4 Linguistic study

Summary   4.1 Grammatical description. – 4.2 Lexicographic work. – 4.3 Corpora. – 4.4 Sociolinguistic variation.

The present chapter offers a brief overview of the main linguistic studies investigating LIS. Specifically, the first section [SOCIO-HISTOR-ICAL BACKGROUND 4.1] provides a description of the phonological, mor-phological, syntactic and pragmatic structures of LIS, comparing their analyses and contributions to the investigation of LIS. The sec-ond section [SOCIO-HISTORICAL BACKGROUND 4.2] deals with lexicographic works hinting to some related issues. The third section [SOCIO-HISTORI-CAL BACKGROUND 4.3] contains a description of corpora and data collect-ed in the last few decades on LIS. The last section [SOCIO-HISTORICAL BACKGROUND 4.4] of this chapter concerns studies on socio-linguistic and diachronic variation of LIS, considering Deaf education, age, gender, and socio-economic background as socio-linguistic factors.

4.1 Grammatical description

The present section offers a broad overview of the research carried out so far on the phonology, morphology, syntax and pragmatics of LIS.

One of the most important studies on LIS, which is considered as a reference for subsequent studies, is *La Lingua dei Segni Italiana* ('Ital-ian Sign Language'), edited by Virginia Volterra in 2004 (previous-

ly in 1987 *La Lingua Italiana dei segni*). This work includes the very first studies investigating the structure of LIS, offering an overview of its main properties. Another work which provides broad linguistic descriptions of LIS is *Fondamenti di Grammatica della Lingua dei Segni Italiana* ('The Basis of Italian Sign Language'), which was written by Carmela Bertone in 2011. It represents a disclosure grammar and constitutes a structured toolset for LIS courses and people approaching the study of LIS.

In particular, *La Lingua dei Segni Italiana* provides the first description of LIS phonology [PHONOLOGY 2]. The traditional approach used to identify minimal pairs and classes of phonemes is based on four parameters: handshape, place of articulation, orientation and movement. Other key works about phonological studies are Russo Cardona & Volterra (2007) and Lerose (2011).

Corazza & Volterra (2008) identified several handshapes: those productively used to create minimal pairs in LIS, a group of handshapes used exclusively as classifiers, and another group of handshapes used only for initialized signs, namely as alphabet letters.

Verdirosi (2004) identified the different locations where it is possible to produce signs. These locations can be divided into three principal categories: neutral space, body and face parts.

Radutzky & Santarelli (2004) identified orientations that can be assumed by the hands and classified movements grouped into different categories.

In 2004, Franchi supported the introduction of facial expressions as a fifth parameter, responsible for the creation of minimal pairs. Subsequently, a great number of studies investigated this parameter (Fontana 2008; Ajello, Mazzoni & Nicolai 2001; Fontana & Raniolo 2015; Conte, Santoro, Geraci & Cardinaletti 2011).

As for the Morphological system, LIS displays both simultaneous and non-simultaneous processes, involving manual and non-manual components. Various morphological processes are attested. Signs modify their articulation in order to convey: i) plurality [MORPHOLOGY 4], ii) verbal agreement [MORPHOLOGY 3.1], iii) tense [MORPHOLOGY 3.2], iv) adjectival [LEXICON 3.4], and v) adverbial information [LEXICON 3.5].

Morphological phenomena could be summarized i) compounds, ii) derivation, and iii) nominal and verbal inflectional processes. Recently, the mechanism of compounding [MORPHOLOGY 1] was studied by Geraci (2009a) and Santoro (2016). Derivational phenomena [MORPHOLOGY 2] as evaluative morphology, namely diminutives, augmentatives, pejoratives and ameliorDatives, have been investigated by Fornasiero (2020), while features distinguishing nominal and verbal expressions have been analysed by Pizzuto (2004).

Verbal inflection started to be investigated in LIS by Pizzuto, Giuranna & Gambino (1990), later studies have been carried out by Corazza (2000) Pizzuto (2004) Geraci, Mantovan & Aristodemo (2016). In particular, verbal tenses [MORPHOLOGY 3.2] and aspects [MORPHOLOGY 3.3] have been addressed by Zucchi (2009) and Zucchi, Geraci, Cecchetto and other scholars (2010). Adverbs and their verbal modification [LEXICON 3.5] have been studied by Lerose (2008, 2009).

Classifiers in LIS have been analysed in the past by Pizzuto (1986), Pizzuto, Giuranna & Gambino (1990) and Corazza (1990). Formal analysis of the semantic proprieties of classifiers was proposed in Cecchetto & Zucchi (2006). Mazzoni (2008) provided a detailed description of the classifier system [MORPHOLOGY 5].

Studies on syntax grew year by year, especially since 2000. Word order in LIS has been studied by Laudanna & Volterra (1991), Cecchetto, Geraci & Zucchi (2006), and Branchini & Geraci (2011). LIS allows for a somewhat flexible word order, although native signers clearly prefer the subject object verb (SOV) order [SYNTAX 2.3].

In contrast to the basic word order of constituents, the distribution of sentential complements is more fixed and restricted in LIS. These structures and their relation to parsing and short-term memory have been investigated in Geraci, Gozzi, Papagno & Cecchetto (2008) and Geraci & Aristodemo (2013).

Variation in syntax was also studied by Mantovan (2015), in relation to nominal expressions. In this case, variations have been studied with a focus on linguistic and sociolinguistic factors which can affect the realisation of signs.

In LIS, syntactic analysis also concerns functional elements, i.e. modals, aspectual markers and negative markers which all appear post-verbally in the final part of the sentence [SYNTAX 2.3.1.2]. The same behaviour was found in negative sentences [SYNTAX 2.3.1.4] investigated in Geraci (2006).

Interrogatives [SYNTAX 1.2] have been studied in Cecchetto, Geraci & Zucchi (2006), Bertone (2011), and Bayley, Geraci, Cardinaletti, Cecchetto & Donati (2012). One feature of LIS concerns the position of *wh*-signs in content questions where they occupy the right periphery of the sentence.

Imperatives [SYNTAX 1.3], a previously understudied topic, have been recently investigated in Donati, Barberà, Branchini, Cecchetto, Geraci & Quer (2017).

As for coordination [SYNTAX 3.1], it was recently analysed in Aristodemo, Geraci & Santoro (2016). By contrast, many studies have been carried about subordination, and in particular about relative clauses (Cecchetto et al. 2006; Branchini & Donati 2009; Brunelli 2006,

Branchini 2014) [SYNTAX 3.4] and conditional clauses (Barattieri 2006; Bertone 2011; Aristodemo 2009) [SYNTAX 3.5.1].

So far, few studies have been conducted on pragmatics in LIS; one of these was carried out by Brunelli (2011). He analyses information structures [PRAGMATICS 4], like focus and topic phenomena by giving preliminary accounts of their realisation and syntactic positions, according to a specific formal linguistic theory, for this reason his analysis addresses an audience specialized in linguistics studies. More recently, a study focusing on types of sentence topics has been carried out by Calderone (2020) [PRAGMATICS 4.2]. Other relevant studies about pragmatic issues have been addressed by Celo (2000) and Pizzuto (2009) who studied cohesion; Cuccio & Fontana (2011) and Geraci (2014) who studied the function of the signing space; Amorini (2008); Cuccio & Fontana (2012) and Russo Cardona (2004) who investigated figurative meaning, such as metaphors and metonymy, and by Gianfreda (2011), who analysed the communicative interactions among signers.

Thanks to different research groups in Italy, the number of studies on LIS is growing year by year, however, much topics remain to be investigated. The following table summarizes some relevant studies conducted on LIS over the last 30 years.

Table 1 Overview of relevant studies carried out on LIS

Topic	Main studies
Phonology	Volterra (2004, 2007), Verdirosi (2004), Radutzky & Santarelli (2004), Franchi (2004), Corazza & Volterra (2008), Lerose (2011).
Morphology and Lexicon	Pizzuto (1986), Pizzuto, Giuranna & Gambino (1990), Corazza (1990, 2000), Pizzuto (2004), Cecchetto & Zucchi (2006), Mazzoni (2008), Zucchi (2009), Lerose (2008, 2009), Geraci (2009), Zucchi, Neidle, Geraci, Duffy, & Cecchetto (2010), Santoro (2016), Geraci, Mantovan & Aristodemo (2016), Fornasiero (2020).
Syntax	Laudanna & Volterra (1991), Cecchetto, Geraci & Zucchi (2006), Geraci (2006), Geraci, Gozzi, Papagno & Cecchetto (2008), Branchini & Donati (2009), Aristodemo (2009), Branchini & Geraci (2011), Cecchetto (2012), Geraci & Aristodemo (2013), Branchini (2007, 2014), Mantovan (2015), Aristodemo, Geraci & Santoro (2016), Donati, Barberà, Branchini, Cecchetto, Geraci & Quer (2017).
Pragmatics	Celo (2000), Russo Cardona (2004), Brunelli (2006, 2011), Amorini (2008), Pizzuto (2009), Cuccio & Fontana (2011, 2012), Gianfreda (2011), Cirillo (2012), Geraci (2014), Mantovan (2015), Calderone (2020).

4.2 Lexicographic work

Several lexicographic works have been produced since the research on LIS started. This section provides an account of the most important resources available in this field. Some details concerning the external form of the text (printed or digital), the internal structure of the text (as a proper context for the examples or the inclusion of socio-linguistic and geographic variations), and other specific information about the existing lexicographic work will be provided.

In the past, several collections of signs have been prepared as handouts to support LIS courses. One example of these first attempts is *Il Corso di lingua italiana dei segni* ('The Italian Sign Language Course') written for the course organised by the provincial section of ENS and the Institute of Regional training (IRFOP) in Trieste. Another example is *L'Abecedario della LIS* ('The Spelling Book of LIS'), created for the course in LIS organised in Rome with the support of the CNR. However, these collections have never been published, and have been disseminated only as didactic tools for people who attended the LIS courses.

The first nationally published works are more detailed and present more complex and different internal structures. *I primi 400 segni in LIS* ('The First 400 Signs in LIS') (2008) is the first attempt to create a national list of signs. This work is structured in topics (as the family, the club, the work) and it was collected for Deaf and hearing people, both Italian and foreign. Each sign is briefly described and glossed in Italian, Spanish, English and French. The purpose was to make Deaf culture accessible also to foreigners who were interested to learn and study LIS.

Other dictionaries of LIS were published before, but with completely different purposes. As a matter of fact, they appeared to be oriented to the needs of hearing people, such as speech therapists, educators or teachers. Examples of this tendency are *Il Dizionario dei segni* ('Dictionary of Signs') (1991) or *Il vocabolario della lingua gestuale italiana dei sordi* ('The vocabulary of the Italian gestural language of deaf') (1996). These works are alphabetically organised, following the order of the Italian alphabet. Similarly, the most recent *Dizionario tematico dei segni* ('Thematic Dictionary of Signs') (2004) shares the same hearing-oriented purposes, even though it is thematically organised. These dictionaries could be defined as bilingual, however, they are more based on Italian criteria.

Il Dizionario bilingue elementare della Lingua dei Segni ('The Bilingual Elementary Dictionary of Sign Language') (1992) represents a useful tool for academics and linguistic researchers. Signs are grouped according to their handshapes and each sign is accompanied

by a drawing, a transcription and a translation into Italian. Furthermore, each sign is followed by: examples of contexts where it could be found, the grammatical category it belongs to, a list of possible signs as synonyms and, some sociolinguistic variants of the signs.

Other dictionaries focus on specific domains, for instance: i) a specific vocabulary about the catholic signs, ii) the colourful child-oriented *Immaginario: immagini per un abecedario* ('Imaginary: Images for a Spelling Book'), and iii) the local dictionary of signs promoted by Regione Marche: *Dizionario Regionale del Linguaggio Mimico Gestuale Marchigiano* ('Regional Dictionary of Mimic-gestural Marchigiano Language').

The publication of dictionaries is a useful tool for researchers who are interested in linguistics. For instance, the presence of dictionaries allowed Paola Pietrandrea to analyse a corpus of 2.055 signs. They also support the linguistic value of sign languages with respect to spoken languages. According to the same linguistic purpose, *Parole e numeri* ('Words and Numbers') explores the relation between arbitrariness and iconicity in LIS, defending the linguistic nature of signs.

The works described so far are written and printed, however, in the last 20 years several dictionaries have started to be available in a computer readable form. Some examples are *Il Dizionario mimico gestuale essenziale* ('The Essential Mimic-Gestural Dictionary'); the *Dizionario Italiano/Lis* ('The Dictionary Italian/LIS') available online and created by the coop Alba; the multimedia dictionary *Dizionario multimediale dei termini informatici per audiolesi* ('The Multimedia Dictionary of informatics terms for people with hearing impairments') planned by ASPHI (Acronym for *Avviamento e Sviluppo di Progetti per ridurre l'Handicap mediante l'Informatica*), in Bologna. Moreover, in 2005, StarLIS, a company which develops multimedia tools for deaf and hearing people, promoted the first illustrated multimedia dictionary of LIS in 12 CD-ROM. It includes 2000 signs translated in four languages. One year later, an e-LIS Electronic Bilingual Dictionary LIS-Italian was created in Bolzano by the Eurac group.

Thanks to these open-access tools, an important Glossary for mobile devices has now been properly created for Deaf people who work with media and communication: *Sign Media Smart*. The concepts and words are designed according to topic criteria. It was financed by European funding and is available online in four different sign languages: LIS, British Sign Language (BLS), Austrian Sign Language (ÖGS), Swedish Sign Language (STS). Finally, *Spread the Sign* is one of the biggest international projects of sign language dictionaries in the country. It started to be available online between October 2008

and October 2010 and it is still growing in the amount of available videos. Today, it includes signs of 35 different sign languages and it represents one of the most detailed lexical resources online.

4.3 Corpora

A corpus represents a fundamental tool for the investigation of the grammatical features of a language. Indeed, it records the linguistic variations and uses of the language among different countries, creating a common base for different types of studies on spontaneous and semi-spontaneous data.

Although various researches have been conducted about the evolution of signs in Italy across different geographic areas (diatopic changings) and time (diachronic changings), a national corpus has never been developed before the *PRIN* project (Research Project of National Interest). The project was financed by the Ministry for Education, University and Research in November 2008. It lasted two years and was created with the partnership of three universities: University of Urbino (then moved to La Sapienza University of Rome), Ca' Foscari University of Venice and Bicocca University of Milan.

One of the main results of this project was the creation of the first national Corpus of LIS. The LIS Corpus is based on video recordings saved in high quality: mpg2. The large quantity of videos collected and the representative variations of signers recorded were very important factors, in order to obtain accurate analyses. Moreover, geographic and social factors have been taken into account to build the corpus. The data was recorded among 10 cities, covering the Northern, Southern and Central part of Italy: Turin, Milan, Brescia, Bologna, Florence, Rome, Salerno, Bari, Catanzaro, and Ragusa. For the purposes of the project, only deaf people were involved in the research and no other people linked to the Deaf society and culture were included, such as the hearing families of Deaf people or their interpreters. However, not only native signers were considered (native signers are between 5% and 10% of Deaf people in Italy), but also Deaf signers who mainly used LIS in everyday communication, despite having learnt sign language later on in life. Other social factors that were taken into account were: gender, deafness in families, type of school attended, educational level, lifestyles with respect to the city or country where they live, and social status (in hearing communities and among Deaf people).

An average of 18 participants was selected for each city and divided into three groups: 6 for the young group, 6 for the middle-aged

group, and 6 for the old group. During the recording of videos, only Deaf researchers or collaborators took part to the recording session in order to minimize the effect of the *paradox of the author participant*, namely the influence of the researchers relating to the linguistic choices of the signers. Furthermore, the session took place in locations which were familiar and commonly frequented by the Deaf informants, in order to avoid an uncomfortable atmosphere and to allow more spontaneous productions.

Four different types of data have been recorded: spontaneous conversations, individual narrations, dialogues, and picture-naming. The section of spontaneous conversation involved three Deaf people and lasted about 45 minutes. Free conversations are good resources for the collection of frequent linguistic structures, but they are less useful to investigate the occurrence of specific constructions in that they lack negative evidence. Individual narrations consisted in an individual story telling which lasted only a few minutes. The signer was sitting in front of another participant. The function of the second participant was to avoid anxiety during the performance due to the presence of the camera, and to make the narration look more spontaneous. The third section aimed at investigating the production of questions. Therefore, participants were invited to ask each other questions to gain detailed descriptions of a car accident. Although these types of productions are not completely spontaneous, (in that there is a guide-line to follow), this task is useful for the elicitation of specific linguistic structures, as in this case wh-questions. During the fourth task, participants were asked to provide the sign(s) for some pictures in order to explore linguistic variation among signers coming due to socio-linguistic variables such as age and geographic origins. When undertaking this task, signers were asked to produce all the signs they knew to refer to the same picture. The pictures belonged to different semantic fields: colours, months, family words, compounds, words without signs, classifiers, signs expressed through *dactylology* (hand alphabet), initialized signs, diachronically evolved signs and diatopically evolved signs.

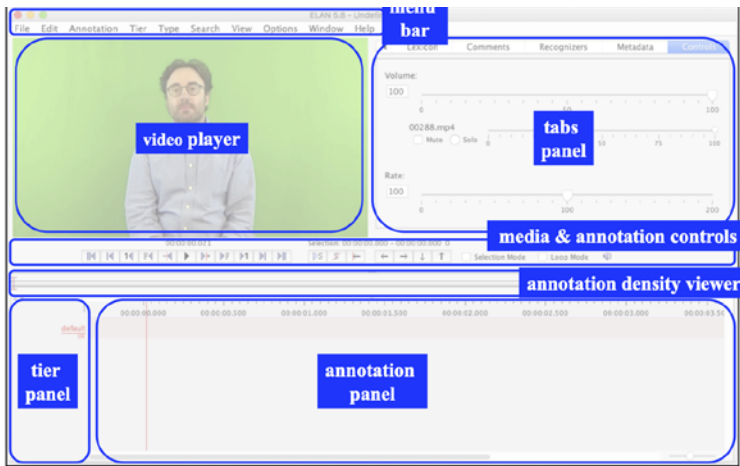The data were annotated in a separate file through a specific software called ELAN.

Figure 1 ELAN dialog box (recreated from Mantovan 2015, 111)

ELAN is a piece of software created at the Max Planck Institute in Nijmegen, Netherlands. It can be used with several operating systems and it can be downloaded for free. ELAN allows the simultaneous analysis of four videos in the video viewer. Linguistic information can be hierarchically organised in the tier panel and then, inserted in the annotation panel with personal classifications, depending on the specific research interests. In the upper right corner, the tabs panel allows users to visualize the annotations in various format and to modify the volume and rate of the videos. When the annotation was concluded, the data have been exported to Excel to run the statistical analysis of the corpus.

4.4 Sociolinguistic variation

Language is not a monolithic entity, since it is not homogeneously used by all speakers. Language can display variation due to sociolinguistic factors, leading to the existence of several alternative expressions to refer to the same referent. These variations can be due to language-internal or language-external factors.

Within sociolinguistic studies, there is a general consensus about the existence of five main kinds of variation: diachronic, diastratic, diaphasic, diamesic, and diatopic. Diachronic variation depends on temporal factors or arises from the comparison between old and young signers. Modifications are diastratic, if the changes are relat-

ed to different social and economic conditions. Diaphasic variation is affected by communicative settings, for example the shifting between formal or informal registers. Diamesic modifications depend on the communicative medium (for example, face-to-face communication, video recordings or online video calls). In fact, in LIS, video calls and recorded videos often imply some reduction of space or adjustments due to a two-dimensional type of transmission. Modifications depending on geographic areas determine diatopic variation. Some cases of diatopic variations in LIS can be traced back to the different Institutes attended by deaf people. In these cases, for example, in a city it is possible to find more than one variant for the same sign, because different signs came from different Institutes based in the same city. *Il Dizionario bilingue elementare della Lingua dei Segni* [SOCIO-HISTORICAL BACKGROUND 4.2] collected many of these instances of linguistic variation.

Among language-external factors in sociolinguistic variation, we find education [SOCIO-HISTORICAL BACKGROUND 2.4], age, gender, ethnicity, sexual orientation, religion, linguistic background, and socio-economic conditions.

As far as LIS is concerned, a high degree of sociolinguistic variation is observed. This is triggered by several factors: i) the lack of formal recognition by the Italian government, ii) the pressure caused by the spoken Italian language, which in some cases is considered as more prestigious, iii) the paucity of bimodal bilingual educational programs for deaf students at school, and iv) the absence of a written form of LIS. Different types of variation can co-occur in relation to various layers of linguistic structure: lexical processes, phonological processes, morphological processes, syntactic processes and discourse level processes. The videos below show the diachronic evolution of the lexical sign PHONE (a-e).

a. PHONE(1)

b. PHONE(2)

c. PHONE(3)

d. PHONE(4)

e. PHONE(5)

In this case, the evolution of the sign reflects the historical evolution of its referent, from candlestick telephones to modern smartphones.

Generally, diachronic variation concerning lexical changes seems to undergo a process of loss of iconicity, whereas an opposite tendency leads younger signers to adopt and codify more arbitrary forms.

Furthermore, younger users of LIS seem to use the most standard-ised and unified variety of LIS.

The variability attested on word order seems to be related to both diatopic and diachronic variation. Indeed, northern signers tend to produce SVO structures, as in (a) below. On the contrary, southern signers seem to prefer the SOV order, as in (b). Moreover, SVO seems to be the order preferred by older signers, while younger signers show a marked preference for SOV. Exceptions to these two tendencies depend on the presence of functional elements or on the reversibility of the verb, in these cases, the social variables are not significant.

a. GIANNI BUY HOUSE
'Gianni bought a house.'

b. GIANNI HOUSE BUY
'Gianni bought a house.'

Another example of diachronic variation concerns the sign ONE, used as cardinal and indefinite determiner. Middle-aged and older generations use the sign ONE both as cardinal number and indefinite determiner (probably due to the influence of Italian). According to some studies, middle-aged and older generations of signers use the sign ONE as an indefinite determiner by associating it with a tremoring motion, a slight trembling movement of the forearm and hand. In these cases, the sign ONE is not articulated in a particular point in space, rather in an unmarked location. Furthermore, the sign ONE used as an indefinite determiner could also be accompanied by a facial expression denoting uncertainty, namely pulling the corners of the mouth down [LEXICON 3.6.2]. More recent studies argue that the indefinite determiner ONE seems to be mostly accompanied by upward head tilt and a shrug of the shoulders. An example is provided below.

$$\overline{\rule{2.5cm}{0pt}\text{indef}\rule{1.5cm}{0pt}}$$
ONE(det) WOMAN CL(G): 'come'$_1$
'A woman suddenly came to me.'

On the other hand, new generations tend to use the sign ONE only as a cardinal number. Therefore, indefiniteness is only expressed by facial expressions of uncertainty, as in the example below.

$$\overline{\rule{1.2cm}{0pt}\text{indef}\rule{0.8cm}{0pt}}$$
WOMAN CL(G): 'come'$_1$
'A woman suddenly came to me.'

An example of diatopic modification is the different realisation of the sign ONE. Depending on the geographical provenience, signers tend to sign ONE in two different ways. In the northern regions, ONE is signed with the index finger (a), namely, with the handshape G, while in the southern regions it is articulated with the thumb extended (b), namely with the handshape S [LEXICON 3.6.2].

a. ONE(det)(G)

b. ONE(det)(S)

Information on Data and Consultants

The descriptions in this chapter are based on the references below. Please see the data and consultant information in these references. The video clips exemplifying the linguistic data have been produced by two fluent native signers, who grew up in the north of Italy. Specifically, one of them belongs to the younger generation of signers, another one belongs to the older generation. The data was recorded at the University of Milan-Bicocca.

Authorship Information

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