mo; mcr, lbt, mbl).

The features 'protruded tongue' and 'protruded lips' sometimes act as defining features of mouth gestures. For example, 'protruded tongue' has this role in the non-manual /th/, which is defined by the tongue protrusion and the air exhalation. In dynamic mouth gestures, however, 'protruded tongue' does not play a defining role and occurs in variants of the same mouth gesture. Presumably, in dynamic mouth gestures, the change of the mouth opening is the most visible feature, and it overshadows all other features. For example, the mouth gesture /ap/ has allomorphs with and without the tongue protrusion:

- mo, ln; mcl, ln 'mouth open, lips neutral; mouth closed, lips neutral';
- mo, ln, **tt**; mcl, ln 'mouth open, lips neutral, tongue protruded; mouth closed, lips neutral'.[25]

The feature 'protruded lips' has a defining role in one mouth gesture, namely, in the non-manual /o/ (mouth open, lips protruded, air exhalation). In all other cases, it occurs in variants of the same mouth gesture, see, for example, the non-manual 'puffed cheeks':

[25] This is also true for the mouth gestures /peeh/ and /pl/ if we adopt the analysis according to which they are instances of the same non-manual.

- mcl, ln, chp ‘mouth closed, lips neutral, cheeks puffed’;
- mcl, **lpd**, chp ‘mouth closed, lips protruded, cheeks puffed’;

or the non-manual ‘inhaled’ air’:

- mcr, lc, chs, msc ‘mouth cracked, lips contracted, cheeks sucked in, air inhalation’;
- mcr, lc, **lpd**, msc ‘mouth cracked, lips contracted, lips protruded, air inhalation’.

Apparently, the mouth gesture /o/ behaves differently due to its iconic nature. The rounded lips evoke the image of a rounded object.

Finally, all other aspects of the lips position, do not act as defining features of mouth gestures. Instead, they appear in variants of the same SASS-associated non-manual. The reason for that might be the fewer degree of visibility of these features compared to, say, the tongue protrusion or the cheeks puffing.

Signers’ preference

As my data show, not all SASS-associated mouth gestures are used by all the signers with the same frequency. Some mouth actions are produced quite consistently to express a certain meaning, see, for example, the distribution of the mouth gesture /af/:

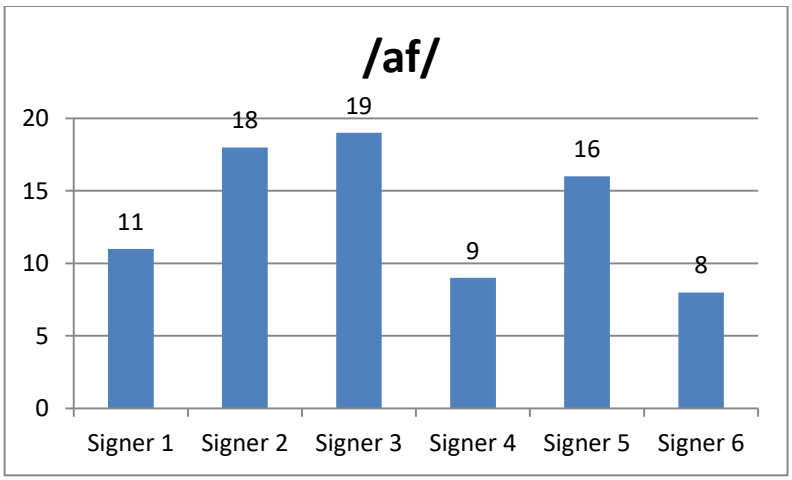


Figure 4.27. Distribution of the MG /af/ across participants

Other mouth gestures, on the contrary, are used by only one couple. See the distribution of the non-manual /o/:

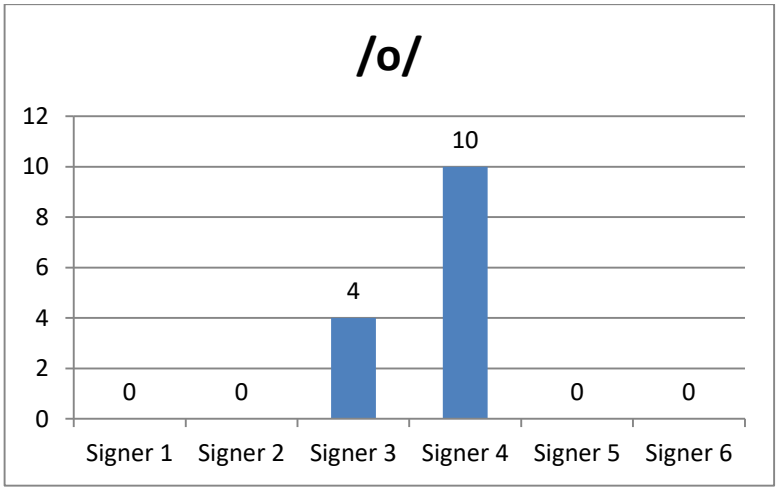


Figure 4.28. Distribution of the mouth gesture /o/ across participants

The reason for this might be a more limited meaning of the mouth gesture /o/. Since different participants described different pictures while performing the data collection tasks, only one pair of pictures might have had suitable objects. Also, there might be priming effects in using this mouth gesture. If it is infrequent in RSL in general, the use of it by one signer in the couple might have provoked its further appearance throughout the session.

Quite interesting is the distribution of the mouth gestures /peeh/ and /pl/ across participants, see the chart below:



Figure 4.29. Distribution of the mouth gestures /peeh/ and /pl/ across participants

Except for the signer 6 who does not use these mouth gestures much, every participant in their signing prefers one non-manual: either /peeh/ or /pl/. It cannot be explained exclusively by priming effects, since the signers 1 and 2, who composed one couple, have different preferences with this respect. At the same time, since these non-manuals express the same meaning, this provides another indirect support for analyzing them as allomorphs of the same mouth gesture.

Since the issues raised in this section of the chapter have not been the focus of this dissertation, they cannot be fully answered within the scope of my work. At the same time, the data presented here provides an interesting insight into these issues and can serve as the starting point for future research.

Chapter 5: Semantic categorization of shapes and sizes by RSL SASSes

As the introductory chapter of this thesis explains, I take a two-way approach in describing the semantic structure of RSL SASSes. Chapters 3 and 4 define the organization of SASSes by investigating them 'from the form'. The detailed description of SASSes' manual components (Chapter 3) and mouth articulation (Chapter 4) allowed us to establish inventories of sub-sign elements in these signs and to discover how each of the elements *separately* contributes to the meaning of the whole. This chapter presents the second direction of my investigation, i.e. 'from the meaning'. At this stage, I create a list of common size & shape meanings and define how each meaning is expressed by RSL SASSes, i.e. how different sign components work *together* to express a particular aspect of the referent's appearance. I then compare my findings to categorization strategies in some spoken languages in order to create the foundations for the cross-modal typology in this domain.

Since this chapter explores SASSes from a different angle compared to chapters 3 and 4, it requires laying out the specific literature and methodological tools applied in the analysis. The former is presented in section 5.1. It explains a theoretical framework for the analysis and introduces the notion of the topological class, which is fundamental for discussing the expression of shape in languages. Section 5.2 describes the methodology used in this part of the thesis and presents the list of discussed shapes and sizes. The two following sections explain how RSL SASSes distinguish between different types of shapes (Section 5.3) and sizes (Section 5.4), correspondingly. Finally, Section 5.5 is the discussion section where the RSL data is discussed in the light of different strategies used to describe the visual characteristics of objects by sign versus spoken languages.

5.1. Topological classification of objects

Numerous studies have shown that the expression of size and shape in languages drastically differs from the objective form of referents, which can be described with mathematical terms and formulas (Bierwisch & Lang, 1989; Rakhilina, 2010; Talmy, 1983). When we characterize the size of an object, we assign values to its height, length, and depth/width. Languages tend to mark two extreme values of these parameters, i.e. 'big' and 'small'. For example, English uses the adjectives *tall* vs. *low*, *long* vs. *short*, *wide* vs. *narrow,* etc. Since, in principle, any three-dimensional object has these parameters, one could expect free compatibility of size adjectives with concrete nouns. However, contrary to this intuition, these words demonstrate a complex selectivity of nominal contexts. Take for example the quality 'long'. According to a dictionary definition, the English word *long* means 'measuring a great distance from end to end; extensive in length' (OED, 2004). Seemingly, this definition accurately describes the direct physical meaning of this adjective. However, in a pragmatically neutral context, we would not say **long book* (meaning its size, and not the time it takes to read it) or **long lips*. In these examples, the objects themselves satisfy the requirements of the quality, i.e. they do, strictly speaking, have the dimension of length. Yet, these English phrases sound unnatural.

The discrepancy between the Euclidean and the language view of objects can be easily demonstrated in the domain of shapes as well. Take, for example, the word *round*. A complicated

definition of ‘a curved line that is everywhere equally distant from the center to every point’ (OED, 2004) indicates a very simple shape which is illustrated in the figure below.

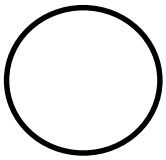


Figure 5.1. Circle

Surprisingly, however, the English word *round* can describe objects of quite different shapes, compare *round ball*, *round column, round edge*, *round corner*, etc; see the corresponding examples for Russian by Rakhilina (2010). Here, yet again, the language ‘ignores’ the mathematical definition of the word and uses it according to a different set of rules instead. It is clear that the compatibility of a given size/shape adjective with a given concrete noun is defined by other properties of the object, than those given in dictionaries. Different researchers use different techniques to describe the rules the language applies when it characterizes the object’s size and shape. For example, Bierwisch and Lang (1989) propose an elaborate system of visual features. Among other things, they claim that the orientation needs to be taken into account. Thus, they differentiate between objects with (1) a fixed, i.e. never changing, orientation (like a lake or a hole in the ground); (2) a canonical orientation (like a wardrobe or a fridge) – these objects have a default orientation, but they can, in principle, change it; (3) an inherited orientation (for example, water in the bottle); and (4) a contextual orientation. The latter can be illustrated with the English phrase *a deep hat*. This phrase sounds natural only if the hat in question is turned upside down – for example, when an illusionist takes a rabbit out of it.

The research by Bierwisch and Lang (1989) provides a valuable insight into the nature of co-dependencies between different characteristics of the object that play a role in the choice of the shape/size adjective. However, the complexity of the system they propose raises questions: do language users indeed make complex calculations every time they describe objects? This issue was resolved with the notion of **the topological class**, which is now widely used in cognitive linguistics. The term was initially introduced by Talmy (1983) for the analysis of English spatial prepositions, but it proved to be applicable on multiple levels of the language. In his analysis, Talmy appeals to the cognitive process of schematization ‘that involves the systematic selection of certain aspects of a referent scene to represent the whole, while disregarding the remaining aspects’ (Talmy 1983:225). In particular, he claims that people perceive the world via a limited set of spatial schemes, or reference forms, i.e. ‘surface’, ‘line’, ‘container’, ‘point’, ‘layer’, etc. He called these schemes ‘topological classes’. The classes are opposed to each other by a number of parameters, such as dimensionality, orientation, flexibility, etc. However, as Talmy claims, the topological classes cannot be reduced to the sum of parameter values, i.e. [+/- 3D], [+/- horizontally oriented], [+/- rigid]. On the contrary, they are perceived as non-decomposable wholes.

The topological classes proved to be crucial for explaining the linguistic behavior of various language elements, starting with the aforementioned English spatial prepositions. In his work, Talmy (1983) argues that when English speakers describe the spatial disposition of objects, they do not treat these objects equally. Rather, the location of one object (the Figure) is described with respect to the other (the Ground). A simple example of such inequality is the use of the preposition

near. Although logically, this preposition simply states the proximity of two objects, the sentence in (5.1a) sounds natural, while the phrase in (5.1b) does not.

(5.1) a) [OK]*The bike is near the house*
b) [???]*The house is near the bike*

Prepositions impose certain restrictions on both the Figure and the Ground. These restrictions include geometrical properties of the objects. For example, the English preposition *across,* as in the example (5.2), indicates that the Figure (the board) is linear, and the Ground (the railway bed) is 'ribbonal', i.e. a plane bounded along two parallel edges.

(5.2) *The board lays across the railway bed*

The preposition *over* offers a different geometrical structure of the objects. In one of its usages, it requires both the Figure and the Ground to be planar:

(5.3) *The tablecloth lay over the table*

As the final example, consider the prepositions *near-between-among-amidst*. These prepositions differ in the degree of the Ground's 'partiteness'. Thus, *near* treats the Ground as a single point, *between* interprets it as a point-pair, *among* sees the Ground as a set of points, and *amidst* conceptualizes it as a gradient mass:

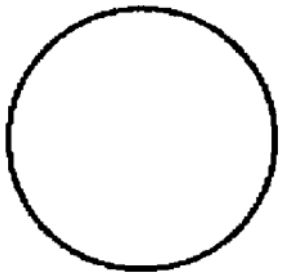
(5.4) a. *The bike stood* ***near*** *the boulder;*
b. *The bike stood* ***between*** *the boulders;*
c. *The bike stood* ***among*** *the boulders;*
d. *The toy bike stood* ***amidst*** *the wheat stalks.*

The notion of a topological class proved to be applicable not only to English, but to other languages as well. A valuable contribution to the theory was made by Lyashevskaya and Rakhilina (2007). They composed an inventory of topological classes in Russian, applying the tools of corpus linguistics. Using the Russian National Corpus (RNC, 2003) as the main source, they studied the distribution patterns of Russian concrete nouns and established a set of topological classes as the result of this analysis. The list consists of more than 30 classes, including 'horizontal surface' ('floor', 'tray'), 'vertical surface' ('wall', 'tableau'), 'containers' ('glass', 'box'), 'poles' ('stick', 'pen'), 'ropes' ('snake', 'belt'), and others. The topological classes became part of the semantic tagging in the corpus, which opened wide possibilities to study the linguistic behavior of Russian concrete nouns.

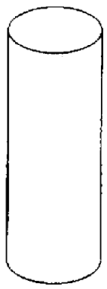
One of the great examples of such a study, which is directly relevant to the topic of this chapter, is the investigation of Russian adjectives denoting size and shape by Rakhilina (2010). The first thing to which Rakhilina brings attention is the disproportionate number of size versus shape words in Russian. While the adjectives denoting size are quite numerous, there are almost no words that purely describe a shape. One of the notable exceptions is the word *kruglȳi* 'round'. The adjectives *oval'nȳi* 'oval', *kvadratnȳi* 'square', *pryamougol'nȳi* 'rectangular', *tsȳllindricheskii* 'cylindrical' and some others mainly constitute mathematical terms and are quite limited in their use in everyday language, while the word *kruglȳi* is quite frequent and shows a wide distribution.

Unsurprisingly, the semantics of this word goes beyond 'enclosed curved line'. The topological classes account for the range of possible shapes this adjective can describe. Thus, as Rakhilina claims, *kruglȳi* indicates different shapes depending on the topological class of the noun

to which it refers. With non-vertical surfaces/planes, it denotes rounded edges of the surface; with elongated objects, it denotes smooth sides (Fig. 5.2a and 5.2b, respectively). When *kruglȳi* characterizes bent poles, the resulting shape is arcing (5.2c), when it is used with a vertical surface, the shape is convex (5.2d). With 'ribbons' *kruglȳi* means rounding in a ring (5.2e). Finally, three-dimensional objects are interpreted as spherical when used with this word (5.2f).



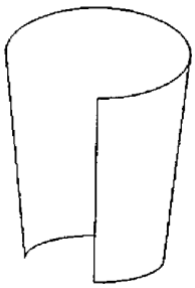
(a) *kruglȳe chasȳ* 'round watch'
krugloe pyatno 'round stain'



(b) *kruglaya bashnya* 'round tower'
kryglȳi karandash 'round pencil'



(c) *kruglaya arka* 'round arch'
kruglȳi rog 'round horn'



(d) *kruglȳi ékran* 'round screen'
kruglȳi zabor 'round fence'



(e) *kruglaya alleya* 'round alley'
kruglaya begovaya dorozhka 'round racetrack'



(f) *krugloe mȳlo* 'round soap'
kruglaya golova 'round head'

Figure 5.2. Shapes depicted by Russian adjective *kruglȳi*
(Rakhilina, 2010: 154-158)

Rakhilina emphasizes the functional basis of the use of shape and size words in languages. Thus, not any round object can be characterized as *kruglȳi* in Russian. For example, although the shape of the Russian coin worth one rouble satisfies the requirements of the topological class (Figure 5.3), the phrase ???*kruglȳi rubl'* 'round rouble' sounds very unnatural. This is because a Russian rouble has a fixed shape that never changes. Therefore, there is no need to ever express this shape. For the same reason, we do not usually say *red blood* (as opposed to *red like blood*) or *yellow sun*, since the blood is always red and the sun is always yellow.

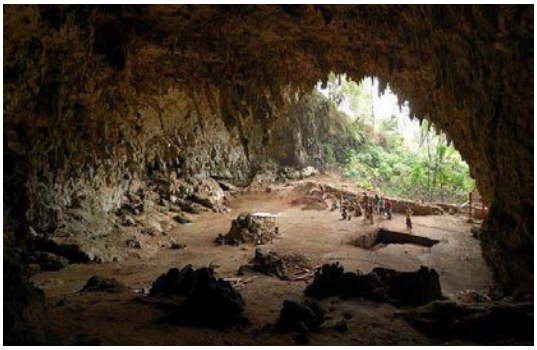


Figure 5.3. Russian coin worth one rouble

Another manifestation of the functional use of language in the domain of forms is different interpretation of the objects with the same shape. Take for example the words *duplo* 'hollow section of a tree' and *peshchera* 'cave' (Figure 5.4). Although geometrically similar, these objects receive different interpretations when used with the adjective *kruglȳi*. When the word *kruglȳi* describes a cave, it refers to its interior shape and denotes rounded walls (similar to a round room). With the word *duplo*, however, *kruglȳi* denotes round edges of the hole (similar to a round window or a round gap). This difference in interpretations is due to the way people perceive these objects. They see tree holes from the outside, but caves often from the inside. Hence, the salience of different parts in these similarly looking objects.



(a) hole in a tree



(b) cave

Figure 5.4. Objects with similar shape but different interpretation when used with Russian word *kruglȳi* 'round'

The adjectives of size, as opposed to the adjectives of shape, are quite numerous in Russian. It makes use of at least twelve words in this domain: *dlinnȳi* 'long', *korotkii* 'short', *vȳsokii* 'tall', *nizkii* 'low', *glubokii* 'deep', *melkii* 'shallow', *tolstȳi* 'thick', *tonkii* 'thin', *shirokii* 'wide', *uzkii* 'narrow', *bol'shoi* 'big', and *malen'kii* 'small'. As I discussed in the beginning of this chapter, the use of these adjectives does not come down to the mathematical definitions. Instead, it can be explained with topological classes. Thus, *tolstȳi* 'thick' in Russian describes the size of the smallest dimension in the objects belonging to the typological class of 'layers' (*tolstaya kniga* 'thick book', *tolstoe odeyalo* 'thick duvet', *tolstaya stena* 'thick wall') and the diameter of elongated objects (*tolstaya palka* 'thick stick', *tolstoe derevo* 'thick tree', *tolstȳe pal'tsȳ* 'thick fingers'). The adjective *shirokii* 'wide' describes the small dimension of flat objects perceived two-dimensionally (*shirokaya doroga* 'wide road', *shirokaya lenta* 'wide ribbon', *shirokii most* 'wide bridge') and the diameter of holes (*shirokoe okno* 'wide window', *shirokaya dȳra* 'wide hole', *shirokii prokhod* 'wide entrance').

The fact that the usage of size adjectives is determined by topological classes means that these adjectives do not purely denote size. Instead, the form of the object is closely interconnected with the representation of its size in languages. Moreover, just as in the case with the adjective *kruglȳi*, the interpretation of size words largely depends on the conditions of the object's functioning. Thus, the strikingly similar objects – a pen and a pencil –exhibit very different linguistic behavior with respect to size adjectives. While the phrase *tolstȳi karandash* 'thick pencil' sounds natural in Russian, the phrase *tolstaya ruchka* 'thick pen' does not. As Rakhilina claims, the reason for this lies in the ways these objects are used. When the adjective *tolstȳi* refers to a pencil, it indicates the thickness of the graphite rod. This dimension is important for the functioning of the pencil, since thick pencils leave thick traces. The size and shape of a pen, on the contrary, are not connected with the quality and the way of writing. Therefore, this dimension of a pen is 'ignored' by the language.

Another example of the functional basis in the use of size adjectives is the pair *dlinnȳi* vs. *shirokii* ('long' vs. 'wide') in Russian. By default, in a rectangular object, its bigger dimension is characterized as 'long' or 'short', and its smaller dimension is defined as 'wide' or 'narrow'. Imagine, however, a rectangular table. Contrary to the just defined rule, its longer dimension receives the characteristics *shirokii* 'wide' or *uzkii* 'narrow'. The same holds for the noun *divan* 'sofa': if the sofa is wide (*shirokii divan*), its longer dimension is big. Functionally speaking, a wide sofa can fit a lot of people. Everything changes, however, if someone is lying on the sofa. In this case, the very same dimension is characterized as *dlinnȳi* 'long' or *korotkii* 'short'. For someone who attempts to explain the use of size words in a language by the objects' geometrical form only, this switch between these adjective pairs presents a contradiction. At the same time, it can be easily explained if the functioning of the objects in question is taken into account. Thus, as a general rule, the side of the object which faces a person is usually a 'working' side. It receives the characteristics *shirokii* 'wide' in Russian even if it is, in reality, longer than the other dimension.

This work by Rakhilina (2010) put forward a number of fundamental theoretical arguments about the conceptualization of size and shape in a language. They include the close interconnection of these two qualities, the importance of topological classes, and the functional basis in interpreting the object's dimensions. Although these conclusions are drawn from examining the data of one language, they are applicable to other languages as well. For example, Dixon (1977) in his article argues that the disproportional number of size versus shape adjectives is observed in numerous spoken languages. Gilyarova (2002) investigates classifier systems in 57 languages and shows that the whole diversity of classifier shape meanings comes down to a limited set of so-called primal shapes, which in turn form topological classes. The significance of topological classes in describing the sizes on the typological level is shown in (Kozlov & Privizentseva, to appear). They analyzed the semantic field of size in 38 spoken languages. The analysis showed that the diversity of lexical systems in this zone builds on a closed number of topological classes. For example, there are five topological classes in the domain of 'small' sizes (i.e., 'thick' versus 'thin' and 'wide' versus 'narrow'):

1) poles (tree branches, pencils);
2) layers (books, planks, walls);
3) strips (ribbons, roads);
4) gaps (windows, holes in a wall);
5) burrows (corridor, tunnel, pipe).

Kozlov and Privizentseva (to appear) show that languages differ in how they lexicalize these classes. For example, Russian uses the pair of adjectives *tolstȳi* versus *tonkii* to describe poles (1) and layers (2), and the pair *shirokii* versus *uzkii* to describe strips (3), gaps (4), and burrows (5). This is a so-called canonical lexicalization pattern that is exhibited by numerous European languages as well as by some languages outside Europe, i.e. Hebrew, Udmurt (Finno-Ugric Uralic), Ingush (Northeast Caucasian), Armenian, among others. Other languages show different lexicalization patterns. For example, in Komi (Finno-Ugric Uralic) wide strips and wide gaps and burrows are described by separate adjectives (*paš′ ki̯d* and *ota*, respectively). In Kazakh (Altaic), different adjectives characterize thick poles (*qalıŋ*) and thick layers (*žuan*). Importantly, however, the lexical structure of this semantic field in a language can always be accounted for with the help of these five topological classes.

These findings present a valuable insight into the conceptualization of the objects' visual characteristics in languages. However, since they have been made based on data from spoken languages only, the question remains whether they are limited by the auditory modality or they are applicable to the whole range of human languages. This chapter is the first study presenting a cross-modal comparison of these semantic fields by discussing the data of RSL in the light of the aforementioned findings. It answers RQ 4 of my dissertation about the categorization of shapes and sizes by SASSes.

Exploring categorization patterns requires a methodology different from the one used so far. As I stated in the beginning of this chapter, Chapters 3 and 4 of this thesis present the analysis of RSL SASSes starting 'from the form'. For each component of SASSes, the range of possible values is determined and then the semantics and distributional patterns of these values are defined. This chapter differs in the way it examines the data. Its starting point is not the form, but the meaning. I take objects' sizes and shapes as reference points and describe the morphological means used to express every size and shape combination. Since SASSes are not 'words' in the classical understanding of the term and do not constitute an easily defined closed list of items, the analysis from the contexts seems to be the optimal strategy for building up a basis of comparison with spoken languages. This approach has already been applied in sign linguistics, see for example the research by Schembri (2001) on polycomponential signs in Auslan. It has not, however, been used in the analysis of SASSes before.

The next section discusses the methodology applied in this part of the research. It starts with a detailed description of the first step, i.e. compiling a list of shapes and sizes for the analysis. This step is followed by indicating what components of SASSes express the qualities in question. The final step is making generalizations based on the observed data and comparing the lexicalization patterns of RSL SASSes with the findings stated in the literature about spoken languages.

5.2. Data processing and analysis

The set of the forms and sizes discussed in this chapter is provided by the 'spot-the-difference' stimuli. These stimuli are designed on the basis of prototypical visual oppositions:

Shape

rounded vs. rounded oblong vs. rounded flat

angular vs. angular oblong vs. angular flat

pointed vs. round-shaped

straight vs. bent vs. wavy

smooth vs. hubby

Size

big vs. medium vs. small
long vs. medium vs. short
tall vs. medium vs. low
thick vs. medium vs. thin
wide vs. medium vs. narrow

Dimensionality

2D vs. 3D

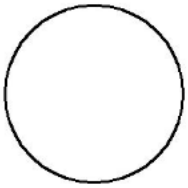
Although these oppositions do not cover the whole range of possible forms and sizes occurring in the real world, they define the objects' types with which people interact on an everyday basis. Thus, the geometries presented in this analysis constitute a good starting point for typological comparison. These oppositions combine into five blocks of shapes: rounded objects, right-angled objects, pointed objects, elongated objects, and surfaces. Here, I introduce them one by one.

Rounded objects

The round-shaped objects in my stimuli are clustered into the following groups:

1) **'limited surfaces'** –flat objects that are perceived two-dimensionally (a mirror, a window, a puddle);
2) '**spheres**' – three-dimensional spherical objects (a ball, a bag);
3) '**cylinders**' – elongated rounded objects (a pipe, a stick, a branch, a pen, a vase);
4) '**flattened spheres**' – three-dimensional objects with one dimension significantly smaller than the others and with smooth edges (a cake, a round-shaped box);
5) '**closed strips**' – two-dimensional elongated objects enclosed in a circle (a round picture frame, a jogging track);
6) '**arcing lines**' – arcing thin elongated objects which are perceived like unidimensional lines (an arc-shaped string, an arc-shaped thin pipe, a pencil trace);
7) '**arcing strips**' – arcing narrow objects which are perceived two-dimensionally (a rainbow, an arcing door frame);
8) '**hemispheres**' – three-dimensional spheres with the bottom side flattened (a pile of sand, a bag of potatoes on the floor, a rock).

The types 1 to 5 represent enclosed forms, while the types 6-8 are arcing non-closed forms. These groups contain unidimensional (6), two-dimensional (1,5,7), and three-dimensional objects (2-4,8). The table below contains schematic representations of the types and the list of objects from the stimuli:

Num	Type	Scheme	Objects
1	limited surface		pizza knife (BP[26]) round window (CH) mirrors (RP)

[26] The abbreviations stand for the stimuli items: BP 'birthday party', CH 'country house', RP 'room with paintings', CS 'convenience store', RC 'room with cats, F 'fields'. See the stimuli in Appendix 1.

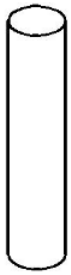
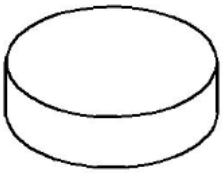
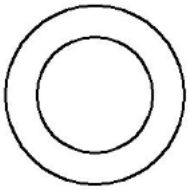
2	sphere		ball of thread (RC) balls (RP) bags with potatoes (CS)
3	cylinder		chair legs (BP) pipes (F, CS) sticks (F) vases (RC, RP) street lamps (BP, CH)
4	flattened sphere		cakes (BP) round boxes (RC, RP) plate (RC)
5	closed strip		strip on a plate (RC)
6	arcing line		line on a painting (BP) branches (F) thin arc-shaped pipe (CS)
7	arcing strip		arcing small path (CH) small paths on paintings (CS)
8	semi-sphere		pile of sand (CH) birdcage (RC) bowl (RC) rock (CS)

Table 5.1. Rounded objects in the stimuli

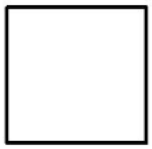
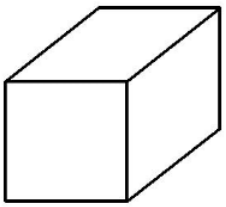
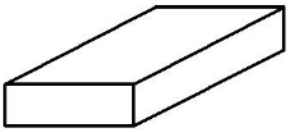
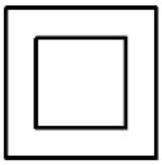
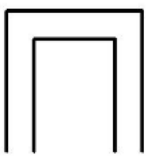
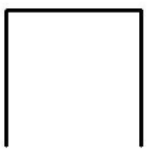
Right-angled objects

These are objects of various forms with right angles. They are divided into the following groups:

1) '**limited surfaces**' – flat objects with right angles that are perceived two-dimensionally (a window, a mirror, a table surface);
2) '**cubes**' – three-dimensional objects that are schematized as cubes and parallelepipeds (a cabinet, a box, a fridge);
3) '**flat parallelepipeds**' – parallelepipeds with one side significantly smaller than the other two (a flat box, a book, a chair pillow);

4) '**closed strips**' – two-dimensional narrow elongated objects enclosed in a square/rectangle (a picture frame);
5) '**П-strips**' – two-dimensional narrow elongated objects in a П-shape (a door frame);
6) '**П-lines**' – thin elongated objects in a П-shape perceived unidimensionally (a chin-up bar);
7) '**planks**' – parallelepipeds with two sides significantly smaller than the other one (a thick plank, a table leg with a square cut)

See schematic representations of the types and the list of objects from the stimuli in the table below:

Num	**Type**	**Scheme**	**Objects**
1	limited surface		windows (BP, CH, RC, F) paintings (BP, RP, CS) sheet of paper (BP) fields (F)
2	cubes		country house cabins (CH) boxes (CH) birdcage (RC) cabinet (RP)
3	flat parallelepipeds		chair pillows (BP) flat boxes (CS) books (BP, RP)
4	closed strips		picture frame (RP)
5	П-strips		table outline (RP)
6	П-lines		chin-up bar (CH)

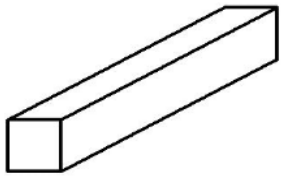
7	planks		stairs (F) thick planks (RC) thin cabin (CH)

Table 5.2. Right-angled objects in the stimuli

Elongated objects

Elongated objects have one dimension significantly bigger than the others. They can be one-, two-, or three-dimensional. In the latter case, the cut can have any form. In my stimuli, it is either round (with cylinders), or rectangular (with elongated parallelepipeds). The overall shape of the object can vary also. The options in my stimuli are: straight, bent, and wavy. See the definitions of the types and the table with the objects below.

1) '**straight lines**' -- thin elongated objects; their length is so prominent that the two other dimensions are ignored (lines, thin branches, windows bars);
2) '**arcing lines**' -- thin elongated objects with an arcing outline (arcing lines, tree branches, a cage handle, a hook);
3) '**wavy lines**' -- thin elongated objects with a wavy outline (wavy lines, a hanging thread, a cat's tail);
4) '**straight cylinders**' -- elongated three-dimensional objects with a round cut (a pipe, a thick branch, a column);
5) '**arcing cylinders**' -- cylindrical objects with an arcing outline (a street lamp, an umbrella handle, an arc-shaped pipe);
6) '**wavy cylinders**' -- cylindrical objects with a wavy outline (a wavy pipe, a stick);
7) '**straight strips**' -- elongated objects perceived two-dimensionally (a small path, a skein, a strip, a plank observed from the front);
8) '**arcing strips**' -- arcing elongated objects perceived two-dimensionally (an arcing small path, scyth blades);
9) '**wavy strips**' -- wavy elongated objects perceived two-dimensionally (a hanging skein, a wavy elongated mirror).

Num	**Type**	**Scheme**	**Objects**
1	straight lines		lines on the paintings (BP) line on the sheet of paper (BP) window bar (F)
2	arcing lines		arcing line on the painting (BP) handle on the cage (RC)

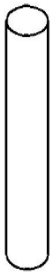
3	wavy lines		wavy line on the painting (BP) hanging thread (RP) cat's tail (RC)
4	straight cylinders		pipes (CS, F) sticks (F) vase (RP)
5	arcing cylinders		street lamps (CH) tree branches (F) arc-shaped pipes (CS)
6	wavy cylinders		pipes (CS)
7	straight strips		thin planks (BP, RP, CS) road (BP) small path (CH) garden beds (CH)
8	arcing strips		arcing small paths (CH, CS) scythes (CH)
9	wavy strips		wavy small paths (CH, F) wavy mirror (RP) hanging skein (RP)

Table 5.3. Elongated objects in the stimuli

An object can be presented in more than one table, depending on the dimension in question. For example, a cylindrical elongated object (a vase or a pipe) is presented in two tables: 'round objects' and 'elongated objects'. In the first case, the expression of the round cut of the cylinder is analyzed, while in the second case, I discuss the morphological means used to describe the elongated contour of the object.

Pointed objects

The next shape type I discuss in this chapter is pointed objects. This type consists of two groups:

1) '**pointed strips**' -- flat pointed objects which are perceived two-dimensionally (a knife, a scythe, a pointed spade);
2) '**cones**' -- three-dimensional objects with a pointed end (a mountain peak, a nose, a pile of sand).

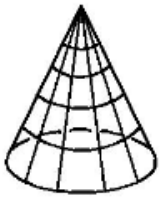
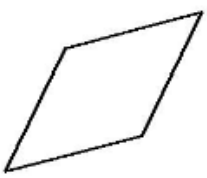
Num	**Type**	**Scheme**	**Objects**
1	pointed strips		knife (BP) scythes (CH) pointed spade (RP)
2	cones		mountains (RP) birthday caps (BP) piles of sand (CH) sharpened sticks (F) conical vases (RC, RP) pointed shoes (RC)

Table 5.4. Pointed objects in the stimuli

Surfaces

The final shape type analyzed in the thesis is surfaces. Surfaces are objects or parts of objects spread across two dimensions. The main distinction in question is smooth versus bumpy surface.

1) '**smooth surface**' -- surface with no visible bumps (a bookshelf, a table, a floor, mountain slopes, a wall);
2) '**bumpy surface**' -- surface with bumps (a bumpy road, a bumpy field).

Num	**Type**	**Scheme**	**Objects**
1	smooth surface		smooth road (F) smooth field (F) floor (RP) mountain slopes (RP) bookshelf (RP) wall (RP)

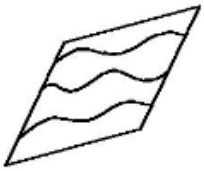
2	bumpy surface		bumpy road (F) bumpy field (F)

Table 5.5. Surfaces in the stimuli

Compilation of the tables 1-5, where the objects with the same form are clustered together, constitutes the first step of the research. The second step is looking for SASSes describing these objects, and marking the manual and non-manual (sub-)components that express the quality in question. Take as an example, the round window from the stimulus 'The country house' (Fig. 5.5). This object is presented in Table 5.1 'round objects' (row 1) and, hence, the quality in question is roundness. Figure 5.6 shows a SASS describing this object.

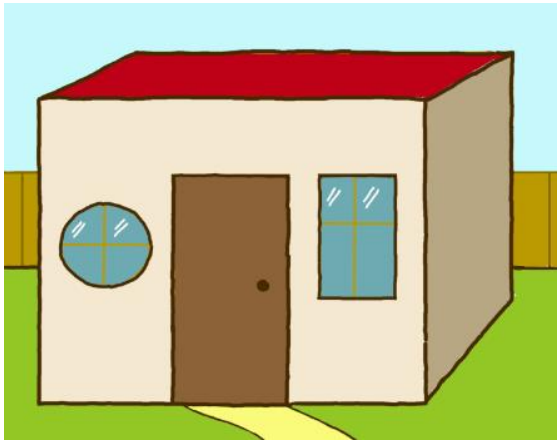


Figure 5.5. Round window in 'spot-the-difference' stimuli



Figure 5.6. RSL SASS: round (window)
[E; 08:41.4]

The SASS in Figure 5.6 has the following components:

- HS: 
- OR: vertical, palm away from the signer
- LOC: neutral space, in front of the face

- MOV: circular; in the vertical plane, downward direction, normal size, no repetition
- NMM: /o/

Out of these components, two are connected with the meaning ‘round’: the circular movement trajectory and the mouth gesture /o/. I put these components in a separate table and indicate that they mark the roundness of limited surfaces. I repeat the same procedure for the rest of the objects in the five tables. If a quality of an object receives more than one expression in my data, I reflect all the options in the new table. For example, a П-shaped elongated object (like a chin-up bar) is described in my corpus by two different SASS forms: (1) two hands in the handshape  touch each other and then move away from each other and down; (2) one hand in the handshape  draws a П-outline in the neutral space. Both these SASS forms are reflected in the table. See a fragment of the table below for the quality ‘round’:

Quality & Type	**Object**	**Num of SASSes**	**Components expressing the meaning**
Round objects: limited surfaces	Round window (CH)	1	MOV trajectory ‘circular’ NMM /o/
Round objects: limited surfaces	Round mirror (RP)	2	MOV trajectory ‘circular’ NMM /o/
Round objects: flattened spheres	Round box (RC)	3	MOV trajectory ‘arcing’ (2 hands) change of orientation
Round objects: spheres	Ball of thread (RP)	7	1) HS:  (2 hands); 2) HS:  (1 hand)
Round objects: cylinders	Pipes (F)	4	1) HS:  2) HS: 
Round objects: cylinders	Arc-shaped pipes (CS)	7	1) HS:  2) HS:  3) HS: 

Table 5.6. Expression of the quality ‘round’ in RSL SASSes

This transcription, performed on the whole body of the data for all the objects in the stimuli prepares the ground for the next step of the research, i.e. the analysis. I examine the morphological means used to express different forms of objects and cluster together the objects that are expressed the same way. For example, in the domain of roundness, limited surfaces (a round mirror) and flattened spheres (a cake) are expressed with a certain movement trajectory: a circular movement of one hand or an arcing movement of two hands away from each other and back. This is different from the expression of the same quality in cylinders (a cylindrical vase, a pipe), where it is described with the handshape , , or  depending on the size of the cross-section. This allows us to claim that with respect to this visual quality, limited round surfaces and flattened spheres are conceptualized the same way, while the cylinders receive a different conceptualization. Such an analysis enables direct comparison with spoken language data. Thus, in Russian, there is no conceptual difference between these objects in the semantic domain ‘round’: the word *kruglӯi* ‘round’ describes all three types of referents.

The analysis of size is performed in the same steps as the analysis of shape. First, for different types of objects, I indicate possible sizes. For example, flattened spheres, like a cake, can change thickness (be thicker or thinner) and diameter; Π-shaped elongated objects (a chin-up bar) can change width and height; spheres can change diameter only. I then make lists of different sizes for different objects presented in my stimuli and organize this information in table format. Functionally, these tables are the same as Tables 5.1-5.5, but filled in with size information instead of shape. Then, for each size of each shape, I indicate the morphological means used to express them (as in Table 5.6). Finally, I analyze these data and cluster together the objects with the same expression of size. This is followed by the exploration of the connection between the size and the shape in RSL SASSes and the comparison with spoken language data.

5.3. Expression of shape in RSL SASSes

This section discusses the categorization of shapes by SASSes. It is organized in five blocks of shapes introduced above: round objects, right-angled objects, pointed objects, elongated objects, and surfaces.

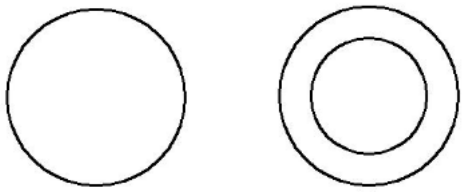
5.3.1. Round objects

The meaning of round shape is expressed in SASSes by a number of morphological means. These are:

- the movement trajectory (circular or in an arc, with one or two hands);
- the handshape feature of the flexed non-base joints;
- the mouth gestures /o/ and 'puffed cheeks'.

The choice of a particular component or a combination of components for carrying this meaning is defined by the topological class of the object.

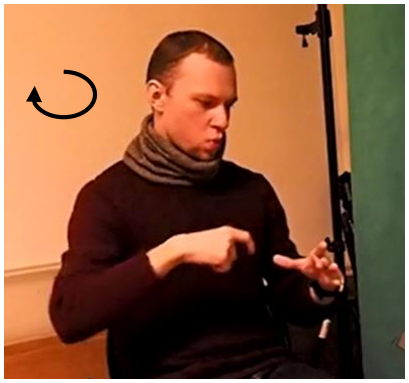
Limited surfaces and closed strips



Round-shaped flat objects, like a mirror or a window, and narrow elongated closed objects, like a jogging track, are described with a rounded movement trajectory. In my data, this is always a circular movement of one hand (Fig. 5.7). However, a semi-circular movement of both hands away from each other and back is also possible, compare the lexical sign PUDDLE that originates from a SASS (Fig. 5.8).



(a) SASS:round (mirror) [D; 04:44.8]



(b) SASS: round (strip on a plate) [S; 02:30.2]

Figure 5.7. Circular trajectory in depiction round shape in RSL SASSes



RSL sign PUDDLE

Figure 5.8. Arcing trajectory in depiction round shape in RSL SASSes (www.spreadthesign.com)

With limited surfaces, the handshape is always ☝. This handshape outlines a contour of a referent which is perceived two-dimensionally. With closed strips, the handshape is formed with the index and the opposed thumb (🤏). This combination is used for long narrow objects that are perceived two-dimensionally. The degree of aperture indicates the width of the object. The flexing of the joints can vary and is irrelevant for the object's shape.

The direction of movement in these SASSes is typically either downward (if the object is oriented vertically), or away from the signer (if the object is oriented horizontally). The SASS can be accompanied by an iconic mouth gesture /o/, which emphasizes the shape of the object.

Semi-circular lines and strips



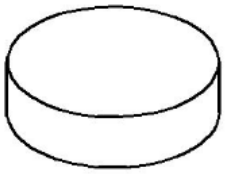
The roundness of semi-circular thin elongated objects (a stick, a thread, a thin pipe) and long narrow objects (a rainbow, a strip, a bent plank seen from the front) is also denoted with the rounded movement trajectory and, optionally, the mouth gesture /o/. As opposed to the previous group of objects, however, the hand (or the hands) does not draw a full circle. Instead, it outlines a semi-circle. Therefore, for rounded objects, the difference between closed and not

closed circular movements in SASSes necessarily leads to the difference in semantics. The handshape options are the same as in the previous group: the stretched index finger outlines arcing lines, and the index and thumb combination describes strips.



Figure 5.9. RSL SASS: curved-thin (cage handle)
[S; 03:51.8]

Flattened spheres and closed strips



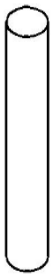
Three-dimensional flat round objects, like a cake or a hatbox, are also described with a movement trajectory. The two hands move away from each other and back in a semi-circle.



Figure 5.10. RSL SASS: round (box)
[S; 00:52.3]

The handshape is formed with the four non-spread selected fingers and the opposed thumb (). This handshape indicates the object type ‘layers’, i.e. three-dimensional objects with one dimension significantly smaller than the other two. This small dimension is shown by the hand. The aperture denotes the thickness of the object. The flexing of joints can vary and does not carry any meaning. SASSes that describe flattened spheres are not usually accompanied by a non-manual.

Cylinders



As opposed to the groups of objects described above, the round cross-section of cylinders is never described with a circular/semi-circular trajectory. Instead, it is shown by a handshape. The handshapes in these group have a combination of features [+flexed non-base joints] & [-spread]: , , and . Different handshapes from this list describe different degrees of the object's thickness. The handshapes  and  are the most frequent; they denote thin and thick cylinders, respectively. The handshape  is rarer. It is used for thin and medium-sized objects.



(a) SASS:thick-cylindrical (vase) [D; 00:28.4]; HS: 



(b) SASS:thin-cylindrical (vase) [D; 00:38.5]; HS: 



(c) SASS: thin-cylindrical (pipe) [T; 12:35.9]; HS: 

Figure 5.11. SASSes describing cylindrical objects in RSL

The movement trajectory in these SASSes does not carry the idea of roundness. The hand moves along the long side of the object outlining its general contour. SASSes that describe cylinders are not usually accompanied by an iconic mouth gesture.

Spheres



Spherical objects, like a ball, a balloon, or a spherical ceiling lamp, are also described with a particular handshape. The definitional features of this handshape are [+flexed non-base joints] and [+spread]. The combination of these features results in a single possible handshape for SASSes, i. e. . The degree of flexing the joints can vary; it reflects the object's size. In these SASSes, there is usually no movement. Two hands are located in close proximity to each other oriented palms towards the midsagittal plane. These signs are, therefore, morphologically *static*. They can be accompanied by the iconic mouth gesture 'puffed cheeks' emphasizing the spherical shape of the object.



SASS: spherical (ball) [G; 01:58.6]

Figure 5.12. RSL SASS describing a spherical object

Semi-spheres



Semi-spherical objects, like a rounded pile of sand, a birdcage, or a bowl, are described with the combination of the semi-circular trajectory and the [+flexed non base joints] handshape. The handshape is usually either , or . The execution of the movement can vary. In the case of the signs with two active hands, the hands, with the palms oriented towards the surface of the object, move away from each other in the semi-spherical trajectory (Figure 5.13). Conceptually, the hands are located on the top of the object and move away from it along the object's sides. In

the signs with one active hand, this hand moves away from the passive hands in an arc. In this case, both hands are located at one side of the object, and then the active hand moves along this side to the top and then down the other side, while the passive hand keeps delimiting the first side (Figure 5.14). The same as with the spheres, SASSes describing semi-spheres can be accompanied by the iconic mouth gesture ‘puffed cheeks’.



SASS: hemispherical-big (pile of sand) [G; 08:15.4]

Figure 5.13. RSL SASSes describing hemispheres with two active hands



SASS: hemispherical (pile of sand) [S; 08:54.6]

Figure 5.14. RSL SASSes describing hemispheres with one active hand

These data show that different geometrical types of objects chose different morphological tools to express the idea of roundness. If we take as a premise that the objects which are described the same way are conceptualized closer to each other in this semantic field, than the objects which are described differently, we can compose a semantic map:

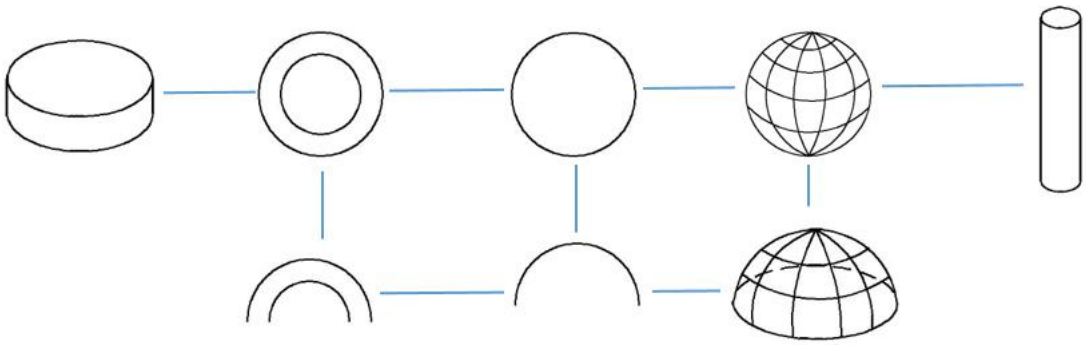


Figure 5.15. Semantic map of the field 'round'

In line with semantic maps regularly used in grammatical and lexical typology (Haspelmath, 2003; Rakhilina & Reznikova, 2016), this map reflects the combinability patterns of RSL SASSes. The objects placed close to each other are more likely to be described with the same word (in our case, morphological tool), than those which are apart. Moreover, the map forbids two objects located apart to be described by the same tool unless all the objects located in-between can be described by this tool as well. In my map, the conceptual closeness of the objects is indicated by both the location and the connecting lines. The central position of limited surfaces on the map is not accidental. I argue that this is the core of this semantic field, and some evidence for that will be presented further in the chapter. Cylinders and flattened spheres, on the contrary, represent the periphery of the field. Their location at the opposite sides of the map reflects that they are not usually conceptualized the same way (unless there is a dominant lexical item which covers the whole map). Indeed, in RSL, there is no morphological tool which would be applied to both types of objects.

The figure below shows the two manual strategies used to express the idea 'round', i.e. the trajectory versus the handshape. The handshape expresses round shape in topological classes covered by the grey bubble. The orange bubble indicates the trajectory as the main carrier of the meaning. One topological class, i.e. semi-spheres, requires both tools. This is marked by the overlap of the bubbles.

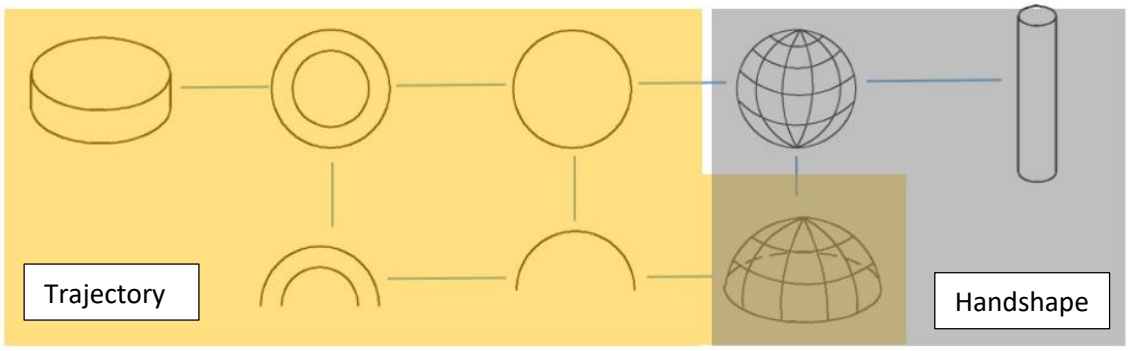


Figure 5.16. Manual strategies for describing round shape in RSL SASSes

A more detailed account of these strategies is given in Figure 5.17. Here I differentiate between different handshapes and types of the trajectory.

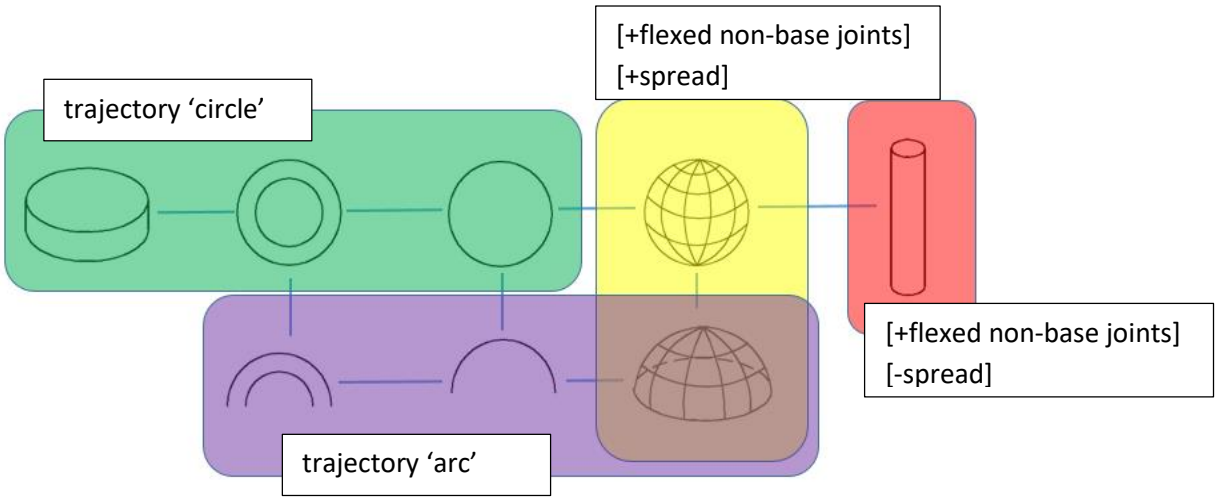


Figure 5.17. Manual strategies for describing round shape in RSL SASSes: a detailed account

The next figure shows the non-manual strategies for describing round shapes. Note that the use of an iconic non-manual is not obligatory with these signs. If a non-manual is used, however, it follows a certain pattern. The puffed cheeks can accompany SASSes describing spheres and semi-spheres, while rounded lips occur in signs describing limited surface, closed strips, semi-circular strips, and semi-circular lines.

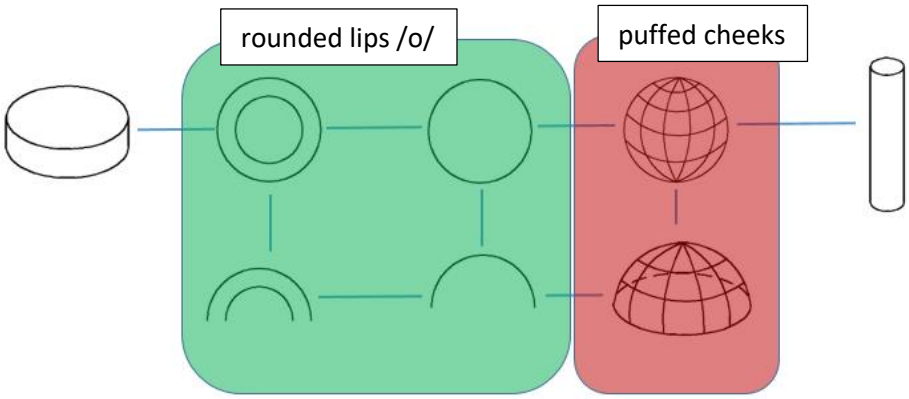


Figure 5.18. Mouth gestures expressing the idea ‘round’ in RSL SASSes

Crucially, this map does not reflect all properties of SASSes describing the objects in question, but only the aspects of their form related to the idea ‘round’. This means that the objects located far away in the map can be described by the same morphological tool if this tool is not connected with the meaning ‘round’. For example, both cylinders and flattened spheres can be depicted with the handshape . At first glance, this contradicts the map: the objects located far away are described by the same component. However, only with the cylinders, this handshape carries the meaning ‘round’. In flattened spheres, the roundness is expressed with the movement trajectory, while the handshape  reflects the topological type ‘layer’. It is possible to modify this map so that it reflects both the tools used to express the meaning ‘round’ and the use of handshapes. This requires the transformation of the general shape of the map from linear to circular. See the hybrid map in the figure below.

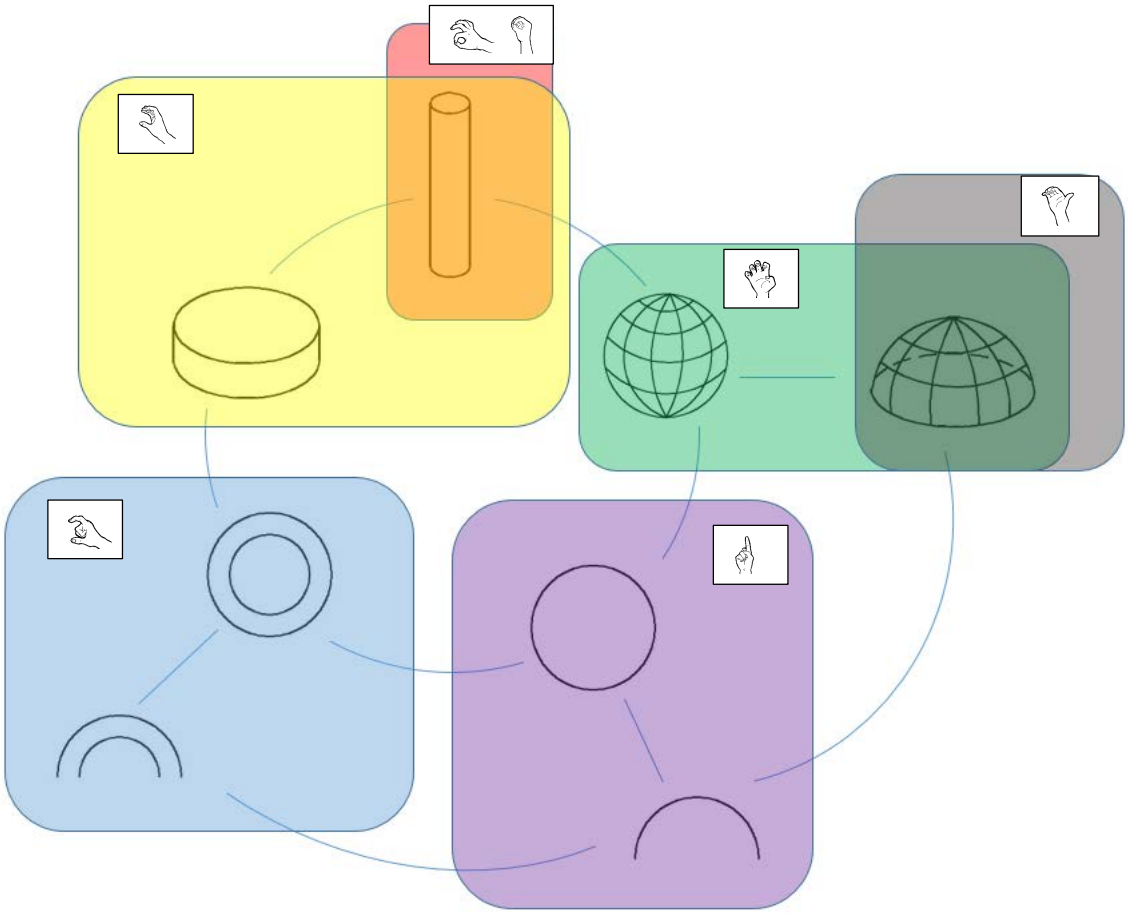


Figure 5.19. Handshapes describing round objects in RSL SASSes

In this version of the map, all the objects described by the same handshape are located close to each other. You can see that the cylinders and the flattened spheres are placed together and connected with a line. Note that accounting for handshapes in these SASSes did not require a complete reorganization of the map, it only required connecting the end points. This diagram is given here for illustrational purposes only, since it ignores the peripheral versus core status of certain topological classes. In my further discussion, I will treat the diagram in Figure 5.15 as the default map of the field 'round objects', and I will use it as a basis of comparison with other semantic fields analyzed in this chapter.

5.3.2. Right-angled objects

Objects with right angles are conceptualized as antonymic to objects with rounded sides. Here, I discuss seven types of objects, introduced in the methodology section of this chapter. As opposed to rounded objects, the right-angled referents are not usually described with the help of non-manuals. Instead, manual components serve as the sole bearers of the meaning. These components include:

- movement trajectory;
- locating the hands at the sides of an object;
- change of the aperture;
- handshape.

The concrete tools and combinations of tools are different for different groups of objects.

Limited surfaces and closed strips



Limited surfaces, like a window, a painting or a sheet of paper, and closed strips, like a picture frame, share two morphological tools of expressing the right-angled shape. These are: (1) the square movement trajectory, and (2) the location of the hands at the sides of the object. The first tool is illustrated in the figure below. Two active hands are initially placed in contact with each other. During the production of the sign, they move away from each other, then in parallel lines, and then back to each other to make a contact again. The handshapes in these SASSes are  for limited surfaces and  for enclosed strips. These configurations function in line with their general meaning: the handshape  draws unidimensional lines (if the line is closed, it is conceptualized as a boundary of a two-dimensional object), and the handshape  delimits long narrow two-dimensional referents. In case a signer wants to emphasize the meaning 'right-angled' (for example, if they contrast it to the idea 'round'), they might use a mouthing *kvadrat* 'square' or *pryamougol'nyī* 'rectangular'. As I mentioned earlier, there is no language-internal mouth gestures carrying this meaning.



(a) SASS:square (window) [S; 08:43.2]

Figure 5.20. Expression of right-angled shape in limited surfaces and closed strips

The second way of expressing right-angled shape is shared not only by these two types of objects, but, as we will see below, by some other topological classes as well. It consists in locating the hands at the sides of the referent. First, two active hands in the handshape  show two parallel sides of the object. Then they change their position to the other two sides, and their handshape to :



(a) SASS: rectangular (field) [T; 02:59.7]

Figure 5.21. Expression of right-angled shape by locating hands at the sides of an object in RSL SASSes

Importantly, here the handshape does not signify geometrical properties of the object (as opposed to  and , discussed above). In this type of SASSes, the handshape is fixed. With this respect, these SASSes represent lexicalized items. The locations and orientations of the hands, however, can vary. Typically, the described object is either horizontal or vertical facing the signer. In the first case, the hands show the far and the close sides of the object, and then the right and the left sides. In the second case, the hands are first located at the top and the bottom sides, and then at the right and the left borders.

The next two strategies can be applied to limited surfaces only. Small rectangular objects, like a small window or a picture, can be described via the change of aperture. In these signs, the two hands in the handshape  are initially in contact with each other. Then they move apart, simultaneously closing the hand. The hands end up in the configuration .



(a) SASS: rectangular (window) [R; 07:38.5]

Figure 5.22. Small rectangular objects in RSL

The index finger and the thumb in these signs delimit two parallel sides of the object. They move along these sides in the opposite directions until they reach the corners. At this moment, the hands stop moving horizontally, and the index finger and the thumb start moving towards each other until they meet, thus showing the sides of the object.

The same handshape  delimits the parallel sides of limited surfaces in the final strategy applicable to this group of objects. Here, however, the two other sides are shown not via changing the aperture, but by changing the orientation of the hand. In these SASSes, performed with one

active hand only, the hand in the configuration , first, moves along one pair of parallel sides, and then, after performing a 90-degree rotation, moves along the second pair.



SASS:rectangular (window) [R; 11:18.6]

Figure 5.23. Small rectangular objects in RSL, the final strategy

Π-lines and Π-strips



Non-closed thin elongated right-angled objects, like a chin-up bar or a door frame, are described with the movement trajectory. In contrast with limited surfaces and closed strips, the hand in these signs draws not the four, but three sides of the object. This has a direct semantic implication: the objects in question have only three sides. The execution of the movement can vary. In two-handed signs, the two hands, initially in contact, move away from each other and then in parallel lines along the two parallel sides of the object. In one-handed signs, the active hand draws a Π-shaped outline of the object. The handshapes are  for Π-lines and  for Π-strips.



(a) SASS: Π-shaped (chin-up bar) [T; 00:41.8]



(b) SASS: Π-shaped (chin-up bar) [T; 00:44.0]

Figure 5.24. Non-enclosed elongated objects in RSL: (a) two-handed signs; (b) one-handed signs

Flat parallelepipeds

Flat parallelepipeds, like chair pillows, flat boxes, or books, are described with either the right-angled movement trajectory or the location of the hands at the sides of the object. The latter strategy is exactly like the one described above for limited surfaces and closed strips. The hands in the configuration  mark two parallel sides of the object, and after that, they move to the other two sides, which they delimit with the configuration .



(a) SASS: right-angled (flat box) [G; 08:42.8]

Figure 5.25. Expression of right-angled shape in flat objects by locating hands at the sides of the object in RSL SASSes

The movement trajectory strategy has certain particularities. With this group of objects, the closed versus non-closed trajectory does not have direct semantic implications for the shape of the referent. Objects of the same shape can be described with a variety of trajectory patterns:

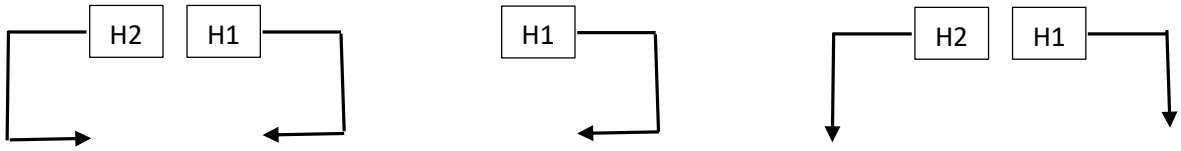


Figure 5.26. Movement trajectories describing flat parallelepipeds in RSAL SASes

The difference between the closed versus non-closed trajectory deals with the functional orientation of the object. Thus, standing referents, like a cabin, are more likely to receive a П-shaped trajectory, since their bottom side is unseen and, therefore, ignored. A flat box, lying on the table, on the contrary, has more potential to be described with an enclosed trajectory.



(a) SASS: wide-tall-rectangular (cabin) [E; 07:46.9]



(b) SASS: thick-flat-rectangular (flat box) [G; 08:38.3]

Figure 5.27. Trajectory options in describing flat parallelepipeds in RSL SASSes

This sheds light on an interesting connection between the form and meaning of SASSes. A SASS does not always outline the full contour of an object. When it shows only a part of the contour, the rest can be assumed by drawing imaginary straight lines between the end points of the object. Therefore, it is possible to draw a Π-shape to denote a square or rectangular object. But it is not possible to draw a semi-circle to denote a sphere or a circle:

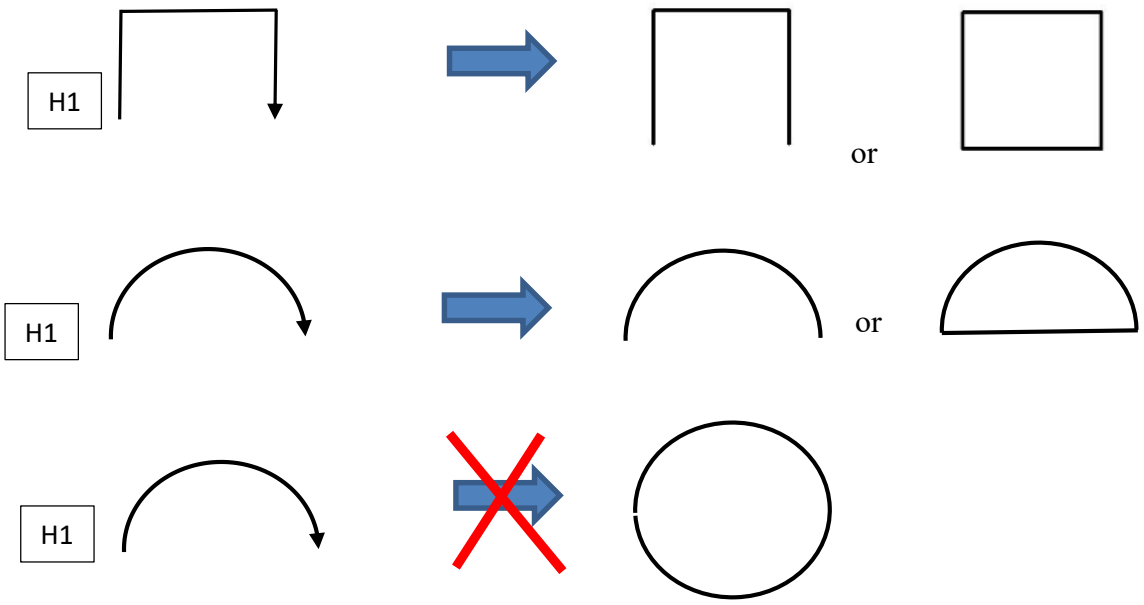
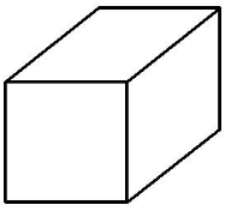


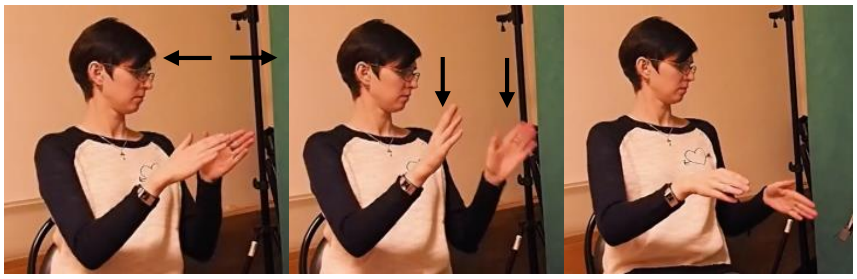
Figure 5.28. Differences in conceptualization of right-angled versus arcing trajectories in RSL SASSes

Cubes



The functional motivation of the movement trajectory described above is even more prominent with cubic objects. Here the Π-shaped trajectory represents the most widespread

strategy, since the majority of cubic referents in my stimuli are standing objects, for example, a cabin or a cabinet. The handshape  these signs denotes the surface.



(a) SASS: three-dimensional-rectangular (cabinet) [D; 02:41.1]

Figure 5.29. Expression of cubical shape of three-dimensional objects with the Π-shaped trajectory in RSL SASSes

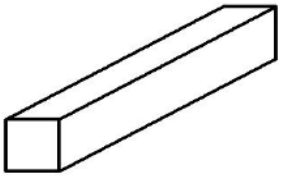
Along with this strategy, the aforementioned way of expressing this shape by placing the hands at the sides of the object is also possible.



(a) SASS: square (box) [E; 09:06.9]

Figure 5.30. Expression of cubical shape of three-dimensional objects by locating hands at the sides of the object in RSL SASSes

Cubic rods



Elongated right-angled objects, like a cubic rod, are described with a different kind of SASSes to those discussed in this subsection so far. The handshape in these SASSes has four selected fingers, which mark one long side of the object, and the opposed thumb, which marks the parallel long side. In signs with one active hand, this hand moves along these two parallel sides. In two-handed signs, the two hands, initially in contact, move in the separate directions from the center of the object towards its ends. The idea of the sides being located at a right angle to each other is, therefore, expressed with the hand configuration , while the trajectory in these SASSes depicts the general shape of the object.



(a) SASS: thick-long-right-angled (cubic rod) [T; 12:34.6]



(b) SASS: thick-long-straight (cubic rod) [S; 03:17.3]

Figure 5.31. Description of elongated right-angled objects with (a) one-handed signs; (b) two-handed signs in RSL SASSes

The figure below shows the semantic map of the field 'right-angled objects'. Note that in many respects it is similar to the map 'round' introduced above. The differences concern the pair 'sphere' versus 'semi-sphere', which does not have a correlate in the map below, and some connecting lines. Thus, flat parallelepipeds are connected with both closed strips and Π-strips. This is because they can be described by both closed and non-closed trajectories, unlike flattened spheres in the semantic field 'round'.

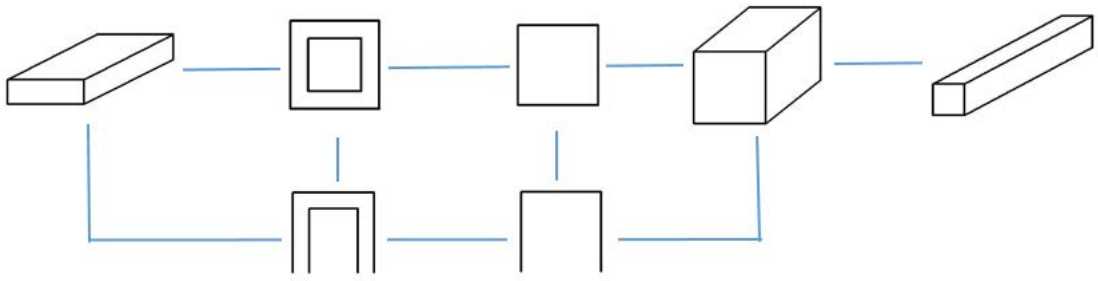


Figure 5.32. Semantic map of the field 'right-angled' in RSL

The figure below reflects the main strategies of reflecting right-angled shapes. These include right-angled movement trajectory (the green bubble), locating the hands at the sides of the object (the red bubble), the  handshape (the yellow bubble), and the two strategies applied to limited surfaces only, i.e. aperture change and the specific trajectory of movement with the hand in the  configuration (the purple bubble).

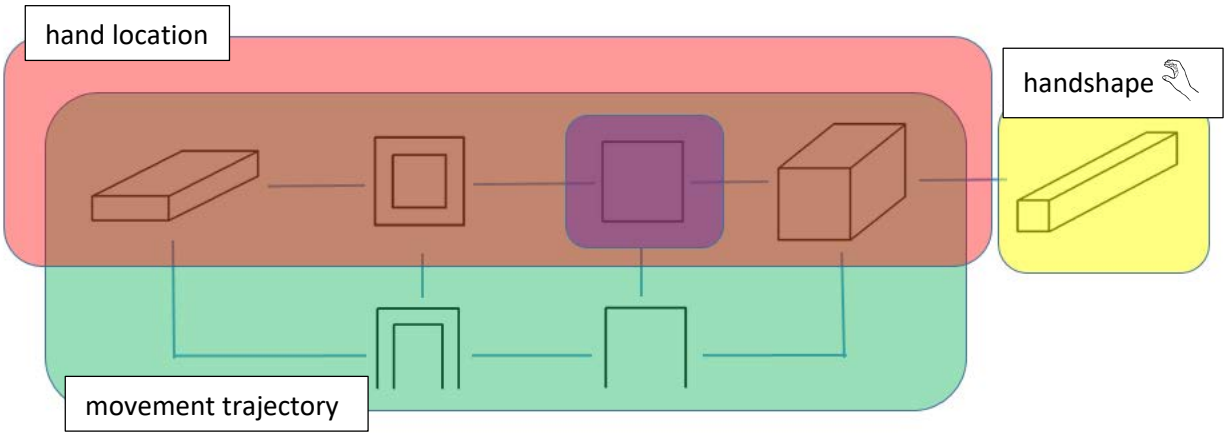


Figure 5.33. Strategies of describing the right-angled shape in RSL

The depiction of cubic rods with the handshape deserves a more detailed discussion. As I argue, this morphological tool conceptualizes the four selected fingers and the opposed thumb as two parallel sides of the object. Interestingly, however, the same handshape is used to describe cylinders, as in Figure 5.11a. There, the handshape receives a different conceptualization, i.e. the whole palm is showing the rounded side of the object. This difference is schematically illustrated in the figure below.



(a) (b)

Figure 5.34. Conceptualization of handshape in right-angled (a) versus cylindrical (b) objects

Due to the possibility to interpret the same hand configuration in different ways, we see an ambiguity in this zone: the morphological tool can potentially describe a cylindrical and a right-angled elongated object. This means that these two types of objects are, strictly speaking, not differentiated in RSL. We can reflect this by combining the two semantic maps together:

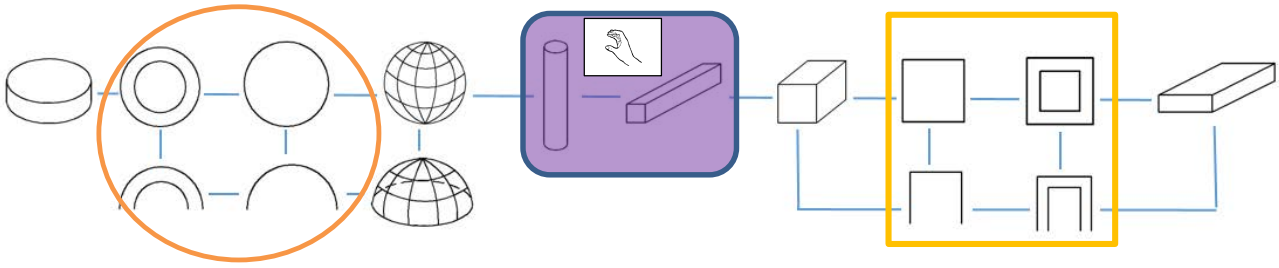


Figure 5.35. Round and right-angled objects in one semantic map

The merger of two maps from different fields into one is not unknown in linguistic typology, see, for example, the same effect in the domains of big and small sizes in spoken languages (Kozlov & Privizentseva, to appear). Conceptually, it means that some situations can be viewed from different perspectives, which leads to the possibility of their description by items

from different semantic fields. In our case, this is a handshape that can be viewed from different perspectives: either the whole palm or only the fingertips can be in the focus of the conceptualization. Crucially, such a merger can happen only in the peripheral zones of the corresponding fields. This is true for our semantic domains as well. The green circle in Figure 5.34 outlines the core part of the zone 'round', the orange square shows the core of the zone 'right-angled'. Thus, although the cylinders and cubic rods are physically located in the center of the map, they are in fact in the periphery. The possibility of these objects (i.e. their roundness and right-angledness, respectively) to be described with one morphological tool is illustrated by the purple bubble.

While fuzzy boundaries in the periphery of a field are not surprising and have theoretical explanations, the same is not true for the core zones of semantic domains, which tend to be clearly defined. At first glance, SASSes present a counter-example to this tendency. The phenomenon in question concerns the 'smoothening of the corners' in depicting the right-angled shape. This is often done for ease of effort: the (semi-)circular trajectory takes less time and less energy to produce than the angular one. As a result, there arises ambiguity in the expression of shapes by SASSes: the rounded trajectory can potentially describe both the rounded and the angular shape. See the example below:



(a) SASS: flat-rectangular (painting) [D; 04:00.7]

Figure 5.36. Arcing trajectory in describing rectangular shape in RSL SASSes

This overlap of the meanings received a number of different explanations in sign linguistics. For example, Ferrara and Napoli (2019) found the correlation between the number of active hands and the described shape. They state that, at least with respect to limited surfaces, two-handed signs are used for depicting angular referents, while one-handed signs denote circles. I have not found this pattern in my data. Instead, the use of the smoothened trajectory for the description of angular objects depends, in my corpus, on the discourse status of the object and the morphological status of the SASS. Thus, if the object has been already introduced before and/or if the SASS in question is lexicalized and is accompanied by a mouthing which clearly states the object's name, the trajectory is likely to be smoothened. This functional difference between the SASSes depicting round versus right-angled objects is strengthened by a formal distinction. The formal distinction concerns the handshape orientation in these signs. If a SASS denotes a round-shaped object, the hand slightly turns while outlining the contour of the object. This guarantees the consistency of the contour: the palm is always oriented towards the center of the object. If a SASS denotes a right-angled object, the hand, on the opposite, does not change its orientation (see the illustration below).



(a) SASS: thick-rounded (hat box) [D; 03:01.0]



(b) SASS: thick-rectangular (box) [G; 08:38.3]

Figure 5.37. Denoting rounded (a) and right-angled (b) objects with arcing trajectory in SASSes

This means that the overlap in the lexical expression of these two shapes is superficial. Although the trajectories in these SASSes are indeed the same, the changing versus non-changing orientations assure the different forms of the signs.

5.3.3. Pointed objects

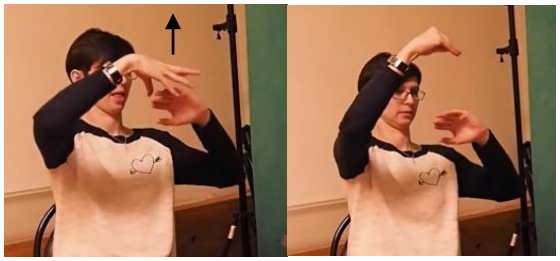
Objects with a pointed end constitute a homogenous group in my stimuli. The two subgroups I discuss in this section are (1) flat objects which are conceptualized two-dimensionally (a knife, a scythe, a tree leaf), and (2) three-dimensional objects with a conical end-point (a mountain top, a cap, a pointed roof). This physical quality can be expressed by a number of different morphological tools:

- change of the hand aperture;
- movement trajectory;
- mouth gestures.

The first tool is the default way to express pointedness. It consists in moving the hand away from the center of the object towards its end-point while simultaneously closing the hand. The actual handshapes in these signs can vary, they denote the thickness of the object. Flat objects are described with the configurations  ⇨ , and conical ends are indicated with the handshapes  ⇨ . Sometimes, a pointed object can be depicted with configurations  ⇨ . See some examples below:



(a) SASS: pointed (spade) [D; 03:44.5]



(b) SASS: pointed (mountain top) [D; 04:19.8]



(c) SASS: pointed (stick) [R; 08:24.6]

Figure 5.38. Depicting pointed objects with the change of the hand aperture: (a) ⇨, (b) ⇨, (c) ⇨

The combination ⇨ is rare in my data. Conceptually, the index and middle selected fingers indicate referents which are wider than those denoted with the index finger only, and narrower than those denoted with all four fingers. See an illustration from Supalla's account of ASL SASSes, provided in Chapter 1 and copied here:

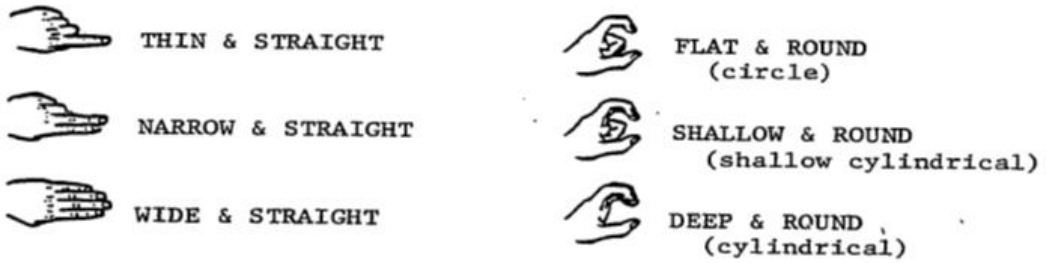


Figure 5.39. ASL SASS handshapes
(Supalla, 1982)

In RSL SASSes, however, the handshapes with the index and the middle selected fingers occur in changing configurations only. My data indicate that they lie in the periphery of the SASS morphemic system and do not have consistent use (see Chapter 3.1 for a detailed discussion).

The movement trajectory can be used for denoting the pointed end in three-dimensional objects. In its prototypical form, this tool consists in two active hands moving from the wide base of the object towards its pointed end until they meet each other.



(a) SASS: pointed (mountain) [D; 04:12.4]

Figure 5.40. Depiction of pointed shape with movement trajectory in SASSes

Rarer, the hands move in the opposite direction: from the end-point of the object towards its wide sides. This can be accompanied by the opening of the hands.



(a) SASS:conical (vase) [S; 01:19.4]

Figure 5.41. Depiction of pointed shape with movement trajectory-2 in SASSes

Finally, in one-handed signs, the hand moves from one side of the object over its end-point towards the other side. This strategy is applied, for example, in the lexicalized sign MOUNTAIN.



(a) lexSASS:mountain

Figure 5.42. Depiction of pointed shape with movement trajectory-3 in SASSes (www.spreadthesign.com)

The manual components expressing the idea ‘pointed’ can be ‘strengthened’ by echo-phonology mouth gestures. In these non-manuals, the mouth is initially open, and then it closes along with the hand closing. The variants are: /ap/, /om/, /asch’/, /lm/. In the signs where the hands move away from each other (as in Figure 5.41), the mouth movement is the opposite, i.e. the mouth is opening (/pl/). Although echo-phonology is quite frequent in this zone, it is not always present and is not obligatory for the well-formedness of the sign.

The diagram below (Fig. 5.43) summarizes the strategies of expressing the pointed shape. Since the diversity of objects in this zone is much smaller than in the previous groups, the diagram is more compact. The green bubble represents the change of aperture, and the orange bubble stands for the movement trajectory. The non-manual tools of expressing the shape are applicable to both types of objects and are not reflected in the diagram in order to maintain the clarity of the map.

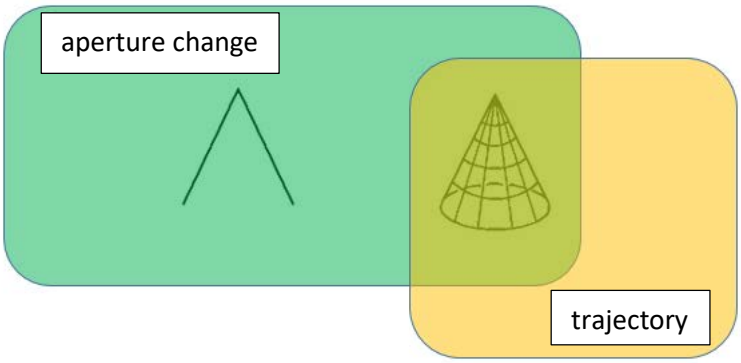


Figure 5.43. Semantic map of the field 'pointed' in RSL

5.3.4. Elongated objects

Elongated objects in my stimuli fall into three groups: straight objects, arcing objects, and wavy objects. Each can be one of three topological classes: lines, cylinders, and strips. Note that one of these types, the cylinder, has been already presented above in the section 'round objects'. Here, however, not the round cross-section of a cylinder, but the long shape is under discussion. The elongated quality of the object is expressed in a SASS with a movement trajectory: the hand moves along the long side of the object. The shape of the trajectory corresponds to the shape of the object, while the handshape shows the topological class:  indicates lines; , , and  denote cylinders, and  are used for strips. See some examples below:



(a) SASS: straight-cylindrical (scythe handle) [E; 07:12.1]



(b) SASS: arcing-narrow (small path) [G; 07:01.3]



(c) SASS: wiggly-thin (thread) [G; 02:10.5]

Figure 5.44. Depiction of elongated objects in RSL: (a) with straight trajectory, (b) with arcing trajectory, (c) with wavy trajectory

Sometimes, the elongated shape of the object is marked with a mouth gesture, in addition to the movement trajectory. The choice of the mouth gesture depends on the shape of the object: the non-manual /pah/ is used for straight objects, the articulation /o/ -- for bent referents, and /th/ (protruded tongue) – for wavy things.



(a) SASS: straight (small path) [E; 07:36.5]



(b) SASS: arcing (small path) [D; 07:10.6]



(c) SASS: wavy (thread) [G; 02:01.0]

Figure 5.45. Mouth gestures in SASSes depicting elongated objects: (a) /pah/ 'straight'; (b) /o/ 'arcing'; (c) /th/ 'wavy'

The semantic map below summarizes the data. The bubbles unite the objects that are described with the same movement trajectory and the same mouth gesture.

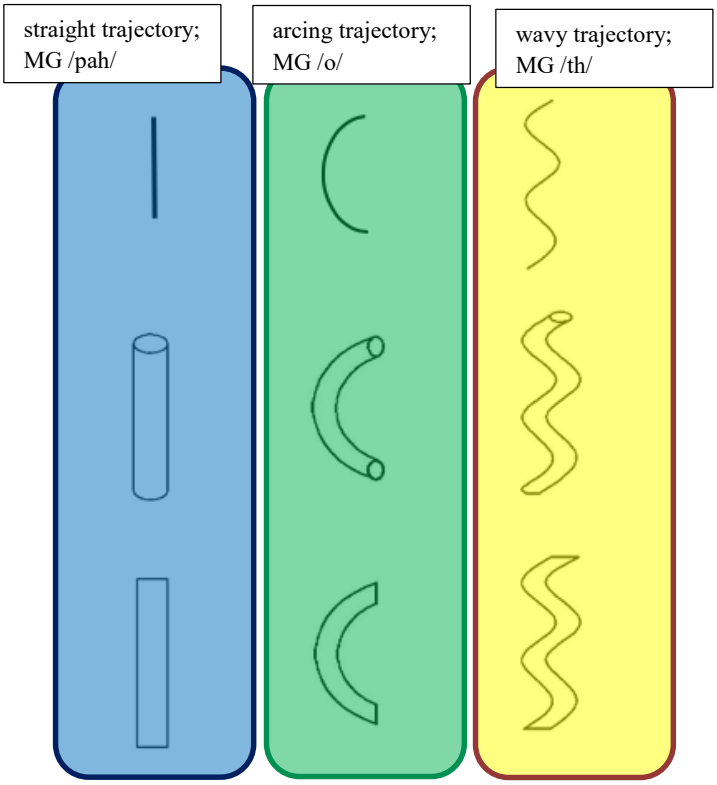


Figure 5.46. Semantic map of the field 'elongated objects' in RSL

5.3.5. Bumpy versus smooth surfaces

The last type of objects discussed in this chapter is the surface. The distinction I focus on is the one between a smooth versus bumpy surface. In my stimuli, this distinction is reflected in different states of football fields and roads. The topological class 'surface' is marked in RSL with the handshape  with an optional spreading of the fingers. The hand moves along the surface with the palm oriented towards this surface. The quality of the surface is determined by the movement trajectory: while smooth surfaces are depicted with a straight trajectory, bumpy ones are expressed with a wavy trajectory, which is achieved either via the pivoting of the wrist or with the wiggling of the fingers. Additionally, this can be intensified with the help of the

mouth gestures: ‘sucked in cheeks’ for smooth referents, and ‘protruded tongue’ or ‘puffed’ cheeks for bumpy objects, see some examples below.



(a) SASS: smooth [T; 04:06.3]



(b) SASS: bumpy (road) [R; 06:01.7]

Figure 5.47. Depicting different types of surface in RSL

5.3.6. Section conclusion: role of the mouth articulation

Section 5.3 describes morphological tools RSL SASSes use to depict different types of shape. These tools consist of both manual and non-manual components. The manual components include the movement trajectory, the handshape, the location of the hands, and the aperture change. The non-manual components consist of a set of mouth gestures. However, the role of these components is not equal: non-manual articulation is not obligatory in these SASSes and can be omitted without affecting the well-formedness of the sign. It is used by signers to intensify the meaning – for example, when the shape in question is crucial for spotting a difference in the ‘spot-the-difference’ task. At the same time, the choice of non-manuals in this zone is highly regular: when a signer decides to use a mouth gesture to underline a certain shape, the form of the mouth gesture is dictated by the shape in question. Moreover, mouth gestures are not limited by a single shape, but, as we have seen, spread across semantic fields. For example, the mouth gesture ‘puffed cheeks’ appeared in my analysis in two fields, i.e. ‘round objects’ and ‘bumpy surface’. This means that the meaning of a mouth gesture does not equal a single shape in question (i.e., ‘sphere’ or ‘bumpy surface’), but is wider. Here, I will discuss the semantic characteristics of two mouth gestures, which are spreading across semantic fields in my data:

- /th/ ‘protruded tongue’
- ‘puffed cheeks’

The mouth gesture /th/ ‘protruded tongue’ occurs in my data in two semantic fields: ‘elongated wavy objects’ and ‘bumpy surface’. In the first field, it co-occurs with wavy lines (a hanging piece of thread), wavy cylinders (a wavy pipe), and wavy strips (a wavy narrow mirror). In the second field, it characterizes bumpy surfaces. The schematic representation of the set is provided below:

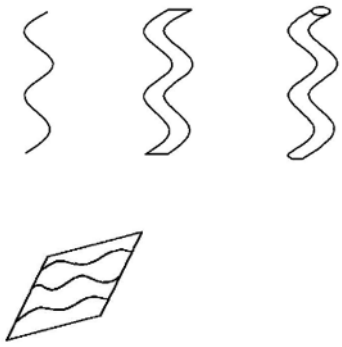


Figure 5.48. Objects described by the mouth gesture /th/ 'protruded lips'

Besides the wavy outline, the common feature these referents have is the lack of functionality. An object is very rarely designed to have a wavy/wiggly shape. More often in everyday life, this shape is a result of mistreatment. For example, a bumpy road is a road which has not been taken care of, and because of that, it lost its quality over time. In the same manner, a piece of thread hanging from the table is usually a result of a non-intentional situation: someone forgot to put it away. Therefore, it is possible, that the core meaning of the mouth gesture /th/ is not a particular shape, but the idea of non-functionality. Interestingly, the same non-manual in BSL has been reported to express the idea 'not neat; performed without care' (Lewin & Schembri, 2011). This idea is very close to the meaning I propose. This might mean that the facial expression in question has wide cultural associations, which spread, at least, across Europe and constitute an inherent part of sign languages.

The mouth gesture 'puffed cheeks' co-occurs in my data with spheres, semi-spherical objects, and bumpy surfaces. See a schematic representation below:



Figure 5.49. Objects described by the mouth gesture 'puffed cheeks'

This combination, most probably, has a visual basis. All three referents have convex sections in them. Since the puffed cheeks create the same form, this is an iconic mouth gesture. The most widespread manual strategy of expressing this shape is the handshape . Its presence, however, is not necessary for the mouth gesture to appear. For example, the bumpy surface is more often described with the flat hand configuration and a wiggly trajectory. And yet, even in these cases, the mouth gesture 'puffed cheeks' can be used. This means that this non-manual does not represent the case of echo-phonology reflecting certain manual features of the sign. Rather, it has a direct connection to the shape of the referent.

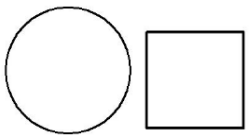
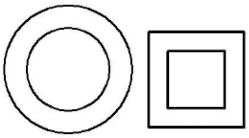
The question of whether this mouth gesture is limited to the semantics described above or not still remains unanswered. In my practice, I encountered 'puffed cheeks' in a different type of contexts, namely, with the meaning of the intensifier. For example, in a casual conversation, a signer used this mouth gesture with the manual sign HEAVY to express the idea 'very heavy'. It

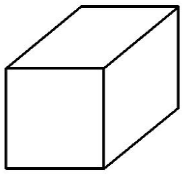
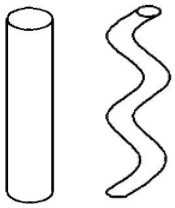
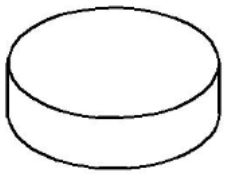
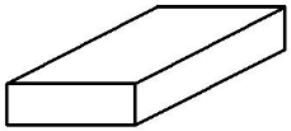
is yet to be determined whether this is the same mouth gesture with a wide meaning or two homonymous mouth gestures.

These data set the ground for a global semantic investigation of mouth gestures in RSL. They convincingly show that mouth gestures play an important role in expressing the visual characteristics of objects. However, this role is different in the domains of shape and size, respectively. While in the expression of shapes, the use of the non-manual articulation is secondary to the manual components, in the domain of size the role distribution is reverse. The next section of this chapter provides a detailed discussion of the latter.

5.4. Expression of size in RSL SASSes

This section explores different strategies used by RSL SASSes to describe different sizes of objects. Although potentially any object can be bigger or smaller in any of its three dimensions (or two, in the case with two-dimensional referents), different topological classes impose different limitations on their possible sizes. For example, as I mentioned in the methodology section of this chapter, a round mirror can be big or small (i.e., it can change its diameter), but not wide versus narrow, or long versus short. If we imagine a situation where we add to the width of a mirror, but do not change its length, it stops being round and becomes oval. Therefore, it is impossible to study the expression of size without taking into account the shape of the object. The list of possible sizes for different types of objects and their representation in my data are given in the table below.

Type	Sizes	Objects in the stimuli
limited surface 	big versus small	BIG: big mirror (RP) big plate (RC) SMALL: small mirror (RP)
enclosed strips 	big versus small	BIG: big window frame (BP) SMALL: small picture frame (BP)
	wide versus narrow	WIDE: wide window frames (RC) NAR: narrow window frame (BP)
sphere 	big versus small	BIG: big ball (RP) NEUT: middle ball (RP) SMALL: small ball (RP)
hemisphere 	big versus small	BIG: big rock (CS) big pile of sand (CH) SMALL: small rocks (CS) small pile of sand (CH)

cube 	big versus small	BIG: big bird cage (RC) big box (CH) cabinet (RP) NEUT: normal sized box (CH) SMALL: small box (CH)
cylinders  	thick versus thin	THICK: thick pipe (CS) thick chimney (RP) thick pencil (BP) THIN: thin pipe (CS) thin chimney (RP) thin pencil (BP)
	long versus short	LONG: long pipes (CS) long snake (F) tall vase (RP) long brush (RP) NEUR: normal sized brush (RP) SHORT: short pipes (CS) short snake (F) short vase (RP) short brush (RP)
flattened sphere 	big versus small	BIG: big cake (BP) big hat box (RC) SMALL: small cake (BP) small box (RP) small hat box (RC)
	thick versus thin	THICK: thick hat box (RC) THIN: thin hat box (RC)
flat parallelepiped 	big versus small	BIG: big flat box (CS) SMALL: small flat box (CS)
	thick versus thin	THICK: thick flat box (CS) thick chair pillow (BP) THIN: thin flat box (CS) thin chair pillow (BP)

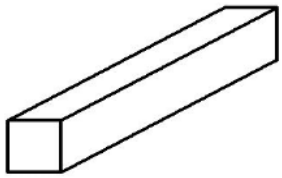
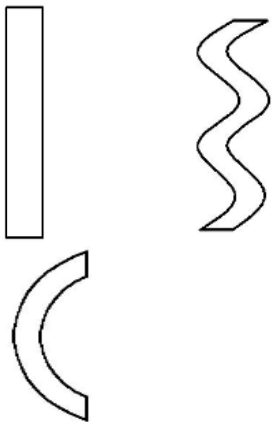
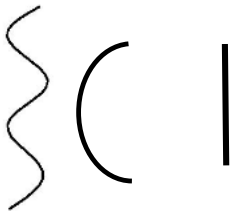
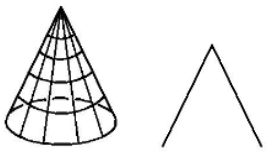
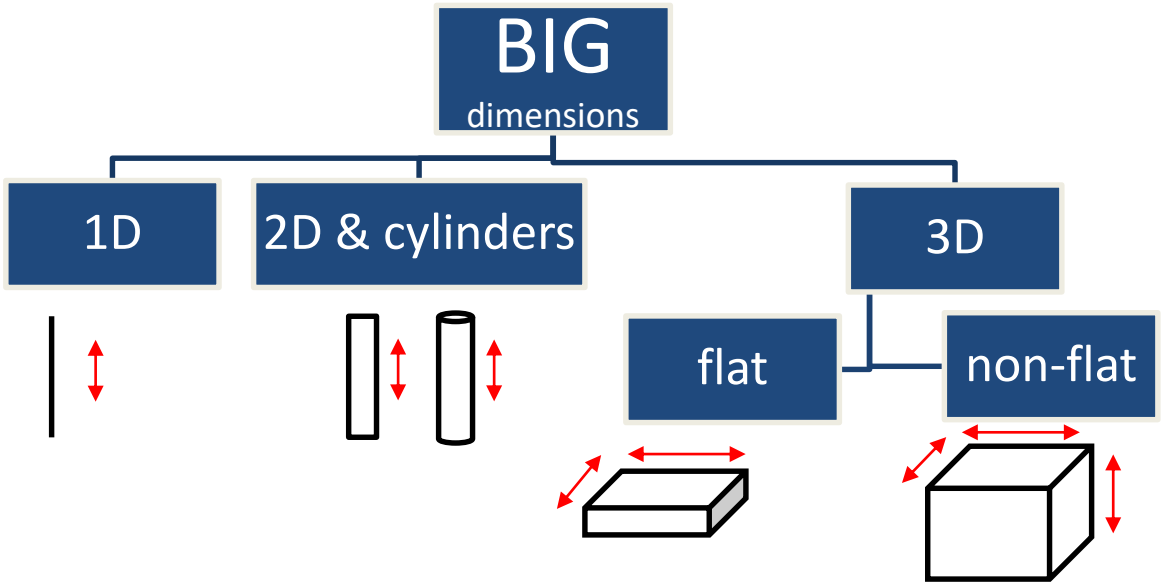
plank 	thick versus thin	THICK: thick plank (CS) big step (F) THIN: thin plank (CS) small step (F)
	long versus short	LONG: long plank (RP) SHORT: short plank (RP)
strips 	wide versus narrow	WIDE: wide plank (CS) wide small path (CS) NAR: narrow plank (CS) narrow small path (CS)
	long versus short	LONG: long curtains (RC) SHORT: short curtains (RC)
lines 	thick versus thin	THICK: thick line (BP) THIN: thin line (BD)
	long versus short	LONG: long stick (BD) tall street lamp (BD) long knitting needle (RC) SHORT: short stick (BD) low street line (BD) short knitting needle (RC)
pointed objects 	big versus small	BIG: big birthday cap (BD) big scythe (CH) SMALL: small birthday cap (BD) small scythe (CH)

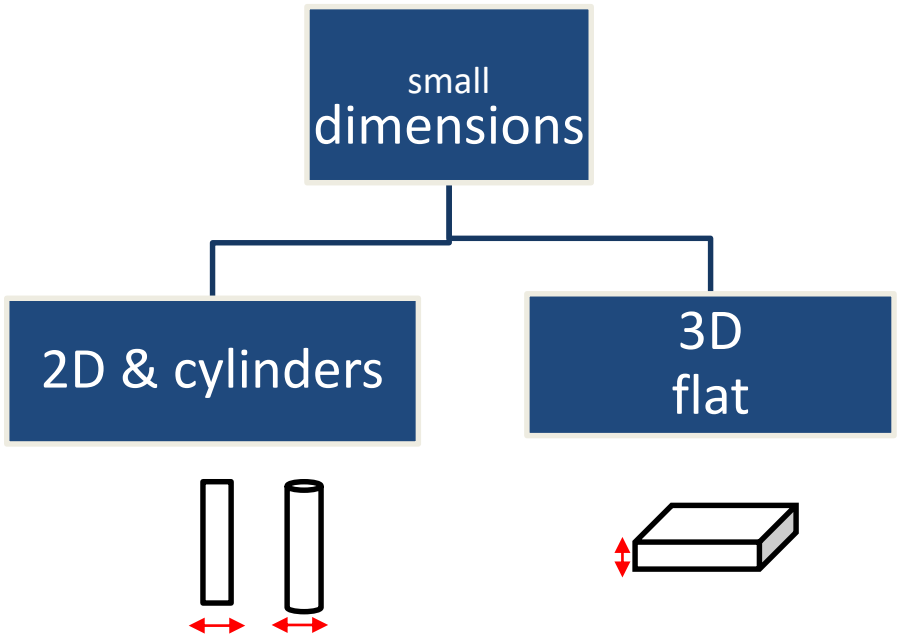
Table 5.7. Objects of different sizes in my stimuli

Size and shape specifiers in RSL use two strategies to express size: a tracing and a static strategy. In tracing SASSes, the hands move along the sides of an object, outlining its contour. In static SASSes, the hands are located at the sides of the object. The choice of the manual component to express the meaning of size depends on the described dimension and, sometimes, on certain geometrical properties of the object. Thus, the main distinction that defines what morphological tool will be applied in a given situation is the distinction between the 'big' and the 'small' dimensions. The 'big' dimensions include (1) the only dimension of a unidimensional object (i.e, length of a thread); (2) the bigger dimension of a two-dimensional object and a

cylinder (i.e., length of a small path; length of a pipe); (3) two bigger dimensions of a flat three-dimensional object (i.e., width and depth of a flat box): (4) all three dimensions of a non-flat three-dimensional object (i.e., height, depth and width of a table). The 'small' dimensions are (1) the smaller dimension of a two-dimensional object or a cylinder (i.e., width of a small path, thickness of a pipe), and (2) the smallest dimension of a flat three-dimensional object (i.e., thickness of a flat box). The schemes below illustrate the two groups.



(a) 'big' dimensions



(b) 'small' dimensions

Figure 5.50. Conceptual distinction between big and small dimensions of objects

The geometrical properties of the object come into play when the handshape is the carrier of the size meaning. In this case, the choice and the form of the handshape depends on the topological class of the referent. As the next sections of this chapters will show, every time signers use a hand configuration to describe the size of an object, they determine whether the

referent is (a) a sphere, (b) a cylinder, (c) an elongated object, (d) a two-dimensional object, or (e) a three-dimensional flat object. Below, I illustrate my arguments about the importance of the topological class and the described dimension by discussing the observed strategies of expressing the size.

5.4.1. Tracing SASSes

As I mentioned earlier in this chapter, in tracing SASSes one or two active hands move along the contour of the object. The choice of the manual component to express the idea of size depends on the described dimension. The 'big' dimensions are expressed with the size of the movement. For example, in Figure 5.51-a, the tall vase is depicted with a long vertical movement of the hand in the configuration . Figure 5.51-b illustrates the depiction of a big flat box. In this SASS, the two hands in the configuration  move away from each other and back in a wide arcing movement. Finally, Figure 5.51-c shows the expression of a small size. A short plank is described with a small straight movement of the hands in the configuration  away from each other.



(a) SASS: long-cylindrical (vase) [E; 01:22.8]



(b) SASS: big-rectangular-flat (box) [G; 08:32.2]



(c) SASS: short-elongated (plank) [G; 02:32.1]

Figure 5.51. Description of size with movement trajectory in SASSes

The 'small' dimensions are expressed with the handshape. Both the choice and the form of the handshape carry the meaning of the size. If the described object is a cylinder, then its 'small' dimension, i.e. thickness, can be represented with one of the following handshapes: , , or

. The handshape denotes thin cylinders, the configuration is used for thick cylinders, and the handshape , which occurs rarely in my data, indicates the size in-between the two extremes. The configuration can change the distance between the thumb and the fingertips to provide additional clarification of size. See some examples below:



(a) SASS: thin-cylindrical-arc-shaped (pipe) [G; 07:52.9]



(b) SASS: thin-cylindrical (vase) [D; 00:38.5]



(c) SASS: thick-cylindrical (pipe) [T; 00:52.4]

Figure 5.52. Expression of thickness of cylinders in RSL SASSes

The width of two-dimensional objects and the thickness of flat three-dimensional objects are described with the hand configurations and , respectively. The degree of the hand opening correlates with the size of the dimension in question. In its extreme form, if the described dimension is very small, the handshapes can qualitatively change to and , respectively.



(a) SASS: thick-flat-3D (box) [D; 08:44.5]



(b) SASS: thin-flat (plank) [E; 03:28.5]



(c) SASS: wide-2D (plank) [D; 06:36.7]



(d) SASS: narrow-long-2D (small path) [R; 10:36.4]

Figure 5.53. Expression of size of small dimensions in tracing SASSes

5.4.2. Static SASSes

In static SASSes, the hands either do not move at all, or their movement does not outline the contour of an object. The size in these signs is always expressed through the distance between two points. The choice of the points, again, depends on the described dimension. If a static SASS depicts one of the big dimensions, then the two reference points are the two hands which are located at the sides of the object. The set of possible handshapes in this group of signs is quite limited and includes only , , and . The first configuration is used with spherical objects, the second one applies to elongated referents (lines, narrow strips, and thin cylinders). The last handshape is the most frequent one and it is used with all remaining topological classes of objects.



(a) SASS: big-spherical (ball) [D; 03:13.3]



(b) SASS: long-elongated (knitting needle) [E; 01:51.9]



(c) SASS: big-3D (table) [G; 07:26.1]

Figure 5.54. Expression of size of big dimensions with static SASSes

An extension of this strategy is locating the hands at two sides of an object and then changing their position to the two remaining sides. This is possible with right-angled referents only. These SASSes are very similar to the ones discussed in the previous section of this chapter (see Figures 5.21, 5.25, 5.30). The only difference is that when a signer describes shape this way, the distance between the hands is not particularly meaningful, whereas when they use this strategy to determine the size of an object, the distance acquires primary importance.



(a) SASS: big-rectangular-3D (box) [S; 09:11.3]



(b) SASS: small-rectangular-3D (flat box) [G; 08:42.8]

Figure 5.55. Description of size of right-angled objects in RSL SASSes

If a static SASS depicts one of the small dimensions, then the two reference points are the thumb and the selected finger(s) of the active hand. These SASSes are almost exclusively one-handed, and the location of the hand does not have any importance for the size of the object, as opposed to the strategy described above. The handshapes used in these signs are  (for two-dimensional elongated objects) and  (for cylinders and flat three-dimensional objects).



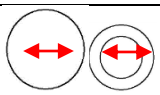
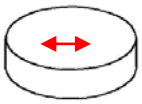
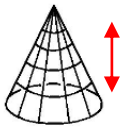
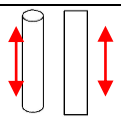
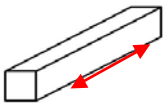
(a) SASS: thick-cylindrical (pipe) [T; 01:46.3]

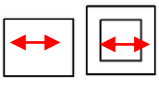
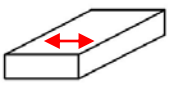
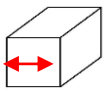
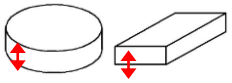


(b) SASS:thin-2D (garden bed) [E; 06:56.5]

Figure 5.56. Expression of small sizes with static SASSes

The table below shows the use of the described strategies with different types of objects.

Object type						
Tracing SASS; size of movement	+	+	+	+	+	+
Tracing SASS, HS						
Static SASS, distance between hands	+ (HS: )	+ (HS: )	+ (HS: )	+ (HS: )	+ (HS: )	+ (HS: )
Static SASS, hands at four sides						
Static SASS, distance between fingers						

Object type						
Tracing SASS; size of movement	+	+	+	+		
Tracing SASS, HS						+ (HS: )
Static SASS, distance between hands	+ (HS: )	+ (HS: )	+ (HS: )	+ (HS: )	+ (HS:)	
Static SASS, hands at four sides		+	+	+		
Static SASS, distance between fingers						+ (HS: )

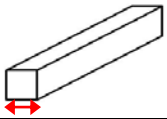
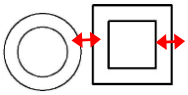
Object type				
Tracing SASS; size of movement				
Tracing SASS, HS	+ (HS: )	+ (HS: )	+ (HS: )	+ (HS: )
Static SASS, distance between hands				
Static SASS, hands at four sides				
Static SASS, distance between fingers	+ (HS: )	+ (HS: )	+ (HS: )	+ (HS: )

Table 5.8. Expression of size in different objects

The table shows that the morphological tools RSL signers use to express size are quite unified. All objects except for the spheres can be described with both static and tracing SASSes. The limitation for the spheres most probably has a morphological, and not a semantic, foundation: the form of these referents can only be described with static SASSes. I believe that this restriction spreads to the expression of size. The concrete strategies of the size expression in each case depend on the described dimension, and not on the object's shape. The 'big' dimensions are indicated with the size of the movement trajectory or the distance between the hands. The right-angled enclosed objects constitute a separate group as their size can be optionally indicated by locating the hands at all four sides of the referent. The 'small' dimensions are characterized by handshape. This is where topological classes of the object come into play.

5.4.3 Section conclusion: role of the mouth articulation

Whereas the manual components of the SASSes described in this section show limited differentiation of the object's topological type, the non-manual articulation in these signs completely ignores it. As I mentioned above, mouth articulation plays an important role in the size specification. If a sign describes an object's size, it is obligatorily co-articulated with a mouth gesture. This mouth gesture indicates whether the object is bigger or smaller than the norm. This distinction between the two extremities contrasts with the common assumptions about these signs. Since the SASSes are often argued to possess a gestural part (Liddell, 1980), they are assumed to express the size of an object in an analogue manner. In this point of view, every time a signer estimates an object's dimension, they produce a manual sign showing its exact size, and they express the idea: 'the object is this size'. I, however, argue that every time a signer describes the size, they put it into the category 'big' or 'small'. The category is indicated by the mouth gesture. The manual components provide a secondary tool with this respect and do not show the exact dimensions of the object. On the contrary, the size of the trajectory and the hand aperture can depend on side factors such as the position of the sign in the sentence and the discourse status of the sign. For example, if the sign is in the focal position, the movement size

tends to be bigger. If a signer compares two objects, they emphasize the difference with more extreme movement sizes or hand apertures.

The detailed description of the mouth gestures carrying the meaning of the size is provided in Chapter 4 of this thesis. Here, I give a brief recap of the morphemes. The big size is expressed with the mouth gestures /o/ and /af/. The small size is indicated by the articulations /peeh/, /pl/, and /u/, see Figures 4.21-4.27. Some examples are repeated here for quick reference.



(a) SASS: narrow_long_straight (road)
MG /u/ [E; 07:32.9] (Ch.4:21a)



(b) SASS:arcing_wide (road)
MG /o/ [S; 01:40.0] (Ch.4:27b)



(c) SASS: big_round (box)
MG: /af/ [E; 01:06.6] (Ch.4:26a)



(d) SASS: thin_cylindrical (vase)
MG: /peeh/ [D; 0:38.5] (Ch.4:23a)



(e) SASS: small (table)
MG: /pl/ [G: 9:00.4]
Figure 5.57. Mouth gestures expressing the idea of size in RSL SASSes

The difference between the mouth gestures with the same meaning (i.e., /af/ versus /o/, and /peeh/ versus /pl/ versus /u/) is an object of future research. Informal consultation with native signers reveals a possible morphological basis of the distinction. Thus, they reported that the articulation /af/ looks more natural with static SASSes, whereas the mouth gesture /o/ accompanies only tracing SASSes. The same distinction was argued for the non-manuals /peeh/ & /pl/ versus /u/. My data, however, does not seem to confirm this claim. The mouth gestures /af/, /peeh/ and /pl/ have been found with both static and tracing SASSes, while its synonyms /o/ and /u/ proved to be much less frequent. The non-manuals /af/, /peeh/ and /pl/, in my data, are the default mouth gestures for expressing the idea of size. They appear in signs describing all topological classes of objects, and all possible dimensions. Since the non-manual articulation is the main carrier of the size meaning, it means that, conceptually, size may not be so closely interconnected with shape in RSL, as in spoken languages. A detailed comparison of these data with the data of spoken languages is presented below.

5.5. Discussion

This chapter explores different ways RSL SASSes categorize objects' shapes and sizes. The described data provide the first glimpse into the structuring of this semantic field in RSL. This kind of analysis has been never conducted for a sign language before. With these data in hand, we can challenge the existing assumptions about the categorization of visual properties of objects, which have been postulated on the basis of spoken languages (Dixon, 1977; Gilyarova, 2002; Kozlov & Privizentseva, to appear).

One of these assumptions concerns the unequal status of the shape versus the size. As I discussed in Section 1 of this chapter, some spoken languages have been reported to have a very limited expression of the shape, while the sets of size words are usually numerous (Dixon, 1977; Rakhilina, 2010). Unsurprisingly, this discrepancy does not hold for RSL. My data show a variety of tools to depict different forms of objects, with right-angled objects being just as well represented as rounded ones. This contrasts with spoken languages, which tend to have better coverage of rounded referents (Gilyarova, 2002). Even if we zoom in the domain 'round', though, we can see a much higher degree of diversity of lexical tools in RSL, than in, at least, some spoken languages. Take another look at the semantic map of this field (Figure 5.17, copied below for a quick reference).

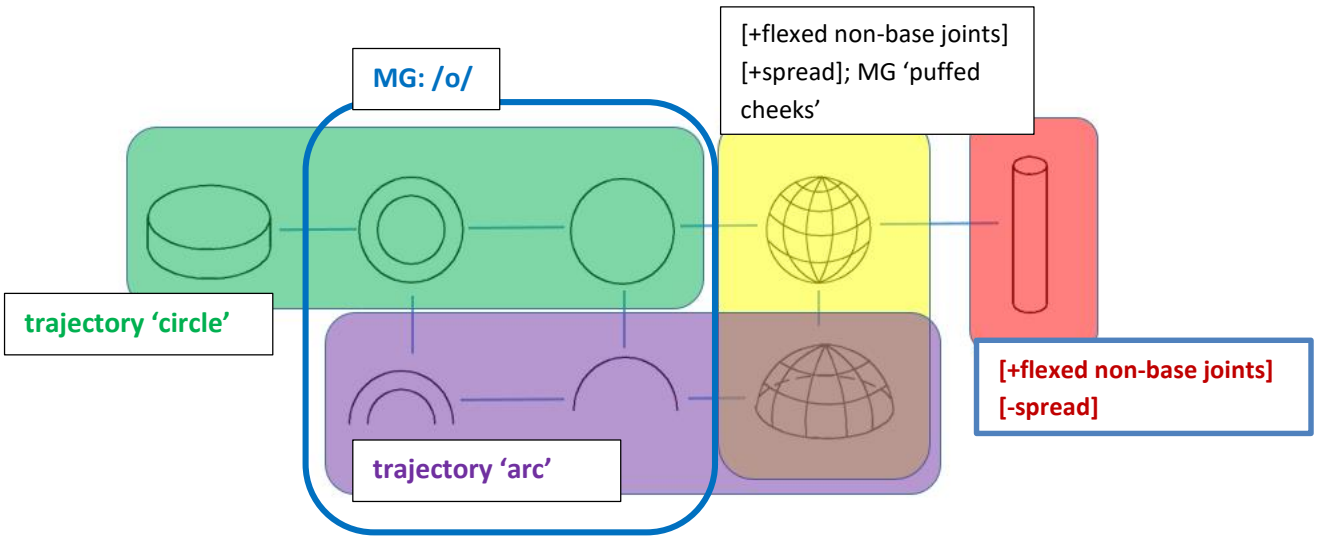


Figure 5.58. Semantic map of the field 'round' in RSL

SASSes use a variety of tools to express this idea. They include two different types of movement trajectories, two types of handshapes, and two mouth gestures. These tools divide the field into a set of overlapping clusters. Such systems are usually called 'distributive' in linguistic typology (Rakhilina & Reznikova, 2016). Russian, for comparison, has a 'dominant' lexical system in this semantic field: it has only one word, i.e. *kruglȳi*, which covers all the types of objects:

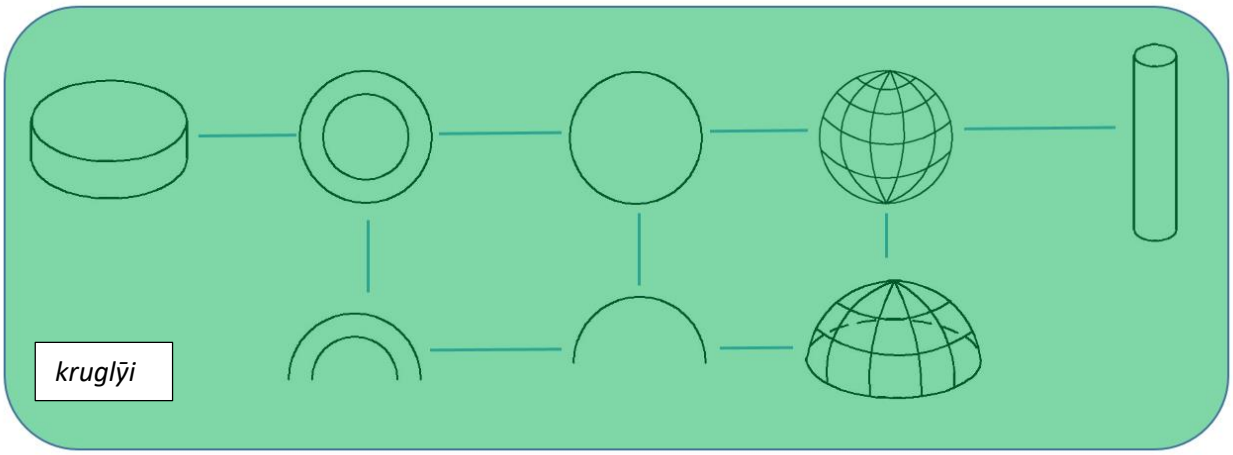


Figure 5.59. Semantic map of the field 'round' in Russian

This is a lexical system with no differentiation between different topological types of objects. This may be evidence that the semantic field in question is not particularly important for speakers of the language, whereas rich systems (like in RSL) are an indication of the opposite.

The second fundamental statement about the conceptualization of different forms and sizes by people, initially made on the data of spoken languages, is the use of topological classes (Gilyarova, 2002; Lyashevskaya & Rakhilina, 2007; Talmy, 1983). The theory says that people categorize objects around them into limited sets of prototypical forms, and this categorization constitutes part of multiple language systems, including spatial constructions and size and shape

words (Talmy, 1983). RSL SASSes conform with these generalizations: when they describe an object, they label it as belonging to a certain typological class. The use of both manual and non-manual components can be accounted for by this categorization. This is an important theoretical finding, since it goes against the widespread assumption that SASSes 'specify' the shape of the object in an analogue way (Liddell, 1980). According to this assumption, native signers construe the size and shape of things around them in a fundamentally different manner than spoken language users. My data show the opposite: both signers and speakers have the same basis of the conceptualization of the objects' visual characteristics. The difference lies in the degree of interconnectedness between the size and the shape. In spoken languages, size is claimed to be closely connected with the shape, i.e. size words do not just mathematically evaluate abstract dimensions, but are bound with certain topological classes of objects (Rakhilina, 2010). For example, the word *deep* in English can characterize only containers and layers. In sign languages, the characteristics of size is much more abstract: the same morphological tool, such as a big / small movement or a relative distance between the hands, can be applied to different topological classes.

The final statement which has been proposed in the literature deals with the role of functionality. According to this idea, the visual description of objects in languages is defined by the ways people interact with these objects. This comes from the concept of the *anthropocentric* language, an important notion in the functional linguistics (Wierzbicka, 1985). The language does not describe the real world objectively, instead, it includes people as the main reference points. Only things that are important for people end up being coded in the language. My data presents an interesting mixed finding with respect to this notion. On the one hand, some aspects of the SASS behavior are guided by functionality. Take as an example the description of the right-angled flat objects with the closed versus non-closed trajectory. As I argued in the respective section, the 'standing' objects, like a cabinet or a building, tend to be described with a П-trajectory, since their bottom part is irrelevant for the language users. Another example of the same factor is the mouth gesture 'protruded tongue' /th/, which seems to mark the referents which do not function well (such as a bumpy road). However, the role of this factor in RSL seems to be much weaker, than in spoken languages. For example, the restriction that only objects which can have different forms are described by a shape word (remember **kruglȳi rubl'* 'round rouble' in Russian) does not seem to hold for RSL. Nor does the distinction between functional versus non-functional size (as in ^{OK}*tolstȳi karandash* 'thick pencil' versus $^{???}$*tolstaya ruchka* 'thick pen'). Although this requires further research, my data preliminarily shows that RSL SASSes have a very wide distribution that is not restricted by the aforementioned functionality aspects. I have not encountered cases of objects from the same typological class having different combination patterns with SASSes depending on their functional status.

The difference in the use of size and shape words in sign versus spoken languages can be accounted for by postulating two conceptualization strategies, i.e. the functional strategy and the visual strategy. The functional strategy categorizes objects based on the way they function in the real world. The visual strategy categorizes objects based on the way they look. Both strategies are active in sign and spoken languages, and their collaborative use defines the linguistic behavior of size and shape words. The difference between the two types of languages lies in the proportion of the aforementioned strategies. While in spoken languages the functional strategy plays a larger role, in sign languages, which use the visual communication channel, the visual

strategy is the most influential. One of the very promising directions for further research is testing whether this difference remains in place if we take into account co-speech gestures. If we compare sign languages with multi-modal communication combining speech and gestures, the distinction in the proportion of the strategies might become much less prominent.

Chapter 6: Conclusions

6.1. Summary of the results

This dissertation presents the first in-depth morphological account of SASSes in RSL. Chapter 1 of this dissertation highlights gaps in the existing analyses of these signs that motivated this research, and outlines the aims of this project: (1) to reveal definitional properties of SASSes that establish them as a separate group; (2) to determine how different structural elements of SASSes contribute to the meaning of the whole sign; (3) to determine whether SASSes describe the world in a gradient or categorical manner; and (4) to compare semantic categorization of different sizes and shapes by SASSes and by spoken language words. This chapter also provides the theoretical background necessary for understanding the analysis presented in the thesis.

Chapter 2 deals with the methodology used in this project. The lack of studies focusing on SASSes results in the lack of proper methodology for their analysis. Therefore, one of the aims of this dissertation is to develop a toolkit for studying SASSes. Although this toolkit was created for analyzing these signs in RSL, it is fully applicable to other sign languages. I propose to collect SASSes via a series of communicative games ('matching task type' scenario) that result in semi-spontaneous signing. For each game, I designed a set of stimuli that prompt the use of size and shape signs in different semantic, syntactic, and discourse contexts. As a result of these games, I obtained a corpus with an extremely high density of SASSes (approximately, every third sign), and the signing was not affected by the spoken language of the community. I used HamNoSys notation with adds-on to annotate the form of the manual components in SASSes. For the mouth articulation, I developed a notation system that marks different parts of the lower face separately. This system captures the form of mouth actions in a detailed way and allows us to account for contributions of different parts of the lower face to the semantics of the component. It is applicable to different sign languages.

The annotation of SASSes was followed by the two-way analysis of these signs. The direction 'from the form' (Chapters 3 and 4) consisted in a one-by-one analysis of SASSes' components and establishing for each of them a set of form-meaning units. The direction 'from the meaning' (Chapter 5) explored how different components of SASSes work together in order to express certain size and shape characteristics. Let me summarize the results of each direction in turn.

Chapter 3 presents the analysis of SASSes' manual components, starting with hand configurations (Section 3.1). The detailed analysis of distributional patterns of different SASS handshapes resulted in the inventory consisting of 16 FMUs. These FMUs depict different aspects of the referent's shape, such as 'narrow long two-dimensional' (), 'thin long' (), 'flat' (), among others. The same handshape can participate in more than one FMU depending on the profiled part. For example, the handshape  denotes cylindrical objects when the whole index and thumb are profiled, and thin lines when only the tips of the index and thumb are profiled. Moreover, different profiling of a handshape results in different sets of allophones. Thus, the handshape  has the allophones  and  only when it denotes thin lines, and not cylindrical objects. This is due to the restrictions imposed by the iconic imagery. If the handshape  denotes cylindrical objects, the circle formed by the index finger and the thumb iconically depict the round cut of the cylinder. Therefore, this FMU can only have variants that do not occlude the round shape created by the selected fingers. The set of 16 FMUs has been further divided into primary and secondary

SASS handshapes. The secondary handshapes , , and  have a distinctive formal feature [+open] and are semantically derived from the handshape , as they denote the same type of objects as the handshape (thin lines), but a different number of them (two, three, and several objects, respectively).

Section 3.2 analyses the movement component of SASSes. It describes the following aspects of this component: the movement of the fingers, the movement of the wrist, elbow trajectory, elbow direction, presence versus absence of repetition, and size of the movement. The analysis of these aspects shows that some of them contribute to the semantics of SASSes. For example, the closing movement of the fingers denotes pointed objects; flexing or extending the fingers denotes rectangular objects; elbow trajectory outlines the general shape of the referent; elbow direction shows the prototypical orientation of the referent. Some aspects of movement do not carry any size, shape, or orientation semantics, but have morphological, syntactic, or discourse functions instead. For example, the repetition of movement can be the marker of plurality, and the size of the movement can mark the focus of the utterance. The small size of the movement can additionally serve as the marker of static SASSes.

The last section of Chapter 3 (§3.3) is devoted to the location component of SASSes. The analysis of this component shows that SASSes do not typically use different points in neutral space in order to represent the referent's exact location. Rather, they tend to 'locate' the referent in front of the signer. At the same time, there is a fundamental difference between SASSes produced in neutral space and SASSes located on the body. This is due to the unique perspective the body of the signer provides when it is actively engaged in the production of the sign. Production of SASSes on the body results in different use of handshapes and even leads to a new morphological type of SASSes with the so-called 'loop' trajectory of movement. The SASSes with the loop trajectory combine the shape outline of tracing SASSes and the size delimitation of static SASSes, they also show similarities to body part size and shape signs used in AdaSL and Bouakako Sign Language.

Chapter 4 explores the role of mouth articulation in the linguistic behavior of SASSes. In my data, SASSes can be accompanied by both mouthing and mouth gestures. These two types of mouth actions show different distribution patterns. While mouthing is drawn to more conventionalized units which have the role of the noun in the sentence, mouth gestures are more frequent with productive adjectival SASSes. With respect to their role in the semantics of SASSes, I divide mouth gestures into two groups. The first group, SASS-associated mouth gestures, contributes to the meaning of the sign by depicting certain aspects of the referent's size or shape. The second group consists of mouth gestures that do not express this semantics, but mark discourse meanings or show the signer's attitude instead. I formed an inventory of SASS-associated mouth gestures attested in my data. It consists of four mouth gestures depicting the referent's shape and five mouth gestures depicting its size. I further revealed an interesting pattern, according to which mouth gestures with the size meaning have a morphemic status in SASSes and belong to the group of adverbial mouth actions, while mouth gestures with the shape meaning do not have a morphemic status and belong to the echo-phonology. Similar phenomena have been attested in other sign languages, which means that this pattern might be not language-specific, but cognitively motivated instead.

Chapter 5 explores RSL SASSes 'from the meaning'. It presents a list of common sizes and shapes and analyses how different components of SASSes express these meanings. It argues that SASSes use different tools for the depiction of size and shape depending on the shape and the

described object. For example, the idea of roundness is expressed by the movement trajectory for limited surfaces (round mirror), closed stripes (round jogging path), and flattened spheres (round hat box); by the handshape for spheres (round ball) and cylinders (round pipe); and by the handshape and the movement trajectory for half-spheres (round pile of sand). This analysis allowed me to design semantic maps, where the objects that are described by the same strategy are located close to each other, and the objects that are described by different strategies are located further away from each other. This map can serve as a basis of comparison with other languages, both sign and spoken. With respect to the size, I found that despite the potential of SASSes to express the size of the object with high accuracy, these signs tend to categorize referents as either big or small (or having the normal size). The morphological tools used for this depend on the type of the SASS (static versus tracing) and on the described dimension.

This concluding chapter summarizes the main points of this thesis and clarifies how the analysis presented here accepts earlier proposals and results, and how it makes an original contribution. The structure of this chapter aligns with the research questions outlined in the introduction. Section 6.2 gives the definition of SASSes and establishes them as a separate group of signs. Section 6.3 presents the semantic structure of SASSes. Section 6.4 is devoted to the role of the mouth articulation in expressing size and shape meanings. Section 6.5 focuses on the way SASSes reflect reality and contributes to the ongoing discussion about the analogue versus categorical nature of these signs. Section 6.6 discusses the typology of size and shape expression. The chapter ends with final remarks where the significance of this work is discussed and some directions for further research are proposed.

6.2. Defining SASSes

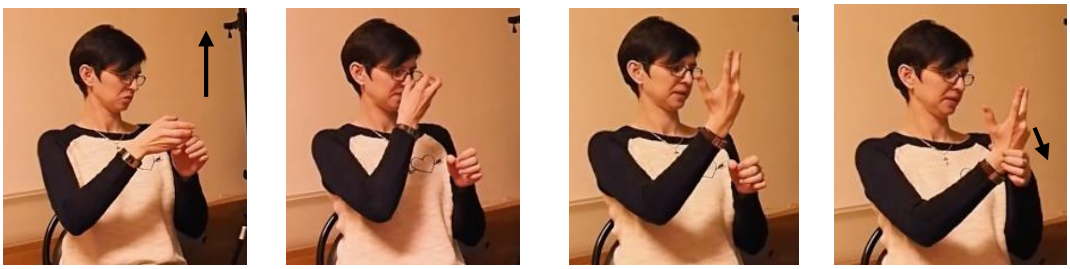
One of the fundamental gaps in the literature with respect to SASSes is the lack of a clear definition that would allow us to clearly delimit the set of signs that belong to this group. Some researchers analyze SASSes as members of a larger group that also includes verbal (classifier) signs which denote the location or displacement of a referent (Supalla, 1978; Nyst, 2016; Ferrara, 2012). The motivation behind this grouping is the common iconic imagery of these signs. Both SASSes and classifier constructions represent the referent's size and shape to a certain extent. Other researchers argued for a separate status of SASSes. For example, Zwitserlood (2003) shows that the signs which outline the contour of an object (*tracing SASSes*) are different from sign language classifier constructions in many ways: they can function as modifiers, they are never used for tracking reference, and they can provide a very detailed specification of the object's form. She argues that these signs should be treated independently from sign language classifier predicates.

In light of these debates, one of the primary aims of my thesis is to determine whether SASSes constitute a separate group of signs in RSL, and if they do, then what are the definitional properties of this group and what types of signs fall into it. A thorough analysis of the data resulted in the following definition:

Size and shape specifiers are signs that**:**
1) denote size and/or shape of objects;
2) their movement cannot denote the object's location or displacement in space.

This definition is in line with Zwitserlood's (2003) account as it treats SASSes separately from classifier constructions. Indeed, it allows us to clearly differentiate between these two groups of signs. In contrast to SASSes, the classifier predicates denote the location or displacement of referents. The example below highlights the difference. Figure 6.1 shows a signer describing three flowers in a vase. She starts with producing the sign VASE, continues with the signs FLOWER, THREE, and the description of three flowers standing in the vase. This first sign in this sentence falls into the category of SASSes, since it iconically shows the cylindrical shape of the vase in question, and the movement in this sign outlines the contour of the object. On the contrary, the last sign, although it expresses some information about the shape of objects, does not belong to SASSes. Instead, it is an example of a classifier construction, with the passive hand representing the vase and the active hand showing the position of three long thin objects with respect to the vase. The movement in this sign does not show the shape of the referents, but locates them in a certain point. The main goal of this sign is to show the place of the objects in space, and not to describe their appearance.

I hypothesize that the different functions of classifier constructions in comparison with SASSes will lead to different morphological properties. For example, I expect them to have a different set of handshapes, different mouth articulation patterns, and different use of the movement component. Such a comparison is beyond the scope of the current thesis and is a subject for future research.



SASS:VASE FLOWER THREE CL:THREE-LONG-THIN

Figure 6.1. RSL 'There is a vase with three flowers in it'
[D; 00:30.6]

This dissertation expands on Zwitserlood's (2003) analysis by defining what types of signs are included in the group of SASSes. In addition to *tracing SASSes* that express the shape of the referent with the movement component, this group includes the signs that do not have a movement at all. Look at the example below. The signer describes the length of a brush. He does it by locating the two hands in the configuration  at the conceptual ends of the object. The handshape in this sign indicates that the referent is a thin elongated object, the distance between the hands shows the size of the referent, and the mouth gesture /af/ marks the described size as 'big'. This sign does not have a movement (apart from a short epenthetic movement of the hands towards the intended locations). Yet, crucially, it does not indicate the object's displacement or location. The main purpose of this sign is to give information about the object's size. Therefore, I include this and similar items in the set of RSL SASSes.



SASS: long (brush) [G; 01:23.6]

Figure 6.2. Static SASS in RSL

In order to differentiate between the SASSes as in the example above and the SASSes that outline the contour of objects, I name the former ones 'static SASSes' (thus, rebranding the term introduced by Supalla (1982, 1986)). See the definitions of the two groups of SASSes below.

In **tracing SASSes**, one or two hands move along the object's sides. They can:
- show the depth and width of objects;
- represent the extent of the surface;
- refer to the external shape of the surface

In static SASSes, two reference points show the extent of one of the object's dimensions. These two points are:
- two hands in case of two-handed signs
- thumb & selected finger(s) in case of one-handed signs



(a) Depth & width SASS:long-thin (plank) [E; 06:06.0]



(b) Surface SASS: floor [S; 00:08.4]



(c) Perimeter SASS: round-flat (mirror) [D; 04:43.9]



(d) 2-handed static SASS:big (bag) [R; 11:55.3]



(e) 1-handed static SASS:this size (small path) [S; 07:55.9]

Figure 6.3. Tracing (a-c) and static (d-e) SASSes

These two types of SASSes differ on semantic, syntactic, and morphological levels. Semantically, static SASSes give very limited information about the referent's shape. Instead, they are usually used to depict the size of referents. Tracing SASSes are able to provide a detailed depiction of both size and shape. Morphologically, static SASSes do not have semantically charged movement, and they are formed from more limited sets of handshapes and mouth actions. Finally, syntactically, static SASSes usually perform the role of the adjectival predicate in the sentence, while tracing SASSes can also be nouns and adjectives. Despite these differences, both static and tracing SASSes have the same general internal structure, to which I turn in the next section.

6.3. Internal structure of SASSes

SASSes are usually treated in literature as polymorphemic signs which express complex information about the object (Johnston & Schembri, 2007; Valli & Lucas, 1995; Zwitserlood, 2003). There is no consensus on what the minimal meaningful units in SASSes are and how they contribute to the meaning of the sign. This section discusses how the account of RSL SASSes presented in this thesis contributes to the debates in this area, namely (1) whether the handshape in SASSes should be divided into a set of smaller meaningful units, and (2) whether the movement plays a secondary role in the structure of SASSes.

A number of researchers argue that the handshape component in SASSes does not carry the meaning as an indivisible whole, but should instead be decomposed into a set of smaller meaningful features (Supalla, 1982; Eccarius, 2008). At least, three sub-handshape components can be identified: the number of selected fingers, the base joint configuration, and the non-base joint configuration. The first two depict the referent's size, and the last one depicts its shape. This analysis is applicable to some RSL handshape FMUs. Consider, for example, the handshape  in the figure below that in one of its usages denotes cylinders.

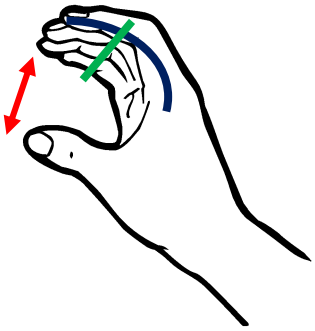


Figure 6.4. Compositional analysis of RSL handshapes

The curved non-base joint configuration in this handshape denotes the round shape of a cylindrical referent (marked with blue), the distance between the thumb and the fingers shows its diameter (marked with red), and four selected fingers (as opposed to one) signify that the object has depth, i.e. it is three-dimensional (marked with green). Despite the clear iconic imagery that stands behind this analysis, I do not adopt it. I propose to interpret handshapes in SASSes as single indivisible morphemes instead. The reason behind this is the lack of a clear paradigm that would be formed by meaningful sub-handshape elements in SASSes. If we treat the handshape in Fig. 6.4 as consisting of (at least) three meaningful features, we expect the change of any of these features to lead to a handshape with a different predictable meaning. For example, if we change the number of selected fingers from four to two (Fig. 6.4a), then the described object should be perceived as flat, and if we change it to one (Fig. 6.4b), that the described object should be perceived as two-dimensional (as, for example, a coin):



(a) (b)

Figure 6.4. Handshapes with two (a) and one (b) selected fingers

However, this is not the case in RSL. The handshape in Fig. 6.4a is not used in RSL SASSes, and the handshape in Fig. 6.4b does not denote round two-dimensional objects (like a coin), but denotes long narrow two-dimensional referents (like a plank or a stripe on cloth) instead. Moreover, the same handshape feature can be meaningful in one FMU and meaningless in another one. For example, the curved selected fingers express the idea of roundness in the handshape when it is part of the FMU that denotes cylindrical objects, and does not express this idea in the same handshape when it is part of the FMU that denotes three-dimensional flat objects (like a book). In the latter case, only tips of the fingers and the thumb are profiled. The non-base joint configuration does not carry any meaning and is, therefore, a subject of variation. Finally, although the hand aperture (i.e., the base joint configuration) can express the idea of size in SASS handshapes and , I argue that this does not happen in a consistent manner and that the handshape with the same aperture can be used for the depiction of objects of different sizes. Therefore, I propose to treat SASS handshapes as indivisible units that depict the general shape of the object. In other terminology, introduced in Chapter 5, they denote the object's *topological class*, such as 'surface' (handshape), 'long thin lines' (handshape), 'cylinders' (handshape , FMU I), among others.

The next point of debates with respect to the semantic structure of SASSes concerns the role of the movement component. In some models, the movement plays a secondary role in SASSes, i.e. it provides a specification of the object's shape that is additional to the meaning of the handshape. One of the latest models of this type is proposed by Nyst (2016). Basing on Taub's classification of iconic devices, Nyst argues that the meaning of SASSes is formed by the shape-for-shape and the size-for-size iconicities. The former uses the shape of the articulator to depict the shape of the referent, the latter uses the distance between two points to depict the size of the referent. Nyst claims that SASSes do not make independent use of the path-for-shape iconicity, where the movement trajectory outlines the referent's contour. Instead, this type of iconicity builds on the shape-for-shape iconicity. In other words, the movement trajectory can show the extent of some of the referent's dimensions, but its general form is depicted by the handshape.

I conducted a one-by-one analysis of sub-sign elements in RSL SASSes, which allowed me to establish the contribution of each element to the meaning of the whole. I found no theoretical advantages in assigning the secondary status to the movement component. In tracing SASSes, the movement depicts the shape of the referent. Sometimes, the movement and the handshape act together to express the same idea. For example, both the handshape and the arcing trajectory are necessary to depict a round pile of sand. Sometimes, the meaning of the movement is copied by the mouth gesture. For example, the wiggly shape can be expressed by both the wiggly movement

trajectory and the mouth gesture ‘protruded tongue’. And in some SASSes, the movement has a unique contribution to the meaning of the sign. For example, in the figure below, a SASS meaning ‘thin cylindrical’ (about a vase) is illustrated. The handshape in this sign marks that the referent is cylindrical, the mouth gesture /peeh/ expresses the idea ‘thin’, and the movement outlines the straight shape of the cylinder. In these signs, all these components make an equal contribution to the meaning of the whole.



SASS: thin-cylindrical (vase) [T; 00:49.2]

Figure 6.5. Contribution of different components to the meaning of SASSes

I believe that the reason behind placing the movement among the secondary components in Nyst’s model, as well as in the original Supalla’s account, is treating SASSes as members of a larger group. Indeed, once we want to create a general model that would explain the semantics of not only SASSes, but also classifier constructions, we see that while the handshape in all these signs expresses the idea of shape more or less uniformly, the movement can carry very different meanings, i.e. it can not only outline the referent’s contor, but also show it’s displacement or location in space. From this perspective, its function as a shape depicting tool is indeed not as permanent as this of the handshape. However, the explanatory advantage of treating the movement as a secondary tool for expressing the shape disappears if we deal with SASSes as a separate group. In this case, the movement is always present and depicts certain visual characteristics of referents. The only exception from this rule concerns static SASSes, which have only an epenthetic movement. However, this is a special group of signs that are used to depict the referent’s size, not shape. In these signs, even the expressive potential of handshapes is very limited. Only two handshapes can be used in static SASSes ( and ), and they express an abstract difference between two-dimensional and three-dimensional objects. Therefore, in static SASSes, neither of the components gives sufficient information about the referent’s shape.

6.4. Role of the mouth articulation

Another contribution of my thesis concerns the primary role of the mouth articulation in the semantics of SASSes. The main meanings of these signs, i.e. the size and shape of objects, are distributed over their components. For example, in Figure 6.6, which shows a signer depicting a vase, the handshape  indicates that the object is cylindrical, the hand aperture indicates that it is of medium width, the straight movement outlines the straight shape of the cylinder, and the size of the movement marks the length of the referent.



SASS: thick_cylindrical (vase)
[D; 00:28.4]
Figure 6.6. Expression of size and shape in RSL SASSes

However, not all these parameters are in the center of the proposition during the production of the sign. Usually, signers focus only on one visual feature of the referent. This feature gets the most accurate description, while the others might be approximated (just like the object's orientation and location). The feature in focus is indicated by the mouth articulation accompanying the sign. SASSes belong to one of the few groups of signs that are regularly produced with mouth gestures. Based on the analysis of my data, I distinguished 9 mouth gestures that contribute to the meaning of the sign. Out of those, five mouth gestures indicate shape ('round', 'wiggly', 'smooth', 'spherical', 'pointed'), and four mouth gestures indicate size (2x 'big', 2x 'small'). When signers talk about the objects' size, they always use one of the size mouth gestures. When they talk about the objects' shape, they tend to (but not always) use one of the shape mouth gestures.

This observation has serious implications for the semantics of the propositions containing these signs. I hypothesize that mouth gestures accompanying SASS predicates mark the *at-issue* content of the utterance. In this hypothesis, I follow the dichotomy *at-issue* versus *not-at-issue* as is defined by Simons et al. (2010). This work elaborates on the notions of *presupposition* and *assertion*, see the classical account by Karttunen (1974). According to Simons et al., every utterance of the discourse aims to answer the Question Under Discussion, or QUD. The QUD is a semantic question that corresponds to the current discourse topic. It can be stated explicitly, in the form of the question, or, more commonly, be implicit in the discourse. Once a question is under discussion, it remains so, until it has been answered or determined to be practically unanswerable. Most utterances have several implications. The implications which address the QUD, are *at-issue* propositions, and the implications which do not address the QUD, are *not-at-issue* propositions. Let me illustrate this model with an example from (Simons et al., 2010: 317).

(6.1) *Background scenario: a nutritionist has been visiting first-grade classrooms to talk to the children about healthy eating.*
Q: What most surprised you about first-graders?
A: They did not know that you can eat raw vegetables.

The answer to the question in (6.1) has at least two implications: 'You can eat raw vegetables', and 'They did not know that you can eat raw vegetables'. While the second implication addresses the QUD, the first implication does not: learning that you can eat raw vegetables does not derive the answer to the question Q. Therefore, the implication 'They did not know that you can eat raw vegetables' is *at-issue* in this utterance, while the implication 'You can eat raw vegetables' is *not-at-issue.*

As Figure 6.6. illustrates, RSL SASSes express multiple implications about the depicted object. I argue that mouth gestures mark the implication that aims to answer the QUD, while the remaining implications are not relevant to the topic of the discussion and, therefore, are *not-at-issue.* This analysis is in line with Schlenker's investigation of ASL classifier predicates (2018). Schlenker shows that when ASL signers use classifier constructions, they treat certain parts of their meaning as not-at-issue content. The choice of the information to be placed in the not-at-issue zone is iconically motivated and depends on the realization of the sign. My work provides a unique insight into the semantic organization of signed propositions on the material of RSL SASSes. It shows that at least one of the indicators of the at-issue versus not-at-issue meaning might be the mouth articulation. Since not-at-issue content is usually not targeted by negation or modal operators, we might expect that placing a proposition with a SASS predicate in the negative context will negate only the implication marked by the mouth gesture, while the assumptions about the referent's appearance expressed by not-at-issue implications will remain intact. This hypothesis requires further research and testing with experimental methods.

It appears that the famous saying 'Hands are the head of the mouth' which serves as a title of the book by Boyes-Braem and Sutton-Spence (2001) is not always correct. This saying refers to echo-phonological mouth gestures and underlines the fact that their form is motivated by the manual channel. My work, however, shows that the role of these (and other) mouth gestures can be much more significant: they do not just iconically 'echo' the meaning expressed by the manual sign, but define the way it should be interpreted in the utterance. Therefore, one can expect to find instances of the same manual SASS accompanied by different mouth actions depending on the topic of the conversation. Indeed, I have such examples in my data, see the figure below.



(a) SASS: wide-wiggly (small path) [T; 04:08.8], MG: /af/ 'big'



(b) SASS: wiggly-wide (small path) [T; 04:12.7], MG: /th/ 'wiggly'

Figure 6.7 Different mouth gestures highlighting different aspects of the object's shape in RSL

Figure 6.7 shows a signer describing a wide wiggly small path on two different occasions. In Fig. 6.7a, she compares this object to a narrow wiggly small path. To highlight the difference and to underline the fact that the object she is talking about is wide, she uses the mouth gesture /af/ 'big'. In Figure 6.7b, she talks about the same referent, but this time, with respect to a wiggly straight path. At this moment, the feature she is concerned with is the wiggly shape of the referent. She marks this with the mouth gesture /th/ 'wiggly'. In these examples, the mouth acts as the head of the hands.

6.5. Categorical versus gradient properties of SASSes

One of the fundamental questions about SASSes, as part of the productive lexicon, is the analogue versus categorical nature of their components. The original account by Supalla (1978; 1982) proposes to treat these signs categorically. According to Supalla, SASS signs are complex items that consist of several morphemes. Each morpheme expresses an aspect of the appearance of the object and is chosen out of a closed list of items. This account has not been fully embraced by subsequent researchers. Highly iconic, SASSes have been claimed to provide a very detailed depiction of a referent's visual characteristics. Moreover, the slightest change in an object's appearance or position could lead to a change in the form of a SASS describing it. This led some researchers to argue that not all structural elements of SASSes describe reality in a categorical manner. Some components provide the analogue description of the referent's features instead (Ferrara, 2012; Liddell, 2003).

Based on the analysis of RSL SASSes, I offer an account which is meant to unite the two aforementioned points of view. In line with Supalla's claim, I argue that SASSes provide a categorical account of objects' visual qualities. When signers use a SASS, they categorize the object as belonging to one of a set of common shapes and/or sizes. At the same time, some of the SASSes' structural elements have a potential for expressing the feature in question in a gradient manner. These elements include hand aperture, movement trajectory, movement direction, movement size, and place of articulation. The gradient use of one or several structural elements of SASSes is possible in pragmatically salient contexts. For example, if two or more objects are being compared, the feature they are being compared by can be expressed in an analogue manner. See an example from my data below:



FLOWER SASS:3D-SMALL SASS:3D-BIG

Figure 6.8. RSL 'One flower is big, and another flower is small' [E; 01:40.6]

In Figure 6.8, the signer describes two flowers in a vase. One flower is big, and the other one is small. The SASSes describing these objects are used in one sentence next to the other. The signer manipulates the hand aperture in a gradient manner to highlight the difference.

Another trigger for the gradient use of a SASS's component is an unusual shape of the object. For example, in the figure below, the signer describes a right-angled shape of the pipe. The

movement trajectory in this sign is not chosen from the list of SASS movement trajectories presented in Chapter 3.2, but instead reflects the exact form of the pipe. The signer signals the fact that the movement component in this sign should be interpreted in a gradient manner by slowing down and extending the motion of the hands.



Figure 6.9. SASS:cylindrical-right-angled (pipe)
[G; 07:33.4]

Gradual use of a SASS component is possible only if the characteristics in question is in the focus of the signer's utterance. Using the terminology introduced in the previous section, only *at-issue* implications can be expressed by the analogue tools. Consequently, the analogue depictions are often marked by mouth gestures. In Figure 6.8 above, this is the size that is in focus of the signer's attention and is described in a non-categorical manner, and in Figure 6.9, the shape is under discussion. In both cases, the mouth articulation accompanying SASSes points at the discussed quality.

This analysis shows that SASSes are not so different from the rest of the lexicon as it is usually assumed. The signers do not produce an exact depiction of the object's form when they use SASSes. Instead, they *categorize* objects as belonging to particular classes of shapes. The potential of some of the SASSes' components to reflect reality in an analogue manner is not very different from the phenomenon of the vowel lengthening analyzed in Okrent (2002). This phenomenon is discussed in detail in section 3.2.3, here I give a brief recap, based on the example below.

(6.2) *It was looooooooooooong time ago.* [Okrent, 2002:187]

In (6.2), the lengthening of the vowel [o] in the word *long* expresses the temporal extension. This is a non-obligatory gradient manipulation of a phonetic parameter which is performed in order to express certain imagery. The possibility of such manipulation does not mean that *long* is not a word in the English lexicon. It only means that this word has the potential for expressing a gradient aspect of meaning. Similarly to this example, the gradient use of some SASSes' structural elements does not undermine their 'word' status. It is a sporadic iconic manipulation of components which have a structure allowing for it.

It is quite insightful to compare the results of my analysis with the study of ASL classifiers by Emmorey and Herzig (2003). They conducted a series of psycholinguistic experiments to determine the gradient versus categorical nature of these signs' components. In one of the experiments, they asked native signers of ASL to place a round sticker in relation to a bar in a square frame. Where the sticker should be placed was indicated by another native signer who produced a classifier construction. The experiment showed that the signers treated the location component of the classifier constructions gradiently, and that every change of this value was reflected in the

position of the dot with respect to the line. At first sight, the results of this experiment contradict my analysis. Contrary to what I argue, Emmorey and Herzig (2003) show that depicting signs have fully analogue parts of the structure. However, the difference in the results might be due to the difference in the methodology. While I investigate RSL SASSes produced in semi-natural conversation, Emmorey and Herzig analyze the use of ASL classifier constructions in a specific context of depicting a visual scheme. This is a pragmatically salient context which is likely to impose the gradient interpretation of sign components.

The analogue versus categorical use of the SASSes' components is directly connected to their position on the lexicalization continuum, introduced in Chapter 1 of this thesis and discussed in Chapters 3 and 4. SASSes have been noted to form a heterogeneous group with respect to the flexibility of their components in different contexts. While some SASSes change the form easily and their meaning is compositionally formed from the meanings of their components, other SASSes have a fixed form and a non-compositional meaning. In my data, I found a range of different types of SASSes with respect to their lexicalization properties. On the one end of the continuum, there are SASSes that function as adjectival predicates and denote the size and shape of objects. I treat them as 'prototypical' SASSes. On the other end of the continuum, there are signs that function as nouns and denote concrete objects. Although their components iconically show some aspects of the referent's form, the meaning of the whole sign is non-compositional.

Developing further the account of the categorical versus analogue use of SASS components, I argue that in lexicalized SASSes, the size and shape of referents are never part of the at-issue content. Instead, these qualities are expressed by not-at-issue implications. Therefore, components of lexicalized SASSes can not be used analogously to express size and shape characteristics. At the same time, lexicalized SASSes can modify the location component in order to show the location of the referent in space. This is, however, a wider phenomenon that is characteristic of not only SASSes, but many iconic signs produced in neutral space. Therefore, it requires a separate account.

SASSes placed on opposite sides of the lexicalization continuum differ in semantic, syntactic, and morphological properties. Besides the (non-)compositional meaning and nominal versus adjectival roles stated above, they include the mouth articulation accompanying the signs in question. My data show that lexicalized SASSes are often co-articulated with mouthing, while productive SASSes almost never have the mouthing articulation. Instead, they tend to be accompanied by mouth gestures. Mouth articulation might be not the only non-manual element that marks the lexicalization status of a SASS. The eye gaze has also been reported to be connected with the position of signs on the lexicalization continuum. For example, Bergman & Wallin (2001) observe that the use of productive SASSes is often accompanied by the break of the eye contact in SSL. The role of the eye gaze in RSL SASSes is a topic for further research.

My data also contribute to the discussion about the historical connection between the two poles of the lexicalization continuum. The intermediate uses of SASSes observed in my corpus suggest that there might be a lexicalization path from productive to fully-lexicalized signs. This path is schematically represented in Figure 6.10:

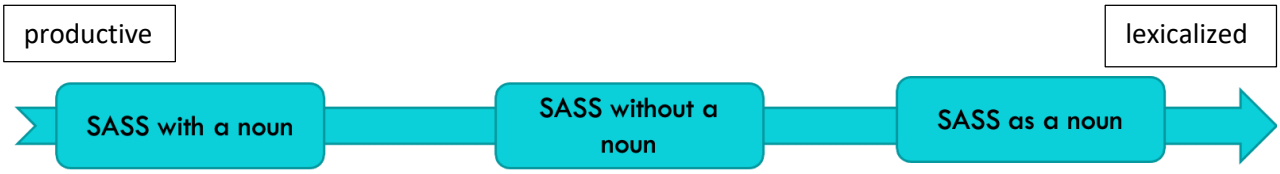


Figure 6.10. Lexicalization path of RSL SASSes

If a SASS follows this path, then it starts at the left end of the continuum as a productive sign that depicts the visual properties of an object. The object itself is denoted by a separate sign that is produced in the same sentence. The next stage on this path is the use of an adjectival SASS without an overtly present noun denoting the referent. This can happen when the object has been introduced earlier and is still active in discourse. Consider the example below:

(6.3) 1. STREET **SASS:long_narrow** HOUSE.LOC
'There is a long street and a house in it.'

2. RED HOUSE
'The house is red.'

3. STAIRS ALRIGHT TWO STAIRS
'Two stairs lead to the house.'

4. DOOR WINDOW ALL
'The house has a door and a window only.'

5. **SASS:long_narrow** RIGHT STEEL ROD TWO
'There are two steel rods to the other side of the road.'
[T; 00:23.2-00:39.7]

In this example, the SASS:long_narrow, which depicts a road, is used twice. The first time, it follows the noun ROAD (Sentence 1). The second time, it is used on its own, without a noun, to refer to the same road (Sentence 5). The reference of this SASS is clear, because the object 'road' is still active in the discourse. The final stage of the lexicalization process is a fully nominal use of a SASS. If a SASS has been produced without a noun to refer to an object once, it can be used for the same purpose again much later in a conversation, when the object in question is no longer active. In this case, the SASS shifts from an adjectival predicate to a noun, which can be marked by the use of mouthing. Its meaning loses compositionality and, at least in the local discourse, it receives the status a lexicalized sign. A repeated shift of a SASS to the lexicalized end of the continuum with the same non-compositional meaning leads to its gradual *entrenchment* in the lexicon (see (Lepic & Occino, 2018) for a similar account of classifiers constructions in ASL).

6.6. Typology of size and shape expression

Besides providing a new perspective on a number of pressing topics in sign language linguistics, this thesis contributes to the typological investigation of the lexical domains of size and shape. A model for the cross-linguistic comparison of iconic devices of the size & shape depiction was proposed by Nyst (2018). Differentiating between two main types of iconicity in this domain, i.e. shape-for-shape iconicity and distance-for-size iconicity, and dividing each of these types into several sub-types allowed her to account for different iconic strategies of the object's depiction used by different sign languages. Thus, the comparison of the size depiction by six sign languages, three

of which are of Western European origin and three are of West African origin, shows that Western European sign languages often delimit a stretch of space in order to depict the size of a referent. West African sign languages rarely make use of this strategy, but they produce body-part delimiting signs instead (Nyst, 2018). With respect to these two strategies, RSL seems to side with the Western European group. It does not use body-part SAS constructions similar to those produced by West African sign languages, but it makes extensive use of tracing and static SASSes in the neutral space in front of the signer to depict the object's size.

This thesis also sets foundations for a different type of typological study, i.e. *the cross-modal comparison* of size & shape depiction. This work is the first to compare SASSes to spoken language words denoting the visual characteristics of objects. The most important finding of this analysis is the crucial role of topological classes in the categorization of shapes (and some sizes) by SASSes. When SASSes describe an object, they label it as belonging to a certain typological class, i.e. an abstract geometrical form that combines such features as dimensionality, orientation,+/- roundness, and others. Since spoken languages have been argued to use the same basis of description (Gilyarova, 2002; Privizentseva & Kozlov, 2014; Rakhilina, 2010), this means that there is a fundamental similarity in the way spoken and sign languages describe the referent's visual characteristics. Consequently, we can design cross-linguistic semantic maps with topological classes as the nodes, and the closeness of the nodes being the reflection of the conceptual closeness of the corresponding objects. In the thesis, I propose preliminary semantic maps for four qualities: 'round', 'right-angled', 'elongated', and 'smooth'. These maps allow us to compare lexicalization strategies in different languages. For example, a comparison of the lexicalization of the semantic field 'round' in RSL and Russian shows strikingly different patterns for two languages spread in the same region and, therefore, sharing the same culture. Thus, RSL uses a variety of different morphological tools to express different types of roundness. For example, round limited surfaces (like a mirror) are described with a circular trajectory of the hands and the mouth gesture /o/, spheres are depicted by claw-like handshapes and puffed cheeks, cylinders are indicated with flexed non-spread handshapes. Russian, on the contrary, uses only one word to cover all these different types, i.e. *kruglӯi*. It means that in this domain, Russian has a more limited lexical system, while RSL exhibits a rich semantic structure.

This discrepancy, observed in one field for two languages, might be an indication of a wider pattern. A detailed depiction of shape is to be expected from a sign language since it functions exclusively in the visual modality. Spoken languages, on the other hand, have been noted to have quite limited tools of expressing shape (Dixon, 1977; Rakhilina, 2010). More research is needed in order to establish the scope of this pattern.

Another result of this analysis concerns the notion of functionality. The distribution of some morphological tools RSL SASSes apply to depict size and shape is motivated by the functional use of objects. For example, the Π-shaped versus square movement trajectory in the description of right-angled referents reflects the ways people interact with these referents in everyday life. Thus, the objects with one canonical orientation, like a house or a cabinet, tend to be depicted with a non-closed Π-shaped trajectory: their bottom side is almost never seen and, therefore, is ignored by the signs. On the contrary, objects which can easily change the orientation, like a box, tend to be depicted with a closed square/rectangular trajectory. The extent of the functionality, however, seems to be lower in RSL than in (at least, some) spoken languages. Thus, Russian shape and size words exhibit certain limitations on compatibility with nouns that can be explained by the functional status

of the object in question. I have not noticed any similar patterns in RSL. Further research focusing on this issue specifically will help to clarify how the functionality affects the behavior of size and shape items in sign versus spoken languages.

6.7. Implications

This section discusses descriptive and theoretical implications of my thesis. From the point of view of the former, the dissertation gives a detailed description of a part of the RSL lexicon. Used by more than 100 000 people all over the Russian Federation and former Soviet Union countries, this language did not receive its official status until 2012. It has no reference grammar or sign-to-word dictionary. It still plays a minor role in society: there are not enough RSL interpreters to meet the needs of the deaf community, and there is a lack of appreciation for the sign language among hearing people. Therefore, this research adds to the description of an understudied language and raises awareness of it. This description results in inventories of handshapes, locations, movements, and mouth gestures occurring in SASSes. These inventories are the first step in describing the whole phonological system of RSL, which is still unexplored. The results presented in the dissertation can be expanded onto other lexical fields of the language. SASSes analyzed here could become entries in an RSL dictionary, and their description can constitute part of a reference grammar.

From the theoretical point of view, this dissertation contributes to on-going debates about different semiotic systems used in human communication. In terms of their role in sign languages specifically, SASSes have been claimed to combine categorical and gradient ways of representing referent's size and shape. The nature of this combination remains relatively understudied in the sign language literature and presents a challenge for the analysis of these signs and comparing them to the rest of the sign language lexicon. The analysis presented in this dissertation, on the one hand, allows us both to account for an extensive descriptive potential of SASS constructions and, on the other hand, illustrates how they share categorical properties with other sign language signs. By showing how SASS morphemes can combine categorical and gradient properties, this analysis contributes to our understanding of sign language morphology. This thesis also represents the first attempt to describe how both signed and spoken modalities represent visual qualities – something previously unattempted.

Moreover, this dissertation has methodological implications, since it offers for the first time a set of methodological tools to study SASSes. This approach drew on an initial analysis of a corpus. Corpus data allow us to study spontaneously occurring signs in different contexts and to form hypotheses about their nature and structural organization. These hypotheses should then be tested with experimental and elicitation methods. For example, tasks related to judgments of grammaticality can be used to test statements about the importance of the mouth articulation for the interpretation of the SASS's semantics. A specialized elicitation with carefully designed sentences to translate or pictures to describe can be conducted in order to confirm my argument about the unequal status of different pieces of semantic information expressed by SASSes.

Another direction for future research is the investigation of Russian co-speech and silent iconic gestures depicting the size and shape of objects. In Chapter 5, which discusses semantic categorization by RSL and Russian items, I focus only on the analysis of Russian spoken language data. However, in future, we should take into account multimodal communication and discuss SASS constructions in light of both speech and gesture, so that we can understand the full potential of a face-to-face spoken language communication. For example, I would predict that the difference

between the sign and spoken language data in this domain might be reduced. Finally, adding data of other sign languages will shed light on the cognitive versus cultural motivation of SASSes. Previously, these signs were assumed to exhibit very similar features across sign languages. Nyst (2018) shows that different sign languages make use of different *iconic devices* for size and shape depiction. The analysis of SASSes with the help of the methodology proposed in this thesis will show whether different sign languages use the same *morphological tools* in depicting visual characteristics of objects. I expect that in different sign languages these signs will be built from different inventories of handshapes and mouth movements. This thesis provides the foundation for this future typological work.

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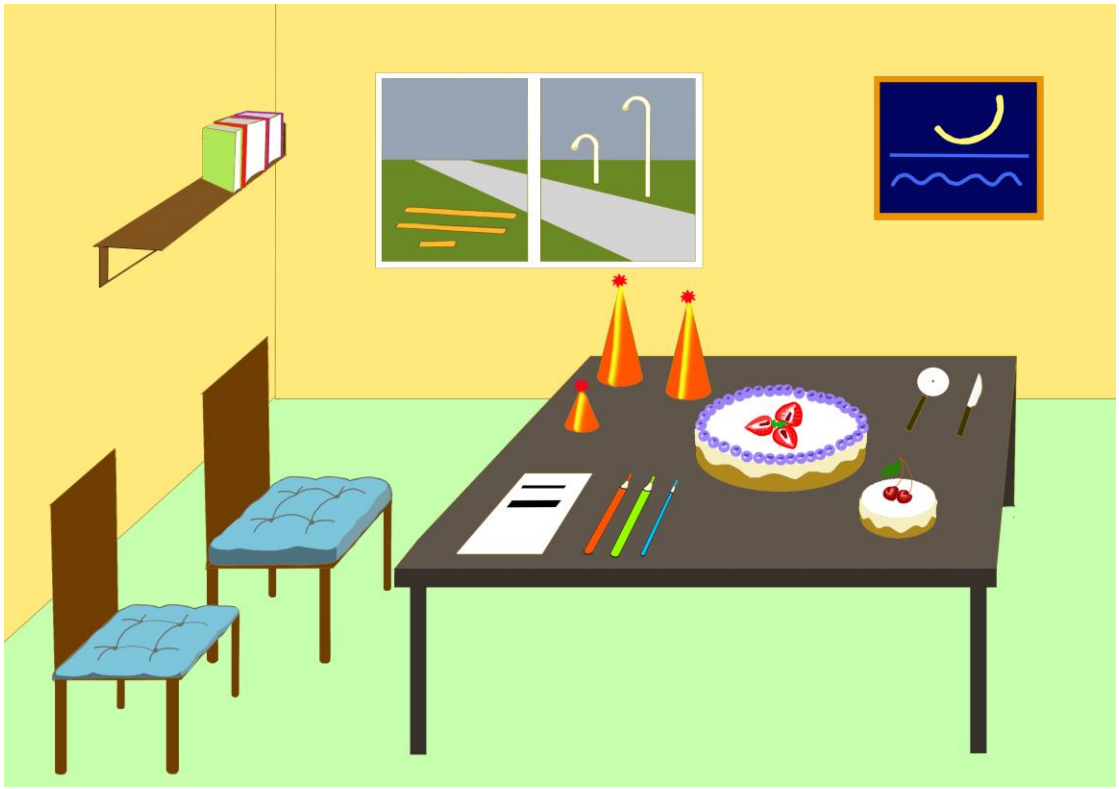
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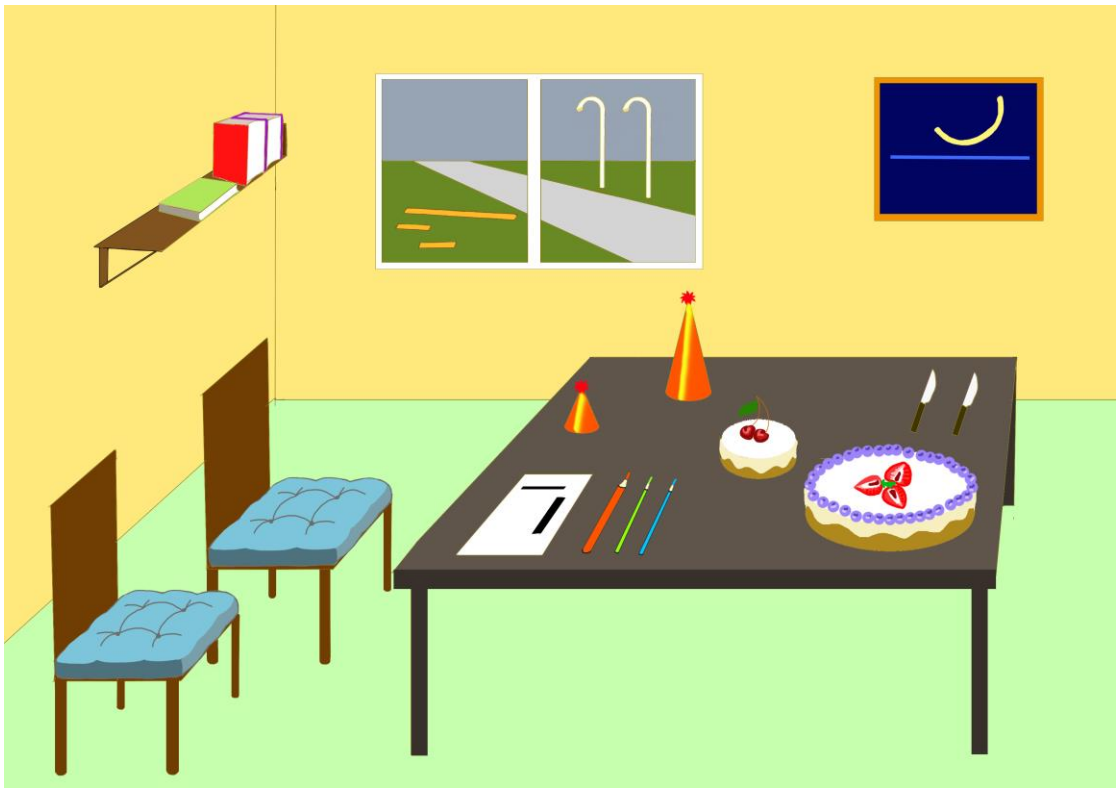
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Appendix I: stimuli for the communicative games used for data collection

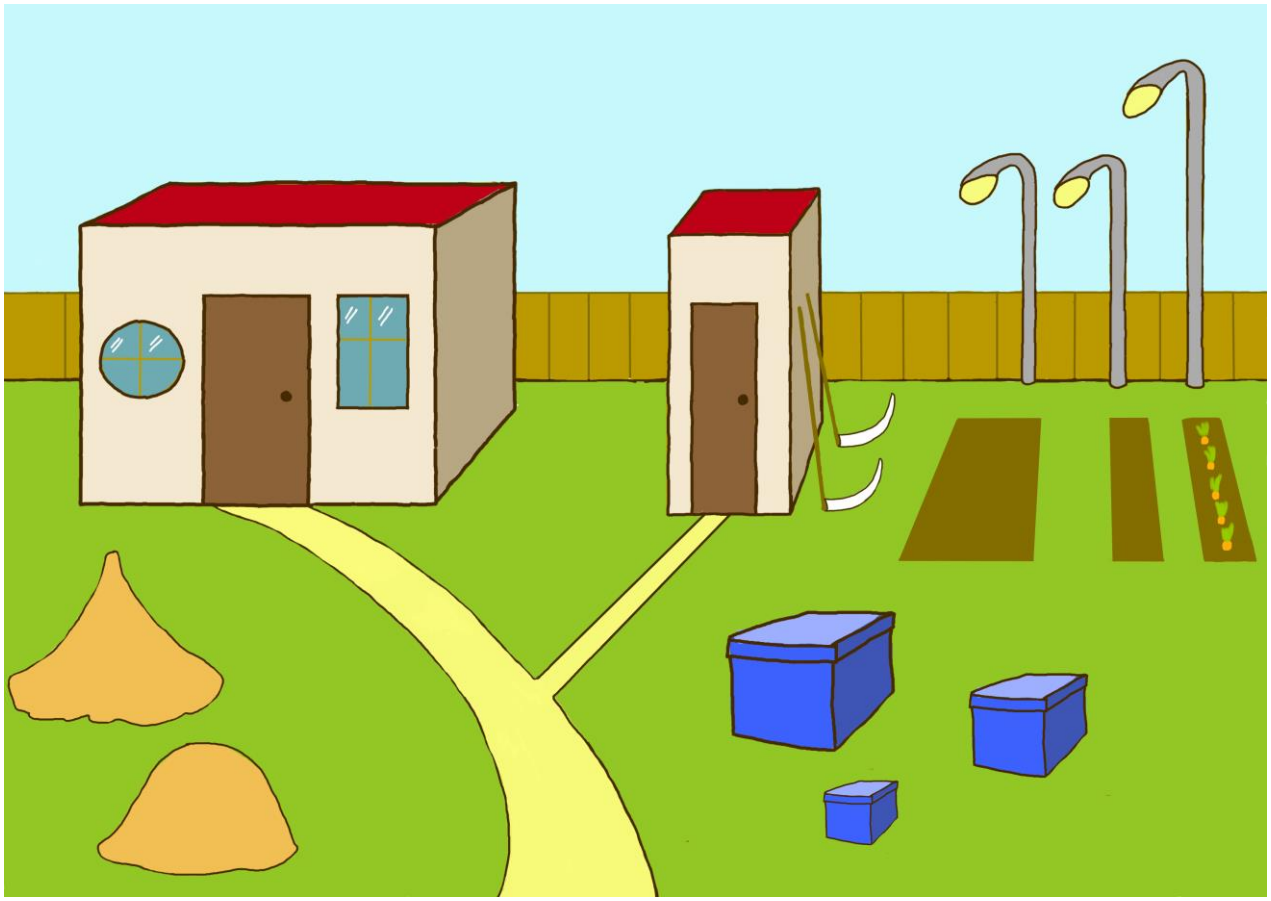
'Spot-the-difference'

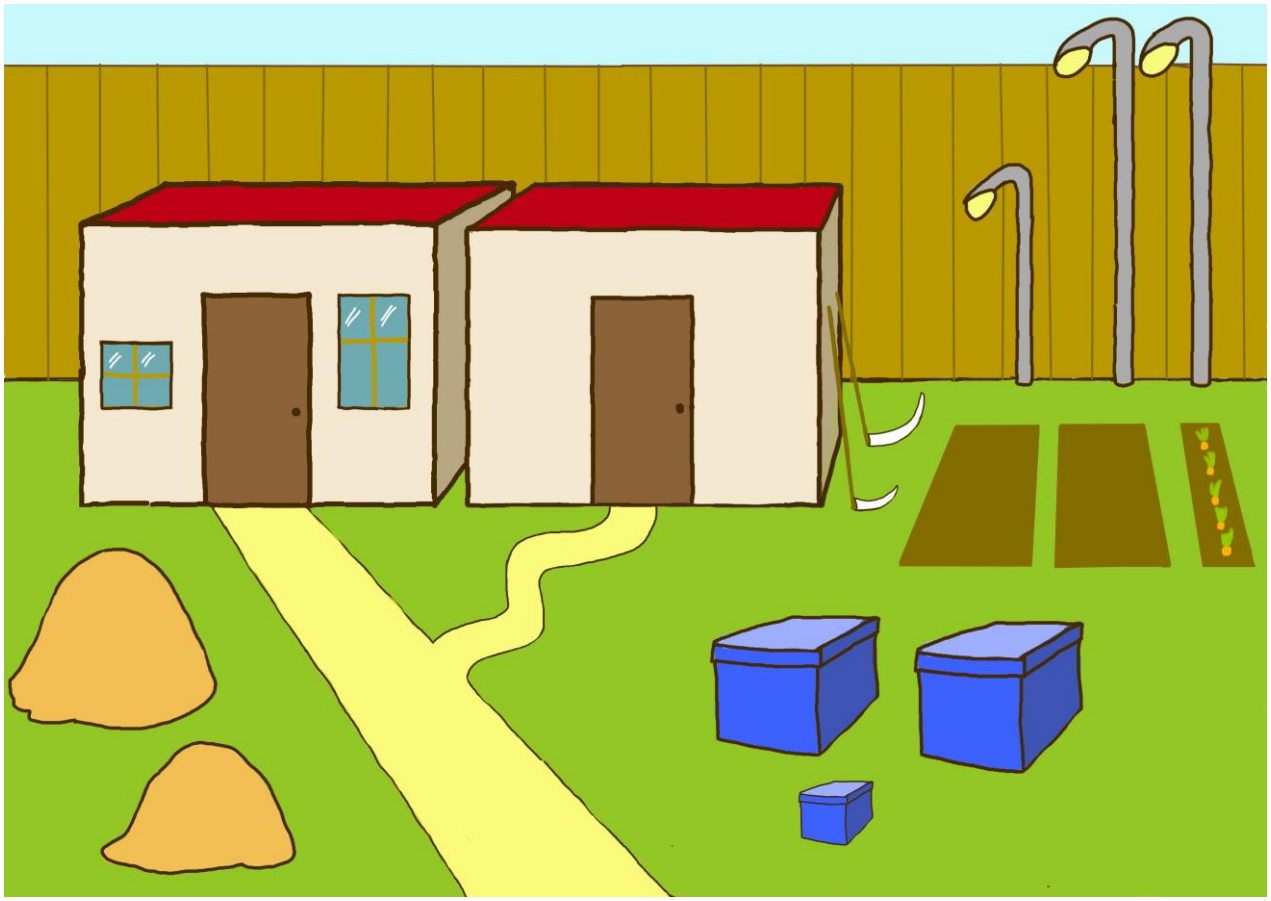
1. Birthday party



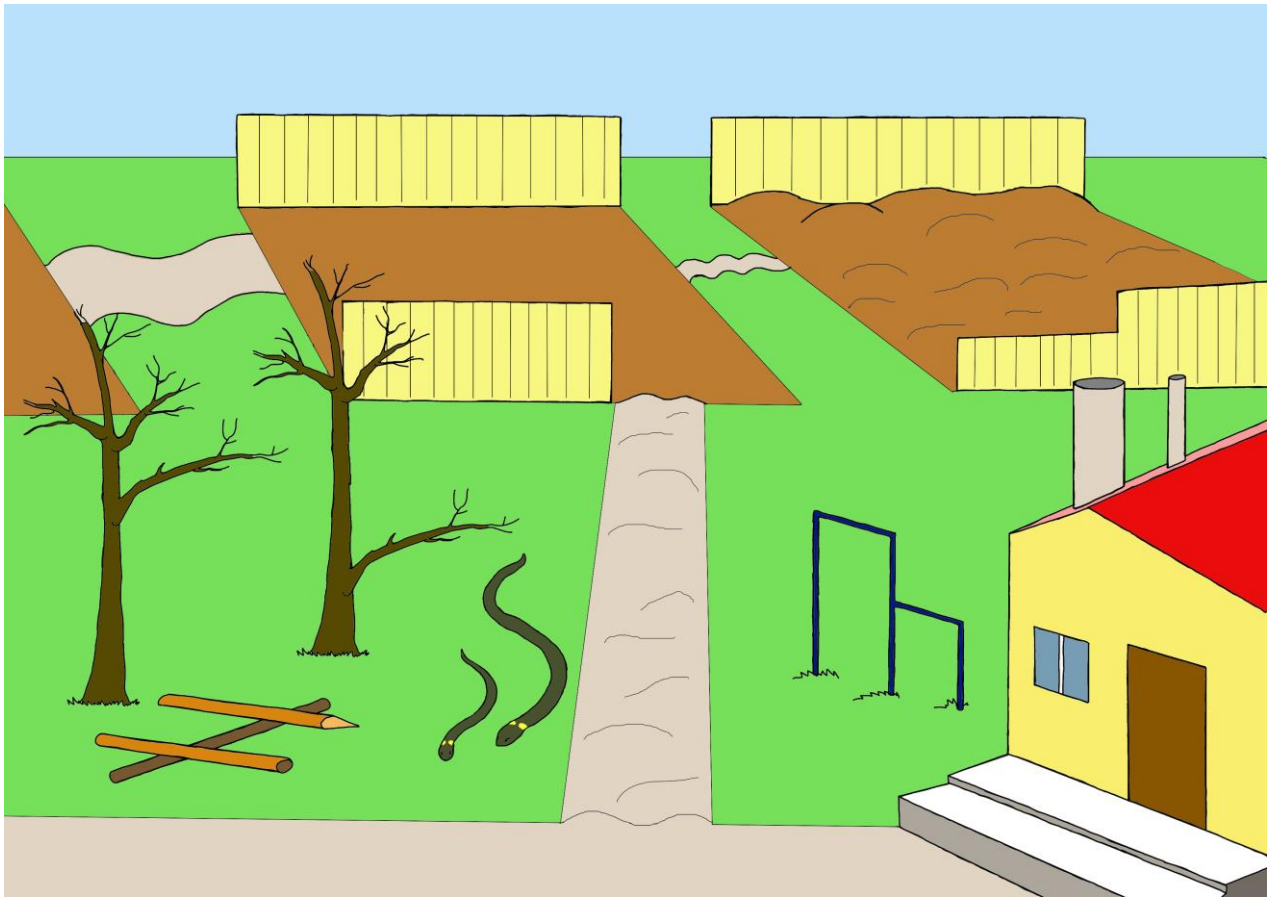


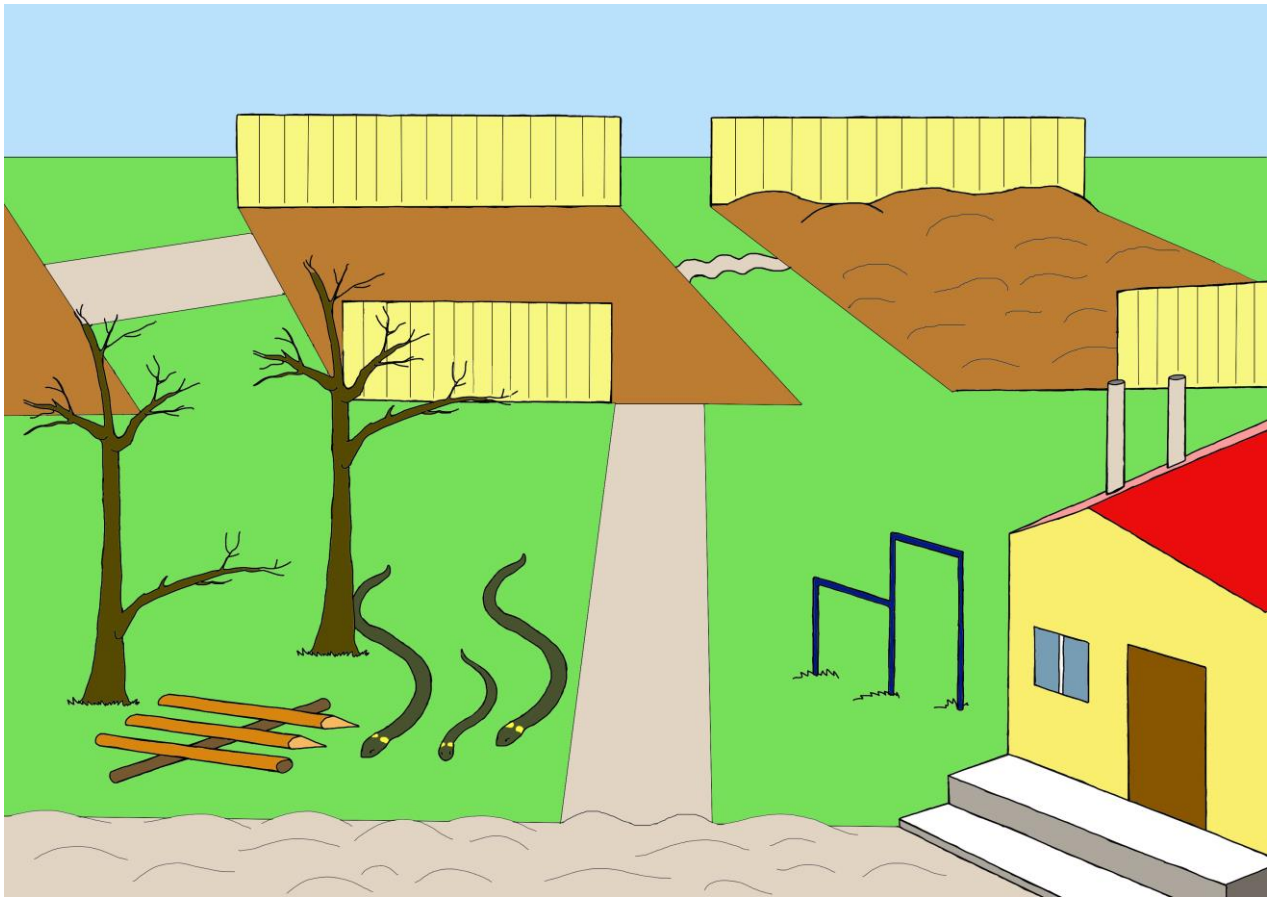
2. Country house



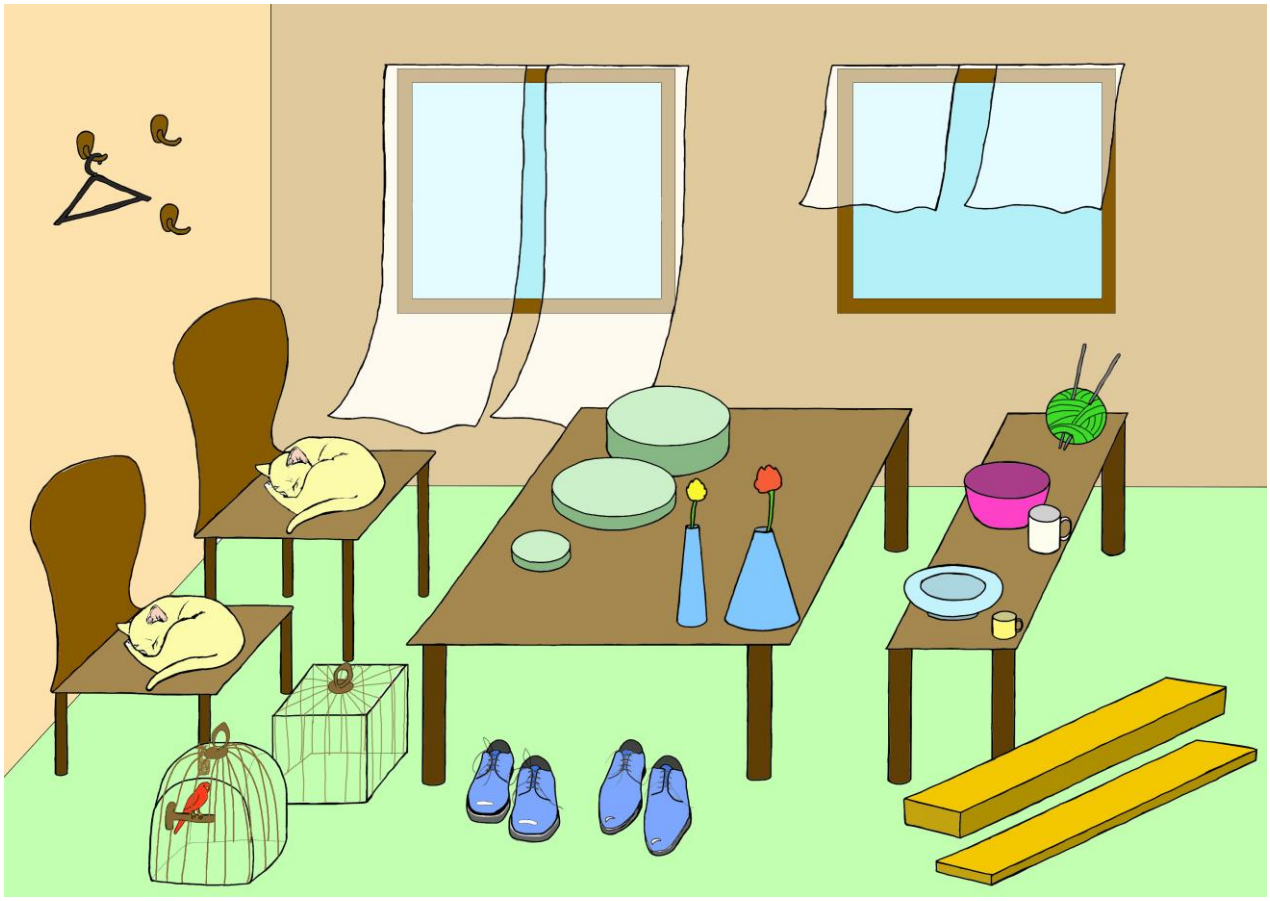


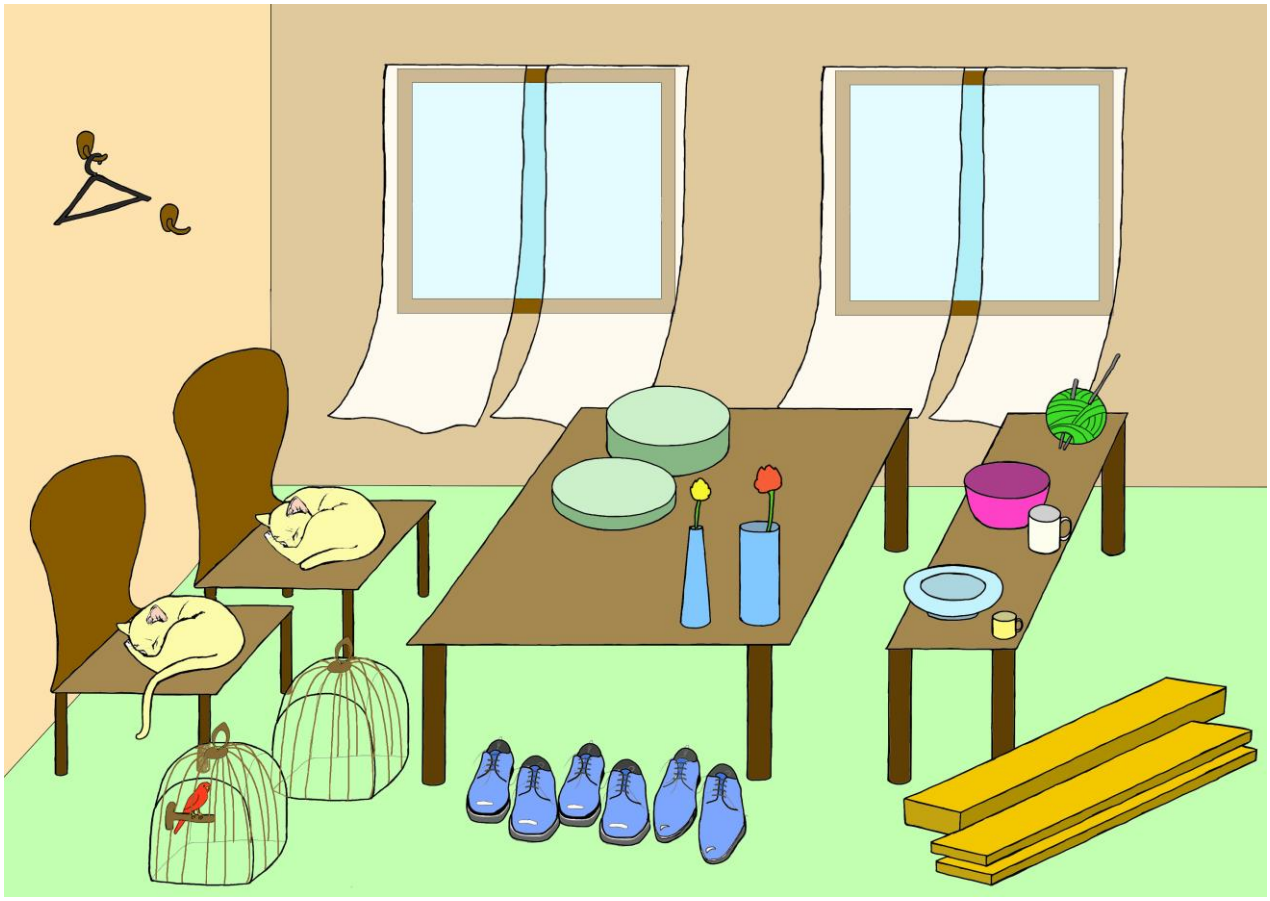
3. Fields



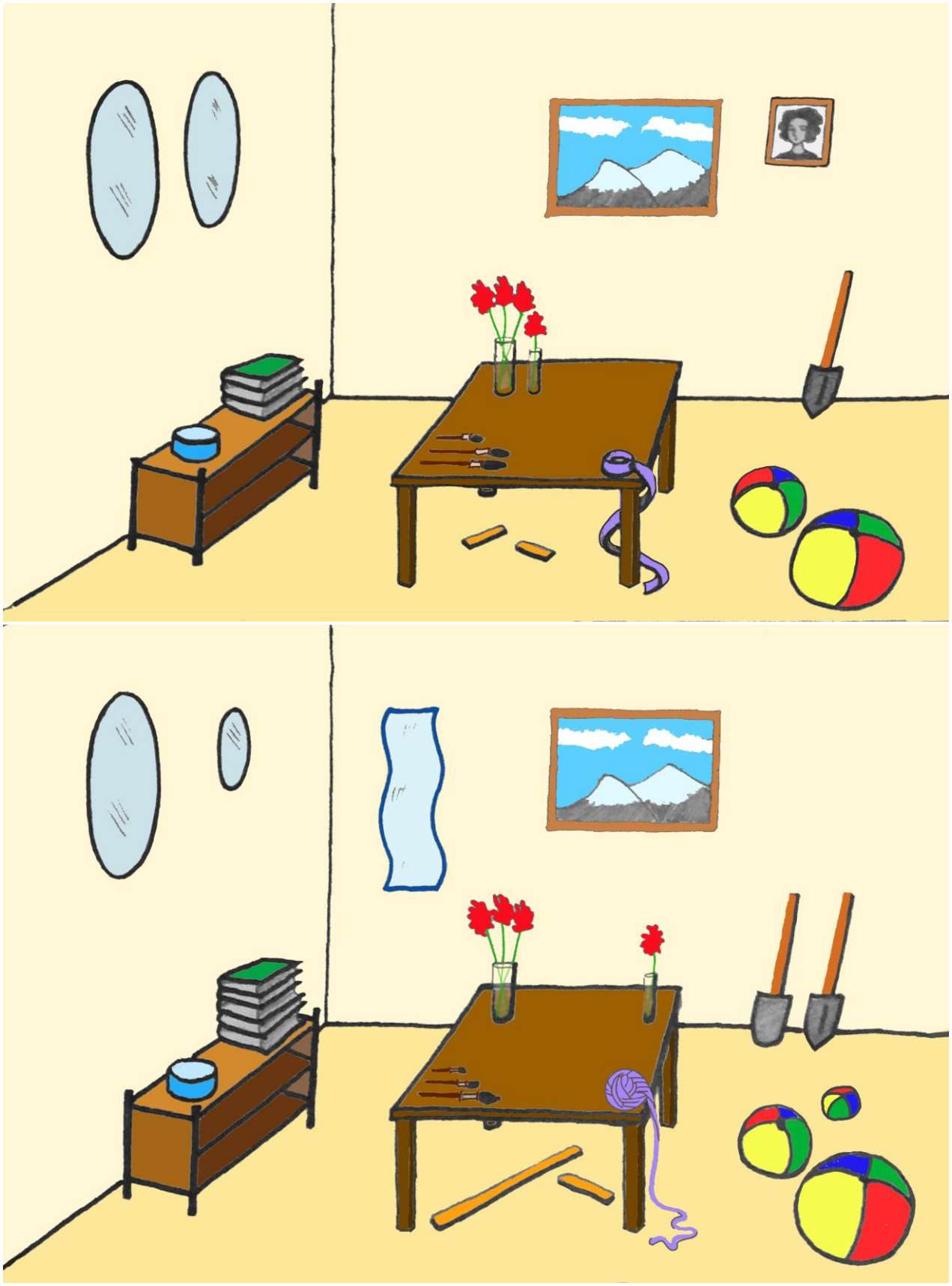


4. Room with cats

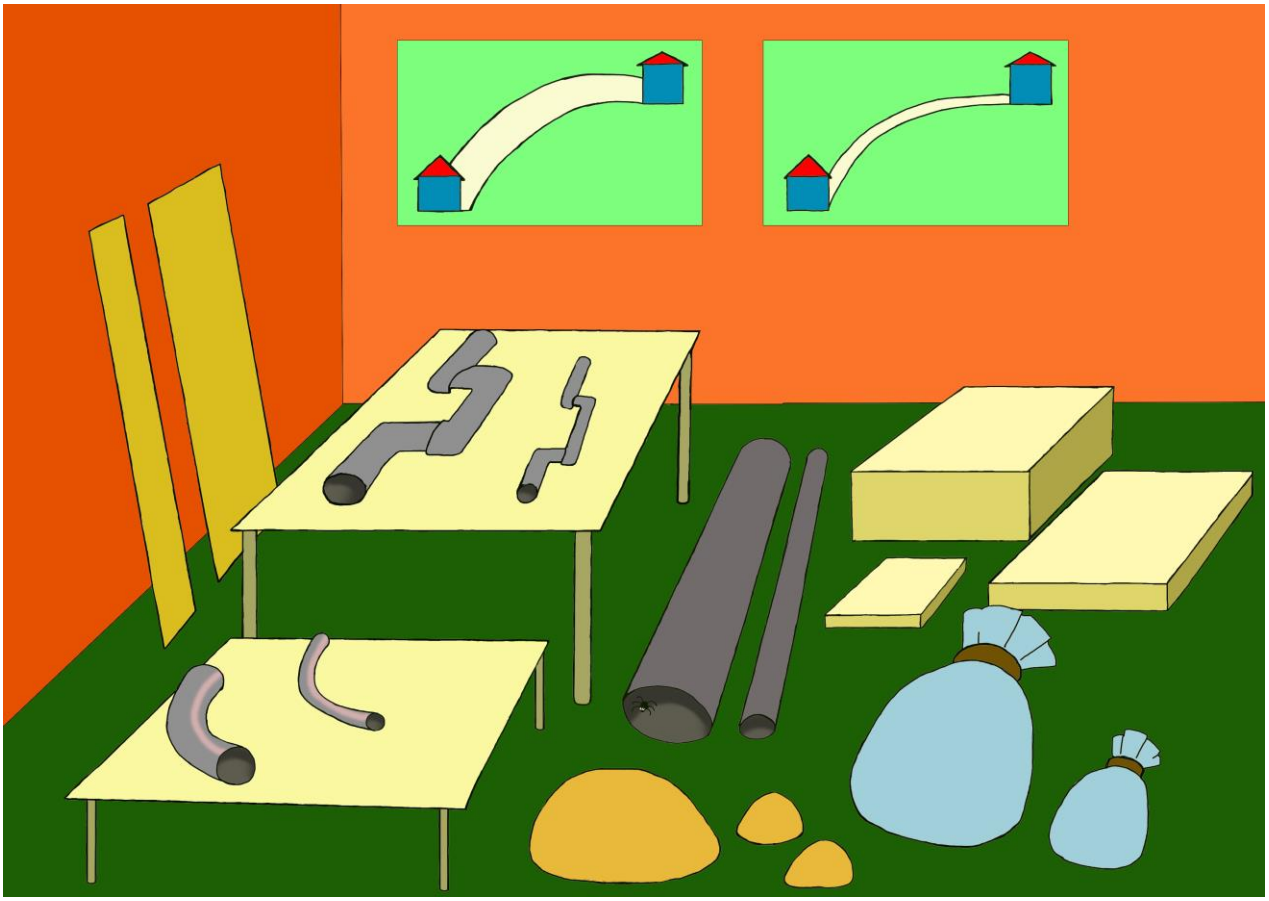


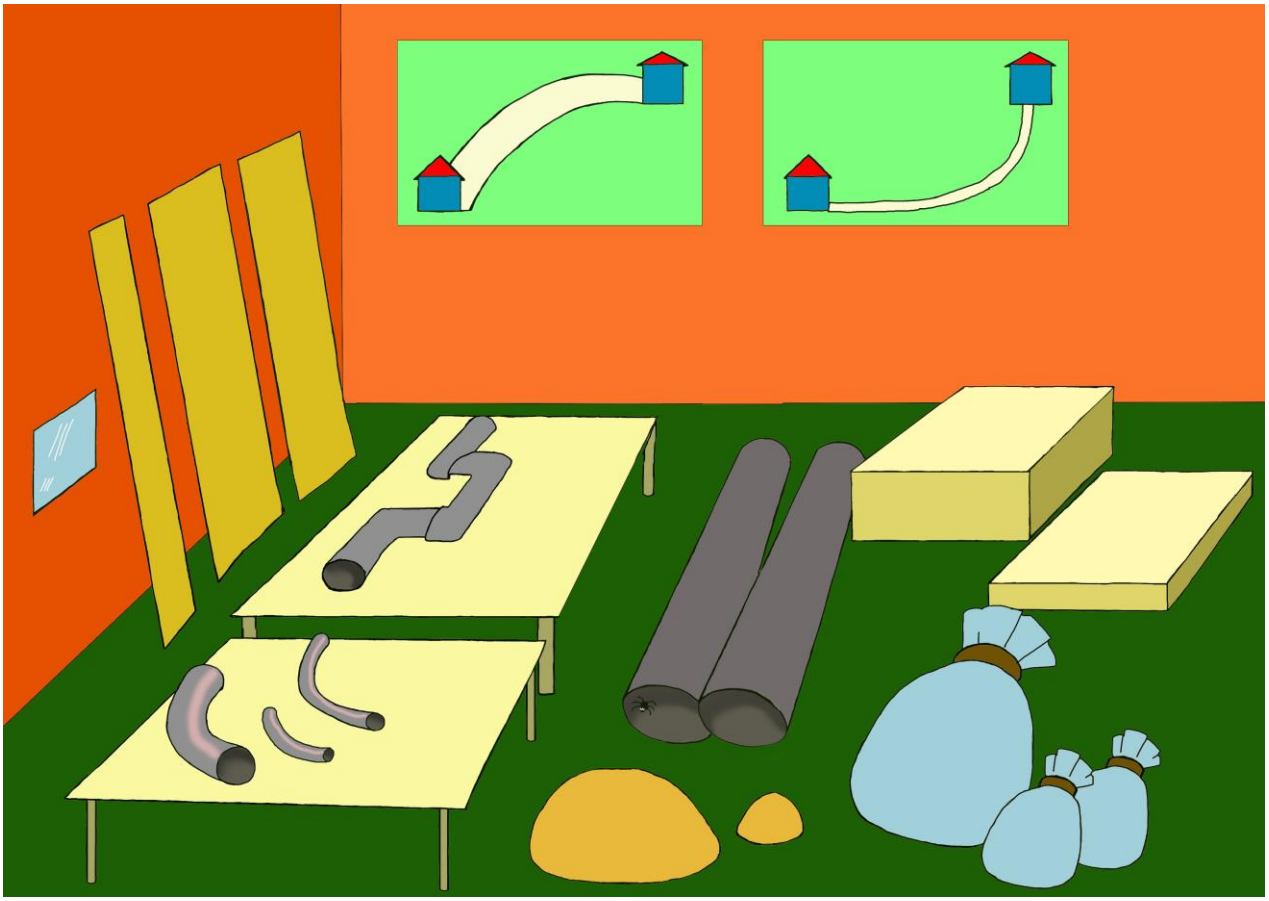


5. Room with paintings

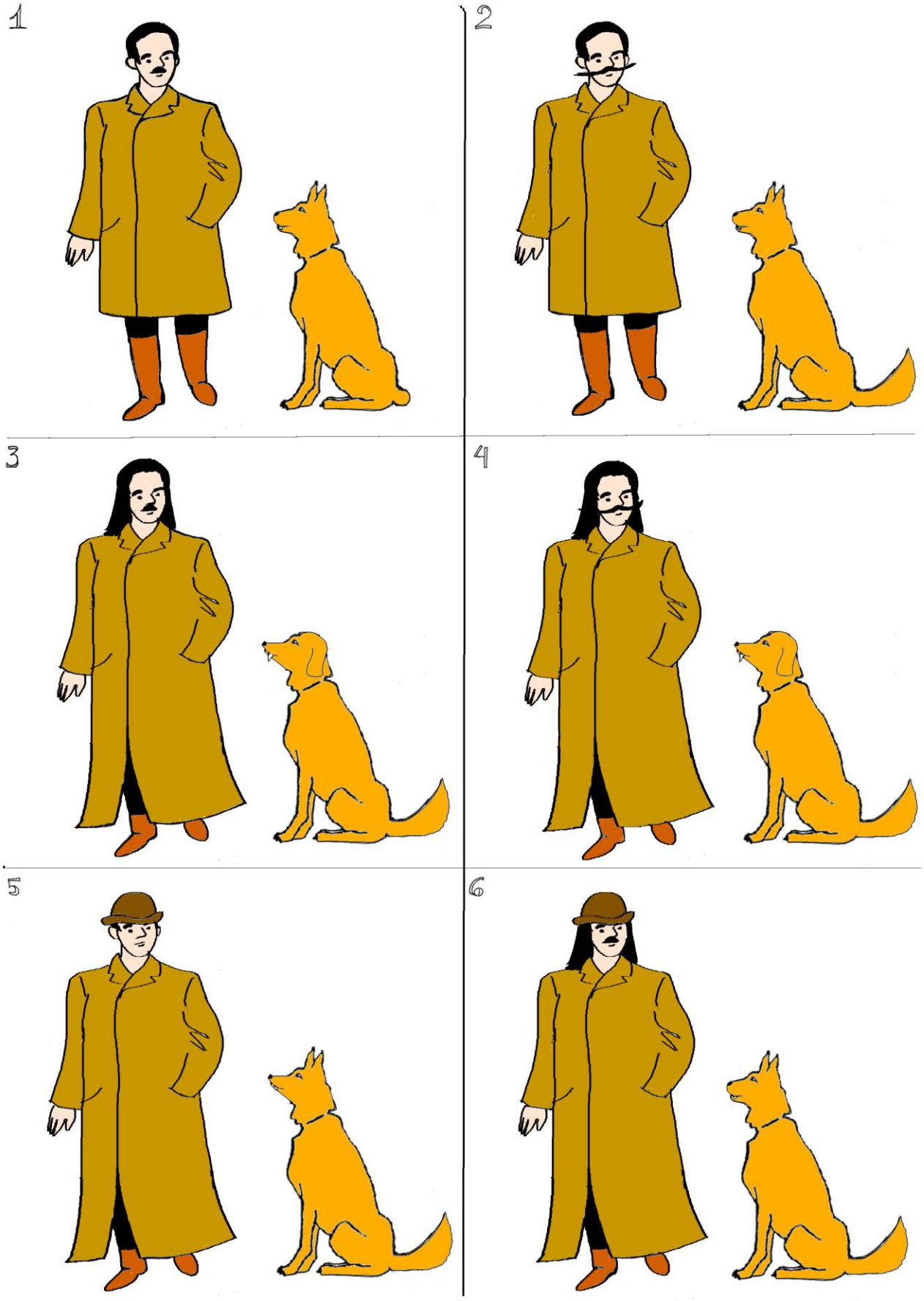


6. Convenience store

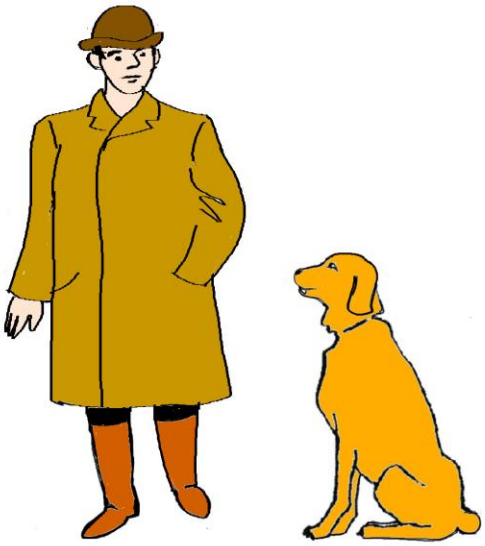




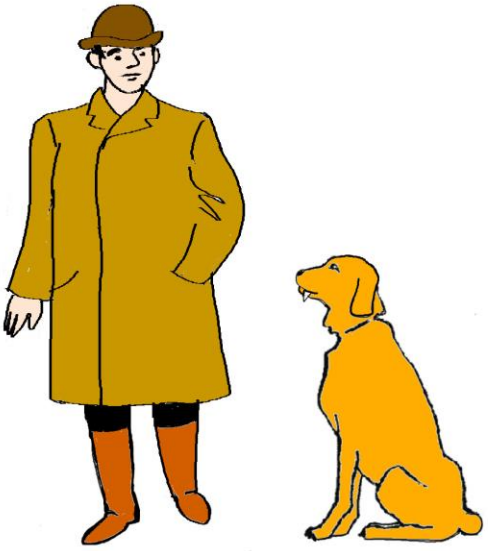
‘Man and dog’



7



8



9



10



11

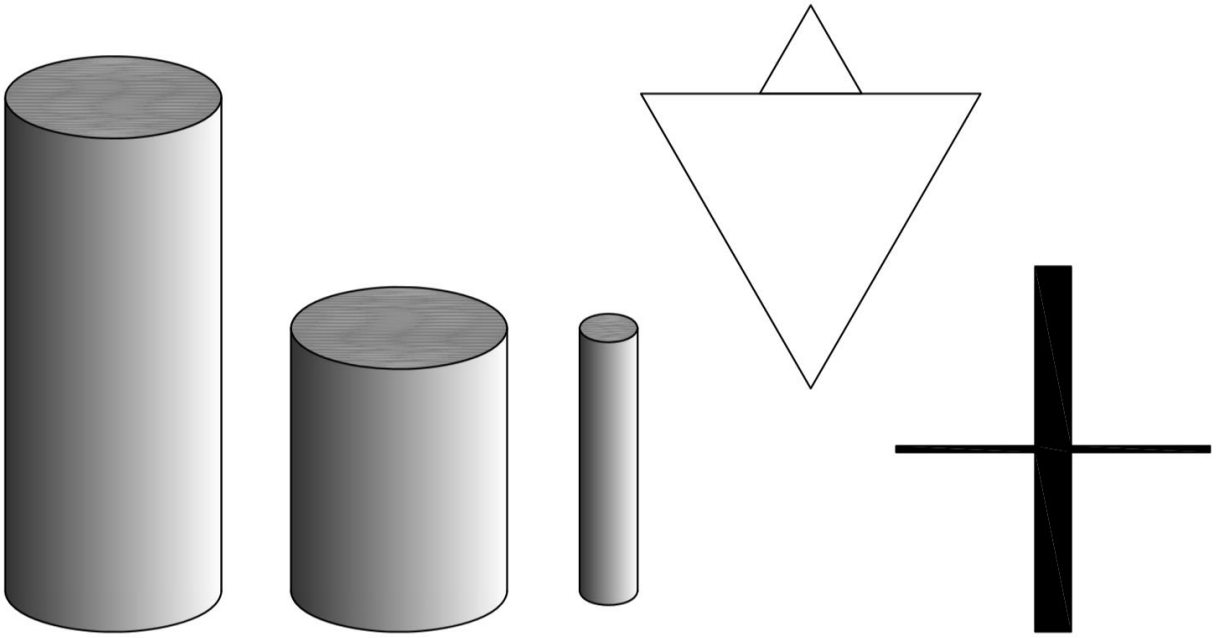


12

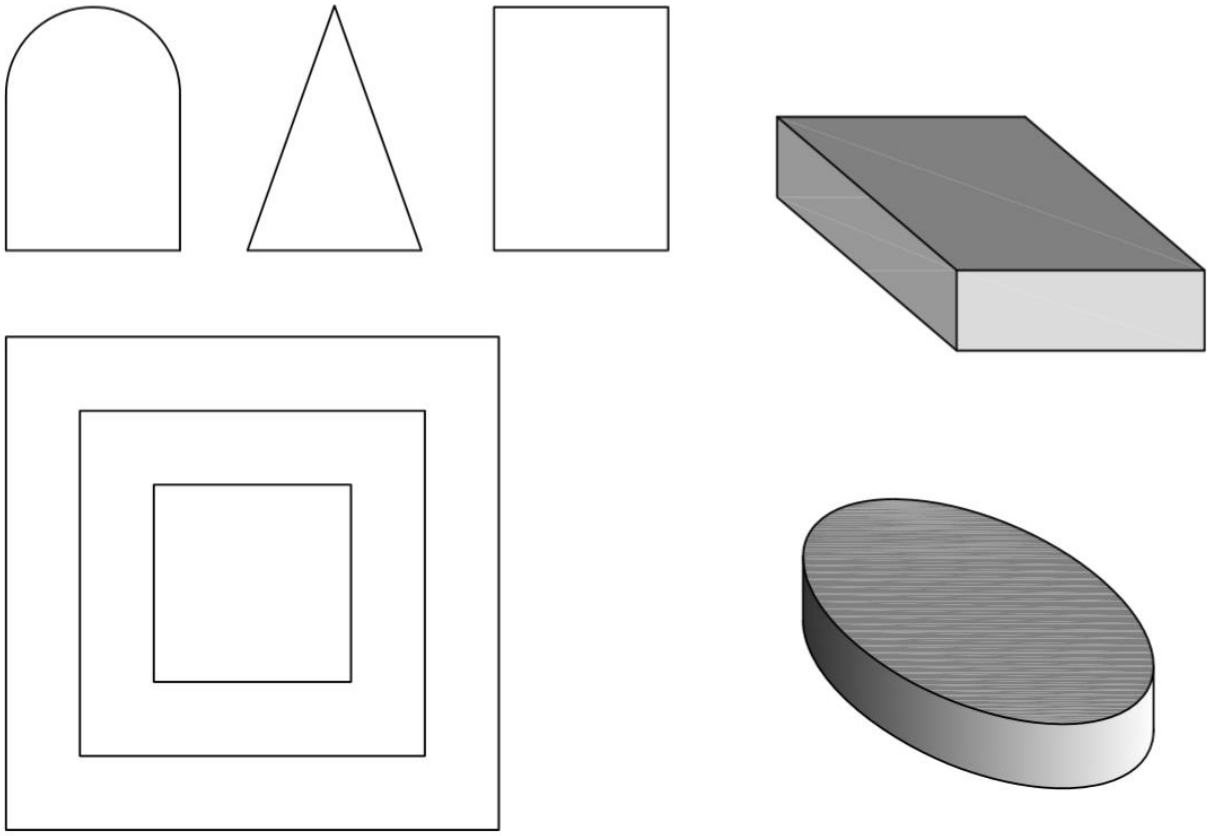


‘Draw a picture’

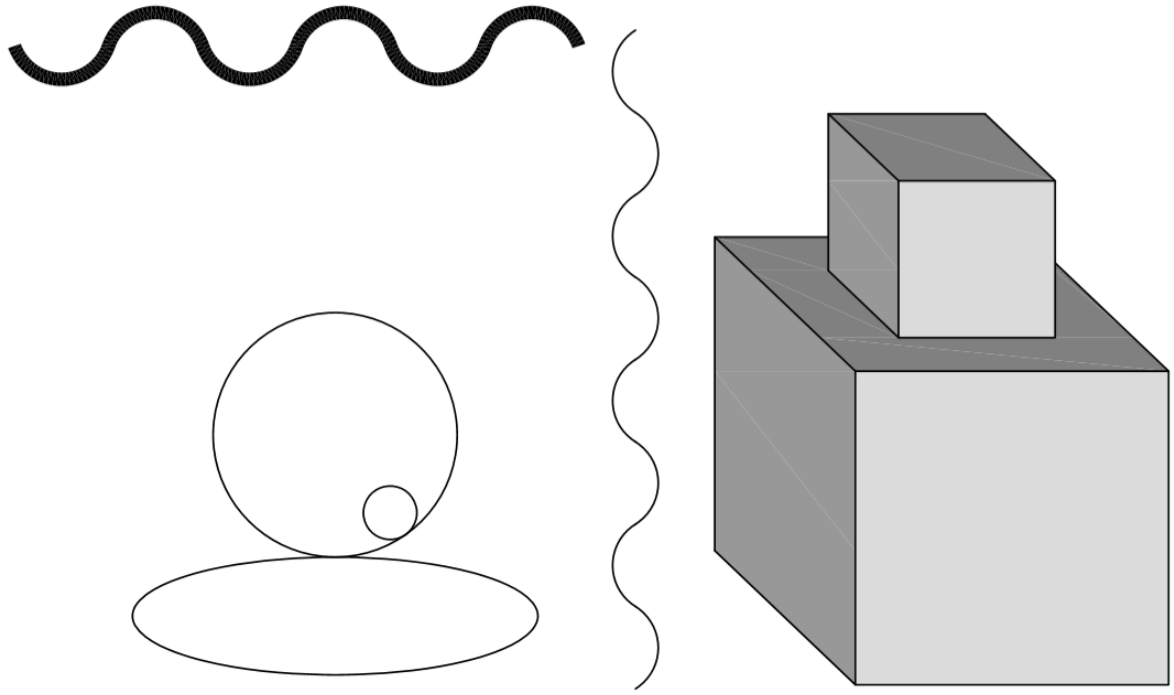
Picture 1



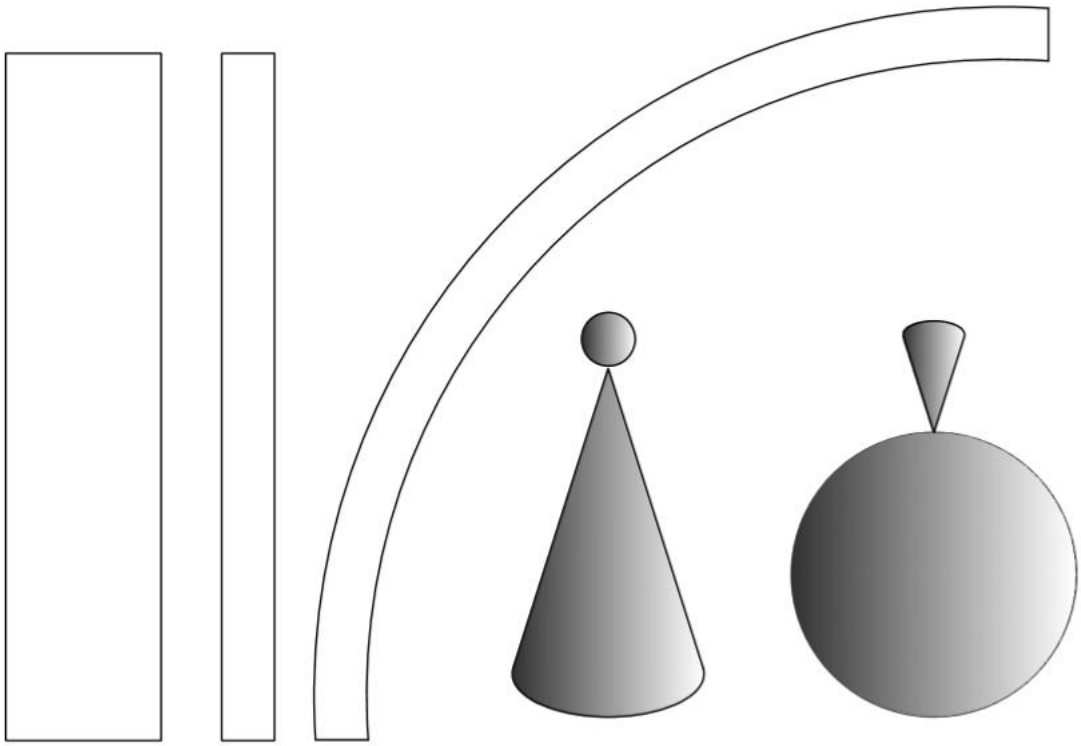
Picture 2



Picture 3

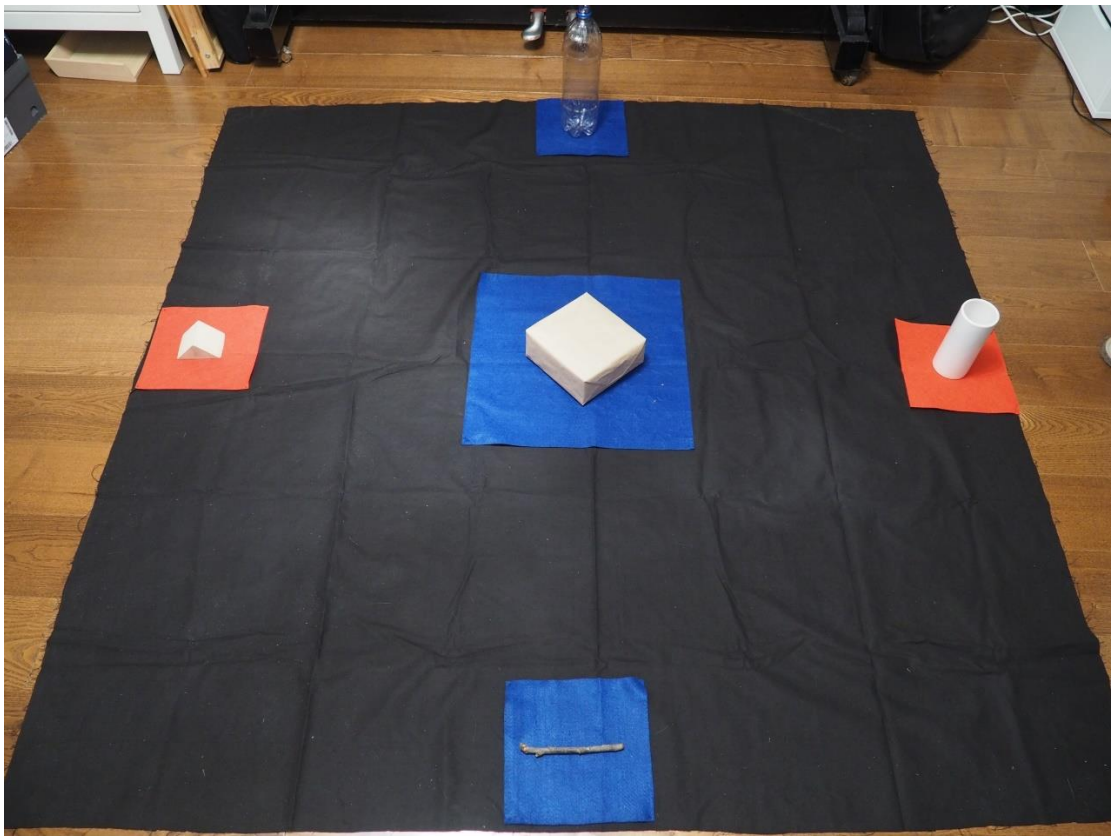


Picture 4

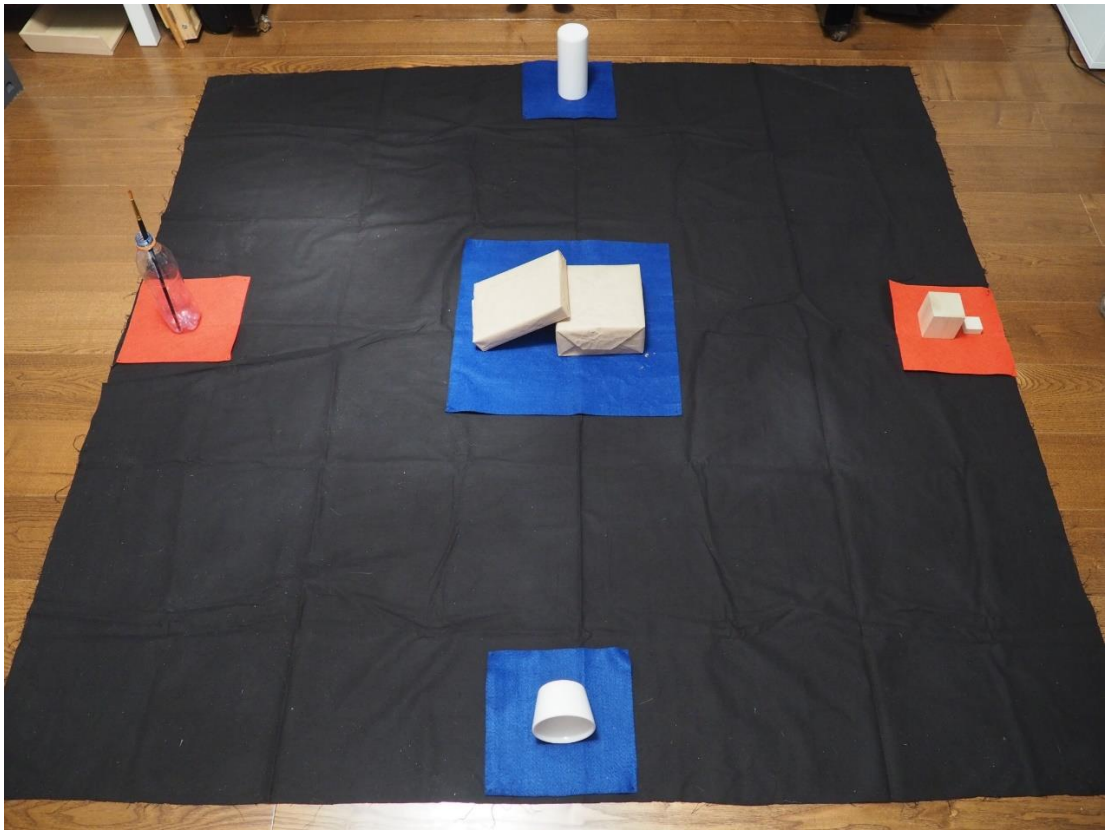


‘Stacks and squares’

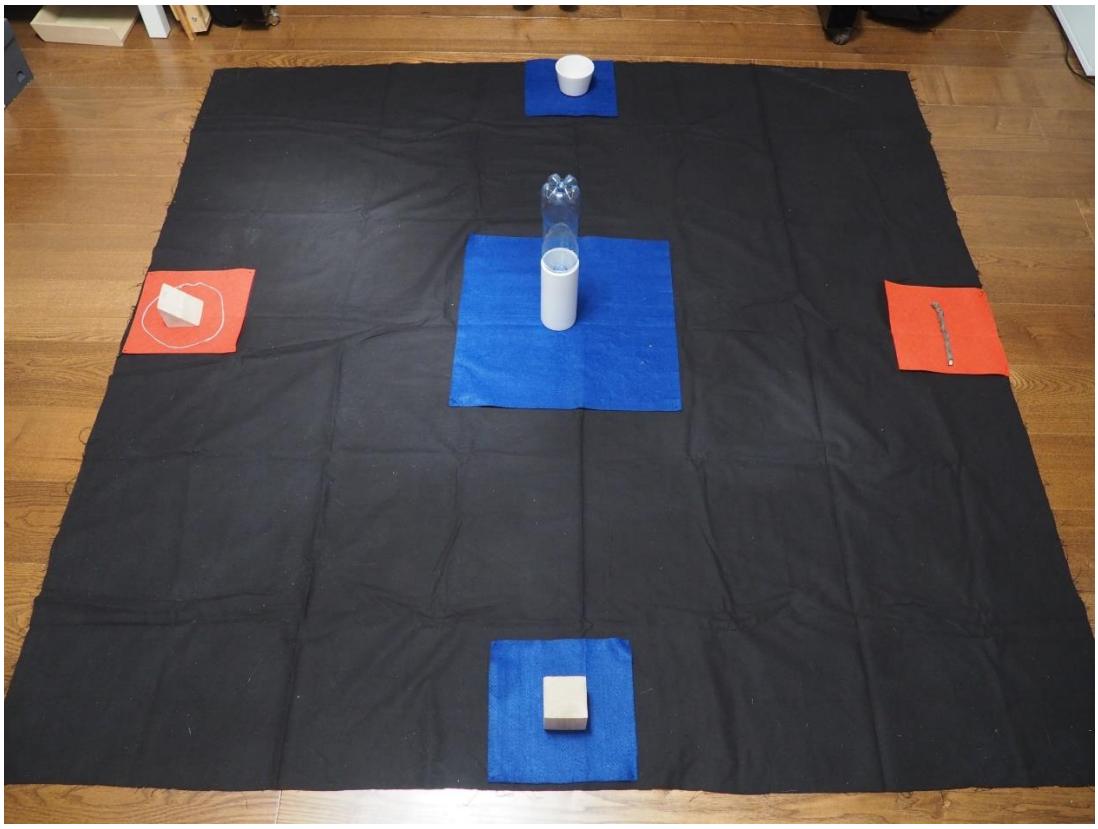
Practice picture



Picture 1



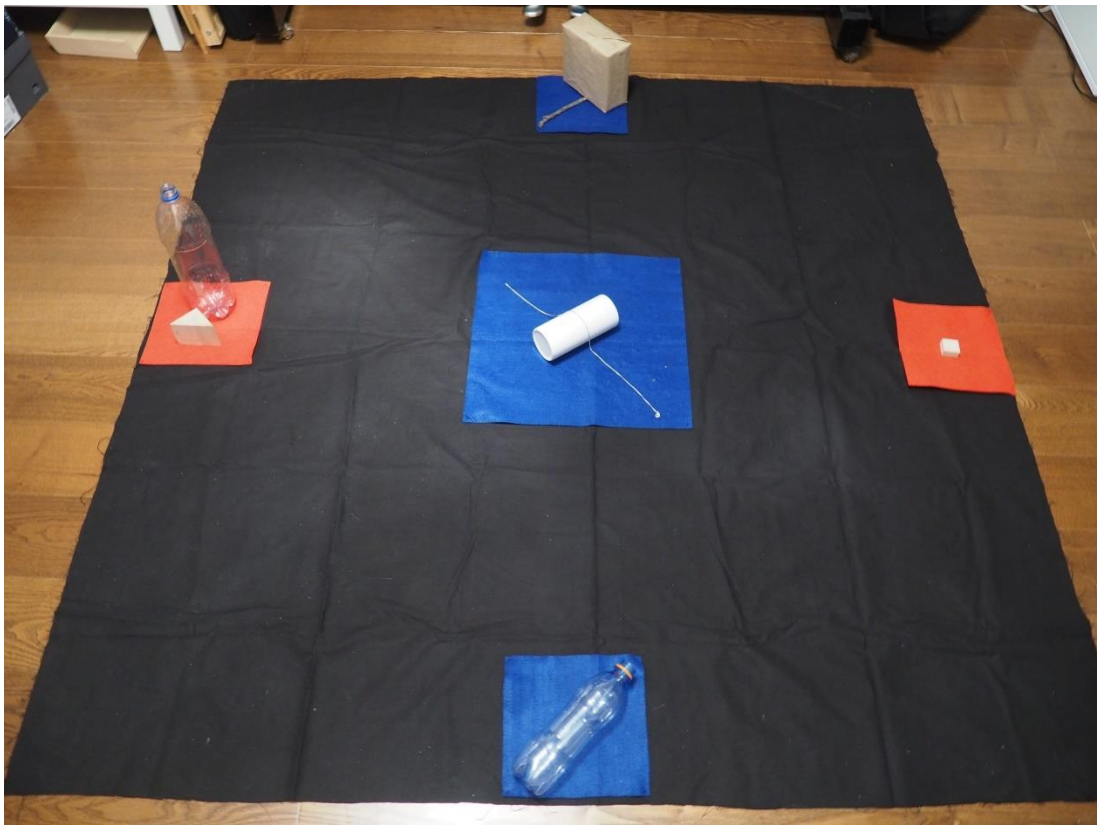
Picture 2



Picture 3



Picture 4



Appendix II: Mouth gesture annotation system developed for RSL SASSes

1	**Jaw**	
	mcl	closed
	mcr	crack
	mo	open
	mwo	wide open
2	**Lips – markedness**	
	ln	neutral
	Ø	marked
3	**Lips – corners**	
	lup	corners up
	ldn	corners down
4	**Lips – horizontal plane**	
	ls	lips stretched
	lso	one corner stretched
	lc	lips contracted
5	**Lips – midsaggital plane**	
	lpd	lips protruded
	llpd	lower lip protruded
	ldr	lips drawn
	lbt	lower lip bitten
6	**Lips – vertical plane**	
	lpr	lips pressed
	ulup	upper lip up
7	**Lips – air**	
	lvb	lips vibrate
	llp	space under lower lip is puffed
8	**Cheeks**	
	chp	cheeks puffed
	chpo	one cheek puffed
	chs	cheeks sucked in
9	**Tongue**	
	tt	tongue protruded
	tch	tongue pushed into cheek
	tll	tongue pushed into the space under the lower lip
10	**Air**	
	msc	inhalation
	mssc	sharp inhalation
	mbl	exhalation
	msbl	sharp exhalation